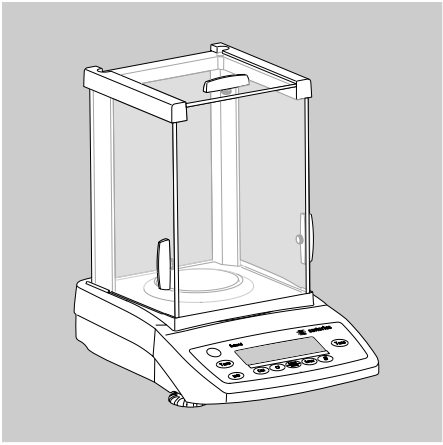
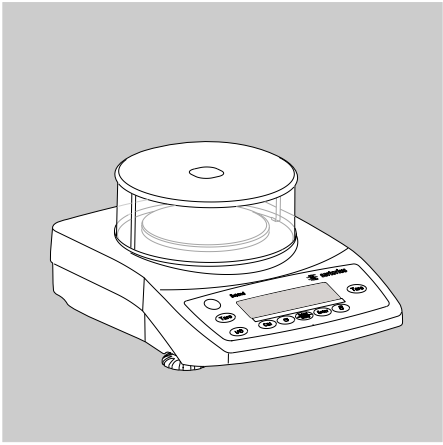
sartorius

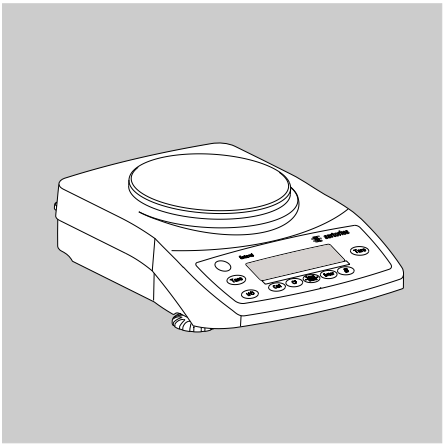
Operating Instructions

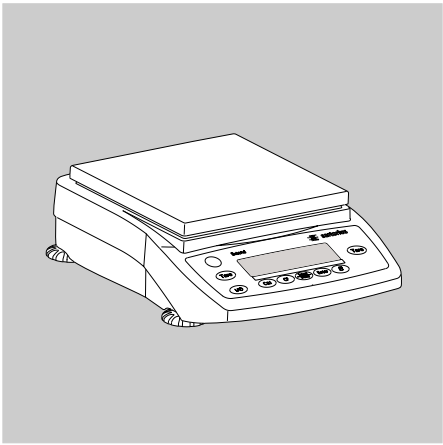
Sartorius Extend Series
Sartorius Gem and Gold Extend

Electronic Analytical and Precision Balances and Precious Metal Scales









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Contents

Warnings and Safety Precautions

Safety

● To prevent damage to the equipment, please read these operating instructions carefully before using the balance/scale.

⚠ Do not use this equipment in hazardous areas.

⚠ The balance/scale may be opened only by trained service technicians.

⚠ Disconnect the balance/scale from power before connecting or disconnecting peripheral devices.

⚠ If you operate the balance/scale under ambient conditions subject to higher safety standards, you must comply with the applicable installation regulations.

⚠ Exposure to excessive electromagnetic interference can cause the readout value to change. Once the disturbance has ceased, the instrument can be used again in accordance with its intended purpose.

Make sure that no liquid enters the equipment housing; use only a slightly moistened cloth to clean the balance/scale.

Installation

⚠ Make sure the voltage rating printed on the power supply is identical to your local line voltage.

– Proceed with extreme caution when using pre-wired RS-232 connecting cables, as the pin assignments may not be compatible with Sartorius equipment. Before connecting the cable, check all pin assignments against the cabling diagrams and disconnect any lines that are assigned differently.

⚠ If there is visible damage to the equipment or power cord, disconnect the equipment from power and lock it in a secure place to ensure that it cannot be used for the time being.

– Connect only Sartorius accessories and options, as these are optimally designed for use with your Extend balance/scale. The operator shall be solely responsible for installation and testing of any modifications to Sartorius equipment, including connection of cables or equipment not supplied by Sartorius. On request, Sartorius will be happy to provide information on operating specifications (in accordance with the Standards for defined immunity to interference).

○ Do not open the balance/scale housing. If the seal is broken, this will result in forfeiture of all claims under the manufacturer's warranty.

○ If you have any problems with your balance/scale, contact your local Sartorius customer service center.

Symbols

The following symbols are used in these instructions:

● indicates required steps

○ indicates steps required only under certain conditions

> describes what happens after you have performed a particular step

– indicates an item in a list

⚠ indicates a hazard

Getting Started

Storage and Shipping Conditions
- Do not expose the balance/scale to extreme temperatures, moisture, shocks, blows or vibration.

Unpacking the Equipment
● After unpacking the equipment, please check it immediately for any external damage.

○ If you detect any damage, proceed as directed in the chapter entitled “Care and Maintenance,” under “Safety Inspection.”

○ Save the box and all parts of the packaging for any future transport. Disconnect all cables before packing the balance/scale for shipping.

Equipment Supplied
- Balance/scale
- Weighing pan
- Pan support (only for models with a round weighing pan)
- Gem tray (GK and GW models only)
- AC adapter

Additional equipment supplied with models ED224S, ED124S, GK1203, GK703, GK303:
- Sliding-door draft shield
- Shield ring
- Shield plate
- Dust cover

Additional equipment supplied with models ED423S-DS, ED323S-DS, ED153-DS, GK2202:
- Sliding-door draft shield

Additional equipment supplied with models ED623S(-CW), ED523S-P0CE, ED423S(-CW), ED323S(-CW), ED153(-CW):
- Round glass draft shield with cover

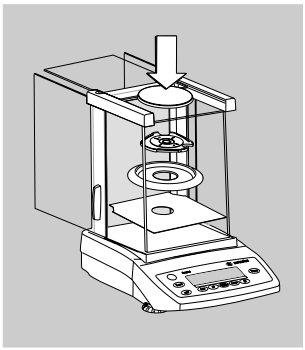
Installation
Choose a location that is not subject to the following negative influences:
- Heat (heater or direct sunlight)
- Drafts from open windows and doors
- Excessive vibration during weighing
- Excessive moisture

Conditioning the Balance/Scale
Moisture in the air can condense on cold surfaces whenever the equipment is moved to a substantially warmer place. To avoid the effects of condensation, condition the weighing instrument for 2 hours at room temperature, leaving it unplugged from AC power.

Seal on Balances/Scales Verified for Use in Legal Metrology in the EU*:
EU legislation requires that a control seal be affixed to verified balances/scales of accuracy class (II). The control seal consists of a sticker with the “Sartorius” logo. If the seal is broken, the verification becomes null and void and the balance/scale must be re-verified.

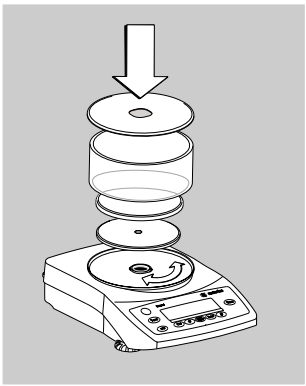
* Including the Signatories of the Agreement on the European Economic Area

Installation



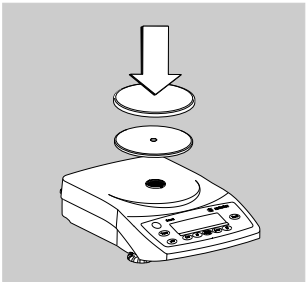
Setting Up the Balance/Scale
Instruments with sliding-door draft shield:

- Place components inside the chamber in the following order:
  - Shield plate
  - Shield ring (not on models ED423S-DS, ED323S-DS, ED153-DS, GK2202)
  - Pan support
  - Weighing pan
  - Gem tray (GK models only)



Instruments with a round glass draft shield:

- Position the components listed below in the order given:
  - Place the lower lid on the balance/scale with the raised edge facing upwards and turn it until it is firmly in position
  - Pan support
  - Weighing pan
  - Glass draft shield
  - Gem tray (GK models only)
  - Place the upper lid on the draft shield with the raised edge facing downwards

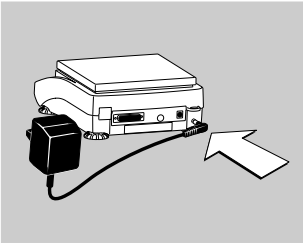


Instruments with a round weighing pan

- Position the components listed below in the order given:
  - Pan support
  - Weighing pan
  - Weighing bowl (GW models only)

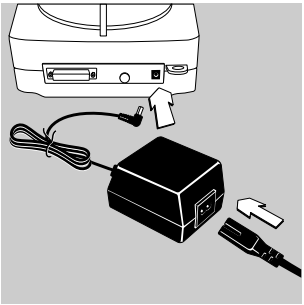
Instruments with a rectangular weighing pan:

- Place the weighing pan on the balance/scale
- Weighing bowl (GW models only)



Connecting the Balance/Scale to AC Power/ Safety Precautions
Use only genuine Sartorius AC adapters. For use within Europe: part no. 6971948

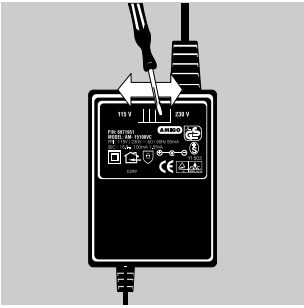
- Connect the angle plug to the balance/scale
- Connect the AC adapter to the wall outlet (mains)



AC Adapter with Country-specific Power Cord
Some models come with separate country-specific power cords for the AC adapter. In Europe, use only genuine Sartorius AC adapter part no. 6971982.

- Connect the angle plug to the balance/scale
- Select the power cord for your area and connect it to the AC adapter
- Plug the power cord into the wall outlet (mains)

The ground terminal is connected to the balance/scale housing, which can be additionally grounded for operation.



Set the required voltage, if necessary.
If you need to set the voltage, use one of the following genuine Sartorius adapters:
- TNG8 adapter, part no. 6971951 (universal)
  or
- TNG8 adapter, part no. 6971952 (for the UK)

- Move the switch to set the voltage to 230 V or 115 V

NOTE: This equipment has been tested and found to comply with the limits pursuant to part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with these instructions, may cause harmful interference to radio communications.

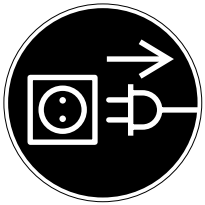
For information on the specific limits and class of this equipment, please refer to the Declaration of Conformity. Depending on the particular class, you are either required or requested to correct the interference.

If you have a Class A digital device, you need to comply with the FCC statement as follows: "Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense."

If you have a Class B digital device, please read and follow the FCC information given below:
"However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

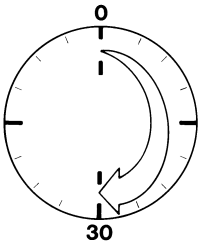
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help."

Before you operate this equipment, check which FCC class (Class A or Class B) it has according to the Declaration of Conformity included. Be sure to observe the information of this Declaration



Connecting Electronic Peripheral Devices

- Make sure to unplug the balance/scale from AC power before you connect or disconnect a peripheral device (printer or computer) to or from the interface port.



