

Operating instructions Precision balance

KERN PES/PEJ

Version 2.0
2024-06
GB



TPES-B_TPEJ-B-BA-e-2420



KERN PES/PEJ

Version 2.0 2024-06

Operating instructions Precision balance

Contents

1	Technical data	4
2	Declaration of conformity	7
3	Appliance overview	8
3.1	Components	8
3.2	Operating elements	10
3.3	Keyboard overview	11
3.3.1	Numeric entry	12
3.4	Display	13
4	Basic Information (General)	15
4.1	Proper use	15
4.2	Improper Use	15
4.3	Warranty	15
4.4	Monitoring of Test Resources	15
5	Basic Safety Precautions	16
5.1	Pay attention to the instructions in the Operation Manual	16
5.2	Personnel training	16
6	Transport and storage	16
6.1	Testing upon acceptance	16
6.2	Packaging / return transport	16
7	Unpacking, Installation and Commissioning	17
7.1	Installation Site, Location of Use	17
7.2	Unpacking and check	18
7.3	Assembling, Installation and Levelling	19
7.3.1	Implantation of the balance	19
7.3.2	Installation of the wind shield	20
7.4	Mains connection	21
7.4.1	Installation of the mains adapter	21
7.4.2	Turning On the Power	22
7.5	Initial Commissioning	22
7.6	Connection of peripheral appliances	22
8	Menu	23
8.1	Menu <Func>	23
8.1.1	Menu overview	23
8.2	Enhanced menu <Func2>	24
8.2.1	Menu overview	24
8.3	Navigation in the menu	25
9	Basic Operation	26
9.1	Turn on/off	26
9.2	Zeroing	27
9.3	Taring	27

9.4	Selection of a weighing application	29
9.5	Simple weighing	29
9.6	Underfloor weighing	30
10	Piece counting	31
11	Percent weighing	34
12	Density determination	37
12.1	Density Table for liquids	41
12.2	Data output of the specific density to a printer	42
13	Weighing with tolerance range	43
13.1	Selection of weighing function with tolerance range	44
13.2	Set distinction condition	44
13.3	Setting the distinction range	44
13.4	Set the number of tolerance limits	45
13.5	Set distinction method	45
13.6	Set acoustic signal	46
13.7	Set tolerance display	46
13.8	Set data output	47
13.9	Setting the tolerance values	48
13.9.1	Absolute values	48
13.9.2	Differential values	51
13.10	Weighing the samples	54
14	Totalization	55
14.1	Select the Totalizing function	55
14.2	Using the totalizing function	56
14.2.1	TOTAL-Adding	56
14.2.2	NET-Adding	57
14.3	Clear the total sum	57
15	Settings	58
15.1	Zero-Tracking	58
15.2	Stability settings	58
15.2.1	Sensitivity	58
15.2.2	Display speed	58
15.3	Bar graph display	58
15.4	Automatic Sleep function	59
15.5	Setting the weighing units	60
15.6	Date and time	60
15.6.1	Set display format	60
15.6.2	Setting time and date	60
15.7	Automatic switch-on function	62
16	Enhanced settings	63
16.1	Balance identification number	63
16.2	Measurement uncertainty of the external adjustment weight	64
16.2.1	Enter measurement uncertainty	64
16.2.2	Take over measurement deviation	65
17	Adjustment	66
17.1	Adjustment with internal weight	66
17.2	Adjustment test with internal weight	67
17.3	Adjustment with external weight	68
17.4	Adjustment test with external weight	69
17.5	Adjustment record	70

18	Verification	71
19	Interfaces	72
19.1	RS-232C interface for data input and output	72
19.1.1	Technical data	72
19.1.2	Interface cable	73
19.2	DIN8P-interface to the data output.	73
19.2.1	Technical data	73
19.3	Formats of the data output (6/7-digits)	74
19.3.1	Data composition	74
19.3.2	Data description	75
19.4	Formats of the data output (special format 1)	77
19.4.1	Data composition	77
19.4.2	Data description	77
19.4.3	Error messages	78
19.5	Formats of the data output (special format 2)	79
19.5.1	Data composition	79
19.5.2	Data description	79
19.5.3	Error messages	80
19.6	Data output formats (CBM)	81
19.6.1	Data composition	81
19.6.2	Data description	81
19.7	Data input.	84
19.7.1	Input format 1	84
19.7.2	Input format 2	86
19.8	Response formats.	88
19.8.1	A00/Exx Format	88
19.8.2	ACK/NAK Format	88
19.9	Communication settings	89
19.9.1	Enable / disable interface and data format	89
19.9.2	Change communication settings	90
19.9.3	Interval output	92
19.10	Output functions.	93
19.10.1	GLP-compliant data output	93
19.10.2	Edition of the time stamp	94
20	Servicing, maintenance, disposal	95
20.1	Cleaning	95
20.2	Servicing, maintenance	95
20.3	Disposal	95
21	Instant help for troubleshooting	96
21.1	Error messages	97

1 Technical data

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

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

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

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

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

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

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

2 Declaration of conformity

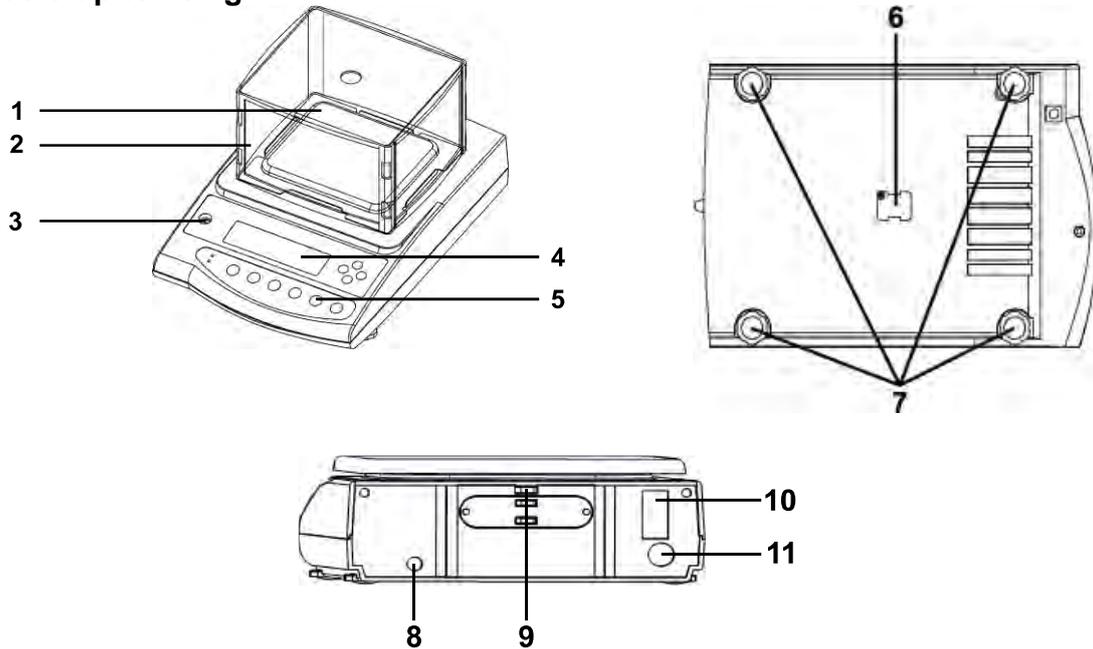
The current EC/EU Conformity declaration can be found online in:

www.kern-sohn.com/ce

3 Appliance overview

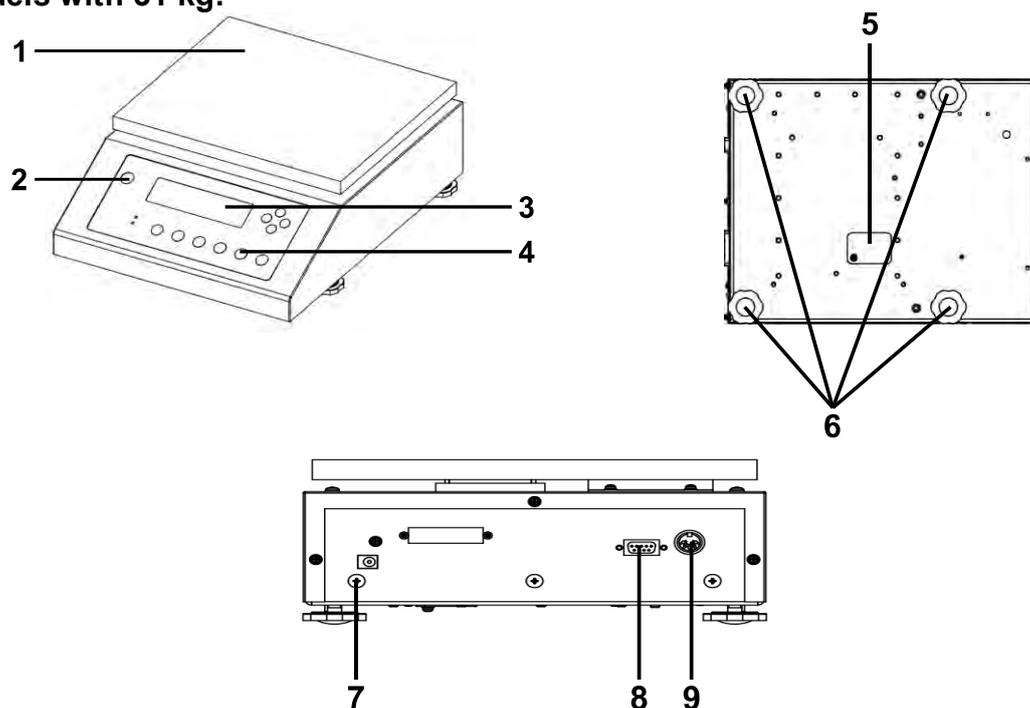
3.1 Components

Models up to 15 kg:



