

Selective Multimeter

SICO 2061 KS

MANUAL



7.4 Specifications

UDC	End of Range	Resolution	Accuracy	
			% / MW	% / BE
Direct voltage (Uni - DMM)	/V	/mV		
	2	1	0.2	0.3
	20	10	0.3	0.1
4mm input	200	100	0.3	0.1
Range of specification:			U = 200 mV .. 200 V	

F	End of Range	Resolution	Accuracy	
			% / MW	% / BE
Frequency (Uni - DMM)	/Hz	/Hz		
	200	0.1	0.2	0.5
	2000	1	0.1	0.05
4mm input multipole-socket	20 000	10	0.1	0.01
	90 000	10	n.s.	n.s.
Range of specification:			F = 50 Hz .. 90 kHz	

UAC	End of Range	Resolution	Accuracy	
			% / MW	% / BE
Alternating voltage (RMS) (Uni - DMM)	/V	/mV		
	0.2	0.1	2.5	0.2
	2	1	2	0.1
	20	10	2	0.1
4mm input	260	100	2	0.1
Range of specification:			U = 50 mV .. 260 V	

UGSK	End of Range	Resolution	Accuracy	
			% / MW	% / BE
Track circuit voltage (AC) (selective)	/V	/mV		
	0.2	0.1	2.5	0.2
	2	1	2	0.1
	20	10	2	0.1
4mm input	240	100	2	0.1
Range of specification:			U = 50mV .. 240V	

IGSK	End of Range	Resolution	Accuracy	
			% / MW	% / BE
Track circuit current (AC) (selective) multipole-socket	/A	/mA		
	0.2	0.1	7	0.1
	2	1	4.5	0.1
	20	10	4	0.1
Range of specification:			I = 20 mA .. 20 A	

UGSK / IGSK Additional error	Frequency $\pm\Delta f$	25 Hz .. 1 kHz				> 1 kHz	
		$\leq 4\text{Hz}$	$\leq 6\text{Hz}$	$\leq 8\text{Hz}$	> 8Hz	$\leq 150\text{Hz}$	> 150 Hz
	% / MW	0	1	3	n.s.	0	n.s.

Explanation	% / MW	Percent of measured value
	% / BE	Percent of range's end
	$\pm\Delta f$	Frequency deviation from set value
	n.s.	not specified

Important note:

UGSK: selective voltage measurement (according to the track circuit chosen)
 IGSK: selective current measurement (according to the track circuit chosen)

The measuring inaccuracy caused by the current sensor is included.
 Depending on the device's configuration, the range of specification can be restricted with respect to the frequency limits of the track circuit type selected from the menu.

7 Technical Data

7.1 General

Input resistance	≥ 1 MΩ
Connections	4 mm safety sockets (L, K) eight-pole socket on front (J)
Power supply	1 rechargeable Li-Ion battery type PA-LH201.K01.R001 or 3 batteries / rechargeable batteries size AA; preferred batteries LiFeS ₂ , type <i>Energizer Ultimate Lithium L91</i> or rechargeable NiMH with minimum 2200 mAh
Charging time of the rechargeable Li-Ion battery	approx. 3 hours
Protection class	II
Overvoltage category	III
IP code	IP 54
Operating time	> 8 hours (at 68°C)
Operating temperature range	-40°C ... +70°C (-40°F ... 158°F) When operating the device at temperatures less than -20°C (-4°F) a doubling of the specified measuring errors is permissible. When operating it at temperatures less than -25°C (-13°F) the function of the display is reduced.
Storage temperature range	-40°C ... +70°C (-40°F ... 158°F)
Permissible maximum input voltage	300 V _{eff} (4 mm sockets)
Voltage resistance to conducting parts of housing	2.5 kV
Dimensions with handle	170 x 145 x 155 mm
Weight with Li-ion battery	max. 1.5 kg

7.2 Current Sensor

Length	850 mm
Diameter of plug connection	28 mm
Tube diameter	approx. 18 mm
Inner diameter of closed loop	approx. 240 mm, suitable for - rail profile S49, S54, UIC 60 and others - cables / lines / connectors / ground wires / connecting rods / track rods ...
Length connecting cable	approx. 2 m
Connection to SICO 2061 KS	eight-pole plug
Weight	approx. 750 g
Operating temperature range	-40°C ... +70°C (-40°F ... 158°F)
IP code	IP 54

7.3 Inspection

It is recommended to have the device inspected every 2 years.