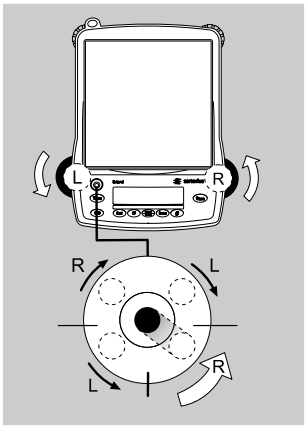
Warmup Time

To ensure accurate results, the balance/scale must warm up for 30 minutes before operation. Only after this time will the instrument have reached the required operating temperature.

Using Verified Balances/Scales in Legal Metrology in the EU*:

- ○ Make sure to allow the equipment to warm up for at least 24 hours after initial connection to AC power or after a relatively long power outage.

* Including the Signatories of the Agreement on the European Economic Area



Leveling the Balance/Scale

Purpose:

– To compensate for unevenness at the place of installation

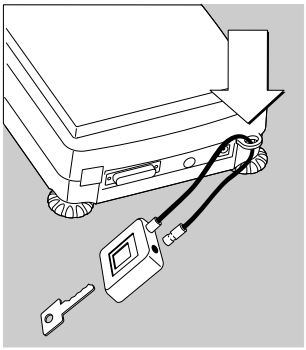
Always level the balance/scale again any time after it has been moved to a different location. Only the 2 front feet are adjusted to level the balance/scale.

● Retract the two rear feet (only on models with a rectangular weighing pan).

● Turn the 2 front feet as shown in the diagram until the air bubble is centered within the circle of the level indicator.

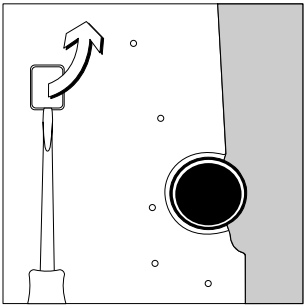
> In most cases this will require several adjustment steps.

● On models with a rectangular weighing pan: extend the 2 rear feet until they touch the surface on which the balance/scale rests.



Anti-theft Locking Device

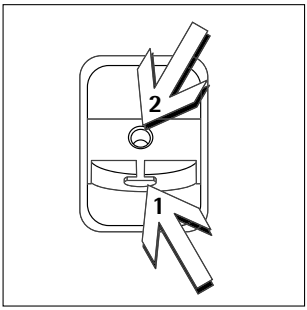
● To secure the balance/scale at the place of installation, fasten a chain or a lock to the lug located on the rear panel of the balance/scale.



Below-Balance/Scale Weighing
A port for a below-balance/scale weighing hanger is located on the bottom of the balance/scale.

○ Below-balance/scale weighing is not permitted in legal metrology.

● Open cover plate on the bottom of the balance/scale.
Important: set the balance/scale on its side to access the cover plate. DO NOT turn the balance/scale upside-down!



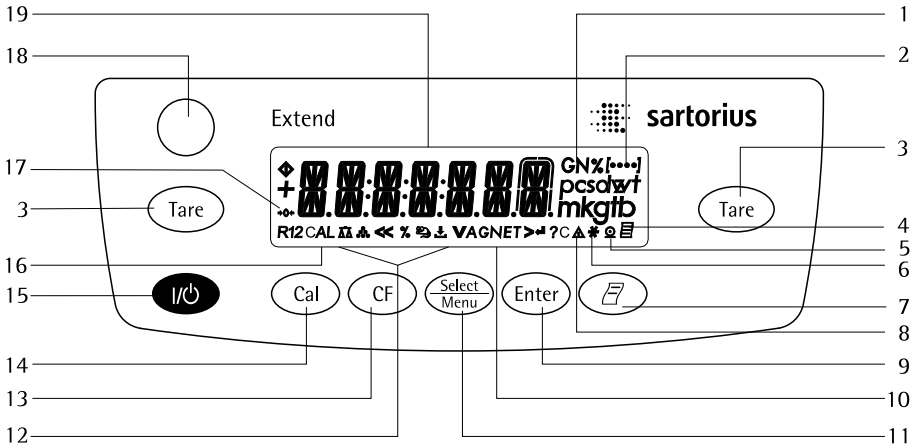
● Using the built-in hook **1**: Attach the sample (e.g., using a suspension wire) to the hanger.

○ Bore hole **2** (not on models ED153.., ED822.., ED8201, ED5201, or ED2201): Carefully fasten the special hanger, or order a hanger directly from Sartorius.

○ Install a shield for protection against drafts if necessary.

Operation

Overview of Display and Operating Elements



Position	Designation
1	Weight units
2	Menu level indicator
3	Taring
4	Symbol: “GLP printing mode active”
5	Symbol: “Printing mode active”
6	Symbol: “Application program active”
7	Data output: Press this key to send readout values to the built-in data interface.
8	Calculated-value indicator (i.e., not a weight value)
9	Start an application program
10	Symbol: Gross or net value
11	Select an application program | Open the operating menu
12	Symbols for active application (⚖⚖, ⁂, %, 🐑, ⬇, A, C)

Position	Designation
13	Delete (Clear Function) This key is generally used to cancel functions: – Quit application program – Cancel calibration/adjustment routine | Exit the operating menu
14	Start calibration/adjustment routine
15	On/off
16	Symbol: Calibration/adjustment function
17	Symbols for zero range (verified models only)
18	Level indicator
19	Weight value displayed in selected weight unit

Symbols:

<<	Save settings and exit the operating menu
<	One menu level higher
V	Scroll through menu items
>	Next item on current menu level
↵	Select a parameter setting

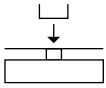
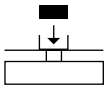
Basic Weighing Function

Features
- Taring the balance/scale
- Printing weights

Preparation
- ● Switch on the balance/scale: Press (I/⏻)
- ● Tare the balance/scale, if necessary: Press (Tare)
- ○ If necessary, change the configuration settings: see the chapter entitled “Configuration”
- ○ If desired, load the factory settings: see the chapter entitled “Configuration”

Additional Functions
- ○ Switching off the balance/scale: Press (I/⏻)

Example
Simple Weighing

Step	Key (or instruction)	Display/Printout
1. Switch on the balance/scale Self-test is performed, followed by automatic initial tare function.	(I/⏻)	0.0 g
2. Place container on weighing pan (in this example: 11.5 g).		+ 11.5 g
3. Tare the balance/scale	(Tare)	0.0 g
4. Place sample in container (in this example: 132 g).		+ 132.0 g
5. Print weight.	(⎙)	N + 132.0 g

Calibration and Adjustment

Purpose
Calibration is the determination of any difference between the measured value displayed and the true weight (mass) of a sample. Adjustment is the correction of this difference, or its reduction to an allowable level within maximum permissible error limits.

Using Verified Balances/Scales as Legal Measuring Instruments in the EU*:
Before using your balance/scale as a legal measuring instrument, internal calibration must be performed at the place of installation.

Features
Calibration/adjustment can be performed only when:
- there is no load on the balance/scale,
- the balance/scale is tared, and
- the internal signal is stable.

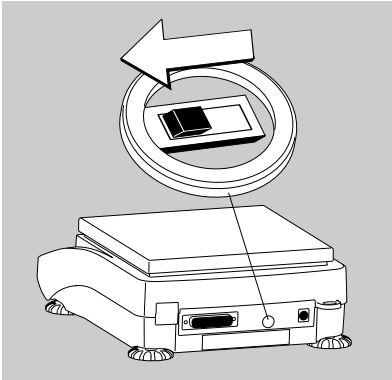
If these conditions are not met, an error message is displayed ("ERR 02").

The weight displayed for the sample on the balance/scale must not differ from the nominal weight by more than 2%.
You can use any of the following weight units in calibration/adjustment: CAL.UNIT: GRAMS, KILOGR. or POUNDS

External Calibration in Verified Balances/Scales of Accuracy Class (II)
- When the balance/scale is used in legal metrology, external calibration is blocked by a seal over the menu access switch.

* Including the Signatories of the Agreement on the European Economic Area

To block calibration/adjustment:
- Select CAL.-ADJ.: BLOCKED in the menu and
- Close the menu access switch on the back of the balance/scale



For details on generating an ISO/GLP-compliant printout of calibration/adjustment results, see page 41.

Following calibration/adjustment, the application program is cleared.

Internal Calibration/Adjustment
In the operating menu, select CAL.-ADJ.: CAL.INT. before beginning.
The built-in motorized calibration weight is applied and removed automatically for internal calibration.
- ● Select calibration/adjustment: Press (Cal)
- > The built-in weight is applied automatically
- > The balance/scale is adjusted
- > The built-in calibration weight is removed.

Internal Calibration/Adjustment
(Only on Models with a Built-in Motorized Calibration Weight)
Models with a resolution of 0.1 mg, ED...-CW, GK.., GW... models, and verified models (with the ...CE suffix) are equipped with a built-in motorized calibration weight as a standard feature

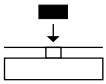
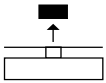
Set the following parameters:
SETUP: BAL.SCAL. : CAL.-ADJ.: CAL.INT. (menu code 1.1.9.4)

The built-in motorized calibration weight is applied and removed automatically for internal calibration.

Step	Key (or instruction)	Display
1. Tare the balance/scale	Tare	0.0 g
2. Start calibration	Cal	CAL.INT.
The built-in weight is applied automatically		CAL.RUN.
3. Calibration/adjustment executed		CAL.END
4. The built-in weight is removed		0.0 g

External Calibration

Parameters (changes in factory settings):
SETUP: BAL.SCAL.: CAL.-ADJ.: CAL.EXT. (menu code 1.1.9.1)
The required calibration weight is configured at the factory (see “Specifications”)

Step	Key (or instruction)	Display
1. Tare the balance/scale	Tare	0.0 g
2. Start calibration. Once you store the zero point the required calibration weight is prompted (flashing display)	Cal	CAL.EXT. - 5000.0 g
3. Apply the prompted calibration weight (in this example: 5000 g) Weight too light: a minus sign “–” is shown Weight too heavy: a plus sign “+” is shown The display stops flashing as soon as the weight value is within the defined limit.		5000.0 g
4. Calibration/adjustment executed; then the calibration weight is displayed		CAL.END + 5000.0 g
5. Remove the calibration weight		0.0 g

Configuration (Operating Menu)

You can configure the balance/scale; i.e., adapt it to individual requirements.