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

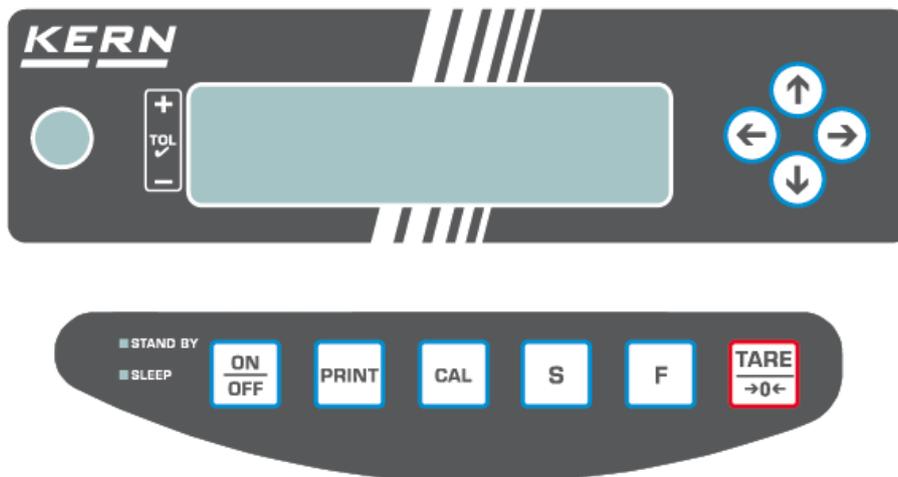
Models with 31 kg:



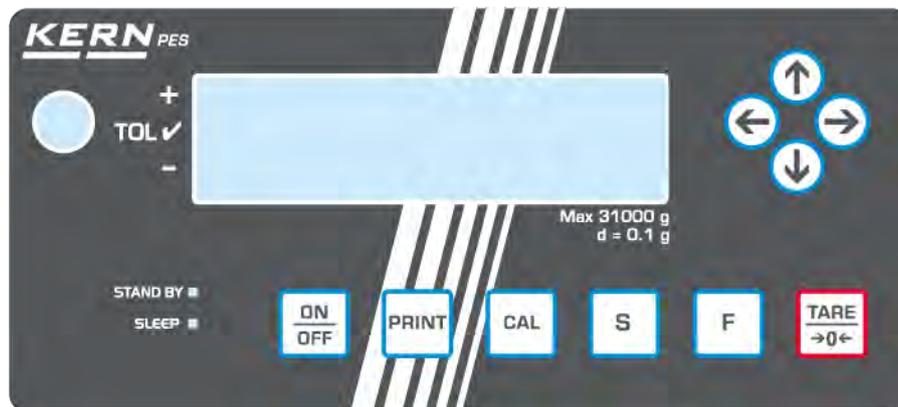
Pos.	Designation
1	Weighing plate
2	Bubble level
3	Display
4	Keyboard
5	Closing cover for underfloor weighing device
6	Footscrews
7	Mains connection
8	RS232 connection
9	DIN8P interface

3.2 Operating elements

Models up to 15 kg:

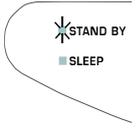
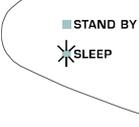


Models with 31 kg:



3.3 Keyboard overview

Button	Name	Function in Operating mode	Function in Menu
	[ON/OFF]	➤ Turn on/off	-
	[PRINT]	➤ Transmit weighing data via interface	➤ Cancel setting
	[CAL]	➤ Start adjustment or adjustment test	-
	[S]	<ul style="list-style-type: none"> ➤ Adding (when function was enabled; press key shortly) ➤ Open limit value setting (when weighing with tolerance range has been activated; press key longtime) ➤ Open interval setting (when interval output was enabled, press key longtime) 	➤ Take over setting and close menu
	[F]	<ul style="list-style-type: none"> ➤ Change display (press key shortly) ➤ Call-up menu (press key longtime) 	➤ Navigation key → / Go to next menu level
	[TARE/ZERO]	➤ Taring and zeroing	➤ Navigation key ↓ / Setting downwards
	[↑]	-	• Navigation key ↑ / Setting upwards
	[↓]	-	• Navigation key ↓ / Setting downwards
	[→]	-	• Navigation key → / Go to next menu level
	[←]	-	• Navigation key ← / Menu level back

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

3.3.1 Numeric entry

 As maximum, the balance can display eight characters

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

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

4 Basic Information (General)

4.1 Proper use

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

4.2 Improper Use

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

4.3 Warranty

Warranty claims shall be voided in case:

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

4.4 Monitoring of Test Resources

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

5 Basic Safety Precautions

5.1 Pay attention to the instructions in the Operation Manual



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

5.2 Personnel training

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

6 Transport and storage

6.1 Testing upon acceptance

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

6.2 Packaging / return transport



- ⇒ Keep all parts of the original packaging for a possibly required return.
- ⇒ Only use original packaging for returning.
- ⇒ Prior to dispatch disconnect all cables and remove loose/mobile parts.
- ⇒ Reattach possibly supplied transport securing devices.
- ⇒ Secure all parts such as the wind shield, weighing pan, power unit etc. against shifting and damage.

7 Unpacking, Installation and Commissioning

7.1 Installation Site, Location of Use

The balances are designed in a way that reliable weighing results are achieved in common conditions of use.

You will work accurately and fast, if you select the right location for your balance.

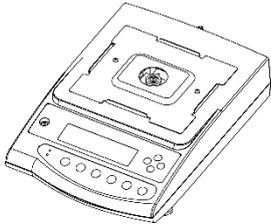
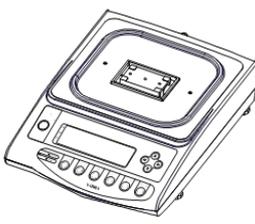
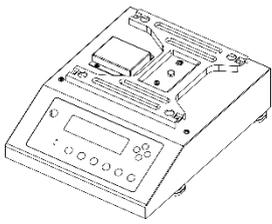
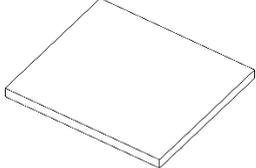
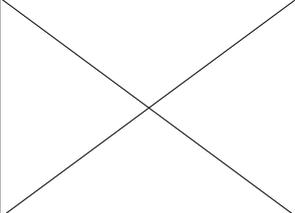
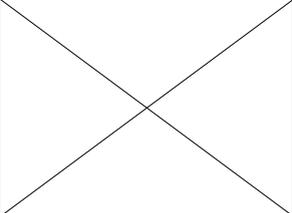
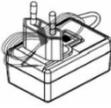
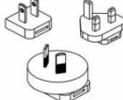
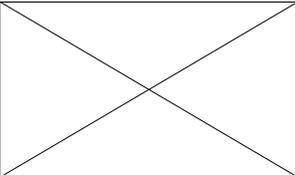
On the installation site observe the following:

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

7.2 Unpacking and check

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

Scope of delivery:

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

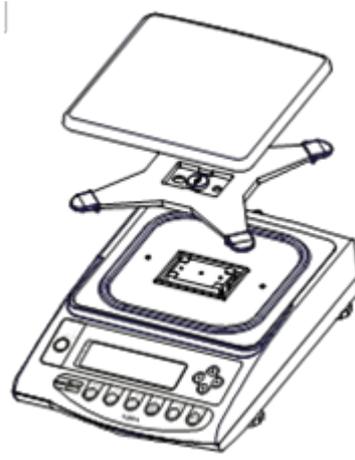
7.3 Assembling, Installation and Levelling



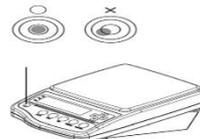
The correct implantation site is important for the accuracy of the weighing results of high-resolving precision balances (see chap. 7.1).

7.3.1 Implantation of the balance

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



3. Put the weighing plate on the weighing plate support
4. Level balance with foot screws until the air bubble of the water balance is in the prescribed circle



⇒ Check levelling regularly

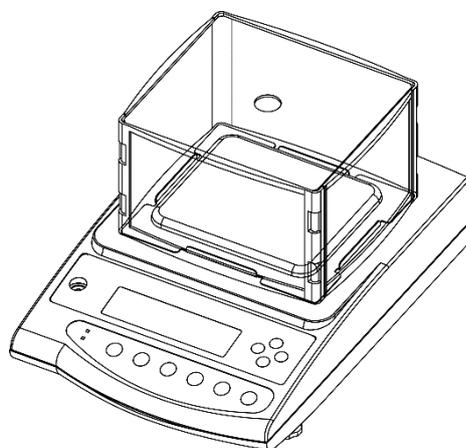
5. Connect the mains adapter (Installation of the mains adapter: see chap. 7.4.1)

7.3.2 Installation of the wind shield

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



2. Plug-on the upper part.
3. Place the wind shield over the weighing plate.



7.4 Mains connection



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



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



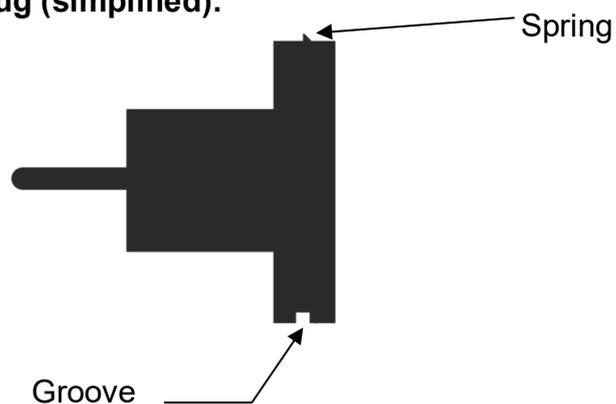
Important:

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

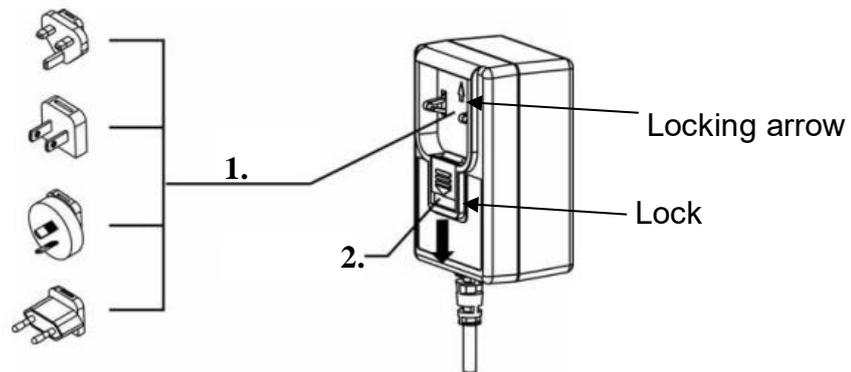
7.4.1 Installation of the mains adapter

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

Side view of the power plug (simplified):



Inserting the mains plug into the mains adapter



7.4.2 Turning On the Power

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

7.5 Initial Commissioning

In order to obtain exact weighing results with the electronic balances, your balance must have reached the operating temperature (see warm-up time chap.1). For this warm-up time the balance must be connected to the power supply (mains connection).

