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Manual Concrete tester

SAUTER Concrete tester

Version 1.0
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GB



PROFESSIONAL MEASURING



SAUTER Concrete tester

V. 1.0 04/2020

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Congratulations on the purchase of a digital concrete measuring device with internal measuring cell from SAUTER. We hope you will enjoy your quality measuring device with a wide range of functions. Please do not hesitate to contact us if you have any questions, requests or suggestions.

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1 Introduction

Please read these operating instructions carefully before commissioning, even if you already have experience with SAUTER measuring instruments.

After receipt of the concrete tester, it should be checked in advance that no transport damage has occurred, that the outer packaging, the plastic housing, other parts or even the gauge itself have not been damaged. If any damage is evident, please notify SAUTER GmbH immediately.

The FC can measure tensile and compressive forces very accurately and it is easy to operate. In this special version it is suitable to measure the resistance of young sprayed concrete. It can be held in the hand for measurements. It is although suitable to cover the procedure according to the EN ISO 14488-2 (Method A) for subsequent calculation of the compressive strength of concrete.

SAUTER offers optional software and accessories to make the measuring instrument more versatile in use. Please ask SAUTER or the SAUTER supplier or visit our website www.sauter.eu.

2 Scope of delivery

- SAUTER FC, incl. internal battery
- Transport case
- Battery charger
- 15 Steel needles, 3mm with a taper angle of 60°
- Needle holder
- Needle holder adapter
- Knurled nut
- T-shaped measuring instrument holder
- User Manual German and English

3 The Shotcrete Tester

SAUTER shotcrete tester supports you to measure accurate readings of the forces required to penetrate sprayed or poured concrete during the initial strength development stage of curing. With the force readings you are able to convert the force values to a compressive strength value. The best use on-site to measure and testing shotcrete according to BS EN ISO 14488 (Method A).

4 Using the Tester

4.1 EN ISO 14488-2

This part specifies two methods from which an estimate of the in situ compressive strength of young hardened sprayed concrete can be made. The strength development of young sprayed concrete is assessed in the ranges of 0,2 MPa to 1,2 MPa and 3 MPa to 16 MPa respectively with Method A and Method B. The SAUTER Shotcrete Tester gives you the possibility to test the force values and convert them according to the EN ISO 14488-2 and gives you an overview of your sprayed concrete quality.

4.2 Principle Method A

This method is used to measure the force required to push a needle of specified dimensions to penetrate into the sprayed concrete to a depth of 15 mm +/- 2 mm. A penetrometer indicates the resisting force, through compression of a calibrated spring from which an estimated compressive strength can be derived from a conversion curve, to be provided by the producer of the test equipment The tester indicates the resisting force, from which an estimated compressive strength can be derived by means of the appropriate example conversion curve, included with the product and shown in Appendix A.

4.3 Test protocol form

The resulting strength calculation from the test data requires the measurement of compressive force at multiple sample points. A test protocol form (see Appendix 2 Example) is needed to record these data;

- Project – construction site address
- Date
- Test equip Serial No.
- Time
- Place – of the measuring points
- Measurement values

4.4 Test specimen

No special test specimen is required. The testing procedure can be used for measurements at any location without advance preparation. A sprayed concrete layer of no less than 100 mm thickness is required for testing.

4.5 Conversion curves

Appendix A of this user guide contains a graph of conversion curves to enable the calculation of the equivalent compressive strength (MPa) of the concrete from a tester force reading (N).

This graph is derived from the example calibration curves provided in EN 14488-2 Annex A (informative) of the test standard.

Two linear curves and their associated formulae are reproduced for two typical aggregate mixes of <8 mm and <=16 mm respectively. The compressive strength value on the y-axis may be derived from a resistance force reading on the x-axis either by direct extraction from the curve, or calculation via the appropriate formula, as indicated.

These curves are provided as reference examples based on data published in the standard, however the individual concrete mix will affect the accuracy of the approximation. The user is at liberty to implement their own correlation function if this would be more appropriate.

5 Test Procedure

- Record time and place of completion of spraying and start of testing.
- Ensure the force indicator is set to zero.
- Apply the device perpendicularly to the surface of the sprayed concrete layer and steadily push in the needle to a depth of 15 mm in a single continuous movement. If this is prevented, for instance because of a large aggregate particle or reinforcement, then discontinue the test and repeat in an adjacent location.
- Choose the aggregate size 8 or 16 mm.
- Read the resistance force from the scale, record the value on the protocol form and return indicator to original position.
- Clean the needle if necessary.
- Repeat the test ten times as quickly as possible (and within 1 min for strengths below 0,5 MPa) in an area representative of the sprayed region.
- Record the time at which the testing is finished (on protocol form).