Functions of the Keys during Configuration

Symbol	Key	Function
V	Select Menu	Scroll through menu items
>	Enter	One menu level lower
↵	Enter	Confirm menu item
	CF (press and hold)	Save settings and exit menu from any position
<<	CF	Save settings and exit menu
<	CF	One menu level higher
[••••]		Indicates menu level

Menu Navigation

Example: Setting the Language

Step	Key (or instruction)	Display
1. **Open the menu:** In weighing mode: first menu item is shown	Select Menu (hold)	APPLIC.
2. Scroll upward within the menu level; after the last menu code, the first code is displayed again	Repeatedly: Select Menu	INPUT ... LANGUAG.
3. Select menu level (scrolls to the right)	Enter	ENGLISH o
5. **Change setting:** Scroll until the desired setting is shown	Select Menu	ESPANOL
6. **Confirm the menu code**; "o" indicates the active setting	Enter	ESPANOL o
7. Return to the next higher menu level (from the fourth level)	CF	LENGUA
○ Set other menu items as desired	Select Menu, Enter	
8. **Save settings** and exit menu	Repeatedly: CF	
or		
○ Exit menu without saving changes	I/⏻	
> Restart your application		0.0 g

Parameter Settings: Menu

Level 1 [•]	Level 2 [••]	Level 3 [•••]	Menu code
SETUP	BAL.SCAL. Balance/scale parameters	AMBIENT Ambient conditions	1. 1. 1.
		APP.FILT. Application filter	1. 1. 2.
		STAB.RNG. Stability range	1. 1. 3.
		TARING Taring	1. 1. 5
		AUTOZER. Auto zero	1. 1. 6
		WT.UNIT Basic weight unit	1. 1. 7.
		DISPLAY Display accuracy	1. 1. 8.
		CAL./ADJ. Function of the (Cal) key	1. 1. 9.
		CAL.UNIT Weight unit for calibration	1. 1. 11.
	INTERF. Interface	BAUD Baud rate	1. 5. 1.
		PARITY Parity	1. 5. 2.
		STOPBIT Number of stop bits	1. 5. 3.
		HANDSHK Handshake mode	1. 5. 4.
		DATABIT Number of data bits	1. 5. 5.
		BAT.REC. Output: SBI (ASCII) or printout	1. 5. 6.
	PRNT.OUT Settings for print function	PRINT (manual/automatic)	1. 6. 1.
		STOPAUT. Stop automatic printing	1. 6. 2.
		AUT.CYCL. Time-dependent autom. printing	1. 6. 3.
		TAR./PRT. Tare bal./scale after ind. print	1. 6. 4.
		PRT.INIT. Printout of appl. parameters	1. 6. 5.
		FORMAT Line format for printout	1. 6. 6.
		GLP ISO/GLP-compliant printout	1. 6. 7.
		TIME: 12/24 h	1. 6. 8.
		DATE: Format	1. 6. 9.
	EXTRAS Additional functions	MENU	1. 8. 1.
		SIGNAL Acoustic signal (beep)	1. 8. 2.
		KEYS Keypad	1. 8. 3.
		EXT.KEY External switch function	1. 8. 4.
		ON MODE Power-on mode	1. 8. 5.
		BACKLIT Display backlighting	1. 8. 6.
	RESET	MENU Factory settings	1. 9. 1.
APPLIC. Application programs	WEIGH		2. 1.
	UNIT Toggle wt. unit	DISP.DIG. Display accuracy	2. 2. 2.
	COUNT. Counting	RESOLUT. Resolution	2. 3. 1.
		REF.UPDT. Autom. ref. sample updating	2. 3. 2.
	PERCENT Weighing in percent	DEC.PLCS Decimal places	2. 4. 1.
	NET-TOT Net-total formulation	COMP.PRT. Printout of components	2. 5. 1.
	TOTAL Totalizing	COMP.PRT. Printout of components	2. 6. 1.
	ANIMALW. Animal weighing	ACTIVTY. Animal activity	2. 7. 1.
		START	2. 7. 2.
	CALC. Calculation	METHOD (operator)	2. 8. 1.
		DEC.PLCS Decimal places	2. 8. 2.
	DENSITY Density determination	DEC.PLCS Decimal places	2. 9. 1.
INPUT Input	ID NO.	ID input; max. 7 characters	3. 1.
INFO Information	VERSION, SER.NO., MODEL	Display software ver., serial no., model	4. 1./.2./.3.
LANGUAG.	ENGLISH (factory setting)		5. 1.
	DEUTSCH German		5. 2.
	FRANC. French		5. 3.
	ITAL. Italian		5. 4.
	ESPANOL Spanish		5. 5.
	CODES Menu shows codes (not texts)		5. 6.

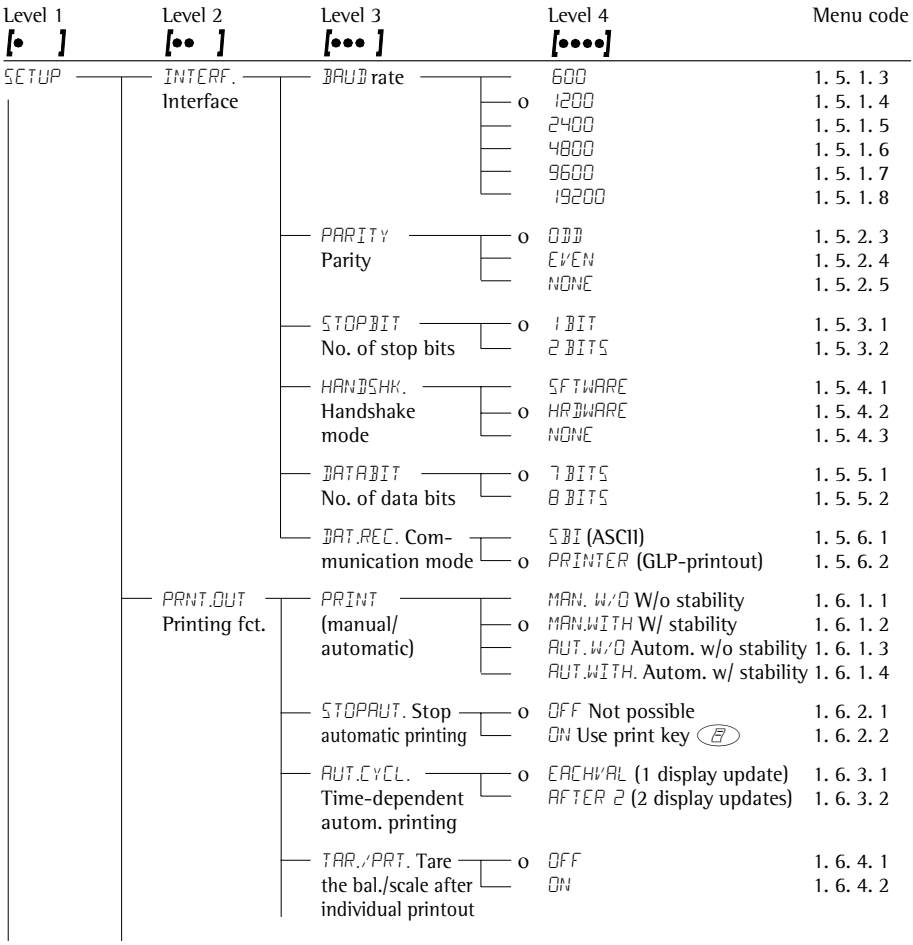
Parameter Settings: Overview

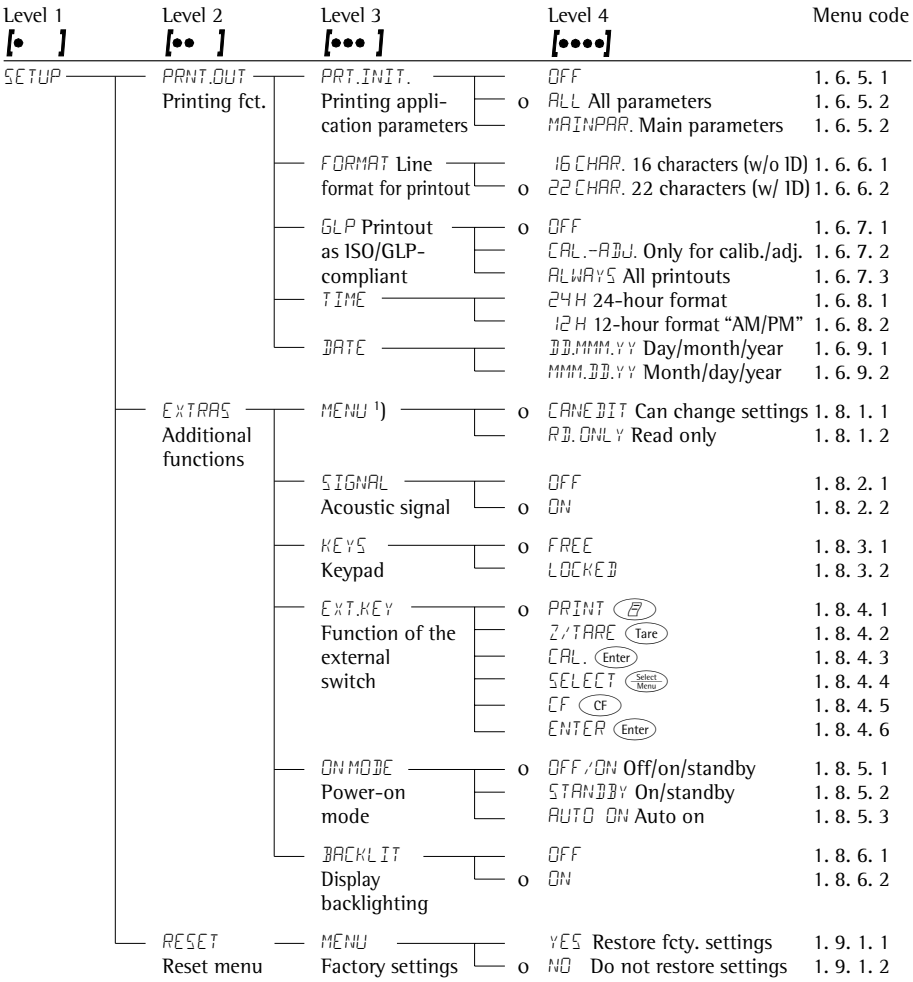
o = Factory setting √ = User-defined setting

Level 1 [•]	Level 2 [••]	Level 3 [•••]		Level 4 [••••]	Menu code
SETUP	BAL.SCAL. Balance/scale parameters	AMBIENT Ambient conditions (Filter adaptation)		V.STABLE Very stable	1. 1. 1. 1
			o	STABLE	1. 1. 1. 2
				UNSTABL	1. 1. 1. 3
				V.UNSTBL. Very unstable	1. 1. 1. 4
		APP.FILT. Application filter	o	FINAL.RD. Final readout mode	1. 1. 2. 1
				FILLING Filling mode	1. 1. 2. 2
		STAB.RNG. Stability range		1/4 DIG. (digit)	1. 1. 3. 1
				1/2 DIG.	1. 1. 3. 2
				1 - DIGIT	1. 1. 3. 3
			o	2 - DIGIT	1. 1. 3. 4
				4 - DIGIT	1. 1. 3. 5
				8 - DIGIT	1. 1. 3. 6
		TARING [1] Taring		W/O STB W/o stability)	1. 1. 5. 1
			o	W/ STAB After stability)	1. 1. 5. 2
		AUTOZER. Auto zero		OFF	1. 1. 6. 1
			o	ON	1. 1. 6. 2
		WT.UNIT Basic weight through unit		For list of units, see "Toggling between Weight Units"	1. 1. 7. 1 – 1. 1. 7. 23
		DISP.DIG. Display accuracy	o	ALL	1. 1. 8. 1
				MINUS 1 [1])	1. 1. 8. 2
				DIVIS. 1 1 interval[1])	1. 1. 8. 6
		CAL./ADJ. Function of the (Cal) key	o	CAL.EXT. External cal./adj.	1. 1. 9. 1
				CAL.INT. Internal cal./adj.[2])	1. 1. 9. 2
				BLOCKED (Cal) key blocked	1. 1. 3. 3
		CAL.UNIT. Unit[1]) for calibration weight	o	GRAMS	1. 1.11. 1
				KILOGR. Kilograms	1. 1.11. 2
				POUNDS	1. 1.11. 3