The accuracy of the balance depends on the local acceleration of gravity. Strictly observe hints in chapter Adjustment.

7.6 Connection of peripheral appliances

Before connecting or disconnecting the auxiliary equipment (printer, PC) to the data interface, the balance must be disconnected from mains without fail!

With your balance, only use accessories and peripheral devices by KERN, as they are ideally tuned to your balance.

8 Menu

8.1 Menu <Func>

Open menu:



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



⇒ Display changes to **<Func>**.

⇒ Release **[F]**- key



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

8.1.1 Menu overview

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

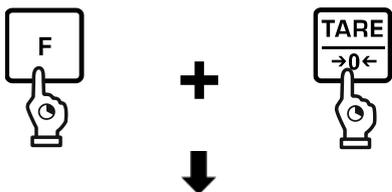
You will find a summary of the setting options in the individual chapters.

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

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

8.2 Enhanced menu <Func2>

Open menu:



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



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

8.2.1 Menu overview



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

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

8.3 Navigation in the menu

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

9 Basic Operation

9.1 Turn on/off

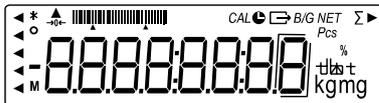


- After switching on, the balance always starts with the last weighing application that was used before switching off.
- The weighing system PEJ carries out an internal adjustment when having been disconnected from mains before switching-on

Start-up:



⇒ Press **[ON/OFF]** key



⇒ The display lights up



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

⇒ Wait until the weight display appears



⇒ The display shows zero

⇒ The balance is now ready for weighing

Check the display:

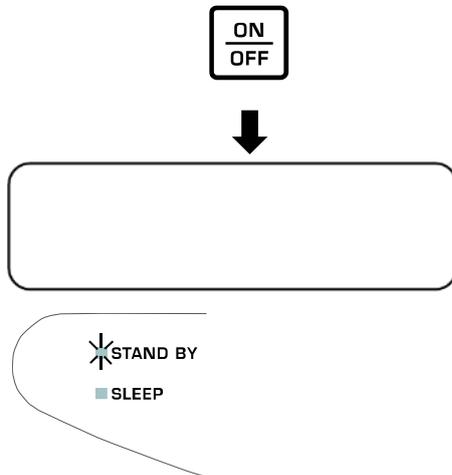


⇒ Touch slightly the weighing plate to check whether the displayed weighing value in the display is changing





Switching off:



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

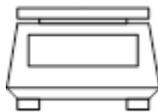
⇒ The balance display turns off

⇒ STAND BY-LED lighting

9.2 Zeroing



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



⇒ Unload weighing plate



⇒ Press the **[TARE/ZERO]** key



⇒ The balance performs zeroing

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

9.3 Taring

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



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



⇒ Place an empty weighing container on the weighing plate



⇒ The weight of the weighing container is shown



⇒ Press the [TARE/ZERO] key



⇒ The balance tares

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



⇒ Fill the weighing container with the weighed goods

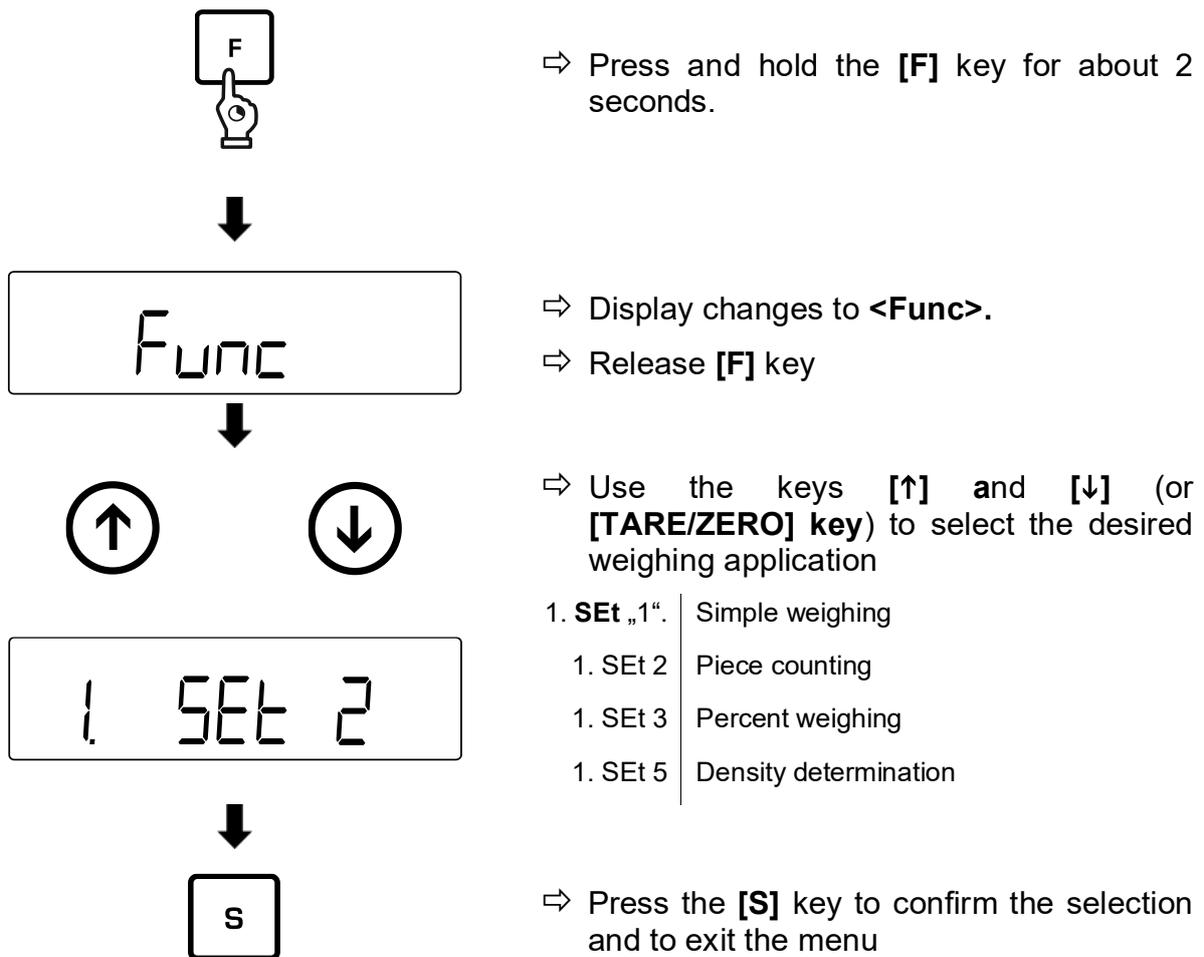


⇒ Read the net weight of the weighed good



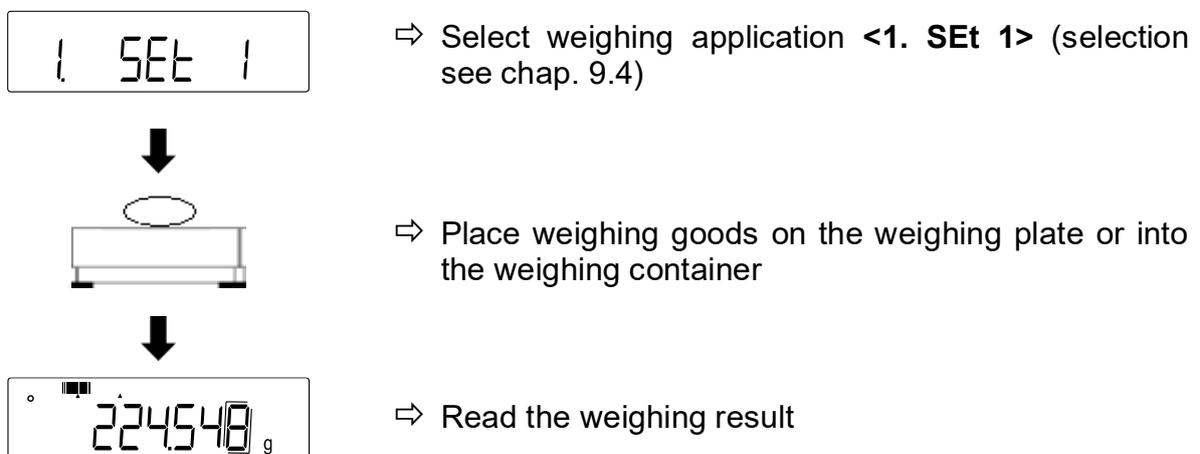
- When the balance is unloaded the saved taring value is displayed with negative sign.
- To clear the stored tare value, unload the weighing plate and press the [TARE/ZERO] key.
- The taring process can be repeated any number of times. The limit is reached when the whole weighing range is exhausted.

9.4 Selection of a weighing application



9.5 Simple weighing

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



Further displays:

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

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

9.6 Underfloor weighing



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

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

Proceed as follows:

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



CAUTION

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

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



NOTICE

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

10 Piece counting

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

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

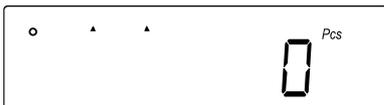
As a rule: **The higher the reference quantity the higher the counting exactness.**



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



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



⇒ The display shows **<Pcs>**.



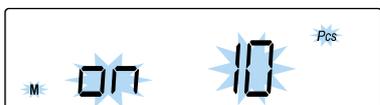
⇒ Press and hold the **[F]** key for about 2 seconds.