5.1 Prepare the tester

Check the fit of the measuring tip

If it is worn out, please replace it

Switch on the FC.

Go to Menu choose Measurement and change Unit to “N” if it’s not already there.

Go to Test Menu and switch to Peak.

Go Back to Measurement screen

Perform your measurement.

5.2 Test the concrete at ten sample locations

Prepare the sample data row

To calculate the single representative value for the compressive strength of the shotcrete at each test instance, 10 individual samples are taken with the tester.

The data are entered into a row on the test protocol form against the timestamp, for example at 5, 20, 40, 60, 120 minutes.

6 Expression of Results

6.1 Calculation of compressive strength

If you use the Excel file (www.kern-sohn.com), it will calculate the values by itself and mark the points in the diagram sheet. So you will get a proper clean protocol of documentation of the quality of your sprayed concrete.

7 Technical data

7.1 Technical data FC with internal loadcell 1kN

Measuring device	FC 1K
Capacity	1000N
Measurement uncertainty	$\pm 0.3\%$ of Max (measuring range)
Relative air humidity	15% to 80% Humidity
Weight (without accessories)	Approx. 500g
Dimensions Display unit (LxWxH)	140x71x36mm
Thread	M6



8 Display indication



Position	Description
1	Measuring mode: Track mode; Peak mode; Preset mode
2	Battery symbol: shows the current charge status; flashes when the battery needs to be recharged
3	Default value status: : the value is between the lower and upper limit and is OK : the value is between the lower limit value and the value of 75% of the lower limit value, i.e. the value falls below the lower limit value : the value exceeds the upper limit value
4	Measuring units: the selected unit is displayed (N, kgf, ozf or lbf optional)
5	System Clock
6	Data transmission symbol
7	Data memory icon
8	Analogue load bar display
9	Current measured value
10	Direction of force (tension) Preset re ()

9 Control buttons

SAVE/ESC:



- Saving the measured value
- By pressing the SAVE/ESC button in the menu, you can return to the previous page

ZERO (zeroing):



- Zeroing the display
- Arrow 'up' in the menu

ENTER:



- Opening the menu
- Confirm the selection in the menu

Mode (mode change):



- Selecting the measuring mode
- Arrow key 'down' in the menu

ON / OFF:



- On / Off button (press button for approx. 1 s)

10 Menu items

10.1 Language

The display of the force gauge has several menu language versions. Select the desired language setting.

Menu	Language
Measurement	English
Memory	简体中文
System	繁體中文
Language	Deutsch
Info	

10.2 Display modes

The force gauge has two display modes: force transducer oriented display and reverse display. Select the desired display mode as required.

Menu	System	Display
Measurement	Display	Obverse
Memory	Auto Power	Reverse
System	Backlight	
Language	Key Sound	
Info	Date/Time	

10.3 Storing measured values

The force gauge is equipped with the function for storing measured values. The stored data can be searched or printed out.

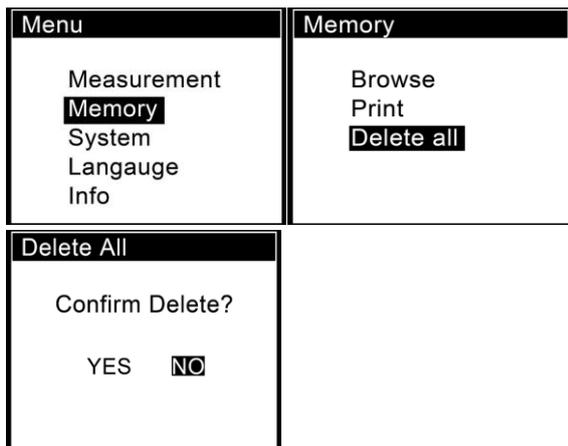
During the measurement,  press the key to save the respective value. The display will show the data storage symbol (.

The stored data is displayed. In Track mode and Preset mode, the current force value is measured, and in Peak mode, the maximum value.

10.4 Delete all records

To empty the memory, all data can be deleted at once. The display then shows a dialog box with a corresponding security prompt.

Individual data can be deleted from the 'Browse' menu.



10.5 Browse Menu

With the menu 'Browse' you can browse the memory contents of the save order.

The keys  or  are used to navigate between the data records .

At the top of the list the last saved record is displayed.

