Reliable Connections

Oetiker fCAL 1
Calibration Measuring Unit

Instruction Manual

Translation of the original instructions
Part no.: 08906871
Issue: 202603 | V02_a
Software / Firmware: — / —

Document: 08906871_V02_a_fCAL_1_IM_202603_EN-US

Table of Contents

1 Information about this document

1.1 Scope of application

This instruction manual is intended for the safe, proper and efficient use of the device and contains all relevant information on safety, design, function, installation, commissioning, operation, maintenance and disposal.

It is part of the device and corresponds to the technical state-of-the-art at the time of publication.

Please note the following instructions:

- Read the operating instructions carefully before using the device. Make sure that you are thoroughly familiar with all the individual parts, their properties and how they work.
- Follow all instructions in this operating manual. They are a prerequisite to the long and reliable operation of the device.
- Observe all instructions marked with a warning symbol.

For reasons of better readability, the masculine form is used for personal names and personal nouns in this document. Corresponding terms apply to all genders in the interest of equal treatment. The abbreviated language form is for editorial reasons only and does not imply any judgment.

1.2 Storage of the instruction manual

This instruction manual is part of the scope of delivery. It must be kept close to the device and must be accessible at all times.

The operator must ensure that the target group [▸ 12] has read and understood it.

It must also be handed over if the device is resold.

1.3 Navigation within this document

Marginal column

The marginal column contains additional information (pictograms, functional illustrations, keywords). They either point out dangers or make it easier to understand and search within the manual.

Cross-references

Cross-references are highlighted in color. They refer to information in other chapters, e.g. Navigation within this document [▸ 6]. These passages can be found via the table of contents or the glossary.

1.4 Presentation conventions

This document contains various symbols and text markups.

Representation of buttons in the instructions

In the operating instructions, the corresponding button or the relevant symbols/icons that must be pressed or selected are shown next to the text.

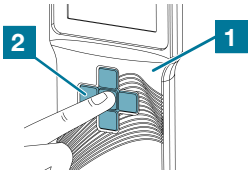
Symbols and text labels in the instructions

Symbol	Name	Function
–	List item	The black dot indicates a list item.
▶	Action	The gray triangle indicates actions that must be performed in the specified order.
▶ ▷	Reaction	The white triangle indicates the reaction to an action.
Symbols/icon or text selection on the display (e.g. Measure)	Option selection reference	References to symbols/icons, or text selections on the display are shown in a display-like format.
1	Reference to image	Color-highlighted references indicate the position in the image.
Target group [▸ 12]	Cross-reference	Cross-references are used for navigation within the document. They refer to other chapters and are linked.
	User note	The light bulb indicates user notes and tips for efficient use of the device.

Graphics

Graphics provide information about the appearance and location of an assembly or function. The parts relevant to a work step are assigned an item number and are highlighted in color. The corresponding parts are indicated in the text by a parenthese, e. g.:

- ▶ Place fCAL 1 Measuring Device (MD) 1 on a flat surface or hold firmly in your hand.
- ▶ Press and hold the middle button of the keypad 2 for 1.5 s.
  - ▷ fCAL 1 Measuring Device (MD) 1 switches on.



1.5 Revision information

All technical information, data and operating instructions contained in this instruction manual correspond to the state-of-the-art at the time of printing and are issued based on our previous experience and findings, according to the best of our knowledge.

We reserve the right to make technical changes within the scope of the further development of the components covered in this instruction manual. Therefore, no claims can be derived from the information, illustrations and descriptions in this instruction manual.

We expressly point out that only original spare parts and original accessories approved by OETIKER Schweiz AG may be used. This also applies analogously to components from other manufacturers.

2 Safety

2.1 General safety information

Every person working with the device must have read and understood this instruction manual and in particular the chapter on safety.

Risk is reduced by observing the safety instructions and complying with the instructed occupational safety measures.

NOTICE

Read the instruction manual and safety instructions before use.

2.2 Safety instructions

This manual uses warning notices to alert you to potential personal injury and property damage.

- Always read and follow these warnings.
- Compliance with a warning symbol and warning word is mandatory.

The warning signs are divided into four levels: Danger, warning, caution, notice. They contain: Type and source of danger, severity of consequences and measures to avoid danger.

2.2.1 Personal hazards

⚠ DANGER

Danger

Signal word to indicate a high risk hazard that will result in immediate death or serious injury.

⚠ WARNING

Warning

Signal word indicating a hazard with medium risk, which could possibly result in death or serious injury.

⚠ CAUTION

Caution

Signal word to indicate a low-risk hazard that could possibly result in minor or moderate injury.

NOTICE

Notice

Signal word for a potentially harmful situation in which the device or an object in its vicinity may be damaged.

2.3 Symbols used

Symbol	Meaning
	Draws attention to dangerous situations with possible personal injury and damage.
	Read the instruction manual and safety instructions before use.
	**Mandatory general notices** Compliance with the safety instructions is mandatory.
	**Wearing safety goggles is mandatory!** Wearing safety goggles when working on the system is mandatory.
	**DO NOT USE IN DAMP ROOMS!** DO NOT EXPOSE TO RAIN OR USE IN DAMP ROOMS.
	**Correct disposal** The device must not be disposed of in the regular waste.

2.4 General safety instructions

⚠ DANGER

Warning against bodily harm

Failure to observe the personal dangers described in this instruction manual may result in personal injury.

- ▶ Read this instruction manual carefully before commissioning and operating the device.
- ▶ Observe the operating instructions.

2.5 Specific safety instructions

⚠ DANGER

Attention: fire and explosion hazard

If rechargeable batteries are left in the device, there is an acute risk of ignition or explosion if they are damaged or handled improperly.

- ▶ Always remove the rechargeable batteries from the device before returning it.
- ▶ Do NOT include the rechargeable batteries with the return shipment.

NOTICE

Warning against malfunctions

Operating the device to carry out functions not described in this instruction manual may damage the device.

- ▶ Read this instruction manual carefully before commissioning and operating the device.
- ▶ Observe the technical specifications under Technical data [▶ 17].

2.5.1 Noise level

The device does not generate any perceptible noise during operation and does not exceed any relevant sound pressure levels.

2.5.2 Ventilation

The device has no special ventilation requirements. No harmful gases, vapors or particles are generated during operation.

2.6 Safety-conscious operation

The fCAL 1 (CMU) Calibration Measuring Unit is intended exclusively for indoor use.

If the fCAL 1 (CMU) Calibration Measuring Unit is operated within its technical specifications and in compliance with the safety regulations, it does not pose any danger.

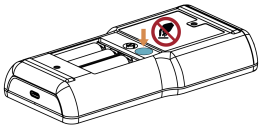
OETIKER accepts no liability for damage to property or personal injury caused by the incorrect interpretation of the measurement results.

All persons entrusted with the installation, commissioning, maintenance or repair of the device must have read and understood this instruction manual.

- Before using the fCAL 1 Calibration Measuring Unit (CMU), check the device for visible damage and ensure that it is in perfect condition.
- Report any defects immediately to your supervisor and stop using the device.
- Error messages may only be acknowledged if the cause of the fault has been rectified and there is no further danger.

2.7 Modifications to the device

If the seal on the device is damaged or removed without authorization, any warranty provided by Oetiker shall be rendered null and void.



In particular, extending or modifying the cables and carrying out repairs are prohibited.

Modifications to the device are generally not permitted. However, if modifications are necessary, the following points must be observed:

- Do not make any modifications or additions or perform conversions on the device without the express permission of Oetiker.
- Do not make any changes to the system software without the express permission of Oetiker.
- All conversion measures require written confirmation from Oetiker.

2.8 Target audience

The operator is responsible for ensuring the required qualification of the personnel and their proper handling of the device. He must ensure that only competent and duly authorized personnel work on the device.

Competent persons are those who have sufficient knowledge, based on their technical training and experience, so as to be familiar with the commissioning and operation of the device. His qualifications should also enable him to assess the safe working condi-

tion of the device in accordance with the relevant occupational health and safety and accident prevention regulations and the generally recognized rules of technology and standards.

	Operator	Line Manager	Service technician (Oetiker)
Normal operation	X	X	X
Initial commissioning		X	X
Cleaning	X	X	X
Troubleshooting and fault correction		X	X
Maintenance, upkeep, repairs and servicing			X

Operator

The operator must have read and understood this instruction manual in his own language.

The operator:

– is familiar with the warnings and safety instructions in this document
– knows the relevant procedures described in this document
– has been trained accordingly
– has been trained by the responsible line manager

The operator may:

– operate the device, using its basic functions
– clean the device
– has been instructed on all operating issues (including risks)

Line manager

The line manager must have read and understood this instruction manual in his own language.

The line manager:

– possesses the knowledge described for the «Operator»
– trains the operator
– can interpret and rectify errors

The line manager may:

– operate the device
– carry out the initial commissioning
– apply settings
– train operators in handling the device
– make the original instruction manual available

Service technician (Oetiker)

The service technician must have read and understood this instruction manual in his own language.

The service technician:

– possesses the knowledge described for the «Line Manager»
– can carry out simple service activities in accordance with the instruction manual

The service technician may:

– operate the device
– carry out the initial commissioning
– apply settings
– train operators in handling the device
– make the original instruction manual available
– carry out maintenance, servicing and repair work

2.9 Signs and labels on the fCAL 1 Calibration Measuring Unit (CMU)

Symbol	Meaning
	**Beware of leaking batteries** Improper use of rechargeable batteries can damage the electronics of the device due to leakage. ▶ Use the NiMH rechargeable battery type recommended in Overall system fCAL 1 Calibration Measuring Unit (CMU) [▶ 17].

▶ Observe the safety signs and safety plates.

▶ Do not remove the safety signs and safety plates and always keep them in a legible condition.

3 Intended use

The fCAL 1 Calibration Measuring Unit (CMU) consisting of the fCAL 1 Measuring Device (MD) and a fCAL 1 Closing Force Sensor (CFS) has been developed according to the state-of-the-art and product-specific standards and is intended exclusively for checking the closing force and for interactive communication with pneumatic/hydraulic tools and other Oetiker tools.

The fCAL 1 Calibration Measuring Unit (CMU) is used in technical production facilities, in industry in the area of commissioning and for process monitoring and quality assurance. Any use beyond this description is considered «not as intended».

Areas of application

– Calibration of Oetiker tools according to the list Compatibility list of Oetiker products [▸ 16]

The fCAL 1 Measuring Device (MD) can be operated both wirelessly (in battery mode) and with a wired setup (via the USB-C cable).

The fCAL 1 Measuring Device (MD) can be used for force measurements in conjunction with a fCAL 1 Closing Force Sensor (CFS).

The display shows the current measured value and the mean values, which can then be sent to an Oetiker tool via an external interface or entered manually. In addition, the measured values can also be stored in the internal memory and sent directly to a PC via the USB-C interface.

The fCAL 1 Calibration Measuring Unit (CMU) is not suitable for safety applications.

«Improper use» includes, for example

– Force measurements on tools for which the fCAL 1 Calibration Measuring Unit (CMU) is not approved and/or that are not Oetiker products [▸ 16].
– Operating the fCAL 1 Calibration Measuring Unit (CMU) with a sensor not intended for this purpose
– Operating the fCAL 1 Closing Force Sensor (CFS) with a measuring unit not intended for this purpose
– Operating the fCAL 1 Calibration Measuring Unit (CMU) outside its measuring range

Unintended use

The fCAL 1 Calibration Measuring Unit (CMU) corresponds to the state-of-the-art and is safe to operate. Residual dangers exist in the event of improper use and operation by untrained personnel (see Target audience [▸ 12]). The operator of the fCAL 1 Calibration Measuring Unit (CMU), not the manufacturer, is responsible for any personal injury or damage to property, resulting from improper use.