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

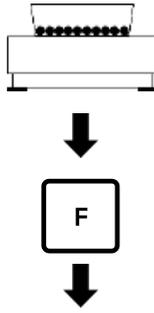


⇒ The reference quantity is shown and flashes (in this example: **<on 10>**)
 ⇒ Use the keys **[↑]** and **[↓]** (or **[TARE/ZERO]** key) to select the desired reference quantity



on 5	5 items
on 10	10 items
on 30	30 items
on 100	100 items





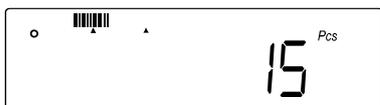
- ⇒ Place the number of parts on the weighing plate or in the weighing container according to the entered reference quantity
- ⇒ Press the **[F]** key to save the weight value of the reference quantity



- ⇒ The reference quantity on the display starts flashing
- ⇒ Put more reference pieces (quantity must be twice of the reference quantity selected at the beginning → Example: Selected = 10 items, additional reference pieces = 20 items or less)
- ⇒ The stability display appears and an acoustic signal sounds when the weight value of the reference pieces has been stored
- ⇒ Press the **[F]** key to finish weighing the reference quantity



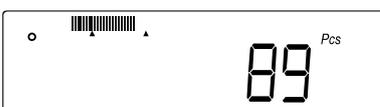
- ⇒ An acoustic signal sounds and **<End.>** is displayed



- ⇒
- ⇒ The display changes into the piece counting mode



- ⇒ Place more weighing goods on the weighing plate or into the weighing container



- ⇒ Read off the piece quantity



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

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

Further displays:

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

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

11 Percent weighing

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

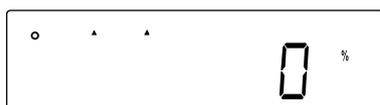
i	<ul style="list-style-type: none"> If you use a weighing container, it should be tared before setting the reference quantity (see chap. 9.3) The readability of the balance automatically adjusts to the reference weight: 	
	Readability in %	Weight range of the reference weight
	1	Minimum load \leq Reference weight $<$ Minimum load \times 10
	0.1	Minimum load \times 10 \leq Reference weight $<$ Minimum load \times 100
	0.01	Minimum load \times 100 \leq Reference weight
	Model	Minimum load for percent weighing
	TPES 620-3-B	0.1 g
	TPES 2200-2-B	
	TPES 4200-2-B	1 g
	TPES 6200-2-B	
	TPES 15000-1-B	10 g
	TPES 31000-1-B	
	TPEJ 620-3M-B	0.1 g
	TPEJ 2200-2M-B	1 g
	TPEJ 4200-2M-B	1 g

The reference weight can be recorded in two ways:

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



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



⇒ The display shows **<0%>**.



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



P. SEt



0000 g



Actual value setting method:



F



End.



24.00 %

⇒ Display changes to <P. SEt>

⇒ Release [F] key

⇒ The last reference weight set flashes on the display

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

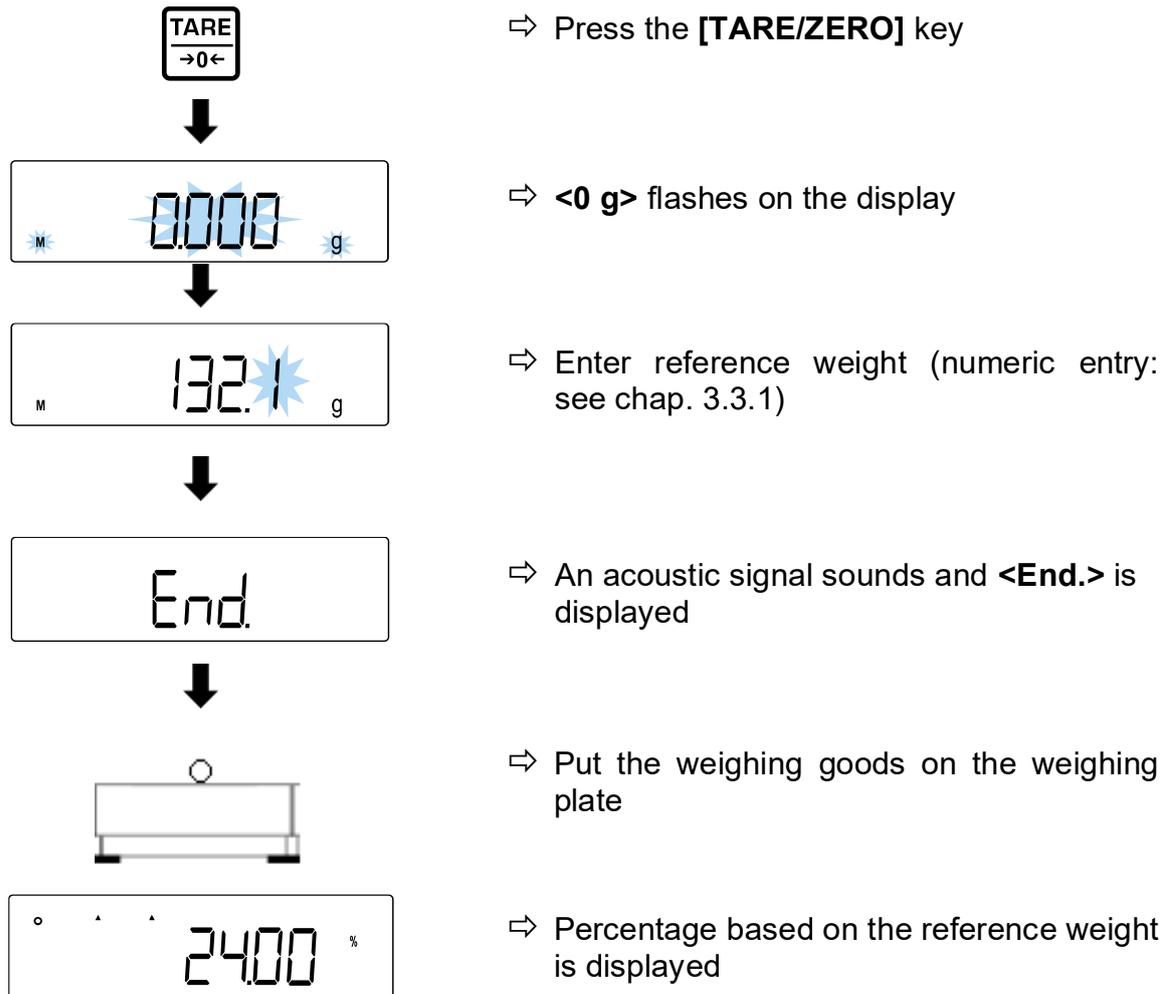
⇒ Press [F] key

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

⇒ Remove reference weight

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

Numerical input of reference weight:



Further displays:

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

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

12 Density determination

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

The following steps must be followed to measure the density:

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

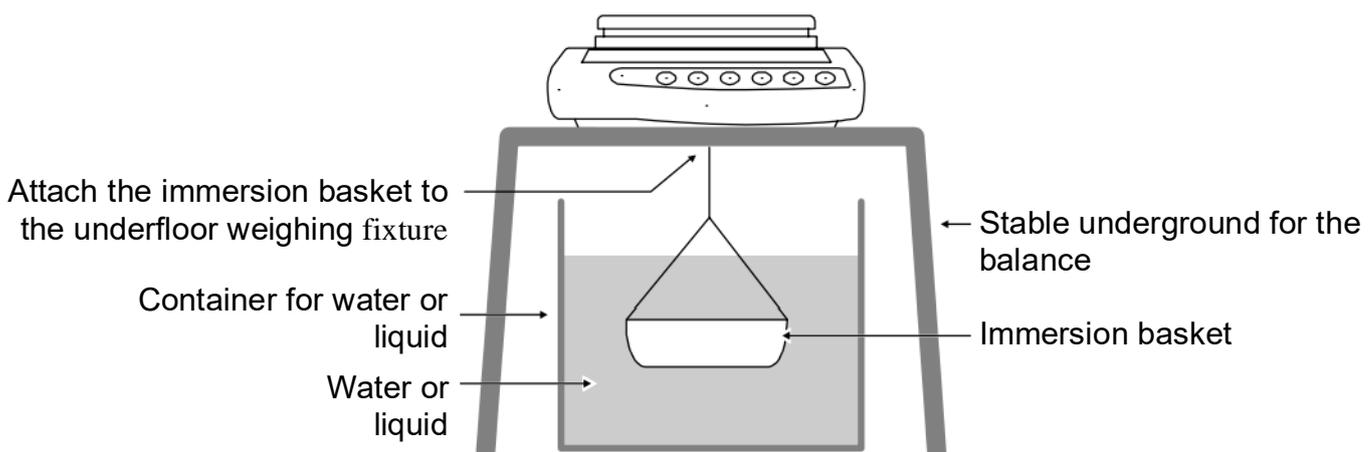


- The hook for the underfloor weighing is available as optional accessory
- Information on this can be found on our homepage:
www.kern-sohn.com



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

1. Prepare the measuring equipment

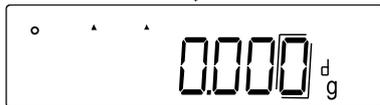


2. Select weighing application for density determination



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

3. Select medium



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

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

⇒ Press the [S] key to save settings

⇒ The display shows <d>

4. Set water temperature or specific density



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



⇒ Press and hold the [TARE/ZERO] key.

When 0 (water) is selected:



⇒ Display changes to <d t> and flashes

⇒ Release the [TARE/ZERO] key.

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

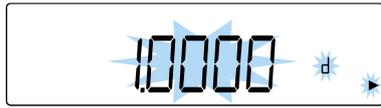


⇒ Enter water temperature (numeric entry: see chap. 3.3.1)



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

When selecting 1 (No water):

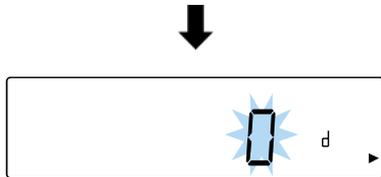


⇒ Display changes to <d> and flashes

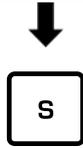
⇒ Release the **[TARE/ZERO]** key.



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

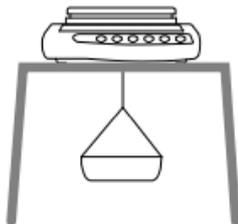


⇒ Enter specific density (Numeric entry: see chap. 3.3.1)



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

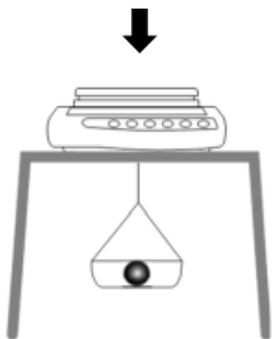
5. Weigh sample by underfloorweighing



⇒ Attach empty immersion basket to hooks for underfloor weighing.



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



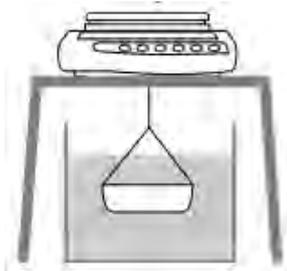
⇒ Place sample in the immersion basket
(In this step the sample can also be placed on the weighing plate)



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

⇒ Balance stores weight value and displays <<>.