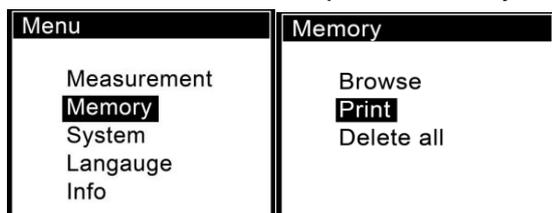
After pressing the button,  a small selection window appears on the display. In this window you can choose between the 'Delete' or 'Print' option

No.	Force	Dir
013	0.738 N	◆
014	1.958 N	◆
015	2.136 kgf	✕
016	0.848 lbf	✕
017	1.799 kgf	◆
018	29.38 ozf	✕

No.	Force	Dir
013	0.738 N	◆
014	1.958 N	◆
015	2.136 kg	◆
016	0.848 lb	◆
017	1.799 kgf	◆
018	29.38 ozf	✕

If the 'Delete' option is selected, a dialog box with a corresponding security prompt is displayed.

To exit the menu,  press the key.



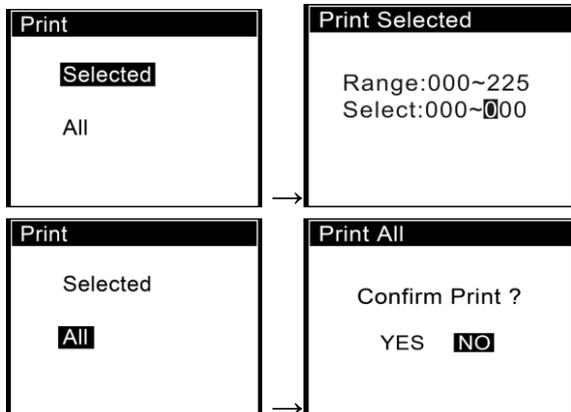
If the percentage drop is between 5% - 10%, please contact the supplier to have the loadcell replaced. These values are given as a guide only. The actual need for calibration/replacement of the loadcell varies with its individual characteristics.

10.6 Print

With the mini-printer the stored data can be printed out.

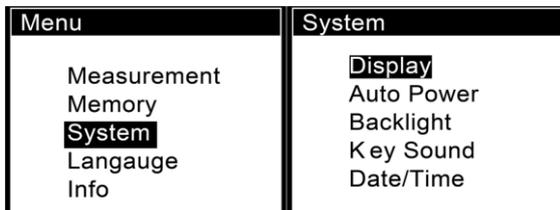
To do this, select the menu 'Print' and then the function 'Selected' or 'All'.

If the 'Selected' option is selected, the pressure range must be determined. If you choose the 'All' option, a dialog box appears with a confirmation prompt



10.7 System settings

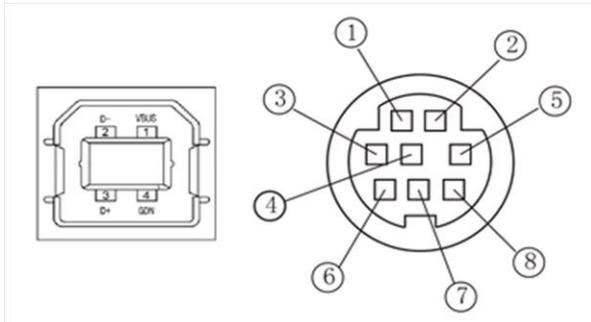
In the 'System' menu, settings for the display, automatic switch-off function, backlight, key tone, etc. can be selected.



10.8 USB/Loading

Via this port, USB2.0 can be used to connect the force gauge to a PC computer for data processing.

The Ni-MH battery can also be charged via this connection. To do this, connect the mains adapter.



10.9 Multifunctional port

The PIN assignment is shown in the table.

Pin	Description
1	TX (RS232)
2	RX (RS232)
3	GND (RS232)
4	Default value output B
5	
6	Default value output C (general)
7	Default value output A
8	

10.9.1 RS-232

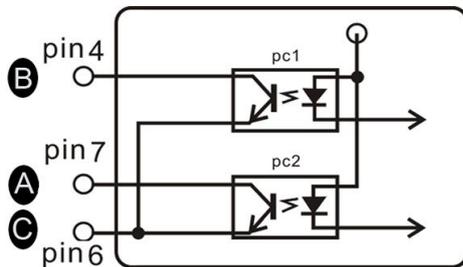
The RS232 interface is only used to connect a mini-printer to print out the data received.

RS-232 specification:

- Hardware flow control: none
- Word length: 8 bits
- Stop bit: 1 bit
- Parity: none
- Data transmission rate: 38400

10.9.2 Default value outputs

Two preset value outputs form an open collector in the NPN version. The circuit diagram below shows the inner default value circuit:



Pins 6 and 7 are switched on after the overload alarm is triggered.

In setting mode, pins 6 and 7 are switched on after the upper limit value has been exceeded, and pins 4 to 6 - after the lower limit value has been fallen below.

