Table of contents

1 Introduction

1.1 Safety instructions

CAUTION!

Do not use scale in hazardous areas!

Our product range includes special devices for hazardous areas.

CAUTION!

Use only scales with Protection Class IP65, if:

- the scale is used in wet areas
- wet cleaning is necessary
- the scale is used in a dusty environment

Even with Protection Class IP65, the scale must not be used in environments with corrosion risk.

▲ Never flood the scale or immerse it in liquid.

DANGER!

Electric shock hazard!

▲ Always pull out the mains plug before any work on the device.

DANGER!

Electric shock hazard if the mains cable is damaged!

▲ Check the mains cable for damage regularly and replace it immediately if it is damaged.

▲ On the rear side of the device, maintain a clearance of at least 3 cm in order to prevent the mains cable bending too much.

CAUTION!

On no account open the device!

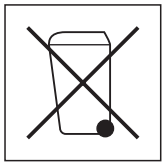
The warranty is void if this stipulation is ignored. The device may only be opened by authorized persons.

CAUTION!

Handle the compact scale with care.

The scale is a precision instrument.

▲ When the weighing pan has been removed, never clean the area under the load plate holder with a solid object!
▲ Do not put excessive loads on the scale.
▲ Avoid banging the weighing pan.



Disposal

➜ Observe the valid environmental regulations when disposing of the scale.

If the device has a rechargeable battery:

The battery contains heavy metals and therefore must not be disposed of with normal waste.

➜ Observe the local regulations for disposing of environmentally hazardous materials.

Note **Use with foodstuffs**

Parts coming into contact with foodstuffs have smooth surfaces and are easy to clean. The materials used do not splinter and are free of harmful substances.

With foodstuffs, it is recommended to use the supplied protective cover.

➜ Clean the protective cover regularly and carefully.
➜ Replace damaged or very dirty protective cover immediately.

1.2 Description

The compact scales are available in a small and large size in various capacities and resolutions.

The power supply is carried out via a built-in power supply device, an internal rechargeable battery with an external mains adapter or an external battery.

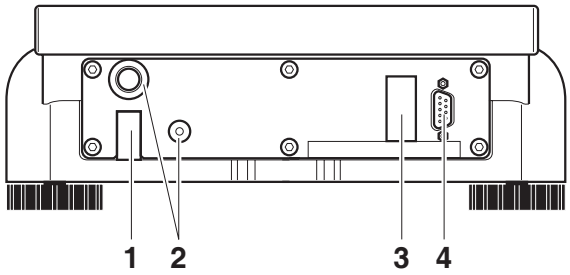
One of the following options can also be ordered:

- Additional interface RS232
- Ethernet interface

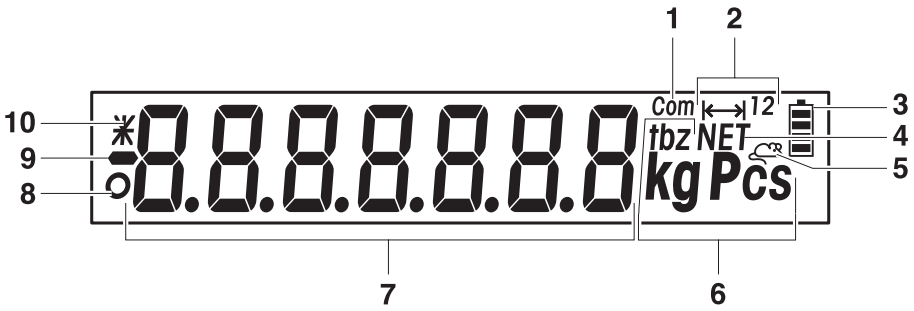
1.2.1 Overview

1 Display
2 Scale specifications
3 Load plate
4 Adjustable foot
5 Keys

1 Power supply connection
2 Fast and fine pressure equalization, only with Protection Class IP65
3 Optional interface
4 RS232 interface



1.2.2 Display



1 Active interface

2 Weighing range display

3 Battery charge level; only present on scales with a battery

4 Symbol for displaying net values

5 Symbol for dynamic weighing

6 Weight units

7 7-segment display, 7 digits, with decimal point

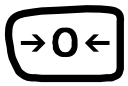
8 Stability monitor (goes out when a stable weight value is reached)

9 Sign

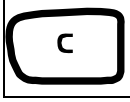
10 Identification for changed or calculated weight values, e. g. higher resolution, minimum weight not reached

1.2.3 Keypad

Main functions

Key	Function in operating mode	Function in the menu
	Switching device on / off, abort	To the last menu item –End–
	Setting scale to zero	Scrolling back
	Taring scale	Scrolling forward
	Transfer key Long key press: Calling up menu	Activating menu item Accepting selected setting

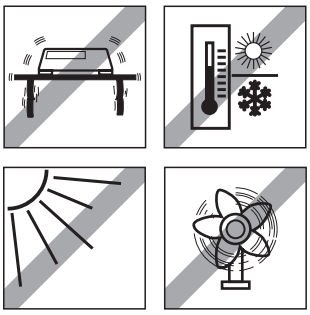
Additional functions

Key	Function
	Switching weight unit
	Clear key

1.3 Putting into operation

1.3.1 Selecting or changing the location

The correct location is crucial to the accuracy of the weighing results!

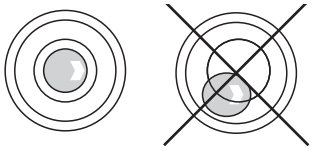


➜ Select a stable, vibration-free and if possible a horizontal location.

The ground must be able to safely bear the weight of the fully loaded scale.

Observe the following environmental conditions:

- No direct sunlight
- No strong drafts
- No excessive temperature fluctuations



Aligning the scale

Only scales that have been aligned precisely horizontally provide accurate weighing results. The certified scales have a spirit level to simplify alignment.

➜ Turn the adjustable feet of the scale until the spirit level's air bubble is inside the inner circle.

Major geographical location changes

The manufacturer adjusts each scale to the local gravity conditions (GEO value). In the event of major geographical location changes, this setting must be adjusted by a service technician. Certified scales must also be recertified observing the national certification regulations. These steps are not necessary for scales with an internal calibration weight.

1.3.2 Connecting the power supply

CAUTION!

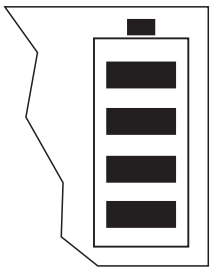
Before connecting the scale to the mains, check whether the voltage value printed on the rating plate corresponds with the local mains voltage.