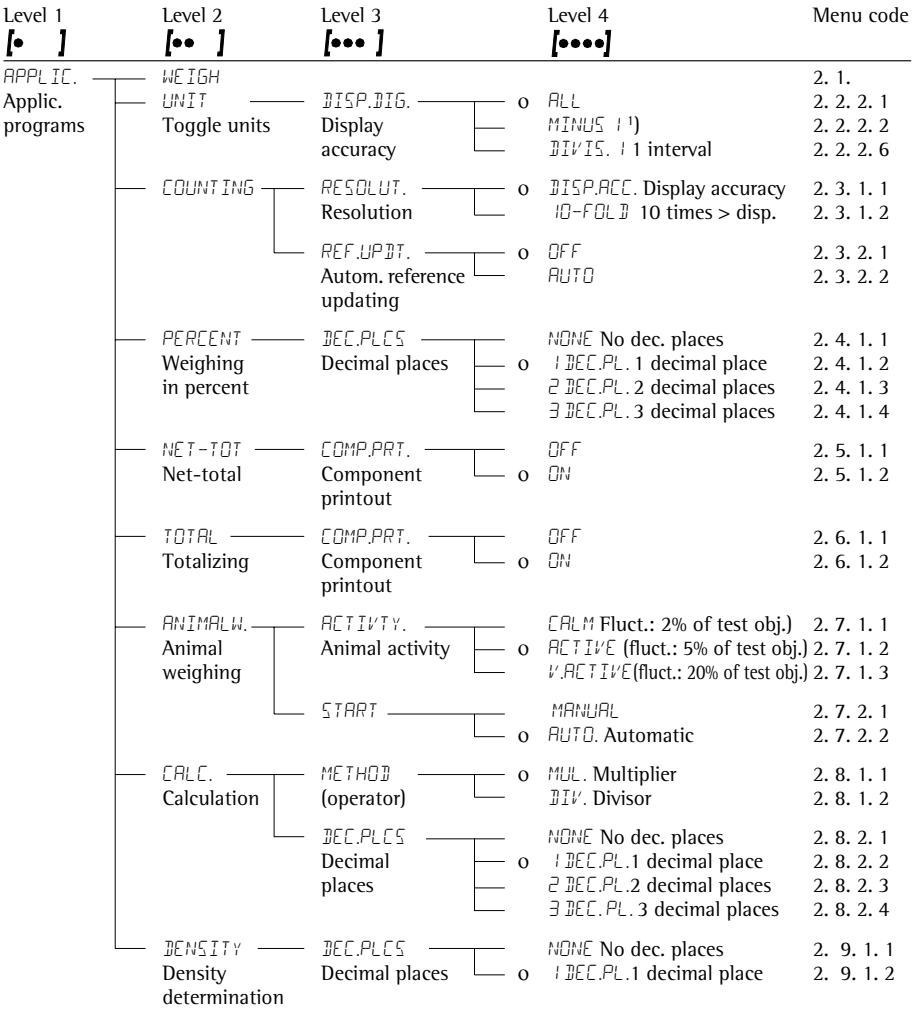
[1]) Setting cannot be changed on verified balances/scales

[2]) Only on models with built-in motorized calibration weight


Level 1
[•]
Level 2
[••]
Level 3
[•••]
Level 4
[••••]
Menu code
SETUP
INTERF.
Interface
BAUD rate
o
600 1. 5. 1. 3
1200 1. 5. 1. 4
2400 1. 5. 1. 5
4800 1. 5. 1. 6
9600 1. 5. 1. 7
19200 1. 5. 1. 8
PARITY
Parity
o
ODD 1. 5. 2. 3
EVEN 1. 5. 2. 4
NONE 1. 5. 2. 5
STOPBIT
No. of stop bits
o
1 BIT 1. 5. 3. 1
2 BITS 1. 5. 3. 2
HANDSHK.
Handshake mode
SFTWARE 1. 5. 4. 1
o
HRDWARE 1. 5. 4. 2
NONE 1. 5. 4. 3
DATABIT
No. of data bits
o
7 BITS 1. 5. 5. 1
8 BITS 1. 5. 5. 2
DAT.REC. Communication mode
SBI (ASCII) 1. 5. 6. 1
o
PRINTER (GLP-printout) 1. 5. 6. 2
PRNT.OUT
Printing fct.
PRINT
(manual/ automatic)
MAN. W/O W/o stability 1. 6. 1. 1
o
MAN.WITH W/ stability 1. 6. 1. 2
AUT.W/O Autom. w/o stability 1. 6. 1. 3
AUT.WITH. Autom. w/ stability 1. 6. 1. 4
STOPAUT. Stop automatic printing
o
OFF Not possible 1. 6. 2. 1
ON Use print key 1. 6. 2. 2
AUT.CYCL.
Time-dependent autom. printing
o
EACHVAL (1 display update) 1. 6. 3. 1
AFTER 2 (2 display updates) 1. 6. 3. 2
TAR./PRT. Tare the bal./scale after individual printout
o
OFF 1. 6. 4. 1
ON 1. 6. 4. 2



[1]) Setting cannot be changed on verified balances/scales



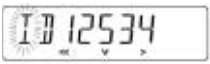
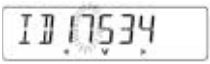
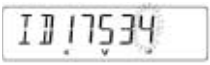
[1]) Setting cannot be changed on verified balances/scales

ID Number for ISO/GLP-compliant Data Record

Level 1 [•]	Level 2 [••]	Level 3 [•••]	Menu code
INPUT	ID NO.	ID input; max. 7 characters Permitted characters: 0 to 9; A to Z; dash/hyphen; space	3. 1.
Input			

Function of the Keys when Entering ID Numbers

Select Menu key: Press and hold to repeat

Display	Key	Display symbol	Function
	First position:		
	Enter	>	Go to next position
	Select Menu	V	Select current position
	CF	<<	Exit without saving changes
	Middle positions:		
	Select Menu	V	Select current position
	Enter	>	Go to next position
	CF	<	Go to previous position
	Last position:		
	Select Menu	V	Select current position
	CF	<	Go to previous position
	Enter	↵	Store and exit

Device Information

Level 1 [•]	Level 2 [••]	Level 3 [•••]	Example	Menu code
INFO Information	VERSION	Show software version	REL.32.02	4. 1.
	SER. NO.	Show serial number (To toggle focus between upper and lower display sections, press Select Menu)	1080 1234	4. 2.
	MODEL	Show model designation (to change focus from upper to middle to lower display section and back, press Select Menu)	ED62025	4. 3.

Display of Menu Items: Text or Codes

LANGUAG.	ENGLISH (factory setting)	5. 1.
	DEUTSCH German	5. 2.
	FRANC. French	5. 3.
	ITAL. Italian	5. 4.
	ESPANOL Spanish	5. 5.
	CODES Menu shows codes (not texts)	5. 6.

Counting

Display symbol: ⁂

Purpose
With the Counting program you can determine the number of parts that each have approximately equal weight. To do this, a known number of parts (the reference sample quantity) is weighed first, and the individual piece weight (reference weight) is calculated from this result. Thus the number of parts subsequently placed on the balance/scale can be determined from their weight.

Changing the Reference Sample Quantity
Activate function:
Press the Select Menu key
Select the desired reference sample quantity (1 to 100):
In increments of 1: Press the Select Menu key briefly
In increments of 10:
Press and hold the Select Menu key.
The quantity is stored in battery-backed memory.

Reference Sample Updating
Automatic reference sample updating optimizes the counting accuracy. You can activate or deactivate this function in the menu.

Automatic reference sample updating is performed when the requirements, including the specified stability criterion, have been met.

The abbreviation OPT, for "optimizing", is displayed briefly with the new reference sample quantity.

Preparation
- Select the Counting application in the menu:
  see "Configuration."

- Set the following parameters:

APPLIC. Application program

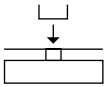
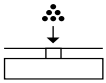
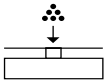
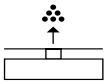
COUNT.
- RESOLUT. Resolution
  - o DISP.ACC. Display accuracy
  - 10-FOLD 10-fold higher
- REF.UPDT. Autom. ref. sample updating
  - o OFF Display accuracy
  - AUTOM. Automatic

o = Factory setting

Printout: Counting

nRef + 10	: Reference sample quantity
wRef + 21.14 g	: Reference weight
Qnt + 500 pcs	: Calculated quantity

Example: Counting parts of equal weight
Parameter settings: APPLIC.: COUNT. (menu code 2. 3.)

Step	Key (or instruction)	Display/Data output
1. Place empty container on the balance/scale		+ 22.6 g
2. Tare the balance/scale	Tare	0.0 g
3. Add reference sample quantity to container (in this example: 20 pcs)		
4. Changing the reference sample quantity:	Select Menu	REF 10 pcs
5. Select reference sample quantity: In increments of 1 (1, 2, 3, etc. to 100) In increments of 10 (10, 20, etc. to 100)	Repeatedly: Select Menu Press briefly Select Menu press and hold	 REF 20 pcs
6. Confirm selected reference sample quantity and start application The current reference weight remains stored until a new reference is set or the power supply is interrupted	Enter	+ 20 pcs * nRef 20 pcs wRef 1.07 g
7. Add desired number of pieces		+ 500 pcs
8. If desired, print quantity		Qnt + 500 pcs
9. Toggle display between mean piece weight, weight, quantity	 Repeatedly: Select Menu	1.07 g ⚠* + 535.0 g * + 500 pcs *
10. Unload the balance/scale		– 2 pcs *
11. Repeat as needed, starting from Step 7		
12. Delete reference value	CF	0.0 g

Weighing in Percent

Display symbol: %

Purpose
This application program allows you to obtain weight readouts in percent which are in proportion to a reference weight.

Changing the Reference Percentage
Activate function:
Press the Select Menu key
Select the desired reference (1 to 100):
In increments of 1: Press the Select Menu key briefly
In increments of 10: Press and hold the Select Menu key.

The percentage is stored in battery-backed memory.

Preparation

- Select the Weighing in percent application in the menu: see “Configuration.”

- Set the following parameters:

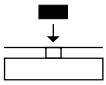
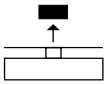
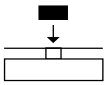
APPLIC. Application program
└ PERCENT Weighing in percent
  └ DEC.PLCS. Decimal places
    - NONE No decimal places
    - o 1 DEC.PL. 1 decimal place
    - 2 DEC.PL. 2 decimal places
    - 3 DEC.PL. 3 decimal places

o = Factory setting

Printout: Weighing in percent

pRef 100	: Reference percentage
Wxx% 111.6 g	: Reference weight net xx% for selected reference percentage
Prc + 94.9 pcs	: Calculated reference percentage

Example: Determining residual weight in percent
Parameter settings: APPLIC.: PERCENT (menu code 2. 4.)
Reference percentage: REF 100%

Step	Key (or instruction)	Display/Data output
1. Tare the balance/scale	Tare	0.0 g
2. Information: Enter reference percentage (Changing the reference: see the previous page)	Select Menu	REF 100 %
3. Place sample equal to 100% on the balance/scale (in this example: 111.6 g)		
4. Initialize the balance/scale The current reference weight remains stored until a new reference is set or the power supply is interrupted	Enter	+ 100.0 % * pRef 100 % Wxx% 111.6 g
5. Remove sample (e.g., for drying)		
6. Place unknown weight on balance/scale (in this example: 322.5 g)		+ 94.9 % *
7. If desired, print percentage		Prc + 94.9 %
8. Toggle display between weight and percentage	Repeatedly: Select Menu	+ 105.9 g * + 94.9 % *
9. Clear display of residual weight and reference percentage	CF	+ 105.9 g
10. If desired, print net residual weight		N + 105.9 g

Calculation

Display symbol: C

Purpose
With this application program you can calculate weight value using a multiplier or divisor. This can be used, for example, to determine the weight per unit area, or “gsm” weight (grams per square meter), of paper.