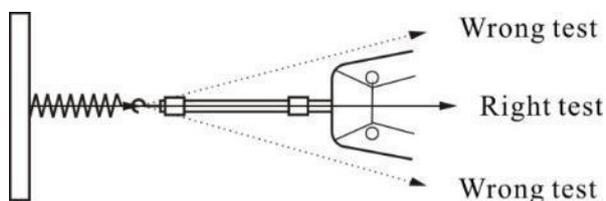
Max. permissible voltage: for pins 7 to 6 and 4 to 6 the voltage must be below 35V, and for pins 6 to 7, pins 6 to 4 below 6V!

11 Warnings

Incorrectly performed force measurements can lead to serious injury to persons and damage to objects and must therefore only be performed by trained and experienced personnel.

In particular, it must be avoided that forces act on the purchased measuring instrument which exceed the maximum load (Max) of the instrument or which do not act axially via the external and internal load cell; or if high impulse forces act on the measuring instrument.

Avoid twisting the loadcell, otherwise it could be damaged and the measuring accuracy will decrease in any case.



Inappropriate use

Do not use the measuring instrument for medical weighing.

If small quantities of the material to be measured are removed or added, incorrect measurement results may be displayed due to the "stability compensation" in the measuring instrument! (Example: Slow flow of liquids out of a container suspended from the measuring cell).

Do not apply a continuous load to measuring instruments with external measuring cell.

Overloads

Please prevent the measuring instrument from being overloaded beyond the specified maximum load (Max), minus any tare load that may already be present. This can damage the measuring instrument (danger of breakage!)

Attention:

- Make sure that never let people or objects are under the load, as this could injure or could be damaged!
- The measuring instrument is not suitable for weighing people, do not use it as an infant measuring instrument!
- The measuring device does not comply with the German Medical Devices Act (MPG).
- Never operate the measuring instrument in rooms where there is a risk of explosion. The standard version is not explosion-proof.
- The design of the measuring instrument must not be changed. This can lead to incorrect measurement results, safety-related defects and the destruction of the measuring device.
- The measuring instrument may only be operated or maintained by trained personnel.
- The measuring instrument may only be used in accordance with the described specifications.
- SAUTER must give written approval for any other areas of use / applications.

Warranty

The warranty is void if

- Non-compliance with our guidelines of the operating instructions
- Use outside the described field of application
- Modifying or opening the device
- mechanical damage and damage caused by agents such as liquids or liquids have been caused
- improper assembly or electrical installation
- Overloading the measuring cell

Test equipment monitoring

As part of quality assurance, the metrological characteristics of the measuring instrument and any test weight that may be present must be checked at regular intervals. The user responsible must define a suitable interval for this purpose as well as the type and scope of this inspection.

Information on the monitoring of measuring instruments and the necessary test weights is available on the SAUTER homepage (www.sauter.eu). The weights and measuring instruments can be checked and adjusted quickly and at favourable prices in KERN's accredited DAkkS laboratory (traceability to the national standard).

Note:

To view the CE declaration, please click on the following link:

<https://www.kern-sohn.com/shop/de/DOWNLOADS/>

12 Adjustment FC

After a certain period of use, the force gauge may show deviations in a measuring range which are due to the functioning of the device or other external influences. In such a case, the device can be sent to our customer service for expert testing and recalibration.

However, if you have standard force gauges and a measuring stand, you can perform the calibration yourself according to the instructions below:

1. Fasten the force gauge to the measuring stand or to another holder

2.  Zero the tare value by pressing the key.
3. Call up the calibration menu.

Menu	System
Measurement Memory System Language Info	Calibration Default
Calibration 1/3	Calibration 1/3
Confirm calibration? YES NO	000.0 N 000.0 N

Calibration 1/3	①
105.2 N	②
100.0 N	③

- ① Kalibrierungsdauer
- ② Aktueller Measured value
- ③ Standardwert, entered

4. Load with test weight. The current measured value now equals the test weight load. Wait until the measured value stabilizes before reading the measured value.

5. Use  the and  keys to enter the test weight.

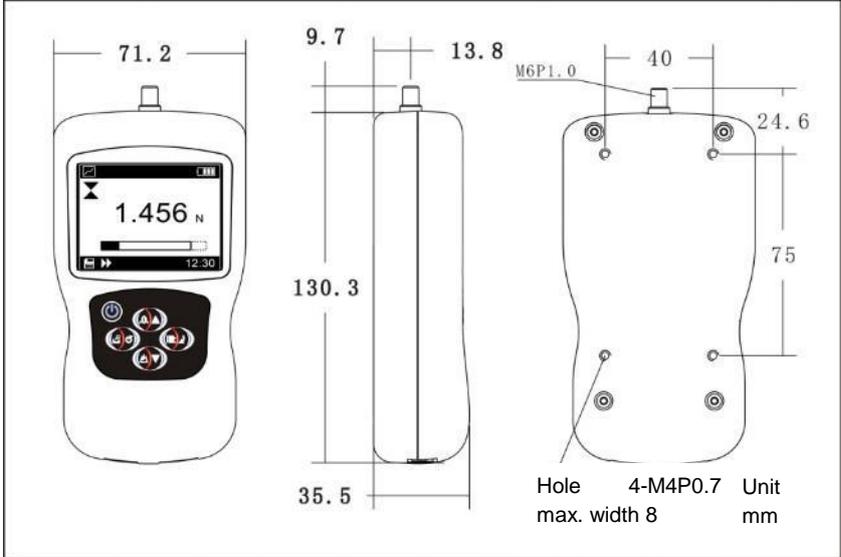
6. Press  the key to initiate a new calibration procedure. The calibration process can be interrupted  by pressing the key.