▲ Never connect the device if the voltage value printed on the rating plate is different to the local mains voltage.

➜ Plug the mains plug into the socket.

After connection, the device performs a self-test. When the zero display appears, the device is ready to weigh.

➜ Calibrate the device in order to obtain the greatest possible precision, see Section 3.3.1.



Scales with a built-in battery can work independently from the mains for approximately 30 hours in normal operation. A prerequisite for this is that the background lighting is switched off and that no peripheral devices are connected.

The device automatically switches to battery operation as soon as the mains supply is interrupted. When the mains supply is restored, the device automatically switches back to mains operation.

The battery symbol indicates the present charging level of the battery. 1 segment corresponds to approx. 25 % capacity. When the symbol flashes the battery must be charged (min. 4 hours). The charging period is extended if work is continued during charging. The battery is protected against overcharging.

Note The battery's charging capacity can be reduced under continuous mains operation.

➜ To maintain the charging capacity, after a maximum of 4 weeks discharge the battery completely before recharging it.

1.3.3 Monitoring the test substances

The metrology features of the balance and any possible available adjusting weight must be checked at regular intervals within the scope of quality assurance. For this purpose, the answerable user must define a suitable interval as well as the nature and scope of this check. 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. Test weights and balances can be adjusted quickly and at a reasonable price in KERN's accredited DKD calibration laboratory (return to national normal).

1.3.4 Adjustment

General:

According to the EU guideline 90/384/EEC balances must be verified officially if they are to be used as follows (legally regulated area):

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

In case of doubt, please contact your local office of weights and measures.

Verification Information:

An EU qualification approval is available for those balances marked as appropriate for verification in the technical data. In the event that the balance is applied in an area subject to verification as described above, it must be officially verified and re-verified at regular intervals.

Re-verification of a balance is carried out in compliance with the respective legal provisions of the states. The term of verification validity for balances in Germany, for example, is normally 2 years.

The legal provisions of the country of use are to be observed.

2 Operation

2.1 Switching on and off

Switching on

➜ Press ON/OFF.

The scale conducts a display test. When the weight display appears, the scale is ready to weigh.

Switching off

➜ Press ON/OFF.

Before the display goes out, -OFF- appears briefly.

2.2 Zeroing / Zero point correction

Zeroing corrects the influence of slight changes on the load plate.

Manual

1. Unload scale.
2. Press →0←.

   The zero display appears.

Automatic

In the case of scales that cannot be certified, the automatic zero point correction can be deactivated in the menu or the amount can be changed.

As standard, the zero point of the scale is automatically corrected when the scale is unloaded.

2.3 Simple weighing

1. Place weighing sample on scale.
2. Wait until the stability monitor ○ goes out.
3. Read weighing result.

2.4 Weighing with tare

2.4.1 Taring

➜ Place the empty container on the scale and press TARE.

The zero display and the symbol **NET** appear.

The tare weight remains saved until it is cleared.

2.4.2 Clearing the tare

➜ Unload scale and press TARE.

The symbol **NET** goes out, the zero display appears.

or

➜ Press C.

The symbol **NET** goes out, the gross weight appears in the display.

If `A.CL-tr` is activated in the menu, the tare weight is automatically cleared as soon as the scale is unloaded.

2.4.3 Automatic taring

Prerequisite

`A-tArE` is activated in the menu, the symbol **T** flashes in the display.

➜ Place the container or packaging material on the scale.

The packaging weight is automatically saved as the tare weight, the zero display and the symbol **NET** appear.

2.4.4 Chain tare

Prerequisite

The tare function `CHAIn.tr` is activated in the menu.

With this function it is possible to tare several times if, for example, cardboard is placed between individual layers in a container.

1. Place the first container or packaging material on the scale and press TARE.

   The packaging weight is automatically saved as the tare weight, the zero display and the symbol **NET** appear.
2. Weigh the weighing sample and read/print out the result.
3. Place the second container or packaging material on the scale and press TARE again.

   The total weight on the scale is saved as the new tare weight. The zero display appears.
4. Weigh the weighing sample in the second container and read/print the result.
5. Repeat the last two steps for other containers.

2.5 Dynamic weighing

With the dynamic weighing function, it is possible to weigh restless weighing samples such as live animals. If this function is activated, the symbol appears in the display.

With dynamic weighing, the scale calculates the mean value from 56 weighing operations within 4 seconds.

With manual start

Prerequisite

`AVErAGE -> MAnuAL` is selected in the menu.

The weighing sample must be heavier than 5 scale divisions.

1. Place the weighing sample on the scale and wait until it has stabilized.
2. Press PRINT to start dynamic weighing.

   During dynamic weighing, horizontal segments appear in the display, and the dynamic result is then displayed with the symbol *****.
3. Unload the scale to be able to start a new dynamic weighing operation.

With automatic start

Prerequisite

`AVErAGE -> AUtO` is selected in the menu.

The weighing sample must be heavier than 5 scale divisions.

1. Place the weighing sample on the scale.

   The scale starts the dynamic weighing automatically.

   During dynamic weighing, horizontal segments appear in the display, and the dynamic result is then displayed with the symbol *****.
2. Unload the scale to be able to perform a new dynamic weighing operation.

2.6 Printing results

If a printer or computer is connected to the scale, the weighing results can be printed out or sent to a computer.

➜ Press PRINT.

The display contents are printed out and transferred to the computer. See Section 7.2 for sample protocols.

2.7 Cleaning

CAUTION!

Electric shock hazard!

▲ Before cleaning with a damp cloth, pull out the mains plug to disconnect the unit from the power supply.

CAUTION!

When the weighing pan has been removed, never clean the area under the load plate holder with a solid object!

This could damage the weighing cell.

Other cleaning information:

- Use damp cloths.
- Do not use any acids, alkalis or strong solvents.
- Do not clean using a high-pressure cleaning unit or under running water.
- If very dirty, remove the weighing pan, protective cover (if present) and adjustable feet and clean these items separately.
- Follow all the relevant instructions regarding cleaning intervals and permissible cleaning agents.

3 Settings in the menu

Settings can be changed and functions can be activated in the menu. This enables adaptation to individual weighing requirements.

The menu consists of 6 main blocks containing various submenus on several levels.

3.1 Operating the menu

3.1.1 Calling up the menu and entering the password

The menu differentiates between 2 operating levels: Operator and Supervisor. The Supervisor level can be protected by a password. When the device is delivered, both levels are accessible without a password.

Operator menu

1. Press PRINT and keep it pressed until `COdE` appears.
2. Press PRINT again.

   The menu item `tErMINL` appears. Only the submenu `dEVICE` is accessible.