6. Correction of residual errors due to immersion basket

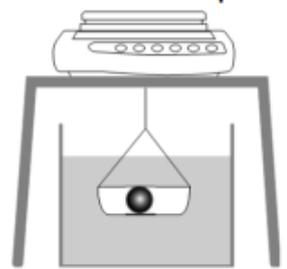


⇒ Place container with water or other liquid under the balance

⇒ Immerse empty immersion basket in the water or liquid

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

7. Measuring the sample



⇒ Place sample in the immersion basket

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

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

⇒ Read off the specific density result



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

12.1 Density Table for liquids

Temperature [°C]	Density ρ [g/cm ³]		
	Water	Ethanol	Methanol
10	0.9997	0.7978	0.8009
11	0.9996	0.7969	0.8000
12	0.9995	0.7961	0.7991
13	0.9994	0.7953	0.7982
14	0.9993	0.7944	0.7972
15	0.9991	0.7935	0.7963
16	0.9990	0.7927	0.7954
17	0.9988	0.7918	0.7945
18	0.9986	0.7909	0.7935
19	0.9984	0.7901	0.7926
20	0.9982	0.7893	0.7917
21	0.9980	0.7884	0.7907
22	0.9978	0.7876	0.7898
23	0.9976	0.7867	0.7880
24	0.9973	0.7859	0.7870
25	0.9971	0.7851	0.7870
26	0.9968	0.7842	0.7861
27	0.9965	0.7833	0.7852
28	0.9963	0.7824	0.7842
29	0.9960	0.7816	0.7833
30	0.9957	0.7808	0.7824
31	0.9954	0.7800	0.7814
32	0.9951	0.7791	0.7805
33	0.9947	0.7783	0.7796
34	0.9944	0.7774	0.7786
35	0.9941	0.7766	0.7777

12.2 Data output of the specific density to a printer



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

Selecting the data for output:



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

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

Activate / deactivate automatic printout:



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

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

13 Weighing with tolerance range

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

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



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

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

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

Example:

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

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

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

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

13.1 Selection of weighing function with tolerance range



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

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

13.2 Set distinction condition

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



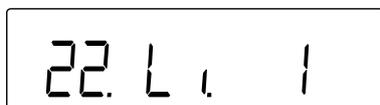
⇒ In the menu navigate to **<21. Co.>** and select distinction condition (Navigation in the menu: see chap. 8.3)

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

13.3 Setting the distinction range

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

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



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

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

13.4 Set the number of tolerance limits

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

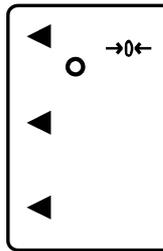


- | | |
|---|--|
| 1 | 1 limit (rank 1) * |
| 2 | 2 limits (rank 1 and rank 3) * |
| 3 | 3 limits (rank 1, rank 2, rank 4) ** |
| 4 | 4 limits (rank 1, rank 2, rank 4, rank 5) ** |

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

Rank 3 (limit 2)

+



Upper tolerance limit exceeded

Rank 2

TOL ✓

Within the tolerance range

Rank 1 (limit 1)

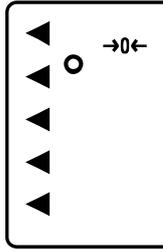
-

Lower tolerance limit not reached

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

Rank 5 (limit 4)

+



Rank 4 < measured value

Rank 4 (limit 3)

Rank 3 ≤ Measured value < Rank 4

Rank 3

TOL ✓

Rank 2 ≤ Measured value < Rank 3

Rank 2 (limit 2)

Rank 1 ≤ Measured value < Rank 2

Rank 1 (limit 1)

-

Measured value < Rank 1

13.5 Set distinction method



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

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

13.6 Set acoustic signal



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

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

⇒ Select desired setting

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

13.7 Set tolerance display

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

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

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



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

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

Set the display for tolerance range weighing:



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

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

13.8 Set data output



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

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

13.9 Setting the tolerance values



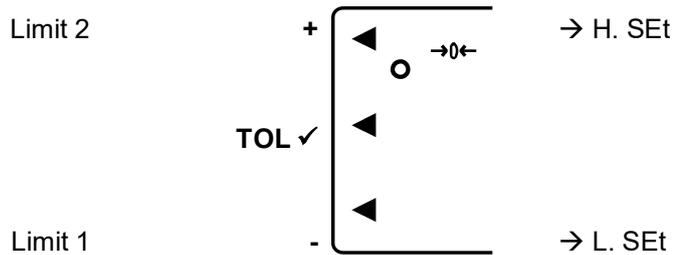
- Tolerance values can only be saved when the balance is in the measurement mode display
- Set the balance to zero (see chap. 9.2) or tare (see chapter 9.3) the balance before saving tolerance values.

13.9.1 Absolute values

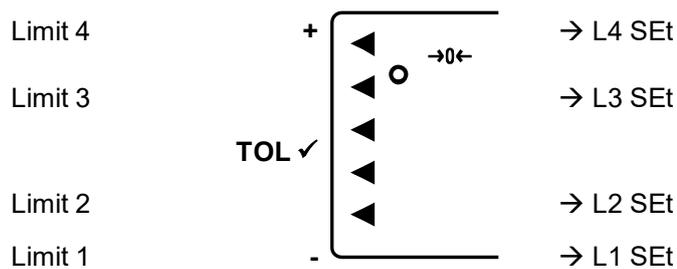


For the distinction method setting with absolute values **<24. tYP. 1>** (see chap. 13.5)

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



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



Actual value setting method:



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

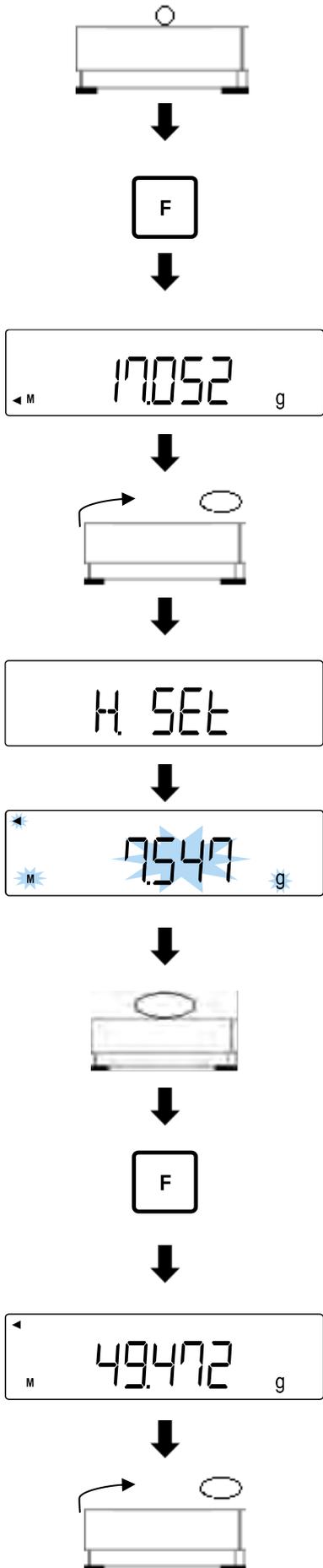


⇒ When **<L. SEt>** or **<L1 SEt>** is displayed, release the **[S]** key



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





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

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

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

⇒ Remove reference sample

If the number of tolerance limits is more than 1:

⇒ The display shows <H. SET> (or <L2 SET> ... <L4 SET>)

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

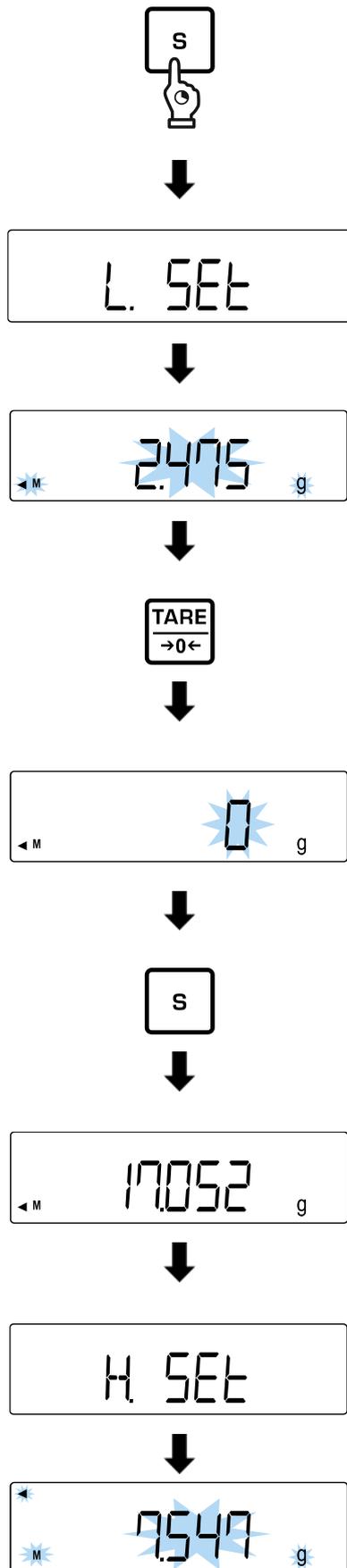
⇒ Place the reference sample for the tolerance limit on the weighing plate

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

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

⇒ Remove reference sample

Numeric input:



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

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

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

⇒ Press the **[TARE/ZERO]** key

⇒ **<0 g>** flashes on the display

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

⇒ Press the **[S]** key

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

If the number of tolerance limits is more than 1:

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

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

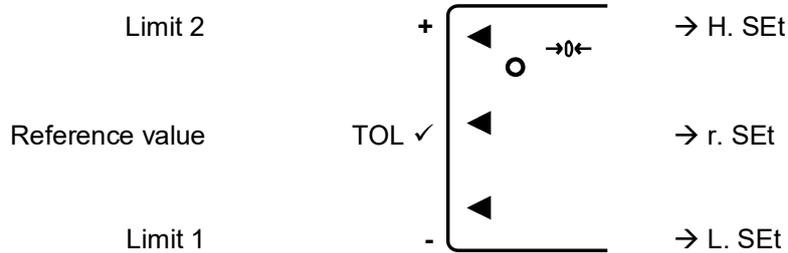
⇒ Enter tolerance limits as described above