Setting the Factor or Divisor
Activate function:
Press the Select Menu key
Select a number of up to 7 digits and, if needed, one decimal point (0.000001 to 9999999):
In increments of 1: Press the Select Menu key briefly
To increase the value without pressing repeatedly:
Press and hold the Select Menu key.

The selected operator is stored in battery-backed memory.

Preparation

- Select the Calculation application in the menu:
  see “Configuration.”

- Set the following parameters:

APPLIC. Application program
└ CALC. Calculation
  └ METHOD Operator
    ├ o MUL. Multiplier
    └ DIV. Divisor

  DEC.PLCS. Decimal places
    ├ NONE No decimal places
    ├ o 1 DEC.PL. 1 decimal place
    ├ 2 DEC.PL. 2 decimal places
    └ 3 DEC.PL. 3 decimal places

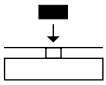
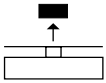
o = Factory setting

Printout: Calculation

Mul	+	1.2634		: Multiplier
Div	+	0.6237		: Divisor
Res	+	79.7	o	: Result

Example:
Calculating the weight per unit area of paper: An A4 sheet of paper is used in this example, with surface dimensions of 0.210 m × 0.297 m = 0.06237 m². To determine the weight per unit area, the total weight is divided by the surface.

Parameter settings:
APPLIC.: CALC..: METHOD: DIV. (menu code 2. 8. 1. 2)

Step	Key (or instruction)	Display/Data output
1. Tare the balance/scale	(Tare)	0.00 g
2. Activate divisor input	(Select Menu)	_____0.
3. Set the divisor (in this example:0.06237): Position the decimal point,	(Enter), 5x (Select Menu), 2× (Enter),	__.00000
Enter numerals	Repeatedly or press and hold; (Select Menu), (Enter), etc.	__.06000 __.06237
4. Store the divisor and initialize the balance/scale The current divisor remains stored in battery-backed memory until the setting is changed	(Enter)	+ 0.0 o Div 0.6237
5. Weight per unit area: Place an A4 sheet of paper on the balance/scale		+ 79.7 o *
6. If desired, print result	(🖹)	Res + 79.7 o
7. Toggle display between weight and calculated value	Repeatedly: (Select Menu)	+ 4.97 g * + 79.7 o *
8. Unload the balance/scale		+ 0.0 o *
9. Repeat as needed, starting from Step 5		

Animal Weighing/Averaging

Display symbol:

Purpose
Use this program to determine the weights of unstable samples (e.g., live animals) or to determine weights under unstable ambient conditions. With this program, the balance/scale calculates the weight as the average of a defined number of individual weighing operations (also referred to as "subweighing operations").

Changing the Number of Subweighing Operations
Activate function:
Press the Select Menu key
Select the desired number of measurement (1 to 100):
In increments of 1: Press the Select Menu key briefly
In increments of 10: Press and hold the Select Menu key.

The selected number of measurements is stored in battery-backed memory.

Preparation
- Select the Animal weighing application in the menu:
  see "Configuration."

- Set the following parameters:

APPLIC. Application program
- ANIMALW. Animal weighing
  - ACTIVTY. Animal activity
    - CALM Stable readout
    - o ACTIVE Unstable
    - V.ACTIVE Very unstable readout
  - START
    - MANUAL
    - o AUTOM. Automatic

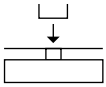
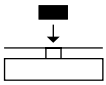
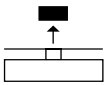
o = Factory setting

Printout: Animal weighing

mDef 20	: Number of subweighing operations
x-Net + 410.1 g	: Calculated average

Example: Determining animal weight with automatic start and 20 subweighing operations (measurements)

Parameter settings: APPLIC.: ANIMALW. (menu code 2. 7.)

Step	Key (or instruction)	Display/Data output
1. Place animal weighing bowl on the balance/scale		22.6 g
2. Tare the balance/scale	Tare	0.0 g
3. Change the number of subweighing operations:	Select Menu	REF 30
4. Set number of measurements: In increments of 1 (1, 2, 3, etc. to 100) In increments of 10 (10, 20, etc. to 100)	Repeatedly: Select Menu Press briefly Select Menu press and hold	REF 20
5. Confirm number of measurements and start automatic animal weighing The number of measurements remains stored in battery-backed memory until the setting is changed	Enter	+ 0.0 g *
6. Place first animal in bowl. The balance/scale delays the start of measurements until the difference between 2 measurements meets the criterion		888 20 19 1
7. Read off the result The result is displayed with the "*" symbol (= calculated value) and remains displayed until the sample (animal) is removed from the load plate (bowl)		+ 410.1 g ⚠* mDef 20 x-Net + 410.1 g
8. Unload the balance/scale		+ 0.0 g *
9. Weigh next animal (if des.) Next weighing series begins automatically		

Net-total Formulation

Display symbol: ⭳

Purpose
With this application program you can weigh in different components up to a defined total. You can print out both the total weight and the individual weights of the components.

Features
- Weigh up to 99 components from “0” to a defined total component weight.
- Store component weights (“Store xx comp.”), with
  – display zeroed automatically after value is stored, and
  – automatic printout
- Clear component memory following cancellation of the weighing sequence (by pressing CF) and printout of the total weight.
- Toggling between component weight and total weight by pressing and holding Select Menu (< 2 sec).
- Printout of the total of the individual component weights (**T–Comp**)

Preparation
- Select the Net-total application in the menu:
  see “Configuration.”
- Set the following parameters:

APPLIC. Application program
└ NET-TOTL. Net-total formulation
  └ COMP.PRT. Printout of components
    ├ OFF
    └ o ON

o = Factory setting

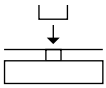
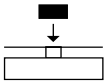
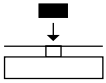
Printout: Net-total formulation

```
Comp 2+   278.1 g
T-Comp+ 2117.5 g
```

: Second component
: Sum of components

Example: Counting parts into a container

Parameter settings:
APPLIC.: NET-TOT (menu code 2. 5.)

Step	Key (or instruction)	Display/Data output
1. Place empty container on the balance/scale.		65.0 g
2. Tare the balance/scale	Tare	0.0 g
3. Add first component		+ 120.5 g
4. Store component data	Enter	+ 0.0 g * NET Comp 1+ 120.5 g
5. Add next component		+ 70.5 g * NET
6. Store component data	Enter	+ 0.0 g * NET Comp 2+ 70.5 g
7. Weigh in further components as desired	Repeat steps 5 and 6	
8. Fill to desired final value view the current total weight value:	Select Menu	+ 191.0 g *
9. Print total weight and clear the component memory	CF	+ 2117.5 g T-Comp+ 2117.5 g

Totalizing

Display symbol: ⭳

Purpose
With this application program you can add values from successive, mutually independent weight values to a total that exceeds the capacity of the balance/scale.

Features
- Totalizing memory for up to 99 values
- Store component weights (“Store xx comp.”), with automatic printout
- Toggle display between the current individual weight value and the value in totalizing memory by pressing Select Menu
- Printout of the total of the individual component weights (**S–Comp**)
- To close the application program and print the total weight: press CF

Preparation
- Select the Totalizing application in the menu:
  see “Configuration.”
- Set the following parameters:

APPLIC. Application program
└ TOTAL Totalizing
  └ COMP.PRT. Printout of components
    ├ OFF
    └ o ON

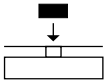
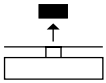
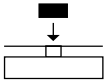
o = Factory setting

Printout: Totalizing

```
Comp 2+   278.1 g   : Second component
S-Comp+ 2117.5 g    : Totalizing memory
```

Example: Totalizing weight values

Parameter settings:
APPLIC.: TOTAL: COMP.PRT: ON (menu code 2. 6. 1. 2)

Step	Key (or instruction)	Display/Data output
1. Tare the balance/scale	Tare	0.0 g
2. Place sample balance/scale (in this example: 380 g)		+ 380.0 g
3. Store value in memory	Enter	+ 380.0 g * Comp 1+ 380.0 g
4. Remove sample		+ 0.0 g *
5. Place the next sample on the balance/scale (in this example, 575 g)		+ 575.0 g *
6. Store value in memory	Enter	+ 955.0 g * + 575.0 g * Comp 2+ 575.0 g
7. View the value in totalizing memory	Select Menu	+ 955.0 g ⚠*
8. Weigh in further components as desired	Repeat steps 5 and 6	
9. Print total weight and clear the totalizing memory	CF	0.0 g S-Comp+ 2117.5 g

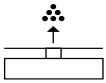
Mass Unit Conversion

Purpose
With this application program you can change the weight value displayed from the basic weight unit to any of 4 application weight units (see table on next page).

Features
- Set the basic unit and display accuracy in the Setup menu: see "Configuration."
- Set the application weight units and display accuracies in the Application menu.
- These settings are stored in battery-backed memory.
- The basic unit is active when the balance/scale is powered up.

Example: Change display from the basic unit (in this example, grams [g]) to pounds [lb] and then to Troy ounces [ozt].

Set the following parameters: APPLIC.: UNIT (code 2. 2.)

Step	Key (or instruction)	Display/Data output
1. Begin selection of an application weight unit	Select Menu	NONE o
2. Select an application unit; in this example, pounds (see table on next page)	Repeatedly: Select Menu	POUNDS
3. Confirm the weight unit (pounds)	Enter	POUNDS o
4. Select the next application weight unit; in this example: Troy ounces (see table on next page)	Enter, Repeatedly: Select Menu	NONE o TROY OZ.
5. Confirm weight unit (Troy ounces)	Enter	TROY OZ. o
6. Select other application units if desired (max. 4 total) (otherwise, confirm NONE by pressing Enter)		
7. Store selection	CF	0.00 g
8. Place sample on balance/scale		+ 100.00 g
9. Change unit for weight value	Repeatedly: Enter	+ 0.22046 lb + 3.5275 ozt

The following weight units are available in your Extend balance/scale (in legal metrology, only units permitted by national law are available):

Menu item	Unit	Conversion factor	Display symbol
1) USERDEF. [1])	Grams	1,00000000000	o
2) GRAMS (Factory setting)	Grams	1.00000000000	g
3) KILOGR.	Kilograms	0.00100000000	kg
4) CARATS	Carats	5.00000000000	o
5) POUNDS	Pounds	0.00220462260	lb
6) OUNCES	Ounces	0.03527396200	oz
7) TROY OZ.	Troy ounces	0.03215074700	ozt
8) HKTAEL	Hong Kong taels	0.02671725000	tl
9) SNG.TAEL.	Singapore taels	0.02645544638	tl
10) TWN.TAEL	Taiwanese taels	0.02666666000	tl
11) GRAINS	Grains	15.4323583500	GN
12) PENY.WT.	Pennyweights	0.64301493100	dwt
13) MILLIGR.	Milligrams	1000.00000000	mg
14) PT.P.LB.	Parts per pound	1.12876677120	o
15) CHN.TAEL	Chinese taels	0.02645547175	tl
16) MOMMES	mommes	0.26670000000	m
17) AUSTR.CT.	Austrian carats	5.00000000000	Kt
18) TOLA	Tola	0.08573333810	o
19) BAHT	Baht	0.06578947436	b
20) MESGHAL	Mesghal	0.21700000000	o
21) TONS	Tons	0.00000100000	t
22) LB/OZ [2])	Pounds : ounces	0.03527396200	lb oz
23) NEWTON	Newton	0.00980665000	N

[1]) = User-defined weight unit; can be loaded in the balance/scale over an optional RS-232 or USB interface using a computer program.