If the calibration procedure is completed or interrupted three times, a message window appears with the request to confirm the displayed message "Save and Exit" (YES) or (NO).

Press  the or  key to select the desired option, then press the key .

If the "YES" option is selected, the display shows "Calibration complete!"

13 Technical drawings



14 Technical data

14.1 Technical data FL with internal loadcell up to 1kN

Measuring device	FL 5	FL 10	FL 20	FL 50	FL 100	FL 200	FL 500	FL 1K
Capacity	5N	10N	20N	50N	100N	200N	500N	1000N
Measurement uncertainty	±0.2% of Max (measuring range)							
Work temperature	15°C to 35°C							
Relative air humidity	15% to 80% Humidity							
Weight (without accessories)	Approx. 500g							
Dimensions Display unit (LxWxH)	160x75x30mm							
Thread	M6							



15 Battery indicator / power supply

■ Battery level > 4.8 V

▣ 4.8 V > Battery level > 4.7 V

▢ 4.7 V > Battery level > 4.4 V

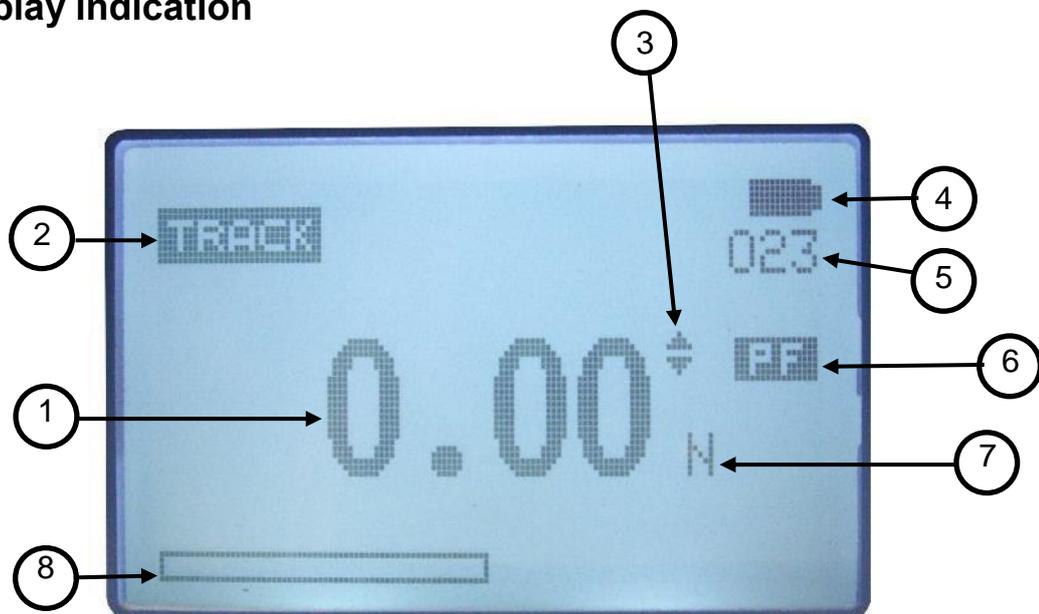
▤ 4.4 V > Battery level > 4.0 V

□ Battery level < 4.0 V

- If the battery voltage is less than 3.9V, a message appears that the battery is exhausted and the device switches off automatically

The FL is equipped with four Nickel Metal Hybrid (NiMH) batteries type AAA. For safety reasons during transport, the batteries are supplied uncharged. For maximum battery life, we recommend that you charge the batteries only with the original charger (supplied) for a period of 14-16 hours before using the meter for the first time.