3.1 Compatibility list of Oetiker products

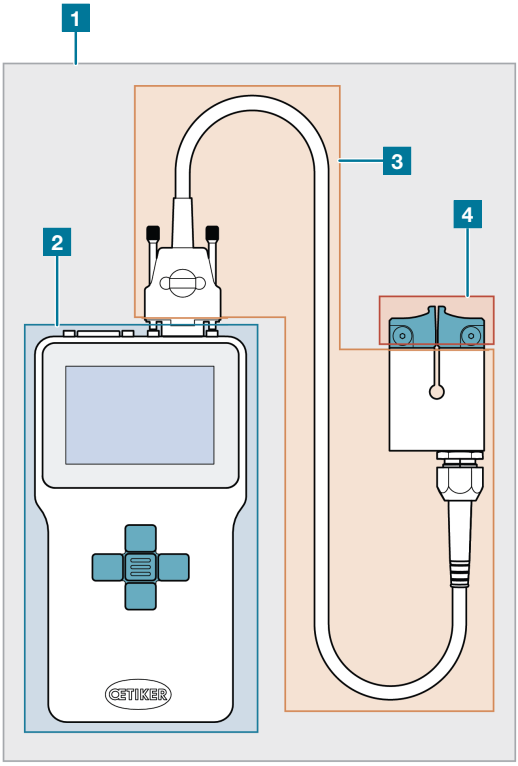
The fCAL 1 Calibration Measuring Unit (CMU) is compatible with the following OETIKER tools:

- «EPC 01» Electronically controlled pneumatic pincers
- «FAST 3000» Stationary tool for mounting strap clamps
- «CP 10 / CP 20» Cordless clamp pincers
- «ELK 02» Electronically controlled pneumatic pincers
- «ME Pincer» mechanical pneumatic pincer series
- «HMK» manual pincers with force monitoring
- «SMART» sensor-monitored assembly and repair tool

4 Technical data

4.1 Overall system fCAL 1 Calibration Measuring Unit (CMU)

The fCAL 1 Calibration Measuring Unit (CMU) consists of the fCAL 1 Measuring Device (MD) and the fCAL 1 Closing Force Sensor (CFS) including the fCAL 1 Closing Force Jaws (CFJ) .



1 fCAL 1 Calibration Measuring Unit (CMU)
2 fCAL 1 Measuring Device (MD)
3 fCAL 1 Closing Force Sensor (CFS)
4 fCAL 1 Closing Force Jaws (CFJ)

4.2 Technical specifications

The following subsections provide a structured summary of the product-specific technical specifications of the complete fCAL1 system and its individual components.

4.2.1 Ambient conditions fCAL 1 Calibration Measuring Unit (CMU)

Parameter	Value
Display resolution	1 N
Working temperature range	10 °C to 40 °C
Altitude	Max. 2000 m a.s.l.
Pollution level	2 (according to EN 61010-1)
Overvoltage category	I (according to EN 61010-1)

4.2.2 USB Power supply fCAL 1 Measuring Device (MD)

Parameter	Value
Voltage	5 V ±0,25 V
Current / output	– 1500 mA / 7,5 W (operation & battery charging) – 200 mA / 1 W (operation & no battery charging)
USB PD protocol	– USB PD 3.0 standard, profile 1 (operation & battery charging) – No PD protocol (operation & no battery charging)
USB cable	– Any cable with USB-C to USB-C connections. USB-PD-compatible cable not required (operation & battery charging) – Any USB-C cable (operation & no battery charging)
Energy source	– Limited Power Source (LPS) classified power supply according to IEC 62368-1 (USB-C power supply with corresponding safety certification)

4.2.3 Battery power supply fCAL 1 Measuring Device (MD)

Parameter	Value
Type	4 x AA NiMH rechargeable battery 1.2 V 2500 mAh

4.2.4 Ambient conditions fCAL 1 Closing Force Sensors (CFS)

fCAL 1 Closing Force Sensor 6 kN (CFS 06)

Parameter	Value
Sensor type	Strain gauge (DMS) sensor
Measuring range	200 - 6000 N
Calibrated range	1200 - 6000 N
Accuracy	Up to 2000 N: ± 11 N Above 2000 N: ± 26 N over the full measuring range
Max. Force	6720 N (112 %)
Working temperature range	10 °C to 40 °C
Altitude	Max. 2000 m a.s.l.
Pollution level	3 (according to EN 61010-1)
Overvoltage category	I (according to EN 61010-1)

fCAL 1 Closing Force Sensor 10 kN (CFS 10)

Parameter	Value
Sensor type	Strain gauge (DMS) sensor
Measuring range	200 – 10,000 N
Calibrated range	2000 – 10,000 N
Accuracy	± 45 N over the full measuring range
Max. Force	11,200 N (112 %)
Working temperature range	10 °C to 40 °C
Altitude	Max. 2000 m a.s.l.
Pollution level	3 (according to EN 61010-1)
Overvoltage category	I (according to EN 61010-1)

4.3 Operating mode

The fCAL 1 Measuring Device (MD) can be operated with 4x AA 1.2V NiMH rechargeable batteries or a USB-C power supply unit. Switching between battery and USB mode is automatic, with USB mode having priority.

USB operation without charging the batteries is possible at any time and there are no special requirements for the USB-C power supply unit. (see Charging the battery [▶ 40]).

4.4 Interfaces

Type	Interface to	Type	Oetiker interface designation
Data communication	EPC (data)	RS 232	X3
Force measurement	CFS	Analog	X5
PC communication	PC	USB-C	 USB-C

4.4.1 Data communication

X3 / RS232 for EPC 01 Control Unit or other device

Communication parameters	Value
Baud rate [bit/s]	9600 bd
Data bits	8
Parity	even
Stoppbits	1
Protocol	None (text as readable ASCII characters)

X5 / analog for fCAL 1 Closing Force Sensor (CFS)

Specification	Value
Connection	9-pin SUB-MIN-D socket

USB-C for PC

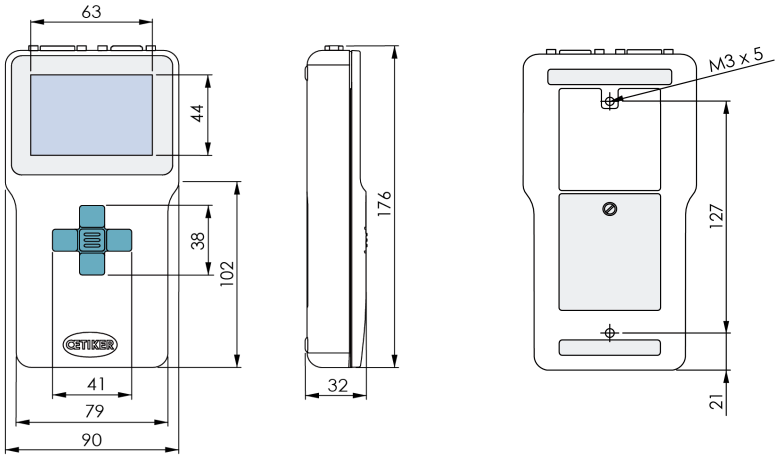
Communication parameters	Value
Baud rate [bit/s]	256'000
Data bits	8
Parity	odd
Stoppbits	1

Communication parameters	Value
New line at	LF

4.5 Dimensions, weight, materials

4.5.1 Dimensions fCAL 1 Measuring Device (MD) [mm]

Dimensional drawing	Hole pattern for wall mounting of the device



H x W x D	176 x 90 x 32

Dimension fCAL 1 Display

L x H	63 x 44

4.5.2 Weight fCAL 1 Measuring Device (MD) [g]

Housing incl. electronics without rechargeable batteries	280
Rechargeable batteries (4 pcs. approx. 20 g each)	80

4.5.3 Material fCAL 1 Measuring Device (MD)

Housing	PC / ABS, black
Keypad	Silicone, light blue
Non-slip rubber feet	Silicone, black

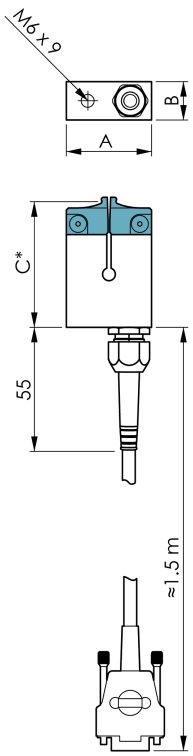
Material fCAL 1 Display

LCD Display	Tempered glass

4.5.4 Dimensions fCAL 1 Closing Force Sensor (CFS) [mm]

Dimensional drawing and variant-independent dimensions

The dimension for the force application plane, which is marked with an * in the dimensional drawing, remains unchanged for all jaw shapes and jaw sizes.



	CFS 06	CFS 10
A	40	48
B	18	22
C	59	66.5

fCAL 1 Closing Force Jaws (CFJ)

The dimensions of the Closing Force Jaws can vary depending on the type of clamp selected. For details on selecting the right Closing Force Jaws for your particular application, please refer to the technical data sheet for the respective clamp type.

Cable length	1.5 m, must NOT be extended or shortened!
Connection	SUB MIN D 9-pin plug
Thread	M6 for individual mounting fixture (see Mounting variants for the fCAL 1 Closing Force Sensor (CFS) [▸ 49])

4.5.5 Weight fCAL 1 Closing Force Sensor (CFS) [g]

	CFS 06	CFS 10
Sensor without fCAL 1 Closing Force Jaws (CFJ)	300	525

4.5.6 Material fCAL 1 Closing Force Sensor (CFS)

CFS	Stainless steel

5 Design and function

5.1 Design of the fCAL 1 Measuring Device (MD)

1 Display
2 Keypad
3 Charging port (USB-C)
4 X5 Interface fCAL 1 Closing Force Sensor (CFS)
5 X3 Interface EPC 01 / ELK 02 (RS232)
6 2x M3 Mounting thread for wall installation
7 Battery compartment

5.2 Device operation

The device is operated via the central keypad. This switches it on and off and executes the functions available in the current menu.

The measured values are shown on the backlit LCD display.

The Oetiker logo appears on the display during the switch-on process:

The last Measure mode used (Hold / Dynamic) is then displayed.

5.2.1 Switch on/off and confirming

Press and hold the middle button (1.5 s) to switch the device on or off.

This can also force a restart of the device (Restarting the device [▶ 68]).

Briefly press this button to select and/or confirm the desired function on the display.

5.2.2 Vertical scrolling

Use the up/down button to «scroll» within the selected menu or submenu.

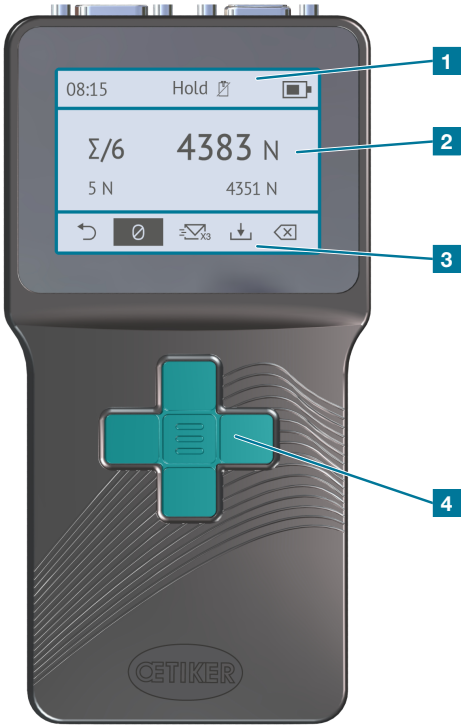
Pressing and holding these buttons («hold press») enables fast scrolling.

5.2.3 Horizontal menu navigation

The left/right button is used to navigate horizontally in the lower display menu bar.

Both buttons also allow to switch directly to the first and last menu selection in the vertical menu navigation.