13.9.2 Differential values

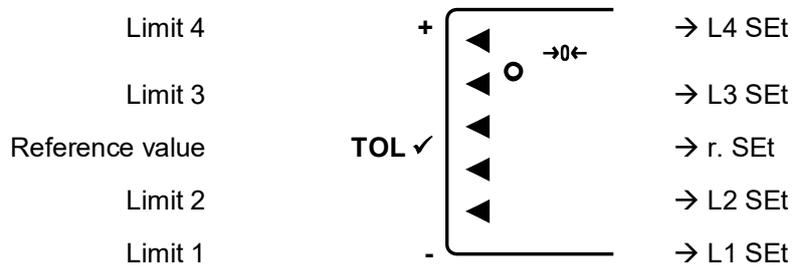


For the distinction method setting with absolute values <24. tYP. 2> (see chap. 13.5)

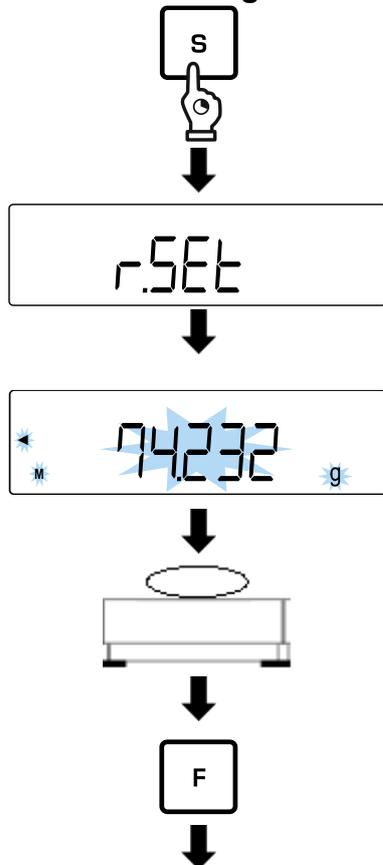
at <23. Pi.> = 1 or 2:



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



Actual value setting method:



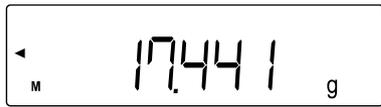
⇒ When the balance is in the measuring mode, hold down the **[S]** key for about 2 seconds.

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

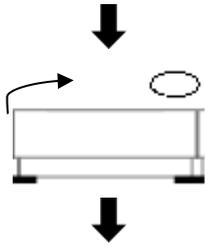
⇒ Last reference value stored for the target weight appears and flashes on the display

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

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



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



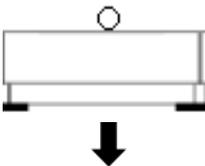
⇒ Remove reference sample



⇒ <L SET> or <L1 SET> is displayed



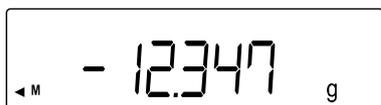
⇒ Last difference to reference sample flashes on the display



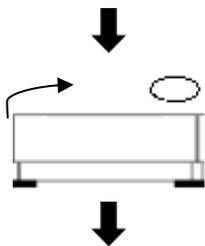
⇒ Place the reference sample for the tolerance limit on the weighing plate



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



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



⇒ Remove reference sample

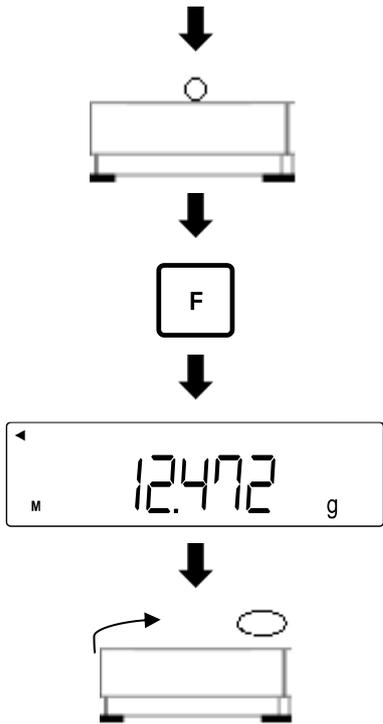


If the number of tolerance limits is more than 1:

⇒ The display shows <H. SET> (or <L2 SET> ... <L4 SET>)



⇒ Last difference to reference sample flashes on the display



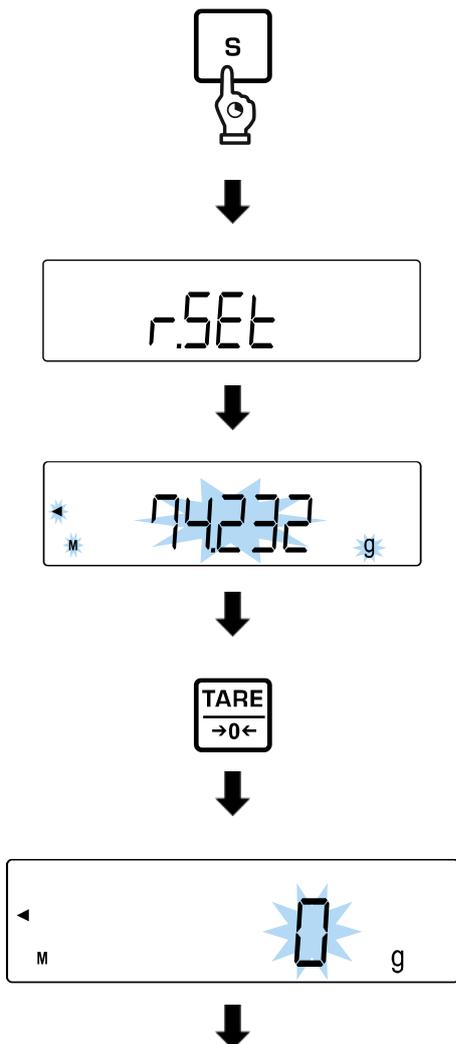
⇒ Place the reference sample for the tolerance limit on the weighing plate

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

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

⇒ Remove reference sample

Numeric input:



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

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

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

⇒ Press the **[TARE/ZERO]** key

⇒ **<0 g>** flashes on the display

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



⇒ Press the **[S]** key

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

⇒ **<L SET>** or **<L1 SET>** is displayed

⇒ Last difference to reference sample flashes on the display

⇒ Enter difference of the target weight as described above

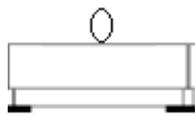
If the number of tolerance limits is more than 1:

⇒ The display shows **<H. SET>** (or **<L2 SET>** ... **<L4 SET>**)

⇒ Last difference to reference sample flashes on the display

⇒ Enter difference of the target weight as described above

13.10 Weighing the samples



⇒ Put the weighing goods on the weighing plate

⇒ Evaluation of the value is shown on the display

14 Totalization

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



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

Totalizing can be done in two ways:

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

14.1 Select the Totalizing function



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

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

⇒ Press **[F]** key

⇒ The display shows **<2C. Ad.M>**

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

1 TOTAL-Adding: Totalizing individual weighings by replacing the sample on the weighing plate

2 NET-Adding: Totalize individual weighings without replacing the samples on the weighing plate (balance tares automatically after totalizing)

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

14.2 Using the totalizing function



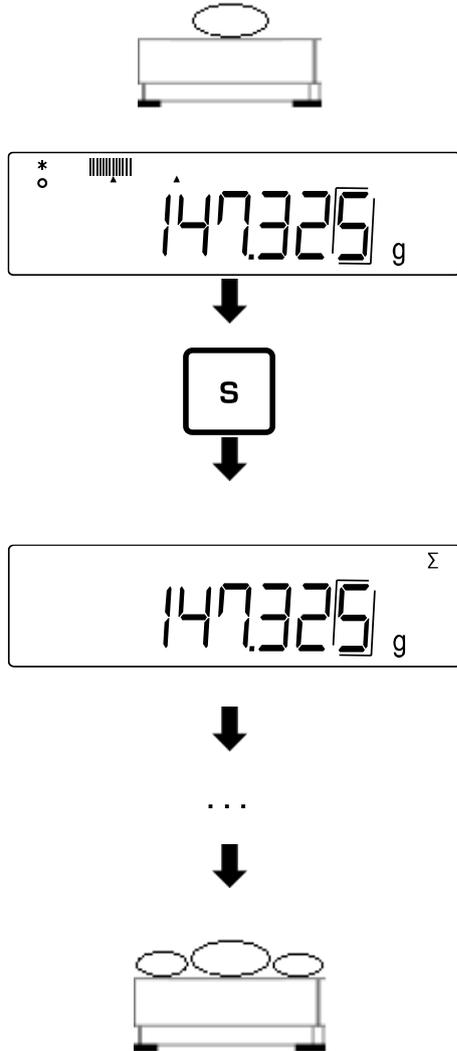
The error message **<t-Err>** appears if you have not placed the samples correctly (More information: see chap. 21.1)

14.2.1 TOTAL-Adding



- ⇒ Set the balance to **<2C. Ad.M 1>** (see chap. 14)
- ⇒ Place the first sample on the weighing plate and wait until the display shows an asterisk **<*>**.
- ⇒ Press the **[S]** key
- ⇒ Weight value is stored
- ⇒ An acoustic signal sounds and **<Σ>** is briefly displayed together with the weight total
- ⇒ Remove sample from weighing plate (balance performs automatic zeroing)
- ⇒ Wait until the balance shows **<0>**.
- ⇒ Place new sample on weighing plate and repeat steps

14.2.2 NET-Adding



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

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

⇒ Press the **[S]** key

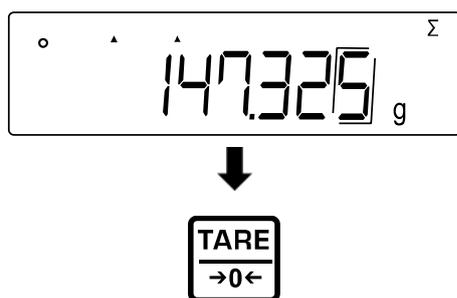
⇒ Weight value is stored

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

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

⇒ Place another sample on the weighing plate and repeat steps

14.3 Clear the total sum



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

⇒ Press the **[TARE/ZERO]** key

15 Settings



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

15.1 Zero-Tracking

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



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

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

15.2 Stability settings

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

15.2.1 Sensitivity

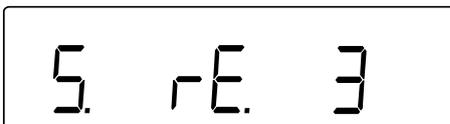


⇒ In the menu navigate to **<4. Sd.>** and select sensitivity.