16 Display indication



Position	Description
1	Measurement result
2	Display mode (track, peak (pull), peak (push))
3	Display of the direction of force
4	battery charge indicator
5	Number of occupied memory locations
6	Activated pass-fail criterion
7	Display unit of the measurement result
8	Progress bar

17 Control buttons

MENU/ESC:



- Opens the menu window with the individual submenus
- By pressing the MENU/ESC button in the menu, you can return to the previous page

ZERO (zeroing):



- Zeroing the display in track mode (tare function)

ENTER:



- Confirm the selection in the menu
- Saving a measured value in PEAK mode

PRINT (print function):



- Output of the memory contents to PC or printer

RESET (delete function):



- Delete the current PEAK value

UNIT (units of measurement):



- Press the key briefly: Switch between N, gf, kgf, ozf, lbf, mN

Mode (mode change):



Assignment with three functions:

- Track mode (continuous measurement)
- Peak ∇ Mode Train
- Peak ∇ Mode Print

ON / OFF:



- On / Off button (press button for approx. 1 s)

18 Functions

18.1 Limit value display Good / Bad

LED display for good / bad tests

Colour	Function
Red	Exceeding the upper limit value
Green	Indicates that the pass-fail criterion has been reached
Yellow	Falling below the lower limit value

An upper and a lower limit value can be programmed. The measuring instrument compares the measurement result with the limit values and outputs the result as a signal in red or green light diodes.

Setting of the limit values see MENU →PASS-FAIL

With the left arrow key the cursor is moved to the desired value. With the UP or DOWN key the value can be changed. By pressing and holding one of these keys, scrolling is possible. With the right arrow key the unit can be changed. With the ENTER-key the settings are saved and you return to the main menu.

The display now shows a "PF".

The PASS-FAIL option is automatically disabled if the upper and lower limits are set to 0 Newton. The lower value must also always be smaller than the upper one.

18.2 Invert display

The display can be rotated by 180°. To do this, do the following:

When the power is off, press and hold the "MENU/ESC" key. In addition, the "On/Off" key is pressed and the unit switches on, thus rotating the display.

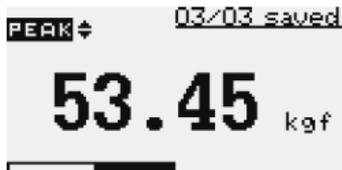
18.3 Store measured value in memory

Any measured value can be stored in the memory at any time by pressing the ENTER key. A maximum of 500 readings can be stored.

18.4 Memory / Storage

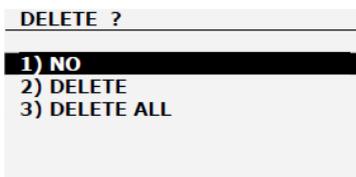
The memory is used to view the stored data. It can store 500 readings. Currently, individual entries or all entries can be deleted, or the measurement data of the memory can be printed out.

To enter the MEMORY menu, the MENU/ESC button must be pressed. Use the UP or DOWN button to move the cursor to MEMORY. Then confirm with the ENTER button and you are on the memory page. Press the ESC button to return to the main menu page.



With the arrow keys UP and DOWN the page can be changed within the memory and by pressing and holding one of these two keys it is possible to scroll up or down. By pressing the PRINT key, the memory contents can be printed out via the serial port.

By pressing the ZERO button, the DELETE menu is accessed



Use the UP and DOWN arrow keys to select the desired delete option. If NO is selected here and confirmed with the ENTER key, the meter returns to the memory page.

When DELETE is selected and the ENTER button is pressed to confirm, the currently stored measurement is deleted and the instrument returns to the memory page.

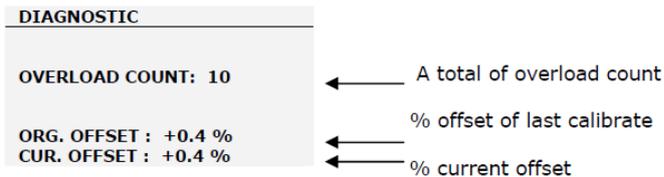
When DELETE ALL is selected and the ENTER button is pressed to confirm, all stored measurements are deleted and the instrument returns to the memory page.

18.5 Diagnostics

This function is used to check the loadcell. If it is suspected that the loadcell has been overloaded, the status can be determined immediately.

To do this, place the device in a horizontal position on a flat surface and call up the main menu page. To enter the DIAGNOSTIC menu, the MENU/ESC button must be pressed. Use the UP or DOWN button to move the cursor to DIAGNOSTIC and confirm with the ENTER button. You are now on the DIAGNOSTIC page.

Press the ESC key to return to the main menu page.



If the percentage drop is between 5% - 10%, please contact the supplier to have the loadcell replaced. These values are given as a guide only. The actual need for calibration/replacement of the loadcell varies with its individual characteristics.

18.6 Select Output

With this option the used data output, RS 232 or USB is selected.