Supervisor menu

1. Press PRINT and keep it pressed until `COdE` appears.
2. Enter the password and confirm with PRINT.

   The first menu item `SCALE` appears.

Note

No supervisor password has been defined when the device is first delivered. Therefore respond to the password inquiry with PRINT when you call up the menu for the first time.

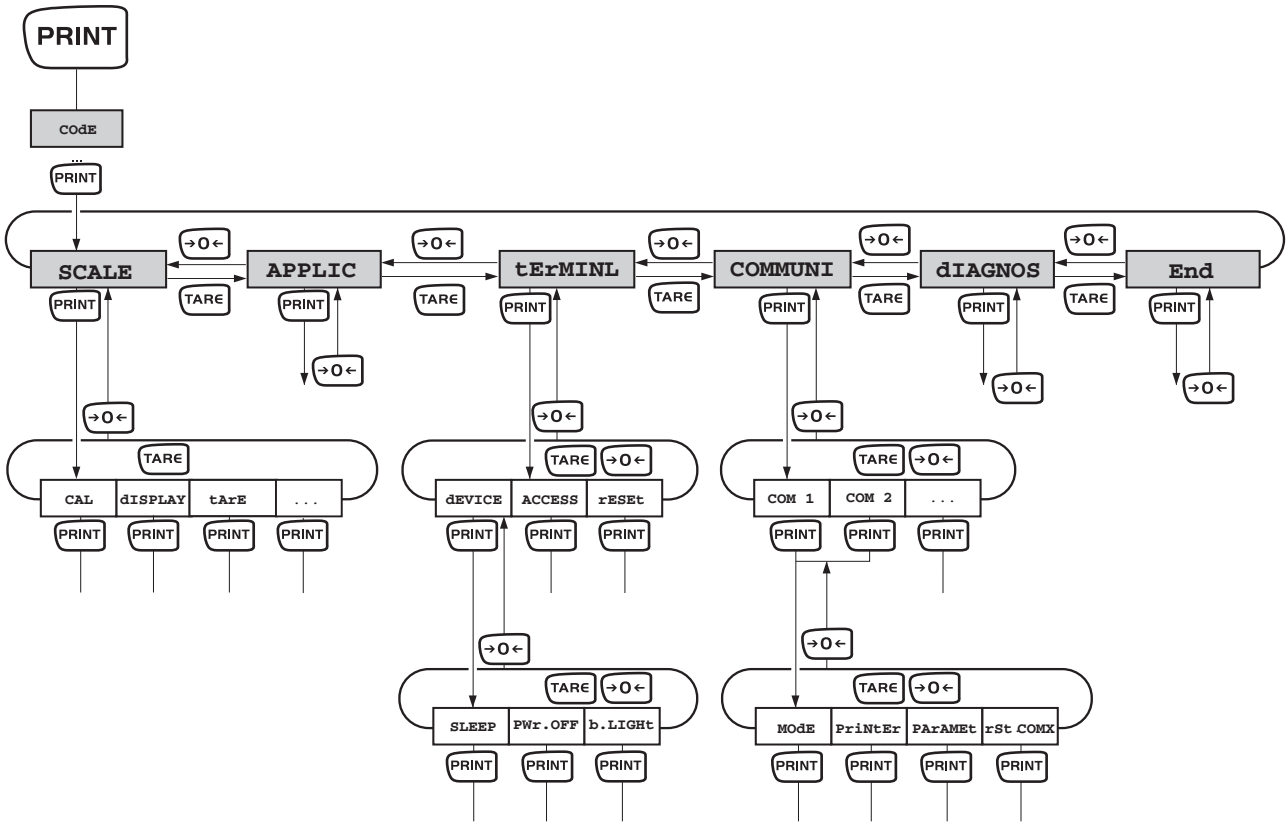
If a password has still not been entered after a few seconds, the scale returns to weighing mode.

Emergency password for Supervisor access to the menu

If a password has been issued for Supervisor access to the menu and you have forgotten it, you can still enter the menu:

➜ Press →0← 3 times and confirm with PRINT.

3.1.2 Selecting and setting parameters



Scrolling on one level

➜ Scroll forward: Press TARE.

➜ Scroll back: Press →0←.

Activating menu items/ accepting selection

➜ Press PRINT.

Exiting menu

1. Press ON/OFF.
   The last menu item END appears.
2. Press PRINT.
   The inquiry SAVE appears.
3. Confirm inquiry with PRINT to save the settin^^urn to weighing mode.

   -or-

➜ Press TARE to discard changes and return to weighing mode.

3.2 Overview

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Page
SCALE	CAL					20
	dISPLAY	UNIt1	g, **kg**, oz, lb, t			22
		UNIt2	**g**, kg, oz, lb, t			
		rESOLU				
		UNt.rOLL	ON, **OFF**			
	tArE	A-tArE	ON, **OFF**			22
		ChAIn.tr	**ON**, OFF			
		A.CL-tr	ON, **OFF**			
	ZErO	AZM	OFF; 0.5 d; 1 d; 2 d; 5 d; 10 d			22
	rEStArt	ON/**OFF**				22
	FILtEr	VibrAt	LOW, **MEd**, HIGH,			22
		PrOCESS	**UNIVEr**, dOSING			
		StABILI	FASt, **StAndrd**, PrECISE			
	rESEt	SUrE?				23
APPLIC	AVErAGE	**OFF**, AUtO, MAnuAL				23
	rESEt	SUrE?				23
tERMINL	dEVICE	SLEEP	**OFF**, 1 min, 3 min, 5 min			24
		PWr OFF	**YES**, NO			
		b.LIGHt	ON, **OFF**			
	ACCESS	SUPErVI				24
	rESEt	SUrE?				24
COMMUNI	COM 1/COM 2	MOdE	**Print**			25
			A.Print			
			CONtINU			
			dIALOG			
			CONt.OLd			
			dIAL.OLd			
			dt-b	GrOSS	ON, OFF	
				tArE	ON, OFF	
				nEt	ON, OFF	
			dt-G	GrOSS	ON, OFF	
				tArE	ON, OFF	
				nEt	ON, OFF	