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

15.2.2 Display speed

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



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

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

15.3 Bar graph display

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



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

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

15.4 Automatic Sleep function

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



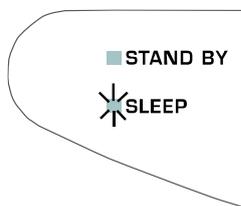
- Sleep mode of the balance is not enabled,
 - when the menu of the balance is open
 - when there are weighing goods on the weighing plate and the value is instable.
- Exit the sleep mode when touching the weighing plate or pressing a key
- During sleep mode, data can be edited



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

0	|	Disabled
1	|	Enabled

When sleep mode is activated:



- ⇒ The balance display turns off after 3 minutes
- ⇒ SLEEP LED glowing

15.5 Setting the weighing units

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



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



or



⇒ In the menu navigate to **<b1.u.A>** or **<b3.u.b>**.

<b1.u.A> | Set unit A

<b3.u.b> | Set unit B

⇒ Select setting

0 | Disabled (setting only available for unit B).

1 | g (gram)

2 | kg (kilogram)

4 | ct (carat)

15.6 Date and time

15.6.1 Set display format



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

1 | Year - Month - Day

2 | Month - Day - Year

3 | Day - Month - Year

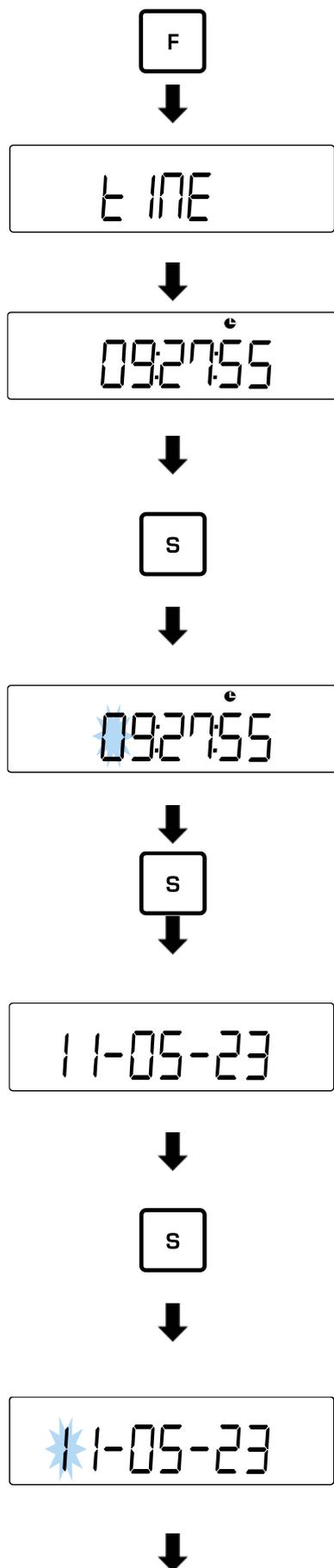
15.6.2 Setting time and date



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

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

⇒ Release **[F]** key



⇒ Press **[F]** key

Enter time:

- ⇒ The display changes to **<tIME>** and then to the clock-time display (24-hours format)
- ⇒ Use the **[TARE/ZERO]** key to set the seconds to 00 and round them up or down to the next minute

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

⇒ Enter time:
Hours:Minutes:Seconds
Numeric input: see chapter 3.3.1)

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

Enter date:

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

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

⇒ Enter date
Sequence is depending on the display format
Numeric input: see chapter 3.3.1)



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

15.7 Automatic switch-on function

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



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

- 0 | Disabled
- 1 | Enabled

16 Enhanced settings



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

16.1 Balance identification number

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



A maximum of 6 characters can be assigned for that ID



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



⇒ Press the **[S]** key



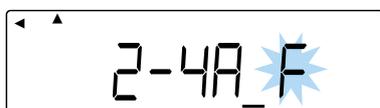
⇒ The balance's ID is displayed on the balance.



⇒ Press the **[TARE/ZERO]** key



⇒ The first input digit flashes



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





⇒ Press the **[S]** key

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

16.2 Measurement uncertainty of the external adjustment weight

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

Measurement uncertainty = Displayed weight - Nominal value



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

16.2.1 Enter measurement uncertainty



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

0 | Not enter

1 | Enter measurement uncertainty

Measurement uncertainty entered:

⇒ Select **<2.o.M.P. 1>**

⇒ Press the **[S]** key

⇒ The last value stored for the measurement uncertainty is shown in mg and flashes

⇒ Press the **[TARE/ZERO]** key



- ⇒ **<0 mg>** is displayed and flashes
- ⇒ Enter measurement uncertainty in mg (numeric input: see chap. 3.3.1)

- ⇒ Press the **[S]** key
- ⇒ An acoustic signal sounds and the measurement uncertainty is displayed briefly.
- ⇒ The balance returns to weighing mode

16.2.2 Take over measurement deviation



- ⇒ In the enhanced menu navigate to **<4. M.E.H.>** and select the setting
- | | |
|---|--|
| 0 | Do not take over |
| 1 | Take over the measurement uncertainty from the adjustment or the adjustment test with external adjustment weight |

17 Adjustment

As the acceleration value due to gravity is not the same at every location on earth, each balance must be coordinated - in compliance with the underlying physical weighing principle - to the existing acceleration due to gravity at its place of location (only if the balance has not already been adjusted to the location in the factory).

This adjustment process must be carried out for the first commissioning, after each change of location as well as in case of fluctuating environment temperature. To receive accurate measuring values it is also recommended to adjust the balance periodically in weighing operation.

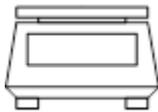


- Observe stable environmental conditions. A warm up time (see chapter 1) is required for stabilization.
- Ensure that there are no objects on the weighing plate.
- Avoid vibration and air draught.
- Always carry out adjustment with the standard weighing plate in place.
- The adjustment record is printed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

17.1 Adjustment with internal weight



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



⇒ Unload weighing plate



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



⇒ Press the [S] key

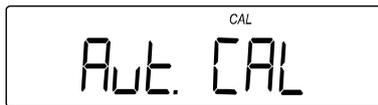


⇒ The balance returns to weighing mode



⇒ Press the [CAL] key to start internal adjustment.





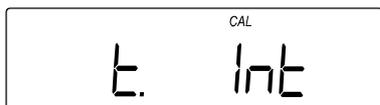
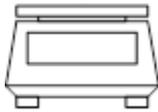
⇒ Various messages are shown on the display one after another: <Aut. CAL> → <WAIt> → <CH. 0> → <CH. F.S.> → <buSy> → <End>

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

17.2 Adjustment test with internal weight



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



⇒ Unload weighing plate

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

⇒ Press the [S] key

⇒ The balance returns to weighing mode

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

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



- ⇒ The difference value between the adjustment weight and the actual weight value is shown (measuring uncertainty)
- ⇒ Press any key to return to the weighing mode.

17.3 Adjustment with external weight



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



- ⇒ Unload weighing plate



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



- ⇒ Press the **[S]** key



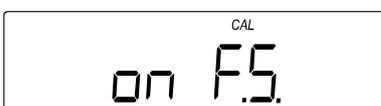
- ⇒ The balance returns to weighing mode



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



- ⇒ The balance performs an automatic zero setting
- ⇒ Various messages are shown on the display one after another: **<CAL EXT>** → **<on 0>** (when **<PuSH F>** appears, press **[F]** key)



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





End

⇒ Place the adjustment weight centrally on the weighing plate.

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

⇒ The balance returns to weighing mode

⇒ Unload weighing plate

17.4 Adjustment test with external weight



- Cancel the process by pressing the [PRINT] key



7. CA. 4



S



0000 g



CAL



CAL
t. EHL



...

⇒ Unload weighing plate

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

⇒ Press the **[S]** key

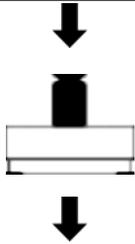
⇒ The balance returns to weighing mode

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

⇒ The balance performs an automatic zero setting



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



⇒ Place the adjustment weight centrally on the weighing plate.



⇒ The difference value between the adjustment weight and the actual weight value is shown (measuring uncertainty)

⇒ Press any key to return to the weighing mode.

17.5 Adjustment record

Enable / disable edition of the weighing log:



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

0 | Disabled

1 | Enabled

Enable/disable adjustment record / adjustment test log:



⇒ In the menu select **<E. GLP 1>**

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

0 | Disabled

1 | Enabled (output after every adjustment / adjustment test)

Log output after adjustment or adjustment test:



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

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

18 Verification

General:

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

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

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

Balances in the legally controlled area (-> verified balances) must keep the error limits in the verification validity period - normally they are the double of the verification error limits.

When this verification validity period expires, a re-verification must be carried out. Should be necessary an adjustment of the balance to keep the verification error limits to satisfy the re-verification requirements, this is not deemed a warranty case.

Verification notes:

An EU type approval exists for balances described in their technical data as verifiable. If the balance is used where obligation to verify exists as described above, it must be verified and re-verified at regular intervals.

Re-verification of a balance is carried out according to the respective national regulations. The validity for verification of balances in Germany is e.g. 2 years.

The legal regulation of the country where the balance is used must be observed!



Verification of the balance is invalid without the seal.

The seal marks attached on balances with type approval point out that the balance may only be opened and serviced by trained and authorised specialist staff. If the seal mark is destroyed, verification loses its validity. Please observe all national laws and legal regulations. In Germany a re-verification will be necessary.

19 Interfaces

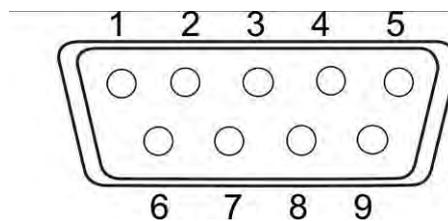
The balance can communicate with external peripherals using the interface. Data can be sent to a printer, PC or control displays. In the same way, control commands and data inputs may occur via the connected devices (such as PC, keyboard, barcode reader).