5.3 Display areas



1 Display information area [▶ 26]
2 Display measurement area [▶ 27]
3 Display operating area [▶ 27]
4 Keypad
(Switch on/off and confirming [▶ 25])

5.3.1 Display information area

08:15 Time

Hold Measure mode

No sensor connected. Please connect sensor and try again.

Battery load

5.3.2 Display measurement area

Amount of closures

Durchschnittskraft aller durchgeführten Messungen

Aktuell gemessene Kraft

Messwert der letzten Schliessung

5.3.3 Display operating area


Je nach Untermenü können im Bedienbereich andere Bedienelemente (Symbole / Icons) erscheinen als die hier beschriebenen. Die zusätzlichen Bedienelemente werden in den entsprechenden Kapiteln ausführlich beschrieben.


Zurück


Set zero


Durchschnittsmesswert über X3-Schnittstelle an angeschlossenes OETIKER-Tool senden


Messung speichern


Messung löschen/zurücksetzen

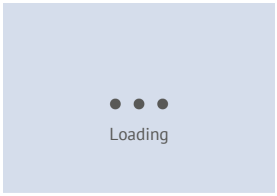
5.4 Device function


When the fCAL 1 Measuring Device (MD) is switched on, the last used «Measure mode» screen appears. The keypad can be used to navigate from the main menu to the lower menu levels.


The «Loading» screen appears if the device is busy performing a task and cannot process any further user input until the task has been completed.

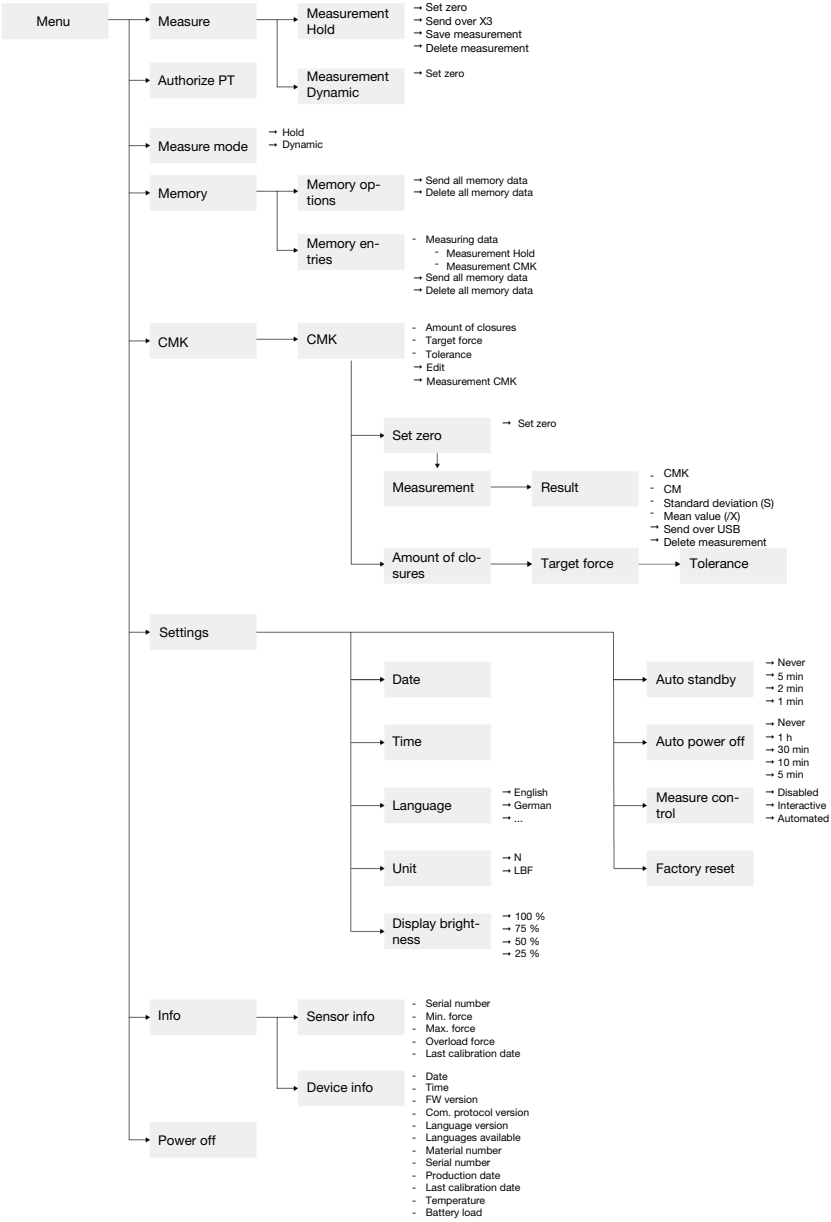
As long as the «Loading» screen is displayed:

- Do not switch off the device.
- Leave the rechargeable batteries and/or the USB-C cable plugged in.



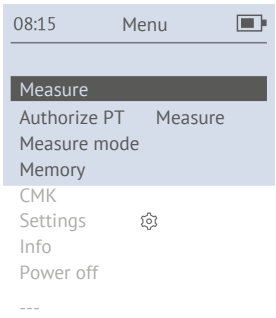
5.4.1 Menu structure

The complete graphical menu structure is shown below:


Menu
Measure
Measurement Hold
→ Set zero
→ Send over X3
→ Save measurement
→ Delete measurement
Measurement Dynamic
→ Set zero
Authorize PT
Measure mode
→ Hold
→ Dynamic
Memory
Memory options
→ Send all memory data
→ Delete all memory data
Memory entries
- Measuring data
- Measurement Hold
- Measurement CMK
→ Send all memory data
→ Delete all memory data
CMK
CMK
- Amount of closures
- Target force
- Tolerance
→ Edit
→ Measurement CMK
Set zero
→ Set zero
Measurement
Result
- CMK
- CM
- Standard deviation (S)
- Mean value (/X)
→ Send over USB
→ Delete measurement
Amount of closures
Target force
Tolerance
Settings
Date
Time
Language
→ English
→ German
→ ...
Unit
→ N
→ LBF
Display brightness
→ 100 %
→ 75 %
→ 50 %
→ 25 %
Auto standby
→ Never
→ 5 min
→ 2 min
→ 1 min
Auto power off
→ Never
→ 1 h
→ 30 min
→ 10 min
→ 5 min
Measure control
→ Disabled
→ Interactive
→ Automated
Factory reset
Info
Sensor info
- Serial number
- Min. force
- Max. force
- Overload force
- Last calibration date
Device info
- Date
- Time
- FW version
- Com. protocol version
- Language version
- Languages available
- Material number
- Serial number
- Production date
- Last calibration date
- Temperature
- Battery load
Power off

5.4.2 Main menu

The following submenus can be selected from the main menu of the fCAL 1 Measuring Device (MD):



- Measure [▶ 30]
- Authorize pincer test [▶ 31] / Authorize PT (-> Measure)
- Measure mode [▶ 31]
- Memory [▶ 32]
- CMK [▶ 33]
- Settings [▶ 34]
- Info [▶ 36]
- Switching off [▶ 37]

5.4.3 Measure

The «Measure» function can be used to determine the force applied by an Oetiker tool. The determined force is visualized on the fCAL 1 display.

▶ Select the Measure function in the main menu.

▶ Zero the measured values on the display (Measure mode [▶ 31]).

▶ The measured value «0» now appears on the display.

∅ ▷ The measurement can now be performed (Performing a measurement [▶ 45]).

Measure control

This function is available exclusively when used with the Electronically controlled pneumatic pincers «EPC 01» from Oetiker.

The «Measure control» function increases the level of automation in the force calibration process with the Oetiker EPC 01. When Measure Control is activated, the steps previously performed manually on the fCAL 1 Measuring Device (MD) — such as transferring the measured force or deleting previous measurements — are performed automatically.

Prerequisites

- ✓ The EPC 01 is configured according to the instructions in the EPC 01 Instruction Manual.
- ✓ The X3 cable is connected between the EPC 01 and the fCAL 1 CMU.
- ✓ The fCAL 1 MD is set to the «Hold» measure mode.

▶ Measure control can be configured as described in the chapter «Settings – Measure Control [▶ 34]».

All Oetiker instruction manuals can be found and downloaded online at Oetiker | Downloads.

5.4.4 Authorize pincer test

A connected Oetiker tool can be authorized for use if it meets certain criteria with the «Authorize Pincer Test» function.

▶ Select Authorize pincer test in the main menu.

▶ Authorize pincer test [▶ 47]

5.4.5 Measure mode

The Measure mode can be set to «Dynamic» or «Hold».

By default, «Hold» is activated as the Measure mode for measurements and calibrations.

▶ Only activate the «Hold» Measure mode for calibration purposes!

The force measured is displayed in the Hold Measure mode . The measured value is not shown on the fCAL 1 display until the jaws of the operated Oetiker tool are released.

Dynamic Measure mode is an available option for self-testing the measuring device.

The dynamically varying force applied to the fCAL 1 Closing Force Sensor (CFS) is displayed on the fCAL 1 Measuring Device (MD) and is continuously adjusted. The displayed measured value can therefore not be used for calibration.

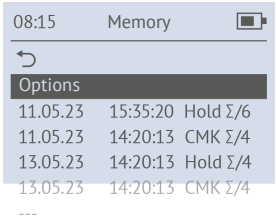
5.4.6 Memory

The «Memory» function enables measured values to be saved, managed and recalled.

- 100 measured values can be stored in each measurement series.
- A total of 100 measurement series of 100 measured values each can be saved.

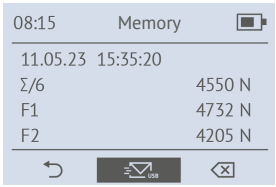
The date and time must be set correctly for the application to work properly.
If the date and time have not yet been set or are no longer up to date, proceed as described in chapter Settings [▶ 34].

- ▶ Select the Memory function in the main display to access the memory functions.
- ▶ Use the Options submenu function to manage the entire measurement series.

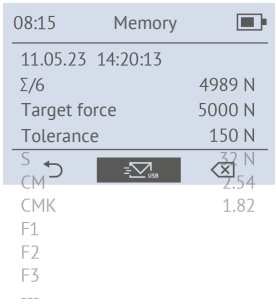


Simply call up the stored measured values or measurement series using the date and time.

- ▶ Select the desired data series to access further details concerning the saved measurement series.



- ▶ Send selected data



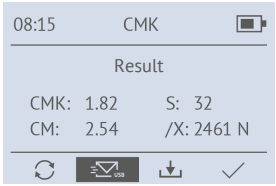
- ▶ Delete selected data.

PERMANENTLY deletes selected data and clears the memory.

5.4.7 CMK

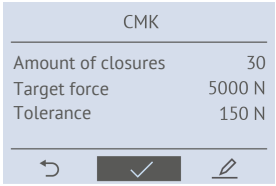
The CMK value (machine capability index) indicates how well a machine is able to produce parts within specified tolerances.

The following values can be read from the fCAL1 display:



- CMK: Information concerning the definition of terms in connection with the use of fCAL 1 Calibration Measuring Unit (CMU) can be requested from the Oetiker Service Center (see Contact details [▸ 78]).
- S: Standard deviation
- CM: as per CMK
- /X: Mean value of the measurements

The «CMK» function can be used to determine the CMK value of the OETIKER tool being operated.



▶ Select the CMK function in the main menu.

  ▷ All default settings that can be applied in connection with a CMK measurement appear on the display.

▶ The preferred default settings can be defined in the CMK submenu, e.g. Amount of closures, Target force, Tolerance.

▶ Check the default settings.

▶ Edit the values individually via the control panel where necessary.

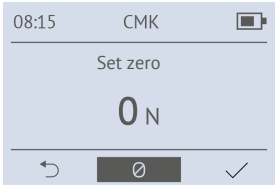
▶ Follow the menu navigation.

▶ Where necessary, adjust the default settings for the number of closures, target force and tolerance via the control panel, using the up/down button or left/right button.

▶ Confirm your settings.