Dear customer,

Thank you for choosing the frequency selective Rail Signal Meter SICO 2061 KS. We hope to meet your expectations and wish to support your work by providing this high-quality and accurate measuring device designed for the industrial environment.

The SICO 2061 KS is used for the purpose of inspections or adjustments on low frequency and audio-frequency track circuits. Frequency-selective as well as non-selective measurements can be carried out both on voltages and currents. Thanks to the frequency-selective principle, accurate measurements can be obtained even in the presence of strong interfering signals. By means of available flexible current sensors, signal currents in both cables and rails can be measured in a frequency-selective manner without any need of electrical contacts.

Adapted to the required purpose, the Rail Signal Meter can be pre-programmed to suit many types of track circuits. For familiarising yourself with possible applications, please see the overview on page 11. The Rail Signal Meter is further equipped with multimeter functionality for general-purpose usage.



Signal Concept GmbH confirms the conformity of the device according to the directives given by the European Parliament and Council 2014/30/EU (EMC-Directive), 2006/42/EC (Machinery Directive), 2014/35/EU (Low Voltage Directive), 85/374 EEC (Product Liability Directive), 2011/65/EU (RoHS Directive) and 2012/19/EU (WEEE Directive).



Signal Concept GmbH holds a Quality Management (DIN EN ISO 9001:2015), which is checked annually by Bureau Veritas Quality International Deutschland GmbH as accredited organization.

This manual serves as an introduction to your new device. Please read it carefully and completely for your own safety, for highest measuring accuracy, and for avoiding damages. Furthermore, it enables you to use all the device's functions properly. This manual is part of your SICO 2061 KS. The user is responsible for keeping it until the disposal of the device. When handing the device to other users, the manual is required to be enclosed.

This product was designed, manufactured and tested with highest care and in compliance with European standards. Please contact us if the Selective Meter SICO 2061 KS does not work properly in accordance with the conditions described in this manual:

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Document no.:	2061 B	Copyright © 2019, Signal Concept GmbH All rights reserved. All data, properties and descriptions given in this operating manual may be changed at any time without giving notice. For the latest version please visit www.signalconcept.com
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Date:	06/03/2019	
Author:	Wendt / Chemnitzer	

Accessory

Please check if all of the components listed are included in the delivery. If parts are missing or damaged, please contact your reseller.

Pieces	Item name	Order number
1	Selective Multimeter SICO 2061 KS including the Firmware Basic Modules <ul style="list-style-type: none"> • Multimeter AC, DC, F • Low Frequency Track Circuits For optional Firmware System Modules please refer to: www.signalconcept.com	106000
1	Connecting lead 4 mm, black, 100 cm	100614
1	Connecting lead 4 mm, red, 100 cm	100613
1	Rechargeable battery PA-LH201.K01.R001	105010
1	SICO 5007 Charger for Cells type PA-LH201.K01.R001, manual included	105050
1	Transport case	110009
1	SICO 2061 KS Manual	---
1	SICO 2061 KS Acceptance test certificate 3.1 to BS EN 10204	---
1	SICO 2061 KS Data cable USB	100213

Optional Accessory

Item name	Order number
Firmware System Modules for Track Circuits	*)
Current Sensors (flexible type) compatible with Firmware Basic and System Modules	*)
SICO 2061 KS Data cable RS232	100214
Rail Clip Contacts SZ 1103	100182

*) For further information on available Firmware System Modules and Current Sensors, we would like to refer to our web site www.signalconcept.com. If you could not find any suitable System Firmware Module for your particular track circuit, please call us or send us an e-mail.

For connecting the measuring leads to the rail, we recommend the easy to use Rail Clip Contacts SZ 1103.

Gross weight 1.95 kg
Commodity code 9030 3100
Country of origin Germany

6 Handling and Failures

6.1 Cleaning

We recommend to clean the tester with a damp, solvent-free cloth. In order not to damage the device's surface, do not use abrasive cleaning agents or those containing alcohol.

6.2 Storage

Storage should be in a cool and dry place. For storing the measuring device during a longer period, we recommend to remove the batteries.

6.3 Transport

To protect the measuring device from dust and dirt as well as from shakes, use the supplied transport case.

6.4 Failures

The SICO 2061 KS performs a selftest in periodic intervals for ensuring its proper functioning. In case of failures information will be shown in the display.