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Page
			COnt-Wt			
			2nd.dISP			
		PriNtEr	tEmPLat	**StdArd**, tEMPLt1, tEMPLt2		25
			ASCi.Fmt	LINE.FMt	**MULtI** SINGLE	
				LENGtH	1 … 100	
				SEPArAt	, ;…	
				Add LF	0 … 9	
		PArAMEt	bAUd	300 … 38400		25
			PArityY	7 nonE, 8 nonE, 7 odd, 8 odd, **7 EVEN**, 8 EVEN		
			H.SHAKE	NO, **XONXOFF**, nEt 422, nEt 485		
			NEt.Addr	0 … 31		
			ChECSuM	ON, **OFF**		
			Vcc	ON, **OFF**		
		rSt.COMx	SUrE?			26
COMMUNI	OPtION	EtH.NEt	IP.AddrS, SUbNEt, GAtEWAY			26
		USb	USb tESt			26
		diGitAL	IN 1 … 4	**OFF**, ZErO, tArE, Print, CLEAr, Unit		26
			OUT 1 … 4	**OFF**, StAbLE, bEL.Min, AbV.Min, UndErLd, OVErLd, StAr		
	dEF.PrN	tEmPLt1/ tEMPLt2	LINE 1 … LINE 20	**NOt.USEd**, HEAdEr, GrOSS, tArE, nEt, StArLN, CrLF, F FEEd		27
dIAGNOS	tESt SC	intErN/ExtErN				28
	KboArd					
	dISPLAY					
	SNr					
	LiSt					
	rESEt.AL	SUrE?				

3.3 Scale settings (SCALE)

3.3.1 CAL – calibration (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 during the initial start-up, after change in location and variation of surrounding temperature. It is also recommendable to adjust the balance periodically during weighing operation in order to obtain exact measured values.

This menu item is not available for certified scales without internal calibration weight.

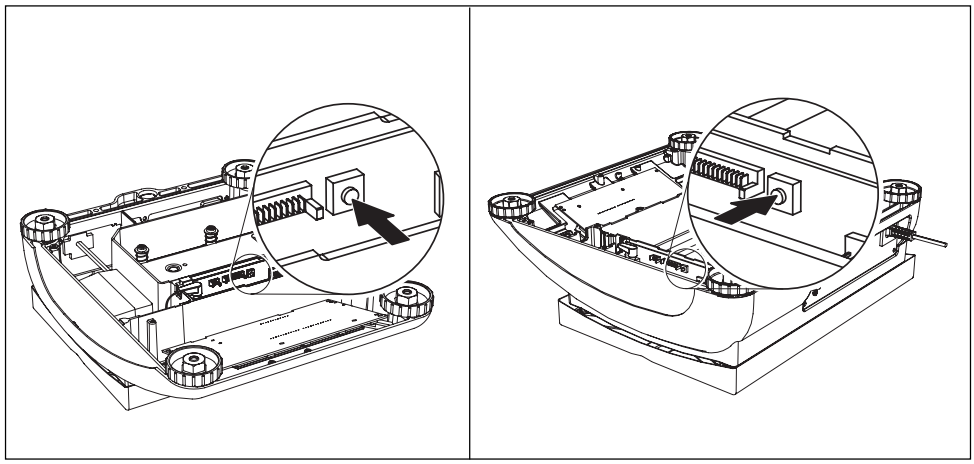
Adjusting of non verifiable balances

External	For scales **without** an internal calibration weight: 1. Unload scale. 2. Activate menu item `CAL` with (PRINT). The scale determines the zero point. `–0–` appears in the display. The calibration weight to be placed on the scale then flashes in the display. 3. If necessary, change the weight value displayed with (TARE). 4. Place the calibration weight on the scale and confirm with (PRINT). The scale calibrates with the calibration weight loaded. After calibration is completed, `–donE–` appears briefly in the display, and the scale automatically returns to weighing mode.

Adjusting of verifiable balances

- Switch off the scale.
- Remove the scale bottom plate by undoing the Torx TX20 retaining screws .Important: In order to remove the bottom plate it is necessary to break the certification seal affixed to it! Once this seal has been destroyed, the scale must be recertified by an accredited organization, and a new certification seal must be affixed before the instrument may be used as a certified scale again!
- Hold down the service switch (pushbutton) on the analogprint (indicated by an arrow in the drawings below, while at the same time switching on the scale. Keep the service switch pressed in until "Scale" appears in the display.

Small platform model **Large platform model**



1.Display "Scale":Press the PRINT **-key (within 20sec)**

2.Display "Metrolo":Press the TARE **-key**

3.Display "ramp":Press the TARE **-key**

4.Display "SNR":Press the TARE **-key**

5.Display "SCAL.bld":Press the TARE **-key**

6.Display "GEO" (adjustment by means of GEO value):

The GEO value can be set in this block and the balance also adapted to the local gravity ratios without adjusting weights.

Case a)You are familiar with the GEO values.

Once the PRINT -key has been pressed, the current GEO value will be displayed.

Press the TARE or →0← -key, in order to alter the GEO value. . The next value is displayed every time the key is pressed (adjustment range: 0 - 31). See the GEO value chart in chapter 7.1.1 for the appropriate value.

Confirm the selected GEO value using the PRINT -key.

Please note: The GEO value may not be readjusted following this "adjustment by means of GEO value", as this would cause the set adjusting values to become invalid.

Case b)You are NOT familiar with the GEO values. In this case adjustment must be made using adjusting weights (see item 8).

Press the TARE -key.

7.Display "LIN-CAL:" Press the TARE -key.

8.Display "CAL:" Press the PRINT -key.

The scale determines the zero point. -preload- appears in the display. Press the PRINT -key. The calibration weight to be placed on the scale then flashes in the display.

If necessary, change the weight value displayed with TARE

Place the calibration weight on the scale and confirm with PRINT

The scale calibrates with the calibration weight loaded. After calibration is completed, -done- appeats briefly in the display.

Return to weighing mode:

Press the (ON/OFF) -key, "END" will appear on the display

Press the (PRINT) -key, order to save the alterations. "Save" will appear on the display.

Press (PRINT) -key. to confirm. Following this the balance will return to weighing mode.

3.3.2 DISPLAY – weighing unit and display accuracy

UNIt1	Select weighing unit 1: g, kg, oz, lb, t
UNIt2	Select weighing unit 2: g, kg, oz, lb, t
rESOLU	Select readability (resolution), model-dependent
UNt.rOLL	When UNT.rOLL is switched on, the weight value can be displayed in all available units with (UNIT).
Notes	• On certified scales, the weighing units oz and lb are displayed with the symbol *. • On certified scales, resolutions that deviate from the scale definition are displayed without a weighing unit and with the symbol *****. • On dual-range/dual interval scales, resolutions marked with **I<–> 1/2I** are divided up into 2 weighing ranges / intervals, e.g. 2 x 3000 d.