[2]) = The format for display of pounds/ounces cannot be changed: xx:yy.yy x=lb, y=oz

⚠ Some weight units may be blocked from use in legal metrology, depending on national verification laws.

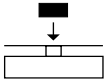
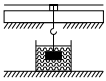
Density Determination

Display symbol: ΔΔ

Purpose
This application program lets you determine the density of solid substances using the buoyancy method. You can have results displayed with one decimal place, or no decimal places: see "Configuration."
Note: the sample holder and suspension wire used in the example below are not included with the balance/scale.

Parameter settings:
APPLIC.: DENSITY: DEC.PLCS: 1DEC.PL. (menu code 2. 9. 1. 2)

Example: Determining the density of a solid sample.

Step	Key (or instruction)	Display/Data output
1. Attach sample holder to suspension wire		
2. Tare the balance/scale	Tare	0.0 g
3. Start application program	Enter	
4. Confirm "AIR" display	Enter	AIR ?
5. Determine the weight of the sample in air: Place sample on the balance/scale		+ 20.0 g *
6. Store value for weight in air	Enter	
7. Remove sample from the balance/scale		WATER ?
8. Determine weight in liquid: place sample in holder		
9. Confirm "WATER" display	Enter	0.0 g *
10. Immerse sample in liquid		+ 15.0 g *
11. Store value for weight in liquid, view result, and print	Enter	+ 4.0 o * Wa + 20.0 g Wfl + 15.0 g Rho 4.0 o
12. Delete result	CF	
13. Repeat as desired, starting from Step 3.		

ISO/GLP-compliant Printout/Record

Features
You can have device information, ID texts and date and time printed before (GLP header) and after (GLP footer) the values of a weighing series. These parameters include:

GLP header:
- Date
- Time at beginning of measurement
- Balance/scale manufacturer
- Balance/scale model
- Balance/scale serial number
- Software version number
- Identification number of the current sampling operation

GLP footer:
- Date
- Time at end of measurement
- Field for operator signature

⚠ **Operating the Balance/Scale with a Verifiable ISO/GLP Printer:**
- Connect a Sartorius data printer designed for ISO/GLP documentation (e.g., the YDP03-0CE printer) to the balance/scale.

Configuration
- Setting menu codes for the printout (see “Configuration”):
- ISO/GLP-compliant printout or record only for calibration/adjustment: SETUP: PRNT.OUT: GLP: CAL.-ADJ. (menu code 1. 6. 7. 2) or ISO/GLP-compliant printout or record always on: SETUP: PRNT.OUT: GLP: ALWAYS ON (code 1. 6. 7. 3)

- Line format for printout: include data ID codes (22 characters; factory setting): SETUP: PRNT.OUT: FORMAT: 22 CHAR. (menu code 1. 6. 6. 2)

- Formats for time: SETUP: PRNT.OUT: TIME: 24 H (menu code 1. 6. 8. 1) or SETUP: PRNT.OUT: TIME: 12 H (menu code 1. 6. 8. 2)

- Formats for date: SETUP: PRNT.OUT: DATE: DD.MMM.YY (menu code 1. 6. 9. 1) or SETUP: PRNT.OUT: DATE: MMM.DD.YY (menu code 1. 6. 9. 2)

⚠ No ISO/GLP-compliant record is output if any of the following settings are configured: SETUP: PRNT.OUT PRINT: AUT.W/O or AUT.WITH (menu code 1. 6. 1. 3, 1. 6. 1. 4,) or FORMAT: 16 CHAR. (menu code 1. 6. 6. 1)

Function Keys
Transfer header and first measured value: press (⊟)

> The header is included with the first printout/data record.

To output header and reference data automatically when an application program is active: press (Enter)

Exit the application:
1) To send the GLP footer: press (CF)
2) Quit application program: press (CF) again

The ISO/GLP-compliant printout can contain the following lines:

`--------------------`	Dotted line
`17-Aug-2005  10:15`	Date/time (beginning of measurement)
`SARTORIUS`	Balance/scale manufacturer
`Mod.  ED8201`	Model
`Ser. no.  10105355`	Balance/scale serial number
`Ver. no.  00-32-02`	Software version
`ID  2690 923`	ID.
`--------------------`	Dotted line
`L ID`	Measurement series no.
`nRef  10 pcs`	Counting: reference sample quantity
`wRef  21.14 g`	Counting: reference weight
`Qnt +  567 pcs`	Counting result
`--------------------`	Dotted line
`17-Aug-2005  10:20`	Date/time (end of measurement)
`Name:`	Field for operator signature
	Blank line
`--------------------`	Dotted line

ISO/GLP-compliant printout for external calibration/adjustment:

`--------------------`	Dotted line
`17-Aug-2005  10:30`	Date/time (beginning of measurement)
`SARTORIUS`	Balance/scale manufacturer
`Mod.  ED8201`	Model
`Ser. no.  10105352`	Balance/scale serial number
`Ver. no.  00-32-02`	Software version
`ID  2690 923`	ID.
`--------------------`	Dotted line
`Cal. Ext. Test`	Calibration/adjustment mode
`Set +  5000.0 g`	Calibration weight
`Diff. +  0.2 g`	Difference determined in calibration
`Cal. Ext. Complete`	Confirmation of completed calibration procedure
`Diff.  0.0 g`	Difference from target following adjustment
`--------------------`	Dotted line
`17-Aug-2005  10:32`	Date/time (end of measurement)
`Name:`	Field for operator signature
	Blank line
`--------------------`	Dotted line

Interface Port

Purpose
Your balance/scale is equipped with an interface port for connection to a computer or other peripheral device.
You can connect a computer to change, start and/or monitor the functions of the balance/scale and the application programs.

Features
Type of interface: Serial interface
Operating mode: Full duplex
Standard: RS-232
Transmission rates:
600, 1200, 2400, 4800, 9600
and 19,200 baud
Parity: odd, even, none
Number of data bits: 7 or 8 bits
Character format:
1 start bit, 7-bit ASCII, parity,
1 or 2 stop bits
Handshake:
For 2-wire interface:
software (XON/XOFF)
For 4-wire interface:
hardware (CTS/DTR)
Data output format of the balance/scale:
16 or 22 characters

Factory Settings
Transmission rate:
1200 baud (menu code 1. 5. 1. 4)
Parity: ODD (1. 5. 2. 3)
Stop bits: 1 STOP bit (1. 5. 3. 1)
Handshake:
HANDSHK. Hardware, (1. 5. 4. 2)
Operating mode: PRINTER (1. 5. 6. 2)
printing: MAN.WITH Manual after stability (1. 6. 1. 2)

Preparation
See “Pin Assignments” and
“Pin Assignment Chart”

Identification of Non-Verified Digits
To have non-verified digits (when “e # d”) automatically identified on the printout, set the following parameters: Communication: PRINTER (menu code 1. 5. 6. 2)
Non-verified digits are marked by square brackets [ ].

Data Output Format with 16 Characters

Display segments that are not activated are output as spaces.

The type of character that can be output depends on the character's position:

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	+			D	D	D	D	D	D	D	*	U	U	U	CR	LF
or	–			.	.	.	.	.	.	.		*	*	*		
or	*		*	*	*	*	*	*	*	*						

*: Space
D: Digit or letter
U: Unit symbol
CR: Carriage return
LF: Line feed
.: Decimal point

Special Codes

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	*	*	*	*	*	*	*	*	*	*	*	*	*	*	CR	LF
or						H	i	g	h							
or						L	o	w								
or				C	a	l	.	E	x	t	.					

*: Space
Cal. Ext.: Calibration, external
High: Overload
Low: Underload

Error Codes

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
				E	r	r	*	#	#	#	*	*	*	*	CR	LF
				A	P	P	.	E	R	R[1])	*	*	*	*	CR	LF
				D	I	S	.	E	R	R[1])	*	*	*	*	CR	LF
				P	R	T	.	E	R	R[1])	*	*	*	*	CR	LF

*: Space
#: Error number

[1]) See "Troubleshooting Guide"

Example: Output of the weight value +123.56 g

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	+	*	*	*	1	2	3	.	5	6	*	g	*	*	CR	LF
	+	*	*	1	2	3	.	5	[	6	][1])	g	*	*	CR	LF

Position 1: Plus or minus sign or space
Position 2: Space
Position 3–10: Weight with a decimal point; leading zeros = space
Position 11: Space
Position 12–14: Unit symbol or space
Position 15: Carriage return
Position 16: Line feed

Data Output Format with 22 Characters

When data is output with an ID code, the 6-character code precedes the 16-character string described above. The code identifies the subsequent value.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
I	I	I	I	I	I	+	*	D	D	D	D	D	D	D	D	*	U	U	U	CR	LF
	*	*	*	*	*	–		.	.	.	.	.	.	.	.		*	*	*		
						*		*	*	*	*	*	*	*	*						

I: ID code character
*: Space
D: Digit or letter
U: Unit symbol [1])
CR: Carriage return
LF: Line feed

Example:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
N						+				1	2	3	.	5	6	*	g	*	*	CR	LF
N						+			1	2	3	.	5	[	6	][1])	g	*	*	CR	LF

[1]) **Identification of Non-Verified Digits**
To have non-verified digits (when "e # d") automatically identified on the printout, set the following parameters: Communication: PRINTER (menu code 1. 5. 6. 2)
Non-verified digits are marked by square brackets [ ].

Special Codes

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
S	t	a	t	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	CR	LF
											H	i	g	h							
											L	o	w								
									C	a	l	.	E	x	t	.					

*: Space High: Overload
Cal. Ext.: Calibration, external Low: Underload

Error Codes

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
S	t	a	t	*	*	*	*	*	E	R	R	*	#	#	#	*	*	*	*	CR	LF
S	t	a	t	*	*	*	*	*	A	P	P	.	E	R	R[1])	*	*	*	*	CR	LF
S	t	a	t	*	*	*	*	*	D	I	S	.	E	R	R[1])	*	*	*	*	CR	LF
S	t	a	t	*	*	*	*	*	P	R	T	.	E	R	R[1])	*	*	*	*	CR	LF

*: Space # # #: Error code number

[1]) See “Troubleshooting Guide”

Commands (Data Input Format)
You can connect a computer to your balance/scale to send commands via the balance/scale interface port for controlling balance/scale functions and applications. The commands sent are control commands and may have different formats. Control commands consist of up to 13 characters. Each character must be transmitted according to the settings configured in the operating menu for data transmission.