Further possible failures and their causes:

Failure	Solution	Page
The device cannot be switched on.	Check the battery condition and all battery contacts.	9
The device does not display data during measurement.	Check the contact surfaces of the plugs / connectors for dirt or oxidation.	8
The status LED indicates an error (fig. 2.1 / I)	In case of failures in the measuring device's functioning, please contact the manufacturer.	16

This product was designed, produced and tested with due care and according to the applicable European Standards. If the device is yet not working correctly under the conditions given in this operating manual, please contact the manufacturer:

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5.3 Functions of the Status LED

The Status LED (fig. 2.1 / I) indicates the operating state of the display heating. Furthermore, it informs about system errors during startup and shutdown of the device. In case of repeating error indication, please contact the manufacturer (see page 17).

LED condition	Function	Explanation
Switch on		
Flashes 1 x	Self-test	During startup of the measuring device
Flashes 3 x	Heating is deactivated.	Heating foil is defective or not present.
Flashes 5 x	Heating is deactivated.	Sensor for temperature is defective.
In operation		
Flashes in short intervals	Display is preheated.	The device is yet not ready for operation! The flashing frequency decreases with rising display temperature.
Flashes in wide intervals	Display is heated.	The device is now ready for operation.
Permanently illuminated	Preheating is finished and display is heated normally.	Depending on temperature the display is well, badly or non-readable.
Switch off		
Flashes 1 x short 1 x long	Storage error	During operation an error occurred with the internal flash memory.
Flashes 2 x short 1 x long	RTC error	During operation an error occurred with the real time clock.
Flashes 3 x short 1 x long	Communication error	During operation an internal communication error occurred.

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1 Safety Instructions

The Selective Meter SICO 2061 KS is to be used exclusively according to the description in this manual. Otherwise, the protection given by the measuring device can be limited.

! Warning !



To avoid the damage of persons or products, mind the following guidelines:

Consider the valid guidelines for working on railway facilities.

When using the measuring device in or near the track, make sure your working area is kept clear of running trains!

Repairs may only be carried out by the manufacturer or a company authorized by the manufacturer.

Only use accessories approved to be used with the device.

Do not use the measuring device in environments with explosive gases, steam or dust.

Do not drop or shock the device.

Qualified professionals only may use the SICO 2061 KS.



Check the device and accessories (leads, plugs, housing) for visible damages or insulation faults. Those parts must not be used!

Plugs shall be fully inserted into the sockets.

First disconnect leads or probes from the inspected system followed by unplugging them from the measuring device.

To avoid any electrical hazard do not connect leads to the measuring device while it is opened. Disconnect all leads before you open the battery cover.

Make sure that maximum allowed input voltages never are exceeded.

Store and transport Li-ion batteries well protected against short circuit.

Disposal

Electric and electronic devices must not be given to the general rubbish, since they mostly contain noxious elements. Instead, dispose them at the collecting points for special waste.

The files generated by the measuring device are stored in the root directory. The file name consists of the date followed by a consecutive number N allowing for multiple recordings per day (YYMMDD_N.LOG).

The first line of the file contains the date of recording. Every following line consists of the current time stamp and the measuring result to be stored.

A recording can be started anytime and with any measuring result displayed. Please press the left multi-function key (B), navigate to *Settings* > *Recording* and configure the required recording parameters such as date/time, recording period, and trigger mode. There are two distinctive trigger modes: *time* and *value* determining whether a new value is to be stored at constant time intervals or whenever the measuring value fluctuates beyond a limit set.

Finally, confirm the selection and start the recording with *Start measurement*. The “REC” indicator in the upper left corner of the display informs you about the running recording. The recording stops as soon as a key is pressed, “REC” disappears.

5.1.6 Device Information

The following details are shown when selecting this menu item

- Serial number (SN),
- Software edition (SW), and
- Last calibration date (D).

5.1.7 Service

For calibration purposes measuring data can be transferred in real time via the RS232 interface (the cable can be ordered as optional accessory). This selection has to be confirmed (choose ON, then ✓).

Format means to format the internal user memory.

5.2 Display Heating

LC displays are hardly readable at temperatures below -20°C (-4°F). Therefore, the SICO 2061 KS display is equipped with a display heating. After switching on the measuring device the display is preheated at temperatures below -10 °C (-14°F). Moreover, at temperatures below 0°C (-32°F) the LC display is heated with reduced power to ensure its legibility.

A LED (fig. 2.1 / I, near the left edge of the display) indicates that the display is being heated. Preheating can be stopped by pressing any key (except the on/off key).

5.1.3 Display

5.1.3.1 Display – Start SLOW

For frequency selective measurements on track circuits, the display update rate should be in accordance with fluctuations of the signal amplitude which can be affected by modulation. You can set the default (at start) display update rate to either <slow> or <fast>.