3.3.3 TARE – tare function

A-tArE	Switching on/off automatic taring
CHAIn.tr	Switching on/off chain tare
A.CL-tr	Switching on/off automatic taring with automatic clearing of the tare weight when the load is removed from scale

3.3.4 ZERO – automatic zero update

AZM	On certified scales, this menu item does not appear. Switching on/off automatic zero update and selecting zeroing range. Possible settings: OFF; 0.5 d; 1 d; 2 d; 5 d; 10 d

3.3.5 RESTART – automatic saving of zero point and tare value

ON/OFF	When the Restart function is activated, the last zero point and tare value are saved. After switching off / on or after a power interruption, the device continues to work with the saved zero point and tare value.

3.3.6 FILTER – adaptation to the ambient conditions and the weighing type

VIbrAt	Adaptation to the ambient conditions
LOW	• Very steady and stable environment. The scale works very quickly, but is very sensitive to external influences.
MEd	• Normal environment. The scale operates at medium speed.

HIGH	• Restless environment. The scale works more slowly, but is insensitive to external influences.
PrOCESS	Adaptation to the weighing process
UNIVEr	• Universal setting for all weighing samples and normal weighing goods
dOSING	• Dispensing liquid or powdery weighing samples
StAbILI	Adjusting the weighing speed
FASt	• The scale operates very fast.
StAndrd	• The scale operates at medium speed.
PrECISE	• The scale operates with the greatest possible reproducibility.
	The slower the scale works, the greater the reproducibility of the weighing results.

3.3.7 RESET – resetting scale settings to factory settings

SUrE?	Confirmation inquiry • Reset the scale settings to factory settings with PRINT • Do not reset scale settings with TARE

3.4 Application settings (APPLICATION)

3.4.1 AVERAGE – determining the average weight for an unstable load

OFF	Calculating average weight switched off
AUtO	Calculating average weight with automatic start of the weighing cycle
MAnuAL	Calculating average weight with manual start of the weighing cycle via PRINT

3.4.2 RESET – resetting application settings to factory settings

SUrE?	Confirmation inquiry • Reset the application settings to factory settings with PRINT • Do not reset the application settings with TARE

3.5 Terminal settings (TERMINAL)

3.5.1 DEVICE – Sleep mode, energy-saving mode and display backlighting

SLEEP	This menu item only appears on devices in mains operation. When SLEEP is activated, the scale switches off display and backlighting after the time period set when not in use. The display and backlighting are switched on again at the press of a key or if the weight changes. Possible settings: OFF, 1 min, 3 min, 5 min
PWr OFF	This menu item only appears on devices in battery operation. When PWr OFF is activated, the device switches itself off automatically after approx. 3 minutes when not in use.
b.LIGHt	Switching the display backlighting on/off. On scales with a battery, the background lighting switches itself off automatically if there has been no activity on the scale for 5 seconds.
Note	This menu item is accessible without a Supervisor password.

3.5.2 ACCESS – password for Supervisor menu access

SUPErVI	Password entry for Supervisor menu access
ENtER.C	Request to enter password ➜ Enter the password and confirm with PRINT
rEtYPE.C	Request to repeat the password entry ➜ Enter the password again and confirm with PRINT
Notes	• The password can consist of up to 4 characters. • The key PRINT must not be part of the password. It is required for confirming the password. • The key →0← may only be used in combination with another key. • If you enter an impermissible code or make a typing error in the repetition, COdE.Err. appears in the display.

3.5.3 RESET – resetting terminal settings to the factory settings

SUrE?	Confirmation inquiry • Reset terminal settings to the factory settings with PRINT • Do not reset the terminal settings with TARE

3.6 Configuring interfaces (COMMUNICATION)

3.6.1 COM1/COM2 -> MODE – operating mode of the serial interface

Print	Manual data output to the printer with PRINT
A.Print	Automatic output of stable results to the printer (e. g. for series weighing operations)
CONtINU	Ongoing output of all weight values via the interface
dIALOG	Bi-directional communication via MT-SICS commands, control of the scale via PC
CONt.OLd	As per CONtINU, see above, but with 2 fixed blanks in front of the unit (compatible with Spider 1/2/3)
dIAL.OLd	As per dIALOG, see above, but with 2 fixed blanks in front of the unit (compatible with Spider 1/2/3)
dt-b	DigiTOL-compatible format.
GROSS	• Transfer of the gross weight, identified with "G"
tArE	• Transfer of the tare weight
nEt	• Transfer of the net weight
dt-G	As per dt-b, see above, gross weight identified with "G"
COnt-Wt	TOLEDO Continuous mode
2nd.dISP	For connecting a second display (automatically activates the 5-V voltage supply at Pin 9)

3.6.2 COM1/COM2 -> PRINTER – settings for protocol printout

This menu item only appears if the mode "Print" or "A.Print" is selected.

tEmPLat	Selecting protocol printout
StdArd	• Standard printout
tEmPLt1	• Printout in accordance with Template 1
tEmPLt2	• Printout in accordance with Template 2
ASCi.FmtT	Selecting formats for the protocol printout
LINE.Fmt	• Line format: MULtI (multi-line) or SINGLE (single-line)
LENGtH	• Line length: 0 ... 100 characters, appears only with line format MULtI
SEPArAt	• Separator: , ; . / \ _ and space; appears only with line format SINGLE
Add LF	• Line feed: 0 ... 9

3.6.3 COM1/COM2 -> PARAMET – communication parameter

bAUd	Selecting baud rate: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 baud
PAritY	Selecting parity: 7 none, 8 none, 7 odd, 8 odd, 7 even, 8 even
H.SHAKE	Selecting Handshake: NO, XONXOFF, nEt422, nEt485 (network operation as per RS485 standard via the optional RS422/RS485 interface, only for COM1)

NET.Addr	Assigning network address: 0 ... 31, only for NET 485
ChECSuM	Activating checksum byte (appears only in TOLEDO Continuous mode)
Vcc	Switching 5V voltage, e.g. for a bar code reader, on / off

3.6.4 COM1/COM2 -> RESET COM1/RESET COM2 – resetting serial interface to factory settings

SUrE?	Confirmation inquiry • Reset interface settings to factory settings with PRINT • Do not reset the interface settings with TARE

3.6.5 OPTION – configuring options

If no option is installed or is not yet configured, `N.A.` appears in the display.