▶ Zero the value currently shown on your display.

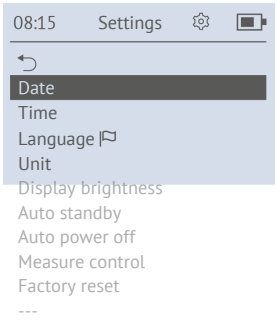
  ▷ The CMK measurement can now be started (see Determining the CMK value [▸ 50]).



5.4.8 Settings

In the Settings menu, settings such as Date, Time, Language, Unit, Display brightness, etc. can be applied individually on the measuring device.

With the central keypad, the settings within the menu can be configured using the up/down and right/left buttons and confirmed with the middle button.



NOTICE

No Automatic Time Adjustment

The fCAL 1 Measuring Device (MD) does not automatically adjust for daylight saving time.

▶ Adjust the time manually for Daylight Saving Time changes.

Date

To produce a timestamp for the recorded data, the system date must be set in the Date submenu. This setting is stored by an internal clock that is powered by an internal battery.

If the battery charge is low, the date can no longer be stored internally. In this case, the backup battery must be replaced by your local Oetiker Service Center [▸ 78].

Time

To produce a timestamp for the recorded data, the system date must be set in the Time submenu. This setting is stored by an internal clock that is powered by an internal battery.

If the battery charge is low, the time can no longer be stored internally. In this case, the backup battery must be replaced by your local Oetiker Service Center [▸ 78].

Language

When the fCAL 1 Measuring Device (MD) is first delivered, the start menu appears in English after switching on. Starting from the start menu, the desired language can be set on the device under the Language submenu. Use the up/down button to scroll to the desired language. Press the middle button on the control panel to confirm the language selection.

Available languages on the fCAL 1 Measuring Device (MD):

Chinese • German • English • French • Italian • Japanese • Korean • Dutch • Polish • Portuguese • Portuguese BR • Romanian • Swedish • Serbian • Slovakian • Slovenian • Spanish • Czech • Turkish • Hungarian

Unit

The desired unit of measurement is set in the Unit submenu.

The displays for the settings, tolerance limits and calibration are then shown in the selected unit.

The following units of measurement can be set:

N (Newton) - lbf (pound-force)

Display brightness

Various brightness levels can be set in the Display brightness submenu.

Lower brightness values can increase energy efficiency and therefore preserve battery life.

The following brightness levels can be set:

100% • 75% • 50% • 25%

Auto standby

The time after which the device switches to standby mode can be set in the Auto standby submenu. Standby mode switches off the display backlight, which preserves the battery life.

The device only switches to standby mode after the configured time if no action (by pressing a button, performing measurements or USB communication) has been detected. Each action resets the counter to the configured automatic standby time.

The following auto standby times can be set:

Never - 5 min - 2 min - 1 min

Auto power off

In the Automatic power off submenu, you can set the time after which the device switches off automatically.

The device only switches off after the configured time if no action (by pressing a button, measurements or USB communication) has been detected. Each action resets the counter to the configured time for automatic switch-off.

The following times can be set for automatic power off:

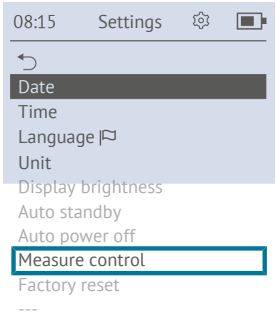
Never - 1 h - 30 min - 10 min - 5 min

Measure control

In the Settings submenu under «Measure control» the mode can be set to Disabled, Interactive, or Automated.

When the mode is set to «Interactive», a confirmation screen appears on the fCAL 1 Measuring Device (MD) at the beginning of each pincer test of a compatible closing tool. To continue with the test, you must confirm with «Accept» or «Decline».

When the mode is set to «Automated», the measure control starts immediately without displaying a confirmation screen. Additionally, the sensor is automatically zeroed at the beginning of the pincer test.



Factory reset

NOTICE

Process cannot be undone: Complete data loss!

Once the Factory reset function has been executed, it is no longer possible to restore data.

▶ Back up important data stored on the device elsewhere before performing the function.

Executing the Factory reset function will completely reset the device to the original factory settings. All user-specific data, settings and saved data will be irrevocably deleted.

This function is used to:

– prepare the device for a new start-up.

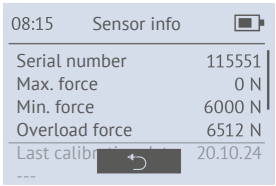
– delete sensitive data before passing on or disposing of the device.

5.4.9 Info

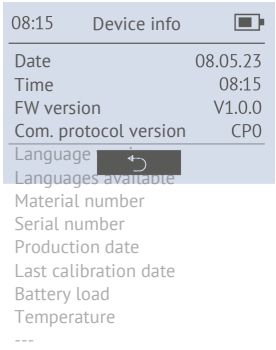
Information about fCAL 1 Measuring Device (MD) and the connected fCAL 1 Closing Force Sensor (CFS) can be called up in the Info menu.

The control panel can be used to scroll to the desired information.

The following information can be called up in the Sensor info submenu:



The following information can be called up in the Device info submenu:



5.4.10 Switching off

The fCAL 1 Measuring Device can be switched off as follows:

- Press and hold the middle control panel button (1.5 s)
- By selecting the Switch off function in the main menu.

6 Commissioning

6.1 Scope of delivery

The scope of delivery must be checked for completeness and visible external damage.

- All components are delivered in the carrying case, provided their dimensions allow it.
- The scope of delivery may vary depending on the order; not all components must be included.
- Additionally, the following items may be included in the scope of delivery:

Designation	Item number / remarks	Quantity
fCAL 1 Measuring device	32100060	1
fCAL 1 Closing Force Sensor 6kN	32100028	1
Calibration set CFS 06-10-FC	32100038	1
Calibration set CFS 06-07-FC	32100040	1
Calibration set CFS 06-05-FC	32100042	1
Calibration set CFS 06-168-03-FC	32100044	1
Calibration set CFS 06-168-13-FC	32100045	1
Calibration set CFS 06-192-FC	32100047	1
Calibration set CFS 06-292-FC	32100055	1
Calibration set CFS 06-270	32100051	1
Calibration set CFS 06-268-FC	32100052	1
Calibration set CFS 06-298-FSC	32100054	1
fCAL 1 Closing Force Sensor 10 kN	32100078	1
Calibration set CFS 10-10-FC	32100087	1
Calibration set CFS 10-12.5FC	32100083	1
fCAL 1 Accessory Bundle	32100089	1
fCAL 1 L-Boxx 102 assembly	32100095	1
fCAL 1 L-Boxx mini assembly for MD	32100097	1
fCAL 1 L-Boxx mini assembly for CFS	32100098	1
Instruction manual fCAL 1 en	08906871	1

Designation	Item number / remarks	Quantity
Multilanguage Declaration of conformity fCAL 1	08906869	1

6.2 Unpacking

The fCAL 1 Calibration Measuring Unit (CMU) is properly packaged and delivered by Oetiker. It is protected from the weather during transportation and is equipped with suitable packaging materials.

⚠ CAUTION

Caution during initial commissioning

Risk of injury and possible material damage due to damage to the device

- Check the device for damage. If transport damage is suspected, contact your local Oetiker Service Center [▸ 78].
- Do not switch on the device if it shows signs of transport damage.
- Only operate the device within the technical specifications described in these operating instructions and for the purpose described.

6.3 Inserting the batteries

- The rechargeable batteries must be inserted before operation.

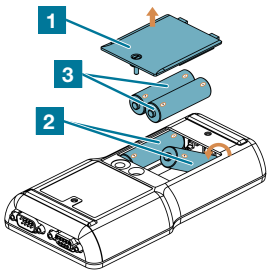
NOTICE

Caution in case of improper handling of rechargeable batteries

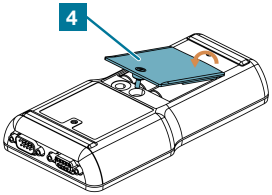
Damage to the measuring device due to improper handling of rechargeable batteries. Observe the following points when operating the device with AA rechargeable batteries:

- Insert the rechargeable batteries according to the battery arrangement diagram in the battery compartment.
- Always use a set of rechargeable batteries with the same charge level.
- Do not replace individual old empty rechargeable batteries with new ones.
- Always use rechargeable batteries from the same manufacturer and of the same type when replacing the batteries.
- Observe the rechargeable battery manufacturer's instructions.

- Open the battery compartment cover 1 with a slot screwdriver size 3.
- Insert the outer rechargeable batteries 2.
- Insert the inner rechargeable batteries 3.



- Insert the battery compartment cover 4 and tighten with a slot screwdriver size 3.



6.4 Charging the battery

The fCAL 1 Measuring Device (MD) can be charged via the USB-C port with inserted NiMH rechargeable batteries (see Technical data [▸ 17]).

⚠ DANGER

Warning against fire hazard when operating with a non-certified USB-C power supply unit

The use of a non-certified power supply unit can lead to overheating and may pose a fire hazard.

- Ensure that the power source is a power supply classified as a «Limited Power Source» (LPS) in accordance with IEC 62368-1 (see Technical data [▸ 17]).
- Only use a USB-C power supply unit with the appropriate safety certification.

NOTICE

Risk of battery leakage

Leaking battery fluid can damage the device electronics and the batteries.

- Only use the recommended NiMH rechargeable battery type.
- Replace the rechargeable batteries periodically.

NOTICE

Inaccurate display of battery charge level values

Inaccurate battery charge level information and interruption of the battery charge-learning process of the fCAL 1 Measuring Device (MD)

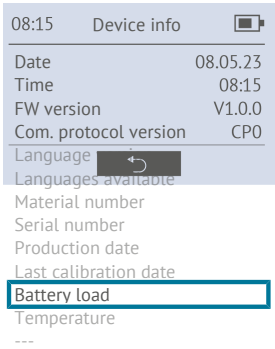
- ▶ Perform several complete charging and discharging cycles with a new set of rechargeable batteries before first commissioning.
- ▶ Repeat this procedure every time a new set of rechargeable batteries is inserted.

The fCAL 1 Measuring Device (MD) operates with four AA NiMH rechargeable batteries. To ensure accurate charge-level indication, the MD learns from the battery data; therefore, perform complete charge and discharge cycles using the same set of batteries. Removing the batteries while the device is powered via USB resets this learning process.

The battery symbol indicates the charge level in 25 % increments, while the device information screen displays it as a percentage. Accuracy may vary depending on the battery type and the current learning process.

- – Use always the same set of balanced batteries – do not exchange them individually.
- – Ensure ambient temperature stays below 35 °C for optimal charging performance and stable thermal conditions.
- – Avoid any movement or vibrations during the charging process.
- – Charge the rechargeable batteries only when the battery cover is assembled.
- – Replace the batteries when the operating time decreases noticeably.

The battery status of the fCAL 1 Measuring Device (MD) can be read via the symbol in Information area (see Display information area [▸ 26]) or in the Device info menu under Battery load.



The corresponding symbol is shown on the display while the battery is charging.

Current battery level

Battery is charging

Battery fully charged

6.5 Switching on

NOTICE

Condensation on the fCAL 1 Measuring Device (MD) due to moisture ingress

Switching on a damp measuring device can lead to damage to the device and its electronic components.

- ▶ Dry the measuring device thoroughly.
- ▶ Before switching the measuring device on, ensure that no moisture remains in or on the housing.
- ▶ Stop using the measuring device immediately if the device malfunctions, and contact your local Oetiker Service Center [▸ 78].

NOTICE

Damage to the Measuring Device (MD) after prolonged periods of non-use

Impairment of the measuring accuracy due to damage to the Measuring Device (MD) due to potential battery damage.

- ▶ Before using the Measuring Device (MD) again, check whether one or more rechargeable batteries have leaked/are damaged.
- ▶ If the rechargeable batteries in the battery compartment are damaged, please stop using the Measuring Device (MD) and contact your local Oetiker Service Center [▸ 78].