5.1.3.2 Display – Bar(graph)

In the track circuit modes it is possible to add a bargraph to the measured value in the lower area of the display. This can be useful in situations where fluctuations, the tendency or a drift of the measuring value are of interest, for instance when adjusting track circuits to their amplitude maximum. The per cent setting to be chosen assigns the bargraph's range to the respective deviation span (in per cent) of the present measuring value. The bargraph is reset to its center position each time the right multi-function key (C) is pressed with the bargraph shown which can be convenient for detecting fluctuations in both directions.

5.1.3.3 Display – RMS / Freq

Only in *Uni - DMM* mode, this function adds a secondary reading to the measuring value.

- When measuring U AC: the frequency reading is added
- When measuring frequency: the related AC voltage value is added

This setting is not saved when switching off the unit.

5.1.3.4 Display – Switch off

In case of long-term measurements it might be useful to disable the automatic shutdown mode of the measuring device. Hence, it is possible to observe a measuring value over a longer period of time without operating the SICO 2061 KS. **This setting is not saved when switching off the unit.**

5.1.4 Date / Time

The display shows *date* and *time*. If you wish to update them, press the button “set”. First, you set the *day* with the navigation keys ▲ and ▼. Confirm the day with ✓. Afterwards you set *month*, *year*, *hour* and *minute* in the same manner. Choose the categories with the navigation keys ◀ and ▶. The changes are either applied with ✓ or discarded with ↵.

5.1.5 Recording

The SICO 2061 KS can be used for long-term measurements such as ballast parameter recording. The measuring results are stored automatically at defined time intervals or on any value change exceeding limits set in per cent of the present measuring value depending on the trigger condition chosen.

2 Controls and Connectors



Fig. 2.1 Controls and Connectors

- | | | | |
|-------------|----------------------------------------------------------------|----------|----------------------------------------------------------|
| A | Display | I | Status LED (see page 16) |
| B | On / Off
or multi-purpose key (softkey) | J | Socket for peripheral devices
(e. g. current sensors) |
| C | Multi-purpose key (softkey)
(function shown in the display) | K | 4 mm socket, negative input |
| D..G | Menu navigation keys | L | 4 mm socket, positive input |
| H | Brightness sensor
used for display backlight | M | Handle release button
(press on both sides) |
| | | N | Carrying handle / Desk stand |

3 Operation

3.1 Overview

The sturdy and stable plastic housing is equipped with a handle, which can be latched (fig. 2.1 / M) every 30 deg. for being used for carrying or as a desk stand. All necessary controls and connectors are arranged on the front panel of the SICO 2061 KS. See fig. 2.1 for more details.

The measuring device is operated by means of six keys: four grey keys for navigation or for changing settings (fig. 2.1 / D+E+F+G, arrow keys) and two yellow display-assigned softkeys, with context-dependent functions (fig. 2.1 / B+C). All available functions assigned to the softkeys are indicated in the display. Apart from that, the left yellow key serves always as the ON/OFF button. Press long this button for switching the device off at any time.

All available navigation keys are indicated at the bottom line of the display. For instance, as long as the menu can be scrolled downwards, the respective ▼ symbol is shown.

The display is illuminated automatically, depending on the ambient light detected by the light sensor (fig. 2.1 / H). The brightness of the LC display can be adjusted. More information can be found on page 13.

There are three sockets on the front panel of the measuring device. The two 4 mm laboratory safety sockets (fig. 2.1 / L+K) are used to connect single measuring leads with 4 mm safety plugs. The 8 pole round socket (fig. 2.1 / J) is used to connect further accessory to the measuring device like current sensors or the data cable for transferring measuring data to a PC.

Voltage measurements on indoor or outdoor equipment of track circuits are made by means of the laboratory leads supplied. Direct contact with the rail can be conveniently established with the Rail Clip Contacts SZ 1103 (see page 4, *Optional Accessory*). If DC voltage is to be measured, the red socket (fig. 2.1 / L) denotes the positive input. Current measurements are carried out with the Current Sensors, which are connected to the eight-pole round socket (fig. 2.1 / J). More information is provided on page 4, *Optional Accessory*.

Attention!

The maximum permitted input voltage is given on page 18 and must not be exceeded.