OUTPUT MENU

- 1) USB OUTPUT
- 2) PS/2 OUTPUT



There is an analog output on the device. This generates a signal that goes from +2V to -2V. This signal is a percentage of the maximum value of the force gauge. FOR EXAMPLE.: FL100 50N is measured in the direction of pull, then a -1V signal is applied to the analog output. 75N in compression direction, then + 1.5V is present at the analog output. If the instrument is in PASS - Fail mode, 2V for PASS and 0V for FAIL are present at the analog output.

19 Computer control of the force gauge

With the RS 232 interface a connection from the force gauge to the PC can be established by sending RS232 commands.

RS232 command	Action
m	Change measuring mode
u	Change measuring unit
z	Set device to "zero"
r	Perform reset on the device

20 RS232 output signal

The reading of the FL shown on the display can be transferred to the PC by pressing the PRINT button or by issuing a command instruction to the force gauge from the PC.

RS232 command	Action
l	Send the direct reading with unit
p	Send peak value (on pull) with unit
c	Send peak value (on pressure) with unit
x or pressing PRINT KEY	<ul style="list-style-type: none"> - Send the direct reading with unit if the current mode is the track mode - Send peak value (on pull) with unit if the current mode is peak mode - Send peak value (on pressure) with unit if the current mode is the peak value print mode
d	Send save
!	Send information about the device such as model, capacity, serial number, firmware check, original offset, current offset, overload counter

20.1 Interface protocol

RS-232 Parameters

- Baud rate: 9600
- Data bit: 8
- Parity: none
- Stop bit: 1
- Start bit: 1

The measured value is requested by the ASCII character "9".

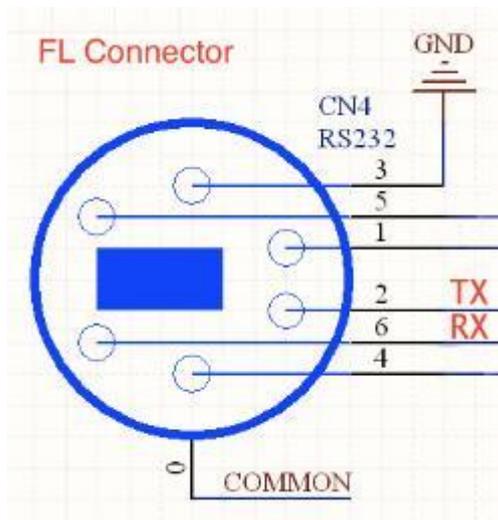
The returned measured value looks like this:

e.g. 0011.70 means -11.70 Newton if Newton is set
 |_____ > first character describes the sign (0 = minus = pressure; 1 = plus = pull)

||____>----- the remaining 6 digits describe the measured value as ASCII character string

or: 1021.15 means +21.15 N (tractive force)

20.2 Assignment of the RS232 data interface



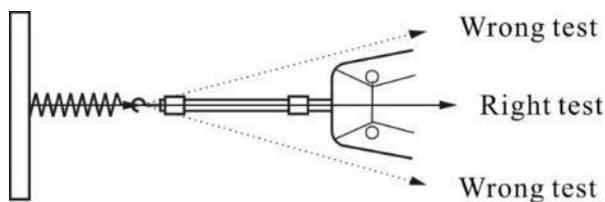
Pin	Signal	Illustration
2	TxD	Data output
3	GND	Ground
6	RxD	Input for control signal

21 Warnings

Incorrectly performed force measurements can lead to serious injury to persons and damage to objects and must therefore only be performed by trained and experienced personnel.

In particular, it must be avoided that forces act on the purchased measuring instrument which exceed the maximum load (Max) of the instrument or which do not act axially via the external and internal load cell; or if high impulse forces act on the measuring instrument.

Avoid twisting the loadcell, otherwise it could be damaged and the measuring accuracy will decrease in any case.



Inappropriate use

Do not use the measuring instrument for medical weighing.

If small quantities of the material to be measured are removed or added, incorrect measurement results may be displayed due to the "stability compensation" in the measuring instrument! (Example: Slow flow of liquids out of a container suspended from the measuring cell).

Do not apply a continuous load to measuring instruments with external measuring cell.

Overloads

Please prevent the measuring instrument from being overloaded beyond the specified maximum load (Max), minus any tare load that may already be present. This can damage the measuring instrument (danger of breakage!)

Attention:

- Make sure that never let people or objects are under the load, as it injures or could be damaged!
- The measuring instrument is not suitable for weighing people, do not use it as an infant measuring instrument!
- The measuring device does not comply with the German Medical Devices Act (MPG).
- Never operate the measuring instrument in rooms where there is a risk of explosion. The standard version is not explosion-proof.
- The design of the measuring instrument must not be changed. This can lead to incorrect measurement results, safety-related defects and the destruction of the measuring device.
- The measuring instrument may only be operated or maintained by trained personnel.
- The measuring instrument may only be used in accordance with the described specifications.
- SAUTER must give written approval for any other areas of use / applications.