Press and hold the middle button (1.5 s) to switch the device on or off.

This can also force a restart of the device (Restarting the device [▸ 68]).

6.6 Connection

⚠ CAUTION

Take care when connecting products other than those described in the instructions without authorization

Risk of injury and damage to the device if products other than those recommended by Oetiker are connected.

- ▶ Only use the fCAL 1 Calibration Measuring Unit (CMU) in combination with original Oetiker tools.
- ▶ Please refer to the compatibility list [▶ 16] of Oetiker products.

NOTICE

fCAL 1 Closing Force Sensor (CFS) is not connected to fCAL 1 Measuring Device (MD).

Measurement not possible.

- ▶ Connect the fCAL 1 Closing Force Sensor (CFS) to the fCAL 1 Measuring Device (MD) in order to carry out a measurement using the measuring device.

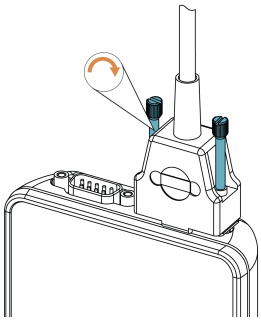
If the fCAL 1 Closing Force Sensor (CFS) is not connected to the fCAL 1 Measuring Device (MD), this is indicated by the corresponding symbol on the display.

NOTICE

Warning against inaccurate measured values

Impairment of the measurement accuracy due to incorrect connection of the fCAL 1 Closing Force Sensor (CFS) to the fCAL 1Measuring Device (MD)

- ▶ Tighten the screws of the CFS after inserting it.



6.7 Switching off

The fCAL 1 Measuring Device (MD) can be switched off in two ways:

– By operating the central control panel:

Press and hold the middle button (1.5 s) to switch the device on or off.

This can also force a restart of the device (Restarting the device [▶ 68]).

– In the display submenu Switching off [▶ 37]

7 Operation

The date and time must be set correctly for the application to work properly.
If the date and time have not yet been set or are no longer up to date, proceed as described in chapter Settings [▶ 34].

7.1 Performing a measurement

⚠ DANGER

Risk of eye injuries if the fCAL 1 Closing Force Jaws (CFJ) break off during the measurement!

Flying sharp parts or splinters from the fCAL 1 Closing Force Jaws (CFJ) can cause serious eye injuries.

- ▶ Wear safety goggles when working with the measuring device.

⚠ WARNING

Warning against hand injuries due to contact with sharp-edged parts!

Broken off sharp parts or splinters from the fCAL 1 Closing Force Jaws (CFJ) can cause cuts.

- ▶ Wear your personal protective equipment when working with the fCAL 1 Measuring Device (MD).

NOTICE

Warning against incorrect measurement

Incorrect measurement due to use outside the specified measuring or temperature range.

- ▶ Operate the fCAL 1 Measuring Device (MD) and the fCAL 1 Closing Force Sensor (CFS) within the specified measuring and temperature range.
- ▶ Observe the technical specifications under Technical data [▶ 17] in this instruction manual.

NOTICE

Warning against dropping

Damage to the device, the sensor and plug connections. This can affect the accuracy of the measured values.

- ▶ Place the device on a flat surface during operation or hold it firmly in your hand.
- ▶ Attach the device to the wall. Use the threaded sleeves on the back of the device.

NOTICE

Risk of damage to the fCAL 1 Closing Force Sensor (CFS)

Damage to the Closing Force Sensor due to improper holding or lifting.

- ▶ Always hold or lift the fCAL 1 Closing Force Sensor (CFS) by its body.

- ▶ Select the Measure [▶ 30] function.

NOTICE

Use of the fCAL 1 Closing Force Sensor (CFS) above its overload limit

Incorrect measurements and permanent damage to the sensor due to exceeding the overload limit.

- ▶ The measuring range of the fCAL 1 Closing Force Sensor (CFS) is specified on its nameplate. Use the Closing Force Sensor within this measuring range.
- ▶ If 112% of the final value is exceeded, the sensor must be recalibrated by an accredited body.

- ▶ The measurement can now be started.

7.2 Authorize pincer test

⚠ DANGER

Risk of eye injuries if the fCAL 1 Closing Force Jaws (CFJ) break off during the measurement!

Flying sharp parts or splinters from the fCAL 1 Closing Force Jaws (CFJ) can cause serious eye injuries.

- ▶ Wear safety goggles when working with the measuring device.

⚠ WARNING

Warning against hand injuries due to contact with sharp-edged parts!

Broken off sharp parts or splinters from the fCAL 1 Closing Force Jaws (CFJ) can cause cuts.

- ▶ Wear your personal protective equipment when working with the fCAL 1 Measuring Device (MD).

⚠ WARNING

Incorrect measurement due to incorrect pincer test preparations

Failure to follow the tool-specific instructions for the Oetiker tool being operated can result in incorrect measured values.

- ▶ Depending on the Oetiker tool, you must carry out the preparations for a pincer test accordingly.
- ▶ Follow the instructions in the respective instruction manual for the Oetiker tool being operated.

- ▶ Select the Authorize pincer test [▶ 31] function.
- ▶ Further operation is dependent on the operated Oetiker tool.

Each Oetiker tool has an individual procedure for the pincer test. This procedure can be found in the corresponding instruction manual.

All Oetiker instruction manuals can be found and downloaded online at Oetiker | Downloads.

7.3 Closing force measurements with the fCAL 1 Closing Force Sensor (CFS)

⚠ DANGER

Risk of eye injuries if the fCAL 1 Closing Force Jaws (CFJ) break off during the measurement!

Flying sharp parts or splinters from the fCAL 1 Closing Force Jaws (CFJ) can cause serious eye injuries.

▶ Wear safety goggles when working with the measuring device.

⚠ WARNING

Warning against hand injuries due to contact with sharp-edged parts!

Broken off sharp parts or splinters from the fCAL 1 Closing Force Jaws (CFJ) can cause cuts.

▶ Wear your personal protective equipment when working with the fCAL 1 Measuring Device (MD).

NOTICE

Warning against malfunctions

Operating the fCAL 1 Measuring Device (MD) and/or the fCAL 1 Closing Force Sensor (CFS) beyond its technical specifications can result in malfunctions.

▶ Observe the technical specifications under Technical data [▸ 17].

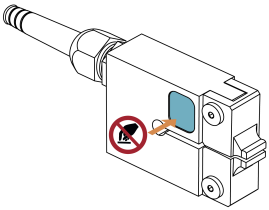
▶ Observe the technical specifications on the corresponding nameplate in this instruction manual.

– Device Switching on [▸ 42].

– Check the battery charge level before measuring. Charge the batteries if necessary (see Charging the battery [▸ 40]).

– Connect the fCAL 1 Closing Force Sensor (CFS) to the fCAL 1 Measuring Device (MD).
Use the «X5» interface provided for this purpose. Connection [▸ 43]

– Perform measurement [▸ 45]



NOTICE

Warning against inaccurate measured values

Impairment of the measuring accuracy due to incorrect holding of the Closing Force Sensor (CFS)

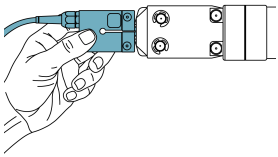
- ▶ When measuring, hold the Closing Force Sensor (CFS) in such a way that you are not touching the potting compound.

7.3.1 Mounting variants for the fCAL 1 Closing Force Sensor (CFS)

The fCAL 1 Closing Force Sensor (CFS) can be held or mounted as described below:

Ensure that you do not expose yourself to any danger.

Manual

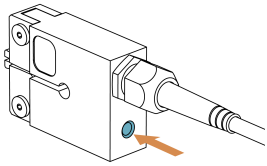


The fCAL 1 Closing Force Sensor (CFS) is held by hand between the pincer jaws of the Oetiker tool being operated.

Insert the fCAL 1 Closing Force Jaws (CFJ) of the fCAL 1 Closing Force Sensor (CFS) flush into the pincer opening as such that:

- they seated against the stop
- they are centered within the pincer jaws
- the sensor body is aligned parallel to the pincer head

With an individual mounting fixture



If it is possible to fasten the sensor mechanically within the assembly chain of your system or installation, the M6 thread provided for this purpose can be used.

On the underside of the fCAL 1 Closing Force Sensor (CFS) (next to the cable connection) there is an M6 thread into which a holder or bracket of your choice can be screwed to enable mounting on an individual mounting fixture or mounting mechanism.

7.4 Determining the CMK value

The fCAL 1 Calibration Measuring Unit (CMU) can be used to determine the CMK value of compatible Oetiker tools as listed at Compatibility list of Oetiker products [▶ 16].

⚠ DANGER

Risk of eye injuries if the fCAL 1 Closing Force Jaws (CFJ) break off during the measurement!

Flying sharp parts or splinters from the fCAL 1 Closing Force Jaws (CFJ) can cause serious eye injuries.

▶ Wear safety goggles when working with the measuring device.

⚠ WARNING

Warning against hand injuries due to contact with sharp-edged parts!

Broken off sharp parts or splinters from the fCAL 1 Closing Force Jaws (CFJ) can cause cuts.

▶ Wear your personal protective equipment when working with the fCAL 1 Measuring Device (MD).

▶ Select the «CMK [▶ 33]» function.

▷ As soon as all default settings have been confirmed with the «Confirm icon», you return to the CMK main menu to carry out the CMK measurement from there.

▶ Start your CMK measurement.

7.4.1 Transferring determined CMK values

NOTICE

Warning against unintentional data loss

If the CMK results screen is exited with «Repeat» or «Back» – you are taken directly to the corresponding submenu. All determined CMK data will be lost.

▶ Save your data before exiting the CMK results screen, either via the save icon...

▶ Or send your data to a device connected via USB.

– The operated Oetiker tool has the «Send over USB» function:

▶ Read and follow the instructions for data transmission via USB in the instruction manual for the Oetiker tool being operated.

All Oetiker instruction manuals can be found and downloaded online at Oetiker | Downloads.

– The operated Oetiker tool does NOT have the «Send over USB» function:

▶ Enter values manually in the desired file format.

7.4.2 fCAL 1 Measuring Device (MD) USB communication

Forces output via the USB interface are specified in newtons, even if the device is configured in lbf.

The USB commands described below can be used to retrieve specific device information.

The USB commands are sent to the USB-C connection of the fCAL 1 Measuring Device (MD) via a virtual Com-Port connection (see parameter: Data communication [▶ 20])

NOTICE

Impairment of the measurement accuracy

Sending commands to the device via USB-C during a measurement produces inaccurate measured values.

▶ Do not communicate with the fCAL 1 Measuring Device (MD) via the USB-C interface during a measurement.

USB function	Command	Description
Statistics	`statistics`	The «statistics» command retrieves the device statistics from the internal memory.
Log	`log`	The «log» command retrieves all saved logs from the internal memory.
Device info	`device info`	The «device info» command retrieves the environmental data for the device, the production data and some of the calibration data.

USB function	Command	Description
Sensor info	`sensor info`	The «sensor info» command retrieves the information stored in the closing force sensor memory.
Sensor IDs	`sensor ids`	The «sensor ids» command retrieves the IDs and connection data for the last ten sensors connected to the measuring device.
Firmware version	`fw version`	The «fw version» command retrieves the measuring device firmware version.
Firmware info	`fw info`	The «fw info» command retrieves the detailed firmware identification information.
Calibration data	`get calibration data`	The «get calibration data» command retrieves the calibration data for the measuring device (gain, offset, V-source and last calibration date).
Production data	`get production data`	The «get production data» command retrieves the production data for the measuring device (material number, serial number and production date).

8 Maintenance

8.1 Maintenance schedule

DANGER

Any modification to the fCAL 1 Calibration Measuring Unit (CMU) without the consent of Oetiker is prohibited!