EtH.NEt IP.AddrS SUBNEt GAtEWAY	Configuration of the Ethernet interface • Enter IP address • Enter Subnet address • Enter Gateway address
USb USb TEST	not documented
diGitAL IN 1 ... 4 OFF ZErO tArE PriNt CLEAr UNIt OUT 1 ... 4 OFF StAbLE bEL.MIN AbV.MIN UNdErLd OVErLd StAr	not documented

3.6.6 DEF.PRN – configuring templates

tEMPLt1/tEMPLt2	Selecting Template 1 or Template 2
LINE 1 ... 20	Select line
NOt.USEd	• Line not used
HEAdEr	• Line as header. The contents of the header must be defined via an interface command, see Section 4.1.
GROSS	• Gross weight
tArE	• Tare weight
nEt	• Net weight
StARLN	• Line with ***
CrLF	• Line feed (blank line)
F FEEd	• Page feed

3.7 Diagnosis and printing out of the menu settings (DIAGNOS)

tESt SC	
Internal	Testing scale with internal calibration weight • `-Int CAL-` appears in the display during the test. • After completion of the test, ideally `*d=0.0g` briefly appears in the display, after which the scale changes to the next menu item `KboArd`.
External	Testing scale with external calibration weight 1. The scale checks the zero point. `-0-` appears in the display. The test weight flashes in the display. 2. If necessary, change the weight value displayed with TARE. 3. Put the calibration weight on the scale and confirm with PRINT. 4. The scale checks the calibration weight put on them. 5. After the test is completed, the deviation from the last calibration briefly appears in the display, ideally `*d=0.0g`, after which the scale changes to the next menu item `KboArd`.
KboArd	Keyboard test
`PUSH 1 ... 6`	• Press the keys ON/OFF →0← TARE PRINT UNIT C in order. If the key works, the scale changes to the next key. **Note** You cannot abort the keyboard test! If you have selected the menu item `KboArd`, you must press all keys.
dISPLAY	Display test: The scale displays all functioning segments
SNr	Display of the serial number
LiSt	Printout of a list of all menu settings
rESEt.AL	Resetting all menu settings to the factory settings
`SUrE?`	Confirmation inquiry • Reset all menu settings to the factory settings with PRINT • Do not reset the menu settings with TARE

4 Interface description

4.1 SICS interface commands

The compact scales FTB support the command set MT-SICS (METTLER TOLEDO **S**tandard **I**nterface **C**ommand **S**et). With SICS commands, it is possible to configure, query and operate the scales from a PC. SICS commands are divided up into various levels.

4.1.1 Available SICS commands

	Command	**Meaning**
LEVEL 0	@	Reset the scale
	I0	Inquiry of all available SICS commands
	I1	Inquiry of SICS level and SICS versions
	I2	Inquiry of scale data
	I3	Inquiry of scale software version
	I4	Inquiry of serial number
	S	Send stable weight value
	SI	Send weight value immediately
	SIR	Send weight value repeatedly
	Z	Zero the scale
	ZI	Zero immediately
LEVEL 1	D	Write text into display
	DW	Weight display
	K	Keyboard check
	SR	Send and repeat stable weight value
	T	Tare
	TA	Tare value
	TAC	Clear tare
	TI	Tare immediately
LEVEL 2	C2	Calibrate with the external calibration weight
	C3	Calibrate with the internal calibration weight
	I10	Inquire or set scale ID
	I11	Inquiry of scale type
	P100	Print out on the printer
	P101	Print out stable weight value
	P102	Print out current weight value immediately

	Command	**Meaning**
	PWR	Power On/Off
	SIRU	Send weight value in the current unit immediately and repeat
	SIU	Send weight value in the current unit immediately
	SNR	Send stable weight value and repeat after every weight change
	SNRU	Send stable weight value in the current unit and repeat after every weight change
	SRU	Send weight value in the current unit and repeat
	ST	After pressing the Transfer key, send the stable weight value
	SU	Send stable weight value in the current unit
	TST2	Start test function with external weight
	TST3	Start test function with internal weight
LEVEL SPECIAL	CLR	Clear
	I31	Header for the printout
	ICP	Send configuration of the printout
	LST	Send menu settings
	M01	Weighing mode
	M02	Stability setting
	M03	Autozero function
	M19	Send calibration weight
	M21	Inquire/set weight unit
	P	Print text
	P130	Weight value, unit and price
	PRN	Print out at every printer interface
	RST	Restart
	SFIR	Send weight value immediately and repeat quickly
	SIH	Send weight value immediately in high resolution
	SWU	Switch weight unit
	SX	Send stable data record
	SXI	Send data record immediately
	SXIR	Send data record immediately and repeat
	U	Switch weight unit

4.1.2 Requirements for communication between scale and PC

- The scale must be connected to the RS232 or Ethernet interface of a PC with a suitable cable.
- The interface of the scale must be set to "Dialog" mode, see Section 3.6.1.
- A terminal progam must be available on the PC, e.g. HyperTerminal.
- The communication parameters baud rate and parity must be set in the terminal program and on the scale to the same values, see Section 3.6.3.

4.2 TOLEDO Continuous mode

4.2.1 TOLEDO Continuous commands

The scale supports the following input commands in TOLEDO Continuous mode:

Command	Meaning
P <CR><LF>	Print out the current result
T <CR><LF>	Tare the scale
Z <CR><LF>	Zero the display
C <CR><LF>	Clear the current value
Tx.xxx <CR><LF>	Define tare

4.2.2 Output format in TOLEDO Continuous mode

Weight values are always sent in the following format in TOLEDO Continuous mode:

	Status			**Field 1**						**Field 2**							
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
STX	SWA	SWB	SWC	MSD	–	–	–	–	LSD	MSD	–	–	–	–	LSD	CR	CHK

Field 1	6 digits for the weight value that is sent without a decimal point and unit
Field 2	6 digits for the tare weight that is sent without a decimal point and unit
STX	ASCII characters 02 hex, characters for "start of text"
SWA, SWB, SWC	Status words A, B, C, see below
MSD	Most significant digit
LSD	Least significant digit
CR	Carriage Return, ASCII characters 0D hex
CHK	Checksum (2-part complement of the binary sum of the 7 lower bits of all previously sent characters, incl. STX and CR)

Status word A								
		Status Bit						
Function	**Selection**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Decimal position	X00	0	1			0	0	0
	X0					0	0	1
	X					0	1	0
	0.X					0	1	1
	0.0X					1	0	0
	0.00X					1	0	1
	0.000X					1	1	0
	0.0000X					1	1	1
Numerical increment	X1			0	1			
	X2			1	0			
	X5			1	1			

Status word B	
Function / value	**Bit**
Gross / net: Net = 1	0
Sign: Negative = 1	1
Overload = 1	2
Movement = 1	3
lb/kg: kg = 1	4
1	5
Powerup = 1	6

Status word C	
Function / value	**Bit**
0	0
0	1
0	2
Print request = 1	3
Extended = 1	4
1	5
Manual taring, only kg = 1	6