Warranty

The warranty is void if

- Non-compliance with our guidelines of the operating instructions
- Use outside the described field of application
- Modifying or opening the device
- mechanical damage and damage caused by agents such as liquids or liquids have been caused
- improper assembly or electrical installation
- Overloading the measuring cell

Test equipment monitoring

As part of quality assurance, the metrological characteristics of the measuring instrument and any test weight that may be present must be checked at regular intervals. The user responsible must define a suitable interval for this purpose as well as the type and scope of this inspection.

Information on the monitoring of measuring instruments and the necessary test weights is available on the SAUTER homepage (www.sauter.eu). The weights and measuring instruments can be checked and adjusted quickly and at favourable prices in KERN's accredited DAkkS laboratory (traceability to the national standard).

Note:

To view the CE declaration, please click on the following link:

<https://www.kern-sohn.com/shop/de/DOWNLOADS/>

22 Adjustment instruction FL

Introduction:

This manual describes the adjustment procedure, although some programming modes are password protected.

Important! During the adjustment procedure, all weights for loading the sensor should be calibrated.

Tempering:

Before the measuring instrument is handed over to the calibration laboratory, the respective instrument must be checked for possible damage and the order specification.

Before starting adjustment, allow the measuring instrument to reach the working temperature of the calibration laboratory for at least 2 hours.

Preparation:

Insert a full set of charged batteries in the battery compartment or connect a standard power supply

Calibration:

1. Switch on the measuring instrument
2. Select the main menu by pressing the MENU key and select the menu function CALIBRATION with the cursor keys UP and DOWN. Then press the ENTER key. The ENTER PASSWORD window will appear on the screen.

**ENTER PASSWORD [Enter password].
4 FIGURES
PASSWORD: 0000***

* Master password = 7780

Use the UP and DOWN arrow keys to scroll up and down. The left and right arrows can be used to select the left and right positions. To change a digit, press and hold for a moment.

Press the ENTER key to confirm the password. If the password is correct, the display shows the calibration menu window.

CALIBRATION MENU

- 1) MAX CAPACITY**
- 2) TENSION GAIN**
- 3) COMPRESSION GAIN**
- 4) SET NEW PASSWORD**

CALIBRATION MENU

- 1) MAXIMUM LOAD
- 2) VOLTAGE INCREASE
- 3) COMPRESSION GAIN
- 4) SET NEW PASSWORD

3. Select the correct value of the weight for the respective measuring instrument. To set the load, use the UP and DOWN arrow keys to select the MAX CAPACITY menu function and press ENTER. The menu window for setting the maximum load appears on the screen.

SET MAX CAPACITY 1/2

- 1) 5 N**
- 2) 10 N
- 3) 25 N
- 4) 50 N
- 5) 100 N
- 6) 250 N

SETTING MAX. LOAD 1/2

SET MAX CAPACITY 2/2

- 7) 500 N**
- 8) 1000 N
- 9) 2500 N

SETTING MAX. LOAD 2/2

4. Use the UP and DOWN arrow keys to select the maximum load, press the selected value and hold for a moment. Press the ENTER key to save the selected value. Then return to the calibration menu.

5. To calibrate in the voltage direction: use the UP and DOWN arrow keys to select TENSION GAIN in the calibration menu and then press ENTER. The display shows a menu window for voltage increase.



5.1. Zero voltage

- Set up the measuring device together with the necessary accessories for performing the voltage calibration
- apply a force of 100% of the meter's power to the weight
- Remove the load, leave the device standing
- as soon as the display becomes stable, press the ZERO key to save the zero display

5.2. maximum stress

- apply the voltage force of 100% of the meter power
- Calibrate the voltage increase with the UP and DOWN arrow keys and RIGHT and LEFT until the meter displays the maximum voltage result
- touch the ENTER key to save the results for the entire voltage scale.

6. Compression calibration: In the calibration menu, use the UP and DOWN arrow keys to select the COMPRESSION GAIN menu function and then press ENTER. The display will show a menu window for compression gain.



6.1. Zero Compression

- Set up the measuring device and all necessary accessories for performing the compression calibration
- apply a force of 100% of the meter's power to the weight
- Remove the load, leave the device standing
- as soon as the display becomes stable, press the ZERO key to save the zero display

6.2. maximum compression

- apply the compression force of 100% of the gauge power
- Calibrate the compression gain with the UP and DOWN arrow keys and RIGHT and LEFT until the meter displays the maximum compression result
- touch the ENTER key to save the results for the entire compression scale

7. After successful calibration, remove all accessories from the meter and place the meter on a flat surface with its backside facing up.

Select the voltage increase menu window, press the ZERO key to obtain the primary calibration offset, date and time and reset the overload counter.