Oetiker accepts no liability for any damage caused if this requirement is not observed.

▶ Repairs should only be carried out by Oetiker specialists!

▶ Check the fCAL 1 Calibration Measuring Unit (CMU) at least once per shift for externally visible damage and proper function.

8.2 Calibration

To maintain the high quality of this measuring instrument, Oetiker recommends that an annual calibration be performed through your nearest Oetiker Service Center [▸ 78].

▶ To do this, send the fCAL 1 Calibration Measuring Unit (CMU) to your nearest local Oetiker Service Center [▸ 78].

The fCAL 1 Measuring Device (MD) and the fCAL 1 Closing Force Sensor (CFS) can also be calibrated together as a set by an accredited laboratory. After this, the fCAL 1 Measuring Device (MD) and fCAL 1 Closing Force Sensor (CFS) may no longer be used separately unless they are recalibrated individually.

For more information, please contact your local Oetiker Service Center [▸ 78].

NOTICE

Possible data loss during calibration

Data retention cannot be guaranteed, as the device will be handed over to external parties for calibration.

▶ Ensure that the fCAL 1 Calibration Measuring Unit (CMU) or its individual components do not contain any sensitive data before calibration.

8.3 Customer service

Please contact your local Oetiker Service Center [▸ 78] if you have any repair questions or questions relating to the functions of the fCAL 1 Calibration Measuring Unit (CMU).

Please have the serial number of the device to hand. This can be found on the type plate of your fCAL 1 Calibration Measuring Unit (CMU).

8.4 Repair

⚠ DANGER

Attention: fire and explosion hazard

If rechargeable batteries are left in the device, there is an acute risk of ignition or explosion if they are damaged or handled improperly.

- ▶ Always remove the rechargeable batteries from the device before returning it.
- ▶ Do NOT include the rechargeable batteries with the return shipment.

8.4.1 Return shipment

In the event of defects or malfunctions, return the defective component (fCAL 1 Measuring Device (MD) / fCAL 1 Closing Force Sensor (CFS)) to your nearest local Oetiker Service Center [▶ 78]. If the faulty component cannot be identified, return the entire unit fCAL 1 Calibration Measuring Unit (CMU).

For warranty claims and commissioned repairs, it is a requirement that you fill out the return form for power tools - please go to: https://www.oetiker.com/de-de/powertool-return and follow the instructions there.

Oetiker recommends returning the device in its original packaging.

If this is not possible, the device must be packed in equivalent packaging.

If the device is damaged due to defective packaging, the customer shall bear the costs, irrespective of any justified warranty claims and commissioned repairs.

8.5 Cleaning

NOTICE

Risk of damage from cleaning agents

Cleaning agents may damage the device.

- ▶ Clean the device using a dry cloth only.

⚠ CAUTION

Water entering the device!

Damage to the device due to the ingress of moisture during operation.

- ▶ Do not immerse the fCAL 1 Calibration Measuring Unit (CMU) in water.
- ▶ Do not hold the fCAL 1 Calibration Measuring Unit (CMU) under running water.

8.5.1 Recommended cleaning agents

NOTICE

Damage to the device due to the use of incorrect cleaning agents

Damage to the device.

- ▶ Do not use any cleaning agents containing acids, alkalis or strong solvents!
- ▶ Wipe the device with a dry cloth.

8.6 Checking/replacing fCAL 1 Closing Force Jaws (CFJ)

Check

- ▶ e.g. visual inspection (check for breakage)

Replace

NOTICE

Damage to the fCAL 1 Closing Force Sensor (CFS) and/or the fCAL 1 Measuring Device (MD) due to improper maintenance

Replacing the fCAL 1 Closing Force Jaws (CFJ) when the fCAL 1 Closing Force Sensor (CFS) is connected can damage the sensor and measuring device.

- ▶ Disconnect the fCAL 1 Closing Force Sensor (CFS) from the fCAL 1 Measuring Device (MD) before replacing the fCAL 1 Closing Force Jaws (CFJ).

NOTICE

Incorrect measurement when replacing a single fCAL 1 Closing Force Jaw (CFJ)

The simultaneous use of new and already used fCAL 1 Closing Force Jaws (CFS) can produce incorrect measured values.

- ▶ Always replace both fCAL 1 Closing Force Jaws (CFS), even if only one of the closing force jaws is damaged.

NOTICE

Damage to the closing force jaw screw connection due to overtightening of the screws

After changing the jaws, the Closing Force Jaws (CFJ) are easily movable. This is a deliberate functional phenomenon intended to avoid impairing the measurement accuracy.

- ▶ Do not tighten the screws beyond the max. tightening torque of 2 Nm.

NOTICE

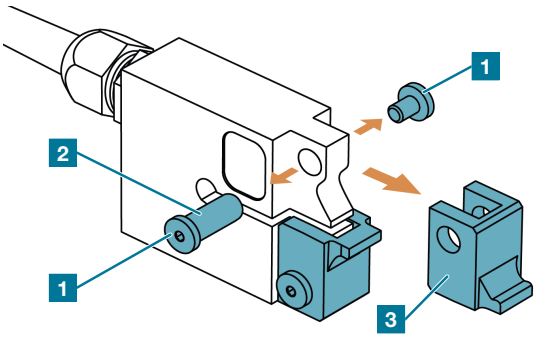
Functional failure of the bolt connection

Improper handling or careless assembly can damage the bolt.
A damaged bolt compromises the safe function of the bolt connection — the required accuracy can no longer be guaranteed.

- ▶ Always assemble and handle the bolt carefully.
- ▶ Replace the bolt immediately if any visible damage is present.

The fCAL 1 Closing Force Jaws (CFJ) are supplied complete with screws and bolts.

When replacing the fCAL 1 Closing Force Jaws (CFJ), ensure that the supplied new screws and bolts are used.



- ▶ Remove the left or right screw 1 using one of the Allen keys provided. Use the second Allen key to exert force against the direction of rotation on the opposite screw 1.
- ▶ Remove the second screw including the dowel pin 1 + 2 screwed to it.
- ▶ Remove the first fCAL 1 Closing Force Jaw (CFJ) 3.
- ▶ Proceed in the same way to remove the second closing force jaw (upper or lower closing force jaw, depending on which jaw was removed first).

- Clean the contact surfaces of the sensor and the closing force jaws with a dry cloth.
- Insert the new closing force jaw (upper or lower closing force jaw).
- Secure the new closing force jaw with the dowel pin 2 and the screw 1 that is screwed to it.
- Secure the new closing force jaw by tightening the second screw 1 with the Allen key. During installation, use the second Allen key to exert force against the direction of rotation on the opposite screw 1.
- Carry out three closures with the currently configured closing force on the replaced Closing Force Jaws (CFJ) to ensure that the jaw system is seated correctly. Your Closing Force Sensor (CFS) is now ready for the next closing force measurement.

NOTICE

Damage to or loss of the replaced fCAL 1 Closing Force Jaws (CFJ)

Improper storage of the fCAL 1 Closing Force Jaws (CFJ) can lead to damage or loss.

- Place the replaced fCAL 1 Closing Force Jaws (CFJ) in the container provided.

8.7 Replacing the batteries

- When replacing the rechargeable batteries, proceed in the same way as described in the chapter Inserting the batteries [▶ 39].
- Dispose of RECHARGEABLE BATTERIES properly: Decommissioning and disposal [▶ 70]

8.8 Original spare parts

Oetiker original spare parts can be found in the scope of delivery table (see Scope of delivery [▶ 38]).

⚠ DANGER

Danger as a result of using the wrong spare parts!

The use of spare parts that have not been tested and approved by Oetiker can impair the measuring accuracy and cause serious physical injury due to subsequent faults in Oetiker Power Tools.

- Only use Oetiker spare parts.

8.8.1 fCAL 1 spare parts

For spare parts, please contact your local Oetiker Service Center (see Contact details [▶ 78]).

In our endeavor to continuously improve the quality of our products, we reserve the right to make improvements without changing the Operating Instructions. For this reason, the specified data for e.g. dimensions, weights, materials, performance data and designations may differ for some individual parts.

9 Troubleshooting

To prevent faults, see Safety-conscious operation [▸ 12].

9.1 Correcting errors

If the fCAL 1 Measuring Device (MD) can no longer be operated, this is indicated by an error message or a symbol on the display.

If the fCAL 1 Closing Force Sensor (CFS) is not connected to the fCAL 1 Measuring Device (MD), this is indicated by the corresponding symbol on the display.

The error messages contain error codes as well as instructions that must be carried out by the user.

The errors can be identified using the error message codes.

⚠ WARNING

Warning against improper error correction

Failure to observe the error messages and the measures to rectify them can result in personal injury and property damage.

- Have malfunctions or errors that you cannot rectify yourself remedied by qualified personnel (see Target audience [▸ 12]).

NOTICE

Incorrect measurement results due to dropped measurement components

Dropping the fCAL 1 Measuring Device (MD) or the fCAL 1 Closing Force Sensor (CFS) can lead to inaccurate measurement results.

- **Perform a visual inspection:** Check the MD and the CFS for visible damage.
- **Perform a plausibility check:** Verify that the measurement results are within the expected tolerances.
- **Initiate recalibration:** Send the MD or the CFS to a certified calibration laboratory if the measurement results remain inconsistent after the plausibility check.

NOTICE

Use of the fCAL 1 Closing Force Sensor (CFS) above its overload limit

Incorrect measurements and permanent damage to the sensor due to exceeding the overload limit.

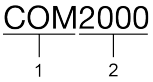
- ▶ The measuring range of the fCAL 1 Closing Force Sensor (CFS) is specified on its nameplate. Use the Closing Force Sensor within this measuring range.
- ▶ If 112% of the final value is exceeded, the sensor must be recalibrated by an accredited body.

Error display

Errors are displayed as follows:

- – The error is shown on the display as an error message with a unique identifier.
- – Errors that cannot be shown on the display are described separately.

Structure of the error message on the display



Position	Characters	Designation	Description
1	COM	Communication	
	PRO	Process	
	SYS	System	
2	—	Number	The four-digit number describes the unique identification.

Apply the countermeasures in the documented order. Proceed to the next step only if the previous countermeasure is unsuccessful.

Error code	Display information	Countermeasures
COM1000	X3 communication failed. Please try again.	▶ Use original Oetiker X3 cable. ▶ Check connection. ▶ Check readiness of connected device. ▶ Restart Measuring Device. ▶ If this occurs several times, contact your local Oetiker Service Center [▶ 78].
COM1001	X3 data is received with error from connected device. Please try again.	▶ Check readiness of connected device. ▶ Use original Oetiker X3 cable. ▶ Check connection. ▶ Restart Measuring Device.
COM1002	Connected device did not reply. Please verify X3 connection and try again.	▶ Check readiness of connected device. ▶ Use original Oetiker X3 cable. ▶ Check connection. ▶ Restart Measuring Device.
COM1010	USB communication failed. Please try again.	▶ Check connection. ▶ Ensure that correct virtual communication port is active in the PC software (virtual com port software). ▶ Disconnect and reconnect USB cable and reactivate virtual communication port. ▶ Restart Measuring Device. ▶ Connect Measuring Device directly to PC. ▶ Restart PC. ▶ If this occurs several times, contact your local Oetiker Service Center [▶ 78].