Format for Control Commands

Format 1:	Esc	!	CR	LF		
Format 2:	Esc	!	#	_	CR	LF

Esc: Escape (optional) CR: Carriage return
!: Command character LF: Line feed (optional)
_: Underline

Command character !	Format 1: Meaning
K	Ambient conditions: very stable
L	Ambient conditions: stable
M	Ambient conditions: unstable
N	Ambient conditions: very unstable
O	Block keys
P	(print) key (print, auto print; activate or block)
R	Unblock keys
S	Restart/self-test
T	(Tare) key
W	Calibration/adjustment (depending on the menu setting)
Z	Internal calibration/adjustment*

Command character !#	Format 2: Meaning
f0_	Function key (Select Menu)
f1_	Function key (CAL)
f2_	Function key (Enter)
s3_	(CF) key
x1_	Print balance/scale model
x2_	Print weighing cell serial number
x3_	Print software version

* = only on models with built-in motorized calibration weight

Synchronization
During data communication between the balance/scale and a connected device (computer), messages consisting of ASCII characters are transmitted via the interface. For error-free data communication, the parameters for baud rate, parity, handshake mode and character format must be the same for both units.

You can set these parameters in the Setup menu so that they match those of the connected device. You can also define parameters in the balance/scale to make data output dependent on various conditions. The conditions that can be configured are listed in the descriptions of the application programs.

If you do not connect a peripheral device to the interface port, this will not generate an error message.

Handshake
The balance/scale interface (Sartorius Balance Interface = SBI) has transmit and receive buffers. You can define the handshake parameter in the Setup menu:

- Hardware handshake (CTS/DTR)
- Software handshake (XON, XOFF)

Hardware Handshake
With a 4-wire interface, 1 more character can be transmitted after CTS (Clear to Send).

Software Handshake
The software handshake is controlled via XON and XOFF. When a device is switched on, XON must be transmitted to enable any connected device to communicate.

Data Output by Print Command
The print command can be transmitted by pressing  or by a software command (Esc P).

Automatic Data Output
Activate the “auto print” operating mode to have data output to the interface port without a print command. You can have data output automatically at defined display update intervals, with or without the stability parameter. The length of a print interval depends on the operating menu settings for AMBIENT (ambient conditions) (menu code 1. 1. 1. x) and AUT.CYCL. (time-dependent autom. printing; menu code 1. 6. 3. x).
If you activate the auto print setting, data will be transmitted immediately the moment you turn on the balance/scale.
In the operating menu, you can define whether automatic printing can be stopped by pressing  .

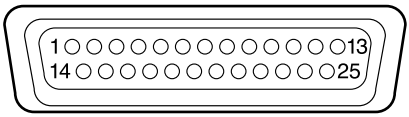
Pin Assignment Chart

Female Interface Connector:
25-contact D-Submini (DB25S) with screw lock hardware

Male connector used (please use connectors with the same specifications):
25-contact D-Submini (DB25S) with integrated shielded cable clamp assembly
(Amp 826 985-1C) and fastening screws (Amp 164 868-1)

⚠ **Warning When Using Pre-wired RS-232 Connecting Cables:**
The pin assignments in RS-232 cables purchased from other manufacturers may be incompatible with Sartorius weighing instruments. Be sure to check the pin assignments against the chart below before connecting the cable, and disconnect any lines identified differently from those specified by Sartorius (e.g., pin 6).
Failure to do so may damage or even completely ruin your balance/scale and/or peripheral device(s).

Pin assignments:



Pin 1: Signal ground
Pin 2: Data output (TxD)
Pin 3: Data input (RxD)
Pin 4: Internal ground (GND)
Pin 5: Clear to send (CTS)
Pin 6: Not connected
Pin 7: Internal ground (GND)
Pin 8: Internal ground (GND)
Pin 9: Not connected
Pin 10: Not connected
Pin 11: +12 V (Power supply for Sartorius printer)
Pin 12: Reset _ Out *)
Pin 13: +5 V
Pin 14: Internal ground (GND)
Pin 15: Universal remote switch
Pin 16: Not connected
Pin 17: Not connected
Pin 18: Not connected
Pin 19: Not connected
Pin 20: Data terminal ready (DTR)
Pin 21: Not connected
Pin 22: Not connected
Pin 23: Not connected
Pin 24: Not connected
Pin 25: +5 V

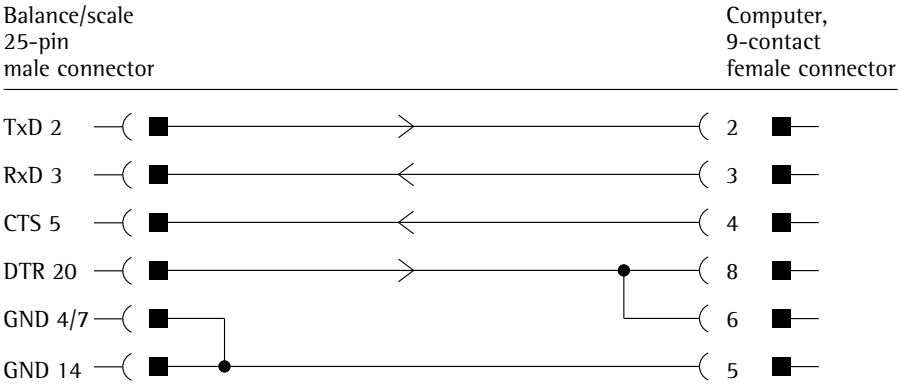
For remote switch

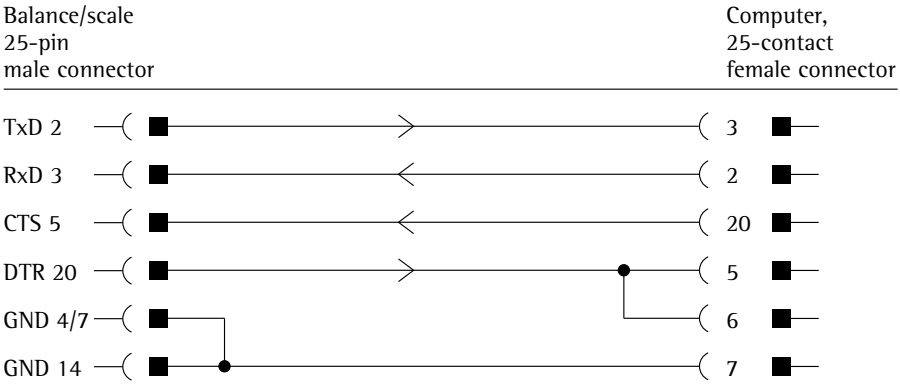
*) = Hardware restart

Cabling Diagram

For connecting a computer or other peripheral device to the balance/scale using the RS-232C/V24 protocol and cable lengths of up to 15 m (approx. 50 ft).

Important: do not connect any other pins to the cable connector of the balance/scale.





Cable type: AWG 24 specification

Troubleshooting Guide

Error codes are shown on the main display for approx. 2 seconds. The program then returns automatically to the previous mode.

Display	Cause	Solution
No segments appear on the display	No AC power is available	Check the AC power supply
	The power supply is not plugged in	Plug in the power supply
HIGH	The load exceeds the balance/ scale capacity	Unload the balance/scale
LOW or ERR 54	Something is touching the weighing pan	Move the object that is touching the weighing pan
APP.ERR.	Cannot store data: Load on weighing pan too light or no sample on pan while application is active	Increase load
DIS.ERR.	Data output not compatible with output format	Change the configuration in the operating menu
PRT.ERR.	Interface port for printer output is blocked	Reset the menu factory settings, or Contact your local Sartorius Service Center
ERR 02	Calibration parameter not met; e.g.: – balance/scale not tared – load on weighing pan	Calibrate only when zero is displayed – Press (Tare) to tare the balance/scale – Unload the balance/scale
ERR 10	The (Tare) key is blocked when there is data in the second tare memory (net-total); only 1 tare function can be used at a time	Press (CF) to clear the tare memory and release the tare key
ERR 11	Tare memory not allowed	Press (Tare)
The weight readout changes constantly	Unstable ambient conditions (excessive vibration or draft) at the place of installation	Set up the balance/scale in another area
	A foreign object is caught between weighing pan and balance/scale housing	Remove the foreign object
The weight readout is obviously wrong	The balance/scale was not calibrated/adjusted	Calibrate/adjust the balance/scale
	Balance/scale not tared before weighing	Tare or zero the balance/scale before weighing

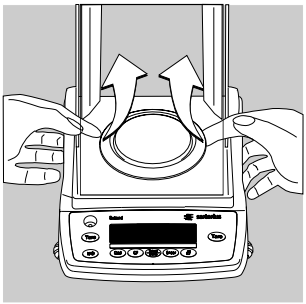
If any other errors occur, contact your local Sartorius Service Center.
Contact information: Please point your Internet browser to: http://www.sartorius.com

Care and Maintenance

Service
On request, Sartorius can offer you an individual service contract.

Repairs
Repair work must be performed by trained service technicians. Any attempt by untrained persons to perform repairs may result in considerable hazards for the user.

Cleaning
- ● Unplug the AC adapter from the wall outlet (mains supply). If you have an interface cable connected to the balance/scale port, unplug it from the port.
- ○ The plastic upper and lower segments of the balance/scale housing are protected by a special coating, so that they will not be damaged by the solvents usually used for cleaning.
- ⚠ Do not used solvents or aggressive cleaning agents on the following parts: keypad overlay, power jack, data interface
- ● After cleaning, wipe down the balance/scale with a soft, dry cloth.



On analytical balances remove and clean the weighing pan as follows:
- ● Reach beneath the shield disk and lift it carefully, together with the pan support, to avoid damaging the weighing system.

⚠ Make sure that no liquid enters the balance/scale housing.

Cleaning Stainless Steel Surfaces
Clean all stainless steel parts regularly. Remove the stainless steel weighing pan and thoroughly clean it separately. Use a damp cloth or sponge to clean stainless steel parts on the balance/scale. You can use any household cleaning agent that is suitable for use on stainless steel. Clean stainless steel surfaces only by wiping them down. Then rinse the equipment thoroughly, making sure to remove all residues. Afterwards, allow the equipment to dry. If desired, you can apply oil to the cleaned surfaces as additional protection.

Recycling

Safety Inspection
If there is any indication that safe operation of the balance/scale is no longer warranted:

● Turn off the power and disconnect the equipment from AC power immediately.

> Lock the equipment in a secure place to ensure that it cannot be used for the time being.

Notify your nearest Sartorius Service Center. Repair work must be performed by trained service technicians.

We recommend having the power supply inspected by a certified electrician at regular intervals, according to the following checklist:

– Insulating resistance: > 7 megaohms measured with a constant voltage of at least 500 volts at a 500 K-ohm load
– Leakage current: < 0.05 mA measured with a properly calibrated multimeter

If you no longer need the packaging after successful installation of the equipment, you should return it for recycling. The packaging is made from environmentally friendly materials and is a valuable source of secondary raw material. Batteries are hazardous waste and must be disposed of seperately. Please deposit empty batteries in the collection boxes set up in your area for this purpose. On request, Sartorius can provide GRS boxes for collecting used batteries. (GRS stands for “Gemeinsames Rücknahme System,” a German organization for battery disposal.*)

Contact your local waste disposal authorities if you wish to scrap the equipment. Sartorius AG in Goettingen will take back equipment and packaging for disposal in accordance with the applicable laws.* If you set up the equipment in a country other than Germany, please contact your local waste disposal authorities for information on similar services.