5 Settings and Special Functions

5.1 Settings Overview

Entering the settings submenu is possible from the main menu which is the leftmost column of the table on page 12. In the main menu scroll down to the bottom and choose *Settings*. With a measuring value displayed, the main menu can even be reached via a shortcut by pressing the menu key (left multi-function softkey, B).

→ Contrast	
→ Brightness	
→ Display	→ Start SLOW
	→ Bar
	→ RMS / Freq
	→ Switch off
→ Date / time	
→ Language	→ German
	→ English
	→ French
	→ Spanish
→ Recording	→ Recording period
	→ Trigger
	→ Start measurement
→ Device information	
→ Service	→ RS232
	→ Format

Press the ◀ key for returning from the menu.

By pressing the ↶ key, you will return to the measurement you started from.

5.1.1 Contrast

At temperatures below 0°C (32°F) the properties of LC displays deteriorate. In addition to an automatic temperature-dependent regulation, the LCD contrast can be user-adjusted.

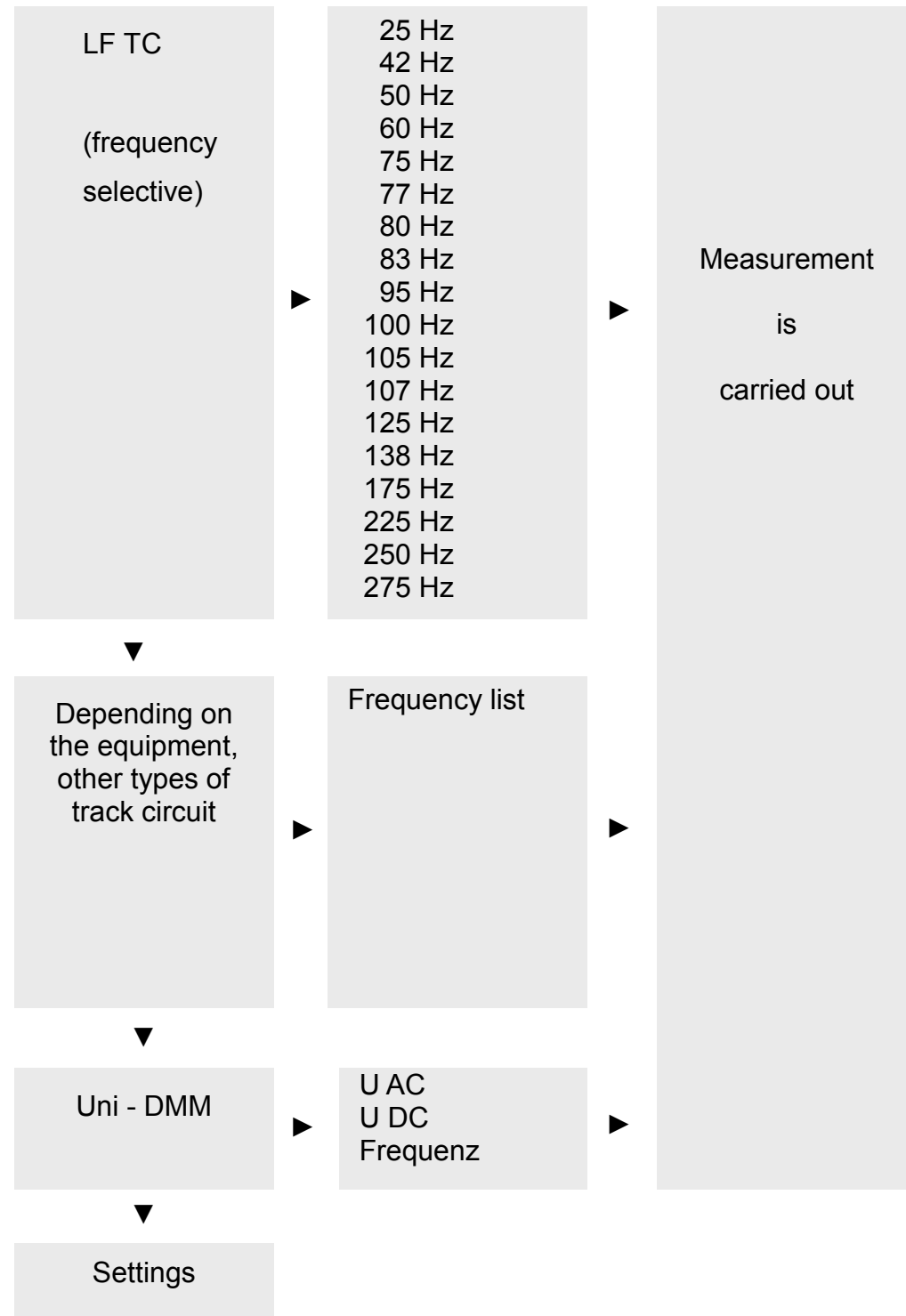
5.1.2 Brightness

You can adjust the brightness of the background light. The background light turns on automatically dependent on the ambient light seen by the light sensor (fig. 2.1 / H). Please note, that the higher the brightness is set, the earlier the battery is emptied.