5 Event and error messages

Error	Cause	Remedy
Display Dark	• Back lighting set too dark	➜ Set back lighting (`b.LIGHt`) brighter
	• No mains voltage	➜ Check mains
	• Unit switched off	➜ Switch on unit
	• Mains cable not plugged in	➜ Plug in mains plug
	• Brief fault	➜ Switch device off and back on again
Insufficient load L - - - - J	• Load plate not on the scale	➜ Place load plate on the scale
	• Weighing range not reached	➜ Set to zero
Overload r - - - - 7	• Weighing range exceeded	➜ Unload scale
		➜ Reduce preload
- - - - - -	• Result not yet stable	➜ If necessary adjust vibration adapter or weigh dynamically
- - no - -	• Function not permissible	➜ Unload scale and set to zero
r - no - 7 L - no - J	• Zeroing not possible with overload or insufficient load	➜ Unload scale
Err 6	• No calibration	➜ Unplug the mains plug then plug it back in; switch unit off and then back on in battery mode
		➜ Calibrate scale
		➜ Contact your dealer or local representative
Err 17	• Printout not yet ended	➜ End printout
		➜ Repeat required action
Err 18	• Switching the weighing unit impermissible during dynamic weighing	➜ End dynamic weighing
		➜ Switch weighing unit
Err 53	• EAROM checksum error	➜ Unplug the mains plug then plug it back in; switch unit off and then back on in battery mode
		➜ Contact your dealer or local representative

Error	**Cause**	**Remedy**
Weight display unstable	• Restless installation location	➜ Adjust vibration adapter
	• Draft	➜ Avoid drafts
	• Restless weighing sample	➜ Dynamic weighing
	• Contact between weighing pan and/or weighing sample and surroundings	➜ Remedy contact
	• Mains fault	➜ Check mains
Incorrect weight display	• Incorrect zeroing	➜ Unload scale, set to zero and repeat weighing operation
	• Incorrect tare value	➜ Clear tare
	• Contact between weighing pan and/or weighing sample and surroundings	➜ Remedy contact
	• Scale tilted	➜ Level scale

6 Technical data and accessories

6.1 Technical data

6.1.1 Type key

The compact scales FTB are available with various capacities and platforms that can be seen from the complete type designation.

6.1.2 General data

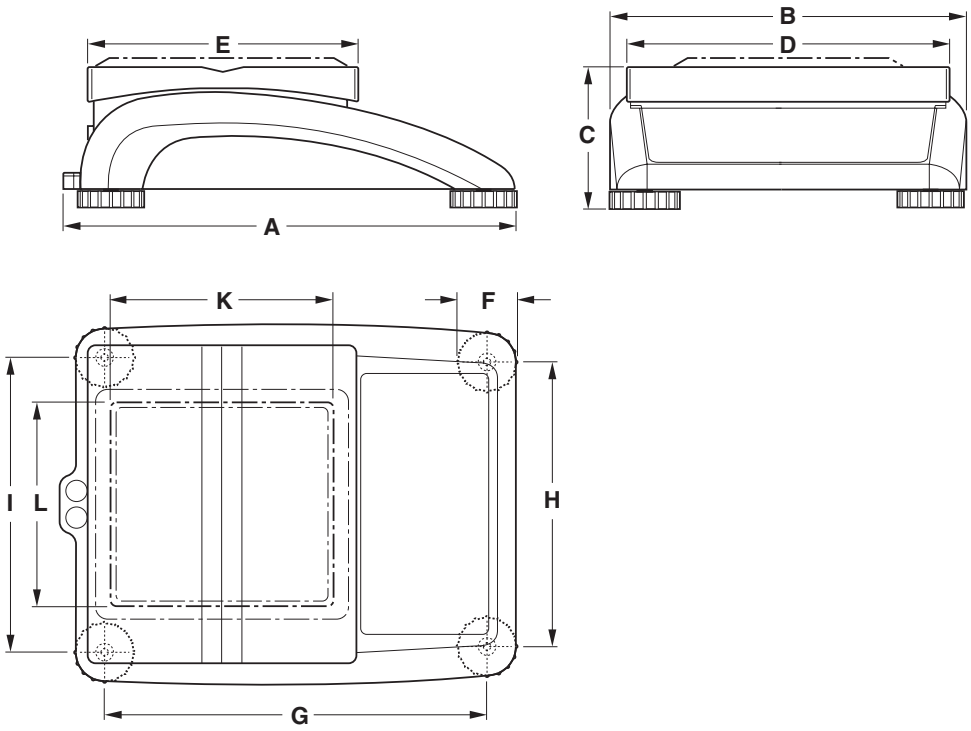
FTB		
Applications	• Weighing • Dynamic weighing	
Settings	• Resolution selectable • Weighing unit selectable: g, kg, oz, lb, t • Taring function: manual, automatic, chain tare • Automatic zero point correction when the scale is switched on and during operation • Filter for adapting to the ambient conditions (vibration adapter) • Filter for adapting to the weighing type, e.g. dispensing (weighing process adapter) • Switch-off function, sleep mode for mains-operated devices, energy-saving mode for battery operation • Display lighting	
Accuracy class OIML/NTEP	III	
Display	• LCD (liquid crystal display), digits 16 mm high, with back lighting	
Keypad	• Pressure point membrane keypad • Scratch-proof labeling	
Housing	• Diecast aluminum housing; chromium nickel steel weighing pan • Dimensions, see Page 38	
Protection Class (IEC 529, DIN 40050, EN60529)	• Small platform model • Large platform model	IP43 (not with Ethernet interface) IP65

6.1.3 Weighing ranges and readability

The compact scales FTB with strain gauge weighing cells are supplied in the configuration 2 x 3000 d. Higher legibilities are available from the factory with the optional "Premium" weighing cells.