Error code	Display information	Countermeasures
COM1020	Sensor ADC communication failed. Device may not work properly. Sensor ADC communication failed. Device might not work properly.	▶ Do not perform any further measurements. ▶ Restart Measuring Device. ▶ If this occurs again, return Measuring Device to your local Oetiker Service Center [▸ 78].
COM1021	Sensor TEDS communication failed. Device might not work properly. Sensor TEDS communication failed. Device might not work properly.	▶ Do not perform any further measurements. ▶ Disconnect and reconnect Closing Force Sensor. ▶ Check Closing Force Sensor connection. ▶ If this occurs several times, contact your local Oetiker Service Center [▸ 78].
COM1030	RTC communication failed. Device time might be inaccurate.	▶ Restart Measuring Device. ▶ Return Measuring Device to local Oetiker Service Center [▸ 78].
COM1040	FRAM communication failed. Device might not work properly.	▶ Restart Measuring Device. ▶ Perform factory reset according to chapter Settings — Factory reset [▸ 34] ▶ Return Measuring Device to your local Oetiker Service Center [▸ 78].
COM1050	FLASH communication failed. Device might not work properly.	▶ Restart Measuring Device. ▶ Perform Factory reset according to chapter Settings — Factory reset [▸ 34]. ▶ Return Measuring Device to your local Oetiker Service Center [▸ 78].

Error code	Display information	Countermeasures
COM1051	Measure storage is full. Please consider freeing up space.	▶ Free up storage space (see Memory [▷ 32]). ▶ Restart Measuring Device. ▶ Perform Factory reset according to chapter Settings — Factory reset [▷ 34].
COM1052	Storing measurement in FLASH failed.	▶ Restart Measuring Device. ▶ Try again. ▶ Perform Factory reset according to chapter Settings — Factory reset [▷ 34]. ▶ If this occurs several times, contact your local Oetiker Service Center [▷ 78].
COM1053	Deleting measurements failed.	▶ Restart Measuring Device. ▶ Try again. ▶ Perform Factory reset according to chapter Settings — Factory reset [▷ 34]. ▶ If this occurs several times, contact your local Oetiker Service Center [▷ 78].
COM1060	Communication to temperature sensor failed.	▶ Restart Measuring Device. ▶ Return Measuring Device to your local Oetiker Service Center [▷ 78].
PROC2000	Amount of CMK closures must be between 5 and 120.	▶ Select the number of closures between 5 and 120 (see CMK [▷ 33]).
PROC2001	CMK target force must be greater than or equal to 500 N (112 lbf).	▶ Select a force greater than or equal to 500 N (112 lbf) (see CMK [▷ 33]).
PROC2002	CMK tolerance must be greater than or equal to 50 N (11 lbf).	▶ Select a tolerance greater than or equal to 50 N (11 lbF) (see CMK [▷ 33]).
PROC2010	Selected time is invalid.	▶ Enter valid time.

Error code	Display information	Countermeasures
PROC2011	Selected date is invalid.	▶ Enter valid date.
PROC2020	No sensor connected. Please connect sensor and try again. No sensor connected. Please connect sensor and try again.	▶ Connect Closing Force Sensor and check plug connection. ▶ Disconnect and reconnect Closing Force Sensor. ▶ If this occurs several times, contact your local Oetiker Service Center [▶ 78].
PROC2030	A force greater than the maximum allowed has been measured.	▶ Check maximum permissible closing force specified on the nameplate of Closing Force Sensor. ▶ Measure again with a force that is less than the maximum permissible force.
PROC2031	A force greater than the maximum allowed has been measured. Recalibration required.	▶ Check maximum permissible closing force specified on nameplate of Closing Force Sensor. ▶ Recalibrate Closing Force Sensor.
PROC2032	A force greater than the maximum allowed has been measured. Sensor is compromised.	▶ Check maximum permissible closing force specified on nameplate of Closing Force Sensor. ▶ Return Closing Force Sensor to your local Oetiker Service Center [▶ 78].
PROC2040	No measurement available. Please perform a measurement and try again.	▶ Perform measurement with a force higher than 200 N.
PROC2050	Measure control error. Please check the logs and consult the Instruction Manual.	▶ Check X3 cable connection. ▶ Ensure that fCAL 1 and EPC 01 are configured according to settings stated in Measure — Measure Control [▶ 30]. ▶ Reboot fCAL 1 and EPC 01. ▶ Read fCAL 1 and EPC 01 logs.

Error code	Display information	Countermeasures
SYS3000	Self-test failed. Device does not work properly.	▶ Do not perform any further measurements. ▶ Restart Measuring Device. If this occurs again, return Measuring Device to your local Oetiker Service Center [▸ 78].
SYS3010	Configuration update failed. Please try again.	▶ Restart Measuring Device. ▶ Perform Factory reset according to chapter Settings — Factory reset [▸ 34]. ▶ Please contact your local Oetiker Service Center [▸ 78] if this occurs several times.
SYS3020	Internal non attributable error. Please consider rebooting.	▶ Restart Measuring Device. ▶ Read log and find for log entries before and after SYS1010 error (see fCAL 1 Measuring Device (MD) USB communication [▸ 51]). ▶ Contact your local Oetiker Service Center [▸ 78] providing log information.
SYS3030	Invalid production data.	▶ Restart Measuring Device. ▶ Return Measuring device to your local Oetiker Service Center [▸ 78].
SYS3031	Invalid calibration data. Force measurement might not work properly. Invalid calibration data. Force measurement might not function properly.	▶ Restart Measuring Device. ▶ Return Measuring Device to your local Oetiker Service Center [▸ 78].

Error code	Display information	Countermeasures
SYS3032	Invalid sensor data. Force measurement might not work properly. Invalid sensor data. Force measurement might not work properly.	▶ Do not perform any further measurements. ▶ Disconnect and reconnect Closing Force Sensor. ▶ Check plug connection of Closing Force Sensor. ▶ Return the Closing Force Sensor to your local Oetiker Service Center [▸ 78].
SYS3040	Strong deviation of zero force. Sensor might be wrongly calibrated.	▶ Zero Closing Force Sensor without load. ▶ Check Closing Force sensor, cable and plug connection for damage. ▶ Return the sensor to your local Oetiker Service Center [▸ 78].
SYS3050	Battery charging failed.	▶ Batteries might not be completely charged. ▶ Restart charge of batteries when they are fully empty according to the Charging the batteries [▸ 40].
SYS3051	USB charger lacks PD capability.	▶ Use a USB power delivery capable charger. ▶ Use a different USB power delivery capable charger.
SYS3060	Battery status monitoring system defective.	▶ Restart device. ▶ Remove and re-insert batteries while keeping device powered with USB cable. ▶ If this occurs several times, contact your local Oetiker Service Center [▸ 78].
SYS3070	Non-rechargeable batteries detected. Please replace with chargeable batteries.	▶ Only use NiMH rechargeable batteries. ▶ Replace entire battery set. ▶ In this occurs several times with NiMH batteries, contact your local Oetiker Service Center [▸ 78].

Error code	Display information	Countermeasures
SYS3071	Battery is low. Please consider charging the device.	▶ Charge Measuring Device via USB-C. ▶ Replace batteries when they have reached the end of their service life. ▶ If this occurs several times during or after charging, contact your local Oetiker Service Center [▸ 78].
SYS3072	Battery is discharged. Device will shut down.	▶ Charge batteries with Measuring Device. ▶ Charge batteries with a dedicated charger. ▶ Replace batteries. ▶ If this occurs several times during or after charging, contact your local Oetiker Service Center [▸ 78].
SYS3080	Device temperature is too high. Device might not work properly.	▶ Only operate Measuring Device within specified ambient conditions (see Technical data [▸ 17]). ▶ Disconnect USB-C cable. ▶ Switch off Measuring Device and allow it to cool down. ▶ If problem occurs several times within the specified ambient conditions, contact your local Oetiker Service Center [▸ 78].
SYS3081	Device temperature is too low. Device might not work properly.	▶ Only operate Measuring Device within specified ambient conditions (see Technical data [▸ 17]). ▶ Allow Measuring Device to acclimatize to a higher ambient temperature. Avoid condensation (see Technical data [▸ 17]). ▶ If this occurs several times within the specified ambient conditions, contact your local Oetiker Service Center [▸ 78].

Error code	Display information	Countermeasures
SYS3090	Device date and time invalid. Please set valid date and time.	▶ Set valid date and time. ▶ If this occurs several times, contact your local Oetiker Service Center [▸ 78].

9.2 Faults that cannot be remedied

If the fCAL 1 Measuring Device (MD) can no longer be operated for no apparent reason or is blocked in a mode and does not respond, a restart must be forced.

9.2.1 Restarting the device

NOTICE

Data loss due to restarting the Measuring Device (MD)

The following data is lost during a restart:
- Unfinished closures
- CMK closures and unsaved CMK results

The device is restarted by switching it off and on again.

▶ Press the middle keypad button (see also Switch on/off and confirming [▸ 25]).
  ▷ Oetiker logo [▸ 25] is displayed.
  ▷ Device is switched off.
▶ Press the middle keypad button again (see also Switch on/off and confirming [▸ 25]).
  ▷ Oetiker logo [▸ 25] is displayed.
  ▷ Device is switched on.

⚠ CAUTION

Warning against improper operation!

Using the device after an unsuccessful restart (reboot) produces incorrect measurement results.

▶ Send your fCAL 1 Measuring Device (MD) to your local OETIKER Service Center (see Contact details [▸ 78]).

9.2.2 Fatal error

If the fCAL 1 Calibration Measuring Unit (CMU) can no longer be operated properly, a fatal error is generated.

This error, known as a «Fatal error», is displayed on the screen in the following form:

When a fatal error is generated, the status of the device is unknown. This means that it is not possible to determine whether the communication interfaces and other parts of the CMU functionalities are available. The device attempts to log the error in the internal memory and on the USB communication interface.

- Please note the description of the «Fatal Error» from the internal memory and report the problem to your local Oetiker Service Center [▸ 78].
- Click on the confirmation checkmark.
  - ▷ fCAL 1 Measuring Device (MD) is restarted.
- If the fCAL 1 Measuring Device (MD) cannot be operated properly again, contact your local Oetiker Service Center [▸ 78].

10 Decommissioning and disposal

10.1 Decommissioning

- Disconnect the fCAL 1 Closing Force Sensor (CFS) from the fCAL 1 Measuring Device (MD).
- Disconnect the USB-C cable
- Disconnect any Oetiker tools that may be connected to the fCAL 1 Measuring Device (MD).
- Perform a «Factory reset» (see Factory reset [▸ 34]) if a complete deletion of all stored data is required.
- Switch off the fCAL 1 Measuring Device (MD).
- Remove the rechargeable batteries.
- Pack the fCAL 1 Measuring Device (MD) and the fCAL 1 Closing Force Sensor (CFS) in the designated carrying case or in suitable transport containers. Ensure that all components are protected against damage and sudden changes in position.

10.2 Storage conditions

NOTICE

Condensation on the fCAL 1 Measuring Device (MD) due to moisture ingress

Switching on a damp measuring device can lead to damage to the device and its electronic components.

- Dry the measuring device thoroughly.
- Before switching the measuring device on, ensure that no moisture remains in or on the housing.
- Stop using the measuring device immediately if the device malfunctions, and contact your local Oetiker Service Center [▸ 78].

Non-permitted locations and environmental conditions

- With rapid changes in ambient temperature
- With direct sunlight
- With humidity above 80% and condensation
- Where excessive dust or debris can accumulate on the fCAL 1 Calibration Measuring Unit (CMU), unless the CMU is stored in the carrying case.
- In which salty moisture can penetrate

Prepare the fCAL 1 Measuring Device (MD) and fCAL 1 Closing Force Sensor (CFS) for storage as follows:

- Perform Decommissioning [▶ 70].
- Clean the fCAL 1 Measuring Device (MD) and fCAL 1 Closing Force Sensor (CFS).

10.2.1 Ambient conditions fCAL 1 Measuring Device (MD)

Parameter	Value
Humidity	Max. 80 % to 31°C
Storage temperature	-20 °to 50 °C
Altitude	Max. 2000 m a.s.l.
Pollution level	1 (according to EN 61010-1)

10.2.2 Ambient conditions fCAL 1 Closing Force Sensor (CFS)

Parameter	Value
Humidity	Max. 80 % to 31°C
Storage temperature	-20 °to 50 °C
Altitude	Max. 2000 m a.s.l.
Pollution level	1 (according to EN 61010-1)

10.3 Disposal

10.3.1 Principle

Ensure that the raw materials contained in the fCAL 1 Calibration Measuring Unit (CMU) are handled with care. Before disposing of materials and components, their suitability for reuse must be checked. The aim must be to maximize reuse. Careless or incorrect disposal can result in unforeseeable damage to the environment. Follow the manufacturer's instructions and the applicable laws and regulations.