* This service is offered only within Germany

Overview

Specifications

Specifications

Built-in motorized calibration weight		All models with the designation suffix ED...-CW, GK..., GW.... or with a readability of 0.0001 g and all verified models
AC power source/power requirements, voltage, frequency		AC adapter 230 V or 115 25 V, +15% to – 20%, 48–60 Hz
Power consumption	VA	maximum 16; typical 8 (STNG6)
Approx. hours of operation with the YRB05Z rechargeable battery pack (backlighting on)	h	35

Ambient Conditions

The specifications given here are ensured under the following ambient conditions:

Operating temperature range	+10 to +30°C (273 to 303 K, 50 to 86°F)
Allowable ambient operating temperature	+5 to +40°C (41 to 104°F)

Proper functioning is ensured within an ambient operating temperature range of 5 to 40°C (41 to 104°F).

Model-specific Specifications

Model		ED224S	ED124S	GK1203	GK703/ GK703-ST	GK303
Weighing capacity		220 g	120 g	1200 ct	700 ct	300 ct
Readability		0.0001 g	0.0001 g	0.001 ct	0.001 ct	0.001 ct
Tare range (subtractive)		220 g	120 g	1200 ct	700 ct	300 ct
Repeatability (std. deviation)	≤±	0.0001 g	0.0001 g	0.001 ct	0.001 ct	0.001 ct
Linearity	≤±	0.0002 g	0.0002 g	0.002 ct	0.002 ct	0.002 ct
Response time (average)	s	2.5	2.5	1.5	1.5	1.5
Sensitivity drift within +10 to +30°C	≤±/K	$2 \cdot 10^{-6}$	$2 \cdot 10^{-6}$	$2 \cdot 10^{-6}$	$2 \cdot 10^{-6}$	$2 \cdot 10^{-6}$
Adaptation to ambient conditions		By selection of 1 of 4 optimized filter levels; display update: 0.1–0.4 (depends on filter level selected)				
External calibration weight (of at least accuracy class...)	g	200 (E2)	100 (E2)	200 (E2)	100 (F2)	50 (F2)
Net weight, approx.:	kg	4.8	4.8	4.7	4.7	4.7
Weighing pan size	mm	90 ∅	90 ∅	90 ∅	90 ∅/35 ∅	90 ∅
Whg. chamber height	mm	230	230	160	160/38	160
Dimensions (WxDxH)	mm	230 × 303 × 330		230 × 303 × 260	Model GK703-ST: 230 × 303 × 138	

Model		ED623S| ED623S-CW	ED423S| ED423S-CW| ED423S-DS	ED323S| ED323S-CW| ED323S-DS	ED153| ED153-CW| ED153-DS	GK2202
Weighing capacity		620 g	420 g	320 g	150 g	2200 ct
Readability		0.001 g	0.001 g	0.001 g	0.001 g	0.005 ct
Tare range (subtractive)		620 g	420 g	320 g	150 g	2200 ct
Repeatability (std. deviation)	≤±	0.001 g	0.001 g	0.001 g	0.001 g	0.005 ct
Linearity	≤±	0.002 g	0.002 g	0.002 g	0.002 g	0.01 ct
Response time (average)	s	1	1	11	1.3	1
Sensitivity drift within +10 to +30°C	≤±/K	$2 \cdot 10^{-6}$	$2 \cdot 10^{-6}$	$2 \cdot 10^{-6}$	$3.3 \cdot 10^{-6}$	$2 \cdot 10^{-6}$
Adaptation to ambient conditions		By selection of 1 of 4 optimized filter levels; display update: 0.05–0.4 (depends on filter level selected)				
External calibration weight (of at least accuracy class...)	g	500 (E2)	200 (E2)	200 (F1)	100 (F1)	
Net weight, approx:	kg	3.2|3.6	3.2|3.6|4.4	3.2|3.6|4.4	2.6|3.0|1	4.4
Weighing pan size	mm	115 ∅	115 ∅	115 ∅	115 ∅	115 ∅
Dimensions (WxDxH)	mm	230 × 303 × 136	230 × 303 × 136 ED...-DS: 230 × 303 × 330			230 × 303 × 260

Model		ED6202S | GW6202 | ED6202S-CW	ED4202S | ED4202S -CW	ED3202S | GW3202 | ED3202S-CW	ED2202S | ED2202S -CW	ED822 | ED822 -CW
Weighing capacity	g	6200	4200	3200	2200	820
Readability	g	0.01	0.01	0.01	0.01	0.01
Tare range (subtractive)	g	6200	4200	3200	2200	820
Repeatability (std. deviation)	≤±g	0.01	0.01	0.01	0.01	0.01
Linearity	≤±g	0.02	0.02	0.02	0.02	0.02
Stabilization time (typical)	s	1.1	1.1	1.1	1.1	1.0
Sensitivity drift within +10 to +30°C	≤±/K	$2 \cdot 10^{-6}$	$2 \cdot 10^{-6}$	$2 \cdot 10^{-6}$	$2 \cdot 10^{-6}$	$5 \cdot 10^{-6}$
Adaptation to ambient conditions		By selection of 1 of 4 optimized filter levels; display update: 0.05–0.4 (depends on filter level selected)				
External calibration weight (of at least accuracy class...)	g	5000 (E2)	2000 (E2)	2000 (F1)	2000 (F1)	500 (F2)
Net weight, approx:	kg	3.1|3.1|3.5	3.1|3.1|3.5	3.1|3.1|3.5	3.1|3.1|3.5	2|2|2.6
Weighing pan size	mm	180 × 180	180 × 180	180 × 180	180 × 180	150 ∅
Dimensions (WxDxH)	mm	230 × 303 × 91				230×303×87

Model		ED8201 | ED8201-CW	GW7201	ED5201 | ED5201-CW	ED2201 | ED2201-CW
Weighing capacity	g	8200	7200	5200	2200
Readability	g	0.1	0.1	0.1	0.1
Tare range (subtractive)	g	8200	7200	5200	2200
Repeatability (std. deviation)	≤±g	0.1	0.1	0.1	0.1
Linearity	≤±g	0.1	0.1	0.1	0.1
Response time (average)	s	1	1	1	1
Sensitivity drift within +10 to +30°C	≤±/K	$10 \cdot 10^{-6}$			
Adaptation to ambient conditions		By selection of 1 of 4 optimized filter levels; display update: 0.05–0.4 (depends on filter level selected)			
External calibration weight (of at least accuracy class...)	g	5000 (F2)	5000 (F2)	5000 (F2)	2000 (F2)
Net weight, approx.:	kg	2.7 | 3.5	2.7	2.7 | 3.5	2.7 | 3.5
Weighing pan size	mm	180 × 180			
Dimensions (WxDxH)	mm	230 × 303 × 91			

Accessories

External calibration weights:

For model	Accuracy class	Weight in grams	**Order no.:**
ED423S/...-DS	E2	200	**YCW5228-00**
ED623S	E2	500	**YCW5528-00**
ED4202S	E2	2000	**YCW6228-00**
ED6202S, GW6202	E2	5000	**YCW6528-00**
ED153S/...-DS	F1	100	**YCW5138-00**
ED323S/...-DS	F1	200	**YCW5238-00**
ED3202S, ED2202S	F1	2000	**YCW6238-00**
ED822	F2	500	**YCW5548-00**
ED2201	F2	2000	**YCW6248-00**
ED8201, ED5201	F2	5000	**YCW6548-00**
or alternatively	± 25 mg	5000	**YSS653-00**

Product	**Order No.**
Data printer with date, time, statistics evaluation, transaction counter functions and LCD	**YDP03-0CE**
Remote display [1]), reflective (for connection to data interface port)	**YRD02Z**
External rechargeable battery pack YRB05Z With battery-level indicator (LED); can be recharged using the AC adapter (charge time for completely discharged battery pack: 15 hours); see “Specifications” for hours of operation. To recharge the battery pack: Unplug the AC adapter from the balance/scale and plug it into the battery pack	
SartoConnect [1]), data transfer software for direct transmission of weight values to another program (e.g., MS Excel)	
– with RS-232C connecting cable, length: 1 m (~20 in)	**YSC01L**
– with RS-232C connecting cable, length: 5 m (~16 ft)	**YSC01L5**
– with RS-232C connecting cable, length: 15 m (~50 ft)	**YSC01L15**

Product	
Density determination kit[1])	
– for ED224S, ED124S	**YDK01LP**
Standard Operating Procedure optimum use of your balance/scale in quality-management systems	**YSL01E**
Industrial AC adapter, model ING2, protection rating: IP65 in accordance with EN 60529	
– for 230 V	**69 71899**
– for 120 V	**69 71500**
Data cable	
– for connecting a computer witha USB port	**YCC01-USBM2**
– for computer connection, 25-pin	**7357312**
– for computer connection, 9-pin	**7357314**
Adapter cable from D-Sub 25-pin male connector to D-Sub 9-contact female connector; length: 0.25 m	**6965619**

[1]) Not for verified models

	Order No.
Universal remote control switch for remote control of the following functions: (⊟), (Tare), (Cal) or a function key (see "Configuration" for details):	
Foot switch with T-connector	**YFS01**
Hand switch with T-connector	**YHS02**
T-connector Note: The T-connector is not intended for connecting multiple intelligent peripheral devices, such as PCs OR YDP03-0CE printers.	**YTC01**
Ionizing blower for eliminating static electricity	
– 220 V	**YIB01-0DR**
– 110 V	**YIB01-0UR**
Stat-Pen anti-static device for eliminating electrostatic charges on samples and containers (100 V to 230 V, 50/60 Hz)	**YSTP01**
Anti-vibration balance/scale table	
– for precise, reliable weighing operations	**YWT01**
– made of cast stone with shock absorbers	**YWT03**
Bracket for wall mounting	**YWT04**
Gem trays/Weighing bowls	
– 300 ml, weight: 86 g, stainless steel	**6407**
– 1000 ml, wt.: 240 g, stainless steel	**641211**
– 500 ml	**641212**
– 300 ml, wt.: 22 g, aluminum	**69641304**
– 110 ml, 90 mm ∅, aluminum	**69GP0003**
– 270 ml, wt.: 62 g, 137 mm ∅, stainless steel	**YWP03G**
– 62 mm ∅, stainless steel	**6910848**
– 85 ml, 70 mm ∅, aluminum	**YWP06G**
– 180 ml, 90 mm ∅, aluminum	**YWP05G**
– 174 mm ∅, stainless steel	**YWP04G**

Declaration of Conformity to Council Directives 89/336/EEC and 73/23/EEC (amended by Directive 93/68/EEC)

The electronic precision weighing instrument of the series ED/GK/GW/XX.....-.....

meets the applicable requirements of the test standards listed below, in conjunction with the associated power supplies, auxiliary peripheral devices and installation equipment listed in Annex A2 (see Annex A1 for a technical description and a list of the individual versions).

1. Electromagnetic Compatibility
1.1 Source for 89/336/EEC: Official Journal of the European Communities, No. 2004/C98/05

EN 61326 Electrical equipment for measurement, control and laboratory use
EMC requirements

Limitation of emissions: Residential areas, Class B

Defined immunity to interference: Industrial areas, continuous unmonitored operation

2. Safety of Electrical Equipment
2.1 Source for 73/23/EEC: Official Journal of the European Communities, No. 2004/C103/02

EN 61010 Safety requirements for electrical equipment for measurement, control and laboratory use
Part 1: General requirements
EN 60950-1 Information technology equipment
Safety
Part 1: General requirements

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