Capacity	**Configuration**			
	2 x 3000 d (standard)		**1 x 6000 d (with optional "Premium" weighing cells**	
	Weighing ranges	**Readability (certified)**	**Weighing range**	**Readability (certified)**
3 kg	1.5 kg / 3 kg	0.5 g / 1 g	3 kg	0.5 g
6 kg	3 kg / 6 kg	1 g / 2 g	6 kg	1 g
15 kg	6 kg / 15 kg	2 g / 5 g	15 kg	2 g
35 kg	15 kg / 35 kg	5 g / 10 g	35 kg	5 g
60 kg	30 kg / 60 kg	10 g / 20 g	60 kg	10 g

6.1.4 Dimensions



	A	B	C	D	E	F	G	H	I	K	L
SM[1)]	335	265	100	240	200	46	276	208	216	–	–
LA[2)]	370	360	115	350	240	52	310	304	310	–	–

[1)]Small platform model

[2)]Large platform model

6.1.5 Net weights

Model	without battery	with battery	with internal calibration weight (without battery)
small	4.6 kg	5.3 kg	–
big	8.2 kg	8.9 kg	–

6.1.6 Interface connections

The compact scale can be fitted with a maximum of 2 interfaces. The following combinations are possible:

COM1	COM2
RS232	–
RS232	Ethernet

6.1.7 Assignment of the interface connections

Pin	RS232 (COM1/COM2)
1	–
2	TxD1/2
3	RxD1/2
4	–
5	GND
6	–
7	–
8	–
9	VCC

7 Appendix

7.1 Table of Geo Values

For weighing instruments verified at the manufacturer's, the geo value indicates the country or geographical zone for which the instrument is verified. The geo value set in the instrument (e.g."Geo 18") appears briefly after switch-on or is specified on a label.

Table **GEO VALUES 3000e** shows the geo values for European countries.

Table **GEO VALUES 6000e/7500e** shows the geo values for different gravitation zones.

7.1.1 GEO VALUES 3000e, OIML Class III (European Countries)

Geographical latitude	Geo value	Country
46°22' – 49°01'	18	Austria
49°30' – 51°30'	21	Belgium
41°41' – 44°13'	16	Bulgaria
42°24' – 46°32'	18	Croatia
48°34' – 51°03'	20	Czechia
54°34' – 57°45'	23	Denmark
57°30' – 59°40'	24	Estonia
59°48' – 64°00' 64°00' – 70°05'	25* 26	Finland
41°20' – 45°00' 45°00' – 51°00'	17 19*	France
47°00' – 55°00'	20	Germany
34°48' – 41°45'	15	Greece
45°45' – 48°35'	19	Hungary
63°17' – 67°09'	26	Iceland
51°05' – 55°05'	22	Ireland
35°47' – 47°05'	17	Italy
55°30' – 58°04'	23	Latvia
47°03' – 47°14'	18	Liechtenstein
53°54' – 56°24'	22	Lithuiania
49°27' – 50°11'	20	Luxemburg
50°46' – 53°32'	21	Netherlands
57°57' – 64°00' 64°00' – 71°11'	24* 26	Norway

Geographical latitude	**Geo value**	**Country**
49°00' – 54°30'	21	Poland
36°58' – 42°10'	15	Portugal
43°37' – 48°15'	18	Romania
47°44' – 49°46'	19	Slovakia
45°26' – 46°35'	18	Slovenia
36°00' – 43°47'	15	Spain
55°20' – 62°00' 62°00' – 69°04'	24* 26	Sweden
45°49' – 47°49'	18	Switzerland
35°51' – 42°06'	16	Turkey
49°00' – 55°00' 55°00' – 62°00'	21* 23	United Kingdom

* factory setting

7.1.2 GEO VALUES 6000e/7500e OIML Class III (Height £)

Geografische Breite	Geo-Wert
00°00' – 12°44'	5
05°46' – 17°10'	6
12°44' – 20°45'	7
17°10' – 23°54'	8
20°45' – 26°45'	9
23°54' – 29°25'	10
26°45' – 31°56'	11
29°25' – 34°21'	12
31°56' – 36°41'	13
34°21' – 38°58'	14
36°41' – 41°12'	15
38°58' – 43°26'	16
41°12' – 45°38'	17
43°26' – 47°51'	18
45°38' – 50°06'	19
47°51' – 52°22'	20
50°06' – 54°41'	21
52°22' – 57°04'	22
54°41' – 59°32'	23
57°04' – 62°09'	24
59°32' – 64°55'	25
62°09' – 67°57'	26
64°55' – 71°21'	27
67°57' – 75°24'	28
71°21' – 80°56'	29
75°24' – 90°00'	30

7.2 Sample protocols

Weighing with tare

```
G          0.1085 kg
T          0.0145 kg
N          0.0940 kg
```

Dynamic weighing

```
Dyn WT     43.52 kg
T           3.78 kg
```

Printout with header

KERN & Sohn GmbH
www.kern-sohn.com

G	**0.1085 kg**
T	**0.0145 kg**
N	**0.0940 kg**

G = Gross weight

N = Net weight

T = Tare

Dyn WT = dynamically determined weight

Protocol of the scale settings (menu point `List`, see page 28)

```
SOFTWARE VER 7-0-1.01b

SCALE
-------------
METROLO     :NO APPr
SNR         :0000000
Scale Build
 SCAL.TYP   :2MULT.RN
 BAS.UNIT   :kg
 SCL.CAP1   :1.5000 kg
 RESOL.1    :0.0005 kg
 SCL.CAP2   :3.000 kg
 RESOL.2    :0.001 kg
GEO         :19
DISPLAY
 UNIt1      :kg
 UNIt2      :g
 RESOLU     :0.0005 kg
 UNt.rOLL   :ON
tArE
 A-TArE     :OFF
 CHAIn.tr   :OFF
 A.CL-tr    :OFF
 PB.TArE    :ON
ZERO
 Z-CAPT     :-2 18
 AZM        :2 d
RESTART     :ON
FILTER
 VIBRAT     :MED
 PROCESS    :UNIVEr
 StABILI    :FASt
Min.WEiG
 SEt.VAL    :0.200 kg
 ONOFF      :OFF

APPLICATION
-------------
DYNAMIC     :OFF

TERMINAL
-------------
DEVICE
 SLEEP      :OFF
 B.LIGHt    :OFF
```

```
COMMUNICATION
-------------
COM 1
 MODE      1:Print
 PriNtEr
  tEmPLat  1:StdArd
  ASCi.Fmt
   LINE.FMT1:MULTI
   LENGtH  1:0
   ADD LF  1:0
 PARAMET
  BAUD     1:9600
  PAriTY   1:8 nonE
  H.SHAKE  1:XONXOFF
  ChECSUM  1:OFF
  Vcc      1:OFF
COM 2
 MODE      2:DIALOG
 PARAMET
  BAUD     2:9600
  PAriTY   2:8 nonE
  H.SHAKE  2:XONXOFF
  ChECSUM  2:OFF
  Vcc      2:OFF
OPTION
 EtH.NEt    :N.A.
 USB        :N.A.
DEF.PrN
 tEmPLt1
  LINE 1    :HEAdEr
  LINE 2    :CrLF
  LINE 3    :GROSS
  LINE 4    :tArE
  LINE 5    :nEt
  LINE 6    :F FEEd
  LINE 7    :STARLN
  LINE 8    :CrLF
 tEmPLt2
```