19.1 RS-232C interface for data input and output

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

19.1.1 Technical data

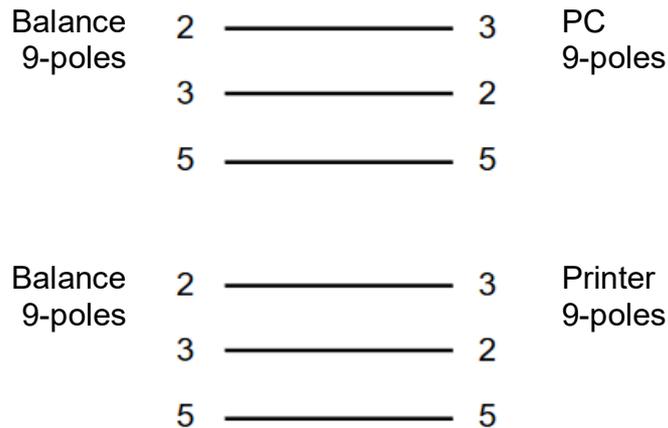
Connection	9 pin d-subminiature bushing
Baud rate	1200/2400/4800/9600/19200 optional
Parity	Empty / Odd number / Even number



Pin connection:

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

19.1.2 Interface cable

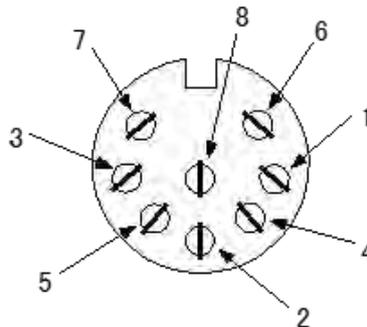


19.2 DIN8P-interface to the data output

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

19.2.1 Technical data

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



Pin connection:

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



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

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



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

19.3.1 Data composition

- **6-digit data format**

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

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

- **7-digit data format**

Consisting of 15 characters, including the end characters (CR= 0DH, LF= 0AH)

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

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

19.3.2 Data description

Presign:

P1 = 1 character

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

Numeric data:

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

**Sp* = space

Units:

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

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

**Sp* = space

Result evaluation for weighing with tolerance range:

S1 = 1 character

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

*Sp = space

Status of data:

S2 = 1 character

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

*Sp = space

19.4 Formats of the data output (special format 1)



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

19.4.1 Data composition

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

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

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

19.4.2 Data description

Presign:

P1 = 1 character

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

Numeric data:

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

*Sp = space

Units:

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

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

*Sp = space

19.4.3 Error messages

<o-Err>:

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

<u-Err>:

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

19.5 Formats of the data output (special format 2)



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

19.5.1 Data composition

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

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

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

19.5.2 Data description

Status:

S1, S2, S3 = 3 characters

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

Numeric data:

10 characters, right justified

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

*Sp = space

Units:

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

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

*Sp = space

19.5.3 Error messages

<o-Err>:

1	2	3	4	5
S	Sp	+	CR	LF

<u-Err>:

1	2	3	4	5
S	Sp	-	CR	LF

19.6 Data output formats (CBM)

19.6.1 Data composition

- **26-digit data format**

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

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

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

- **ERROR**

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

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

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

19.6.2 Data description

Status:

S1 = 1 character

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

Result evaluation for weighing with tolerance range:

C1 = 1 character

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

*Sp = space

Data type

T1 - T6 = 1 - 6 characters

For PEJ:

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

*Sp = space

For PES:

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

*Sp = space

Numeric data:

D1 – D12: 1 – 12 characters

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

*Sp = space

Units:

U1, U2 = 2 characters

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

**Sp* = space

19.7 Data input



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

19.7.1 Input format 1

Input format:

1 2 3 4

C1	C2	CR	LF
----	----	----	----

Example of permanent output:

⇒ Input: O0

Zeroing / taring, data output:

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

*Sp = space

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

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

Weighing functions:

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

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

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

Date and time:

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

Response:

A00:	Input successful
E01:	Input Error
E02:	Error

Adjustment / Adjustment test:

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

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

Response:

A00	Input successful
E01	Input Error
E02	Function has been disabled
E03	Cancelled
E04	Incorrect execution

19.7.2 Input format 2**Input format (variable length):**

1	2	3	4	...	...	...	n
C1	C2	,	D1	...	Dn	CR	LF

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

⇒ Input: LB,120.0

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

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



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

Set interval output:

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

Set tolerance values:

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

19.8 Response formats

A00/Exx Format	Response	ACK/NAK Format
A00: Normal answer E00-E99: Incorrect answer		ACK: Normal answer NAK: Incorrect answer

19.8.1 A00/Exx Format

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

1	2	3	4	5
A1	A2	A3	CR	LF

* End characters: CR = paragraph, LF = line

Commands:

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

19.8.2 ACK/NAK Format

Consists of one character (without end characters).

1
A1

Commands:

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

19.9 Communication settings

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



For navigation in the menu see chapter 8.3

19.9.1 Enable / disable interface and data format



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



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

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

19.9.2 Change communication settings



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

Set output condition:



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

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

Set baud rate:

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

62 bL. 1

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

Set parity:



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

63 PA. 0

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

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

Set the data length:



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

64 dL. 8

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

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

Set stop bit:

65 St. 2

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

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

Set handling of blank digits:



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

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

Set response format:



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

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

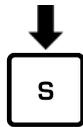
19.9.3 Interval output

Setting output interval:



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

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



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



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

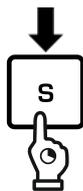
⇒ Release **[S]** key



⇒ Enter output interval:

Hours:Minutes:Seconds

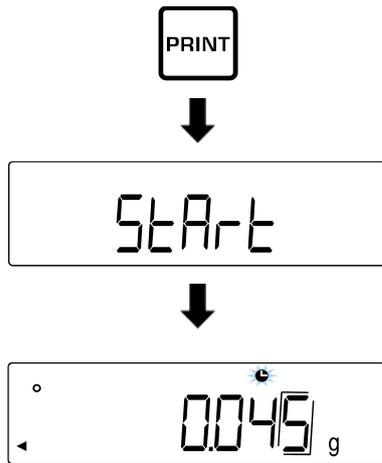
Numeric input: see chapter 3.3.1)



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

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

Start the interval output:



⇒ Press **[PRINT]** key

⇒ Display changes to **<StArt>**

⇒ The balance returns to weighing mode

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



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

19.10 Output functions

19.10.1 GLP-compliant data output

Enable / disable ISO / GLP / GMP compliant log:



⇒ In the menu select **<E. GLP 1>**

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

0	|	Disabled
1	|	Enabled

Setting the output language:



⇒ In the menu select **<E. GLP 1>**

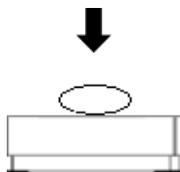
⇒ In the menu navigate to **<E3. P.F.>** and select setting

1	|	English
2	|	Japanese (Katakana)

Output of the GLP-compliant weighing log:



⇒ In the menu select **<E2. od. 1>**



⇒ Carry out weighing



⇒ Press and hold the **[PRINT]** key.



⇒ **<HEAd>** is displayed

⇒ Head line is issued

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



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



⇒ **<Foot>** is displayed

⇒ Foot line is edited

19.10.2 Edition of the time stamp



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

0 | Disabled

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

20 Servicing, maintenance, disposal



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

20.1 Cleaning

Do not use aggressive cleaning agents (solvents or similar) - just use a cloth moistened with mild soapy water. Ensure that no liquid penetrates into the appliance. Polish with a dry soft cloth.

Loose residue sample/powder can be removed carefully with a brush or manual vacuum cleaner.

Spilled weighing goods must be removed immediately.

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

20.2 Servicing, maintenance

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

20.3 Disposal

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

21 Instant help for troubleshooting

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

Fault	Possible cause
The weight display does not glow	<ul style="list-style-type: none"> • The balance is not switched on • The mains supply connection has been interrupted (mains cable not plugged in/faulty). • Power supply interrupted.
The displayed weight is permanently changing	<ul style="list-style-type: none"> • Draught/air movement • Table/floor vibrations • Weighing plate has contact with other objects • Electromagnetic fields / static charging (choose different location/switch off interfering device if possible)
The weighing result is obviously wrong	<ul style="list-style-type: none"> • The display of the balance is not at zero • Adjustment is no longer correct • The balance is on an uneven surface • Great fluctuations in temperature • Electromagnetic fields / static charging (choose different location/switch off interfering device if possible)
The weighing result is wrong after the adjustment	<ul style="list-style-type: none"> • Adjustment was not carried out under stable ambient conditions. • Differences in weight between the adjustment weight and the weight used for testing
The display does not change when the M symbol flashes	<ul style="list-style-type: none"> • Draught/air movement • Table/floor vibrations • Weighing plate has contact with other objects • Electromagnetic fields / static charging (choose different location/switch off interfering device if possible)

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

21.1 Error messages

Error message	Description	Possible causes / repair
o-Err	<ul style="list-style-type: none"> Maximum weighing range exceeded 	<ul style="list-style-type: none"> Split sample and weigh individually Use lighter tare weight
u-Err	<ul style="list-style-type: none"> Negative load is below the minimum weighing range 	<ul style="list-style-type: none"> Weighing plate or weighing plate carrier incorrectly adjusted Check whether the balance is touching other objects
L-Err	<ul style="list-style-type: none"> Weight value of the sample when setting the reference weight in piece counting mode is too low 	<ul style="list-style-type: none"> Use samples / reference weights with higher weight value (lowest piece weight, minimum load)
t-Err	<ul style="list-style-type: none"> The [S] key was pressed, although <*> has not been displayed 	<ul style="list-style-type: none"> Observe the totalizing procedure according to the Operating instructions
c-Err	<ul style="list-style-type: none"> System error 	<ul style="list-style-type: none"> Inform the retailer.
b-Err		
d-Err		
l-Err	<ul style="list-style-type: none"> The weight value of the adjustment weight is less than 50 % of the weighing capacity. The external adjustment weight is less than 95 % of the weighing range when calibrating the internal adjustment weight 	<ul style="list-style-type: none"> Use a adjustment weight with a weight value as close as possible to the weighing capacity.
z-Err	<ul style="list-style-type: none"> Error > 1.0 % at adjustment test with external weight 	
3-Err	<ul style="list-style-type: none"> Weighing plate is loaded during the internal adjustment 	<ul style="list-style-type: none"> Unload the weighing plate and repeat the internal adjustment
4-Err	<ul style="list-style-type: none"> Error > 1.0 % at the internal adjustment 	<ul style="list-style-type: none"> Perform internal adjustment again
r-Err	<ul style="list-style-type: none"> The input value for the measurement uncertainty of the external adjustment weight at <2. o.M.P.> exceeds the maximum setting range of +/- 100 mg 	<ul style="list-style-type: none"> Use adjustment weights with poor deviation
A-Err	<ul style="list-style-type: none"> Faulty end of the internal adjustment 	<ul style="list-style-type: none"> Perform internal adjustment again