10.3.2 Materials, packaging materials and device parts

The components must be separated according to material and an attempt must be made to recycle:

- Steel scrap
- Copper and non-ferrous metals in electrical parts and conductors
- Batteries
- Plastics

10.3.3 Electronic components

The fCAL 1 Calibration Measuring Unit (CMU) must not be disposed of with household waste.

Correct disposal

This symbol requires the separate disposal of electrical and electronic components. Such devices may contain dangerous and environmentally hazardous substances. These devices must be disposed of at a designated collection point for the recycling of electrical and electronic devices. This helps to protect resources and the environment. For further information, please contact your local authorities.

- Disconnect the fCAL 1 Measuring Device (MD) from the power supply if it is connected via USB-C.
- Have the components and the packaging material disposed of by a specialist company in accordance with local and statutory regulations.
- Optionally, send the fCAL 1 Calibration Measuring Unit (CMU) to your local Oetiker Service Center [▸ 78] to have it disposed there.

11 Conformity

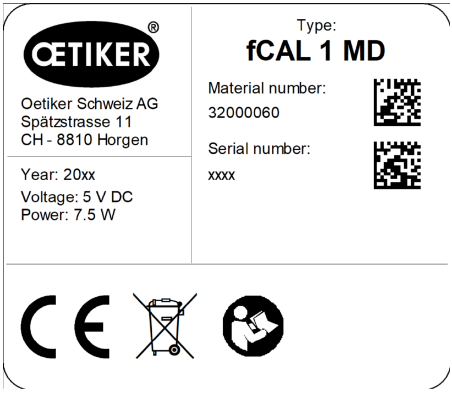
11.1 Symbols and meanings

Symbol	Meaning
	Read the instruction manual and safety instructions before use.
	**Correct disposal** The device must not be disposed of in the regular waste.

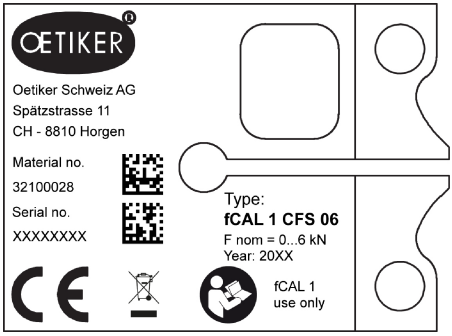
11.2 Sample

The illustrations shown below of the nameplates and Declarations of Conformity (German / English) intended for the product are provided for information purposes only. Only the nameplates affixed to the delivered product and the respective valid Declarations of Conformity are authoritative. Subject to change without notice.

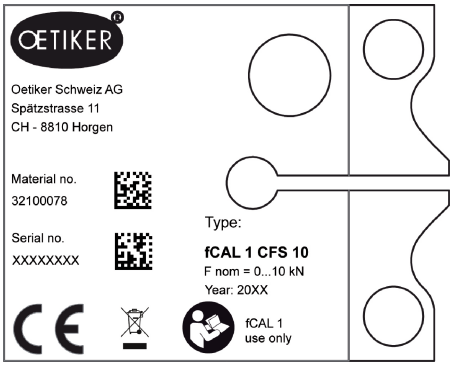
11.2.1 Nameplate for fCAL 1 Measuring Device (MD)



11.2.2 Nameplate for fCAL 1 Closing Force Sensor 6 kN (CFS 06)



11.2.3 Nameplate for fCAL 1 Closing Force Sensor 10 kN (CFS 10)



11.2.4 EU Declaration of Conformity for fCAL 1 Measuring Device (MD)

EG-Konformitätserklärung

EU Declaration of Conformity

(Original-EG-Konformitätserklärung)
(Translation from the German original Declaration of Conformity)

Wir, *We,*	Oetiker Schweiz AG Spätzstrasse 11 CH-8810 Horgen SWITZERLAND

erklären in alleiniger Verantwortung, dass das Produkt als Gesamtsystem, welches das unten aufgeführte Messgerät oder den Sensor enthält:
declare under our sole responsibility that the product as a complete system consisting of the measuring device or the sensor listed below:

Typ */ Type* **Material Nummer** */ Material number* **Serien Nummer** */ Serial number*	fCAL 1 MD
allen grundlegenden Anforderungen der nebenstehenden Richtlinien – jeweils mit deren Änderungen – entspricht: *meets all the essential requirements of the directives listed alongside – in each case with their revisions:*	2014/35/EU – Niederspannungsrichtlinie *2014/35/EU – Low Voltage Directive* 2014/30/EU – EMV-Richtlinie *2014/30/EU – EMC Directive* 2013/56EU– RoHS3-Richtlinie *2013/56/EU – Restriction of Hazardous Substances Directive*

Angewandte harmonisierte Normen: *Applied harmonised standards:*	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen – Teil 1: Allgemeine Anforderungen *Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements*	EN IEC 61326-1:2021
	Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte – Teil 1: Allgemeine Anforderungen *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*	EN 61010-1:2010+A1:2019
	Technische Dokumentation zur Bewertung von Elektro- und Elektronikgeräten hinsichtlich der Beschränkung gefährlicher Stoffe *Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances*	EN IEC 63000:2018
Angewandte sonstige technische Normen und Spezifikationen: *Other technical standards and specifications applied:*	– – –	– – –

Bevollmächtigte Person für das Zusammenstellen der technischen Unterlagen:
Authorised person for compiling the technical file:

* Oetiker Schweiz AG
Pascal Moser
Spätzstrasse 11
CH-8810 Horgen
SWITZERLAND

Unterzeichnet für und im Namen von Oetiker Schweiz AG
Signed for and on behalf of Oetiker Schweiz AG

Horgen, 17. Februar 2026

Pascal Moser	Andreas Pulver
Head R&D CoC Automatic Assembly Tools Oetiker Group	Plant Head Switzerland

11.2.5 EU Declaration of Conformity for fCAL 1 Closing Force Sensor 6 kN (CFS 06)

EG-Konformitätserklärung

EU Declaration of Conformity

(Original-EG-Konformitätserklärung)
(Translation from the German original Declaration of Conformity)

Wir,
We,

Oetiker Schweiz AG
Spätzstrasse 11
CH-8810 Horgen
SWITZERLAND

erklären in alleiniger Verantwortung, dass das Produkt als Gesamtsystem, welches das unten aufgeführte Messgerät oder den Sensor enthält:
declare under our sole responsibility that the product as a complete system consisting of the measuring device or the sensor listed below:

Typ */ Type*	fCAL 1 CFS 06
Material Nummer */ Material number*	
Serien Nummer */ Serial number*	

allen grundlegenden Anforderungen der nebenstehenden Richtlinien – jeweils mit deren Änderungen – entspricht: *meets all the essential requirements of the directives listed alongside – in each case with their revisions:*	2014/35/EU – Niederspannungsrichtlinie *2014/35/EU – Low Voltage Directive* 2014/30/EU – EMV-Richtlinie *2014/30/EU – EMC Directive* 2013/56EU– RoHS3-Richtlinie *2013/56/EU – Restriction of Hazardous Substances Directive*

Angewandte harmonisierte Normen: *Applied harmonised standards:*	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen – Teil 1: Allgemeine Anforderungen *Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements*	EN IEC 61326-1:2021
	Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte – Teil 1: Allgemeine Anforderungen *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*	EN 61010-1:2010+A1:2019
	Technische Dokumentation zur Bewertung von Elektro- und Elektronikgeräten hinsichtlich der Beschränkung gefährlicher Stoffe *Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances*	EN IEC 63000:2018
Angewandte sonstige technische Normen und Spezifikationen: *Other technical standards and specifications applied:*	– – –	– – –

Bevollmächtigte Person für das Zusammenstellen der technischen Unterlagen:
Authorised person for compiling the technical file:

* Oetiker Schweiz AG
Pascal Moser
Spätzstrasse 11
CH-8810 Horgen
SWITZERLAND

Unterzeichnet für und im Namen von Oetiker Schweiz AG
Signed for and on behalf of Oetiker Schweiz AG

Horgen, 17. Februar 2026

Pascal Moser

Head R&D
CoC Automatic Assembly Tools Oetiker Group

Andreas Pulver

Plant Head Switzerland

11.2.6 EU Declaration of Conformity for fCAL 1 Closing Force Sensor 10 kN (CFS 10)

EG-Konformitätserklärung

EU Declaration of Conformity

(Original-EG-Konformitätserklärung)
(Translation from the German original Declaration of Conformity)

Wir,
We,

Oetiker Schweiz AG
Spätzstrasse 11
CH-8810 Horgen
SWITZERLAND

erklären in alleiniger Verantwortung, dass das Produkt als Gesamtsystem, welches das unten aufgeführte Messgerät oder den Sensor enthält:
declare under our sole responsibility that the product as a complete system consisting of the measuring device or the sensor listed below:

Typ */ Type*	fCAL 1 CFS 10
Material Nummer */ Material number*	
Serien Nummer */ Serial number*	

allen grundlegenden Anforderungen der nebenstehenden Richtlinien – jeweils mit deren Änderungen – entspricht: *meets all the essential requirements of the directives listed alongside – in each case with their revisions:*	2014/35/EU – Niederspannungsrichtlinie *2014/35/EU – Low Voltage Directive* 2014/30/EU – EMV-Richtlinie *2014/30/EU – EMC Directive* 2013/56EU– RoHS3-Richtlinie *2013/56/EU – Restriction of Hazardous Substances Directive*

Angewandte harmonisierte Normen: *Applied harmonised standards:*	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen – Teil 1: Allgemeine Anforderungen *Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements*	EN IEC 61326-1:2021
	Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte – Teil 1: Allgemeine Anforderungen *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*	EN 61010-1:2010+A1:2019
	Technische Dokumentation zur Bewertung von Elektro- und Elektronikgeräten hinsichtlich der Beschränkung gefährlicher Stoffe *Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances*	EN IEC 63000:2018
Angewandte sonstige technische Normen und Spezifikationen: *Other technical standards and specifications applied:*	– – –	– – –

Bevollmächtigte Person für das Zusammenstellen der technischen Unterlagen:
Authorised person for compiling the technical file:

* Oetiker Schweiz AG
Pascal Moser
Spätzstrasse 11
CH-8810 Horgen
SWITZERLAND

Unterzeichnet für und im Namen von Oetiker Schweiz AG
Signed for and on behalf of Oetiker Schweiz AG

Horgen, 17. Februar 2026

Pascal Moser
Head R&D
CoC Automatic Assembly Tools Oetiker Group

Andreas Pulver
Plant Head Switzerland

12 Contact details

If you require help or technical support, please contact your local Oetiker Service Center.

For further information, see www.oetiker.com.

EMEA	
E-mail	ptsc.hoe@oetiker.com
Phone number	+49 7642 6 84 0

America	
E-mail	ptsc.oea@oetiker.com
Phone number	+1 989 635 3621

China	
E-mail	ptsc.cn.tianjin@oetiker.com
Phone number	+86 22 2697 1183

Japan	
E-mail	ptsc.jp.yokohama@oetiker.com
Phone number	+81 45 949 3151

Republic of Korea	
E-mail	ptsc.kr.seoul@oetiker.com
Phone number	+82 2 2108 1239

India	
E-mail	ptsc.in.mumbai@oetiker.com
Phone number	+91 9600526454

Oetiker Schweiz AG

Spätzstrasse 11
CH-8810 Horgen
Schweiz

www.oetiker.com/service