4.3 Menu Overview

The main menu will appear after switching on the SICO 2061 KS. From here, both the operating mode and function (selective frequency or type of measurement) is chosen and finally the reading is obtained by using the navigation keys. In the frequency-selective modes, both voltage and current can be measured. The exact menu configuration is dependent on the kind and number of the available modules.

With a suitable Current Sensor connected, you can toggle between the two modes by means of the **mode** key (right multi-function softkey, C). The currently active mode is indicated by the measuring unit shown.



3.2 Power Supply

Either one rechargeable Li-Ion battery type PA-LH201.K01.R001, which is included in the accessory, or three standard batteries size AA supply the SICO 2061 KS with energy. (see chapter 7.1 General).

Before being used, the rechargeable Li-Ion battery needs to be charged with the supplied Charger SICO 5007. In case you use rechargeable NiMH batteries, a standard, commercially available charger must be used.

Attention!

Do not replace the supplied rechargeable Li-Ion battery, type PA-LH201.K01.R001 with other or similar types.

For charging the supplied Li-Ion battery PA-LH201.K01.R001, do only use the Charger SICO 5007 for Lithium-Ion Cells type PA-LH201.K01.R001 (included in delivery).

Primary cells must not be recharged (risk of explosion).

Disconnect all measuring leads from the device before opening the battery compartment. Use a coin or similar to open the battery compartment, which is located on the measuring device's rear side. After inserting the rechargeable Li-Ion battery for the first time or replacing completely discharged batteries you might have to set date and time.

Undervoltage detection

During operation the battery icon in the display's upper right corner informs you about the remaining capacity of the inserted battery/batteries. With low remaining capacity, a warning appears in the display. The measuring device has an automatic shutdown mode to avoid irreversible discharge of the batteries. Date and time will remain for approx. 24 hours.

Automatic shut-down mode

Even in case of a sufficient battery charge the device turns off automatically. When not pressing a button within five minutes, a flashing hand icon appears in the display. Otherwise, press any button to avoid the shutdown. The automatic shutdown mode shall prevent the discharging of the batteries to enable a long-term availability of the SICO 2061 KS.

In extreme cold temperatures all types of batteries lose more or less capacity. For the best possible measurement, carry them in warm pockets of your clothing and do rather not insert them into the measuring device before you have reached the measuring site. For the operation at temperatures lower than -10°C (14°F) we recommend Lithium batteries (LiFeS₂, size AA, i.e. L91).

Please remove the batteries from the battery compartment when you plan not to use the device for a longer period.

3.3 Switching on and Shutdown

Your SICO 2061 KS will work correctly when you follow the steps in this manual and mind the notes.

- Insert the supplied rechargeable battery in the battery compartment. Ensure the correct polarity (see chapter 3.2 Power Supply).
- Before using the Lilon rechargeable battery for the first time, please remove the protective plastic strip.
- Press the on/off key briefly (fig. 2.1 / B, left multi-use function key).

The start screen appears directly after switching on the device. It switches automatically to the first selection menu. Select operation mode and function with the navigation keys ▲ (D), ▼ (F), and ► (E). The measuring result is displayed after pressing the navigation key ► (E).



Note: When inserting batteries for the first time or after a long storage without power supply you are asked to set date and time (see chapter 5.1.4) before being enabled for making any further menu selection.



Hold this button pressed until “Good bye” appears in the display. The shutdown function is always assigned to the left yellow softkey, thus shutdown is possible at any time.

3.4 Icons used

The SICO 2061 KS is menu controlled. The function of each of the two yellow variable-purpose keys (softkeys) (fig. 2.1 / B+C) is dependent on the context and always shown in the display. The four grey navigation keys (fig. 2.1 / D+E+F+G) serve for navigating the menu, for moving the cursor or for changing certain displayed values.

✓	Confirm the selection made
↶	Return (in menu) or cancellation
▲	Selection, up
▼	Selection, down
◀	Selection, left
▶	Selection, right
 flashing	Automatic shutdown mode (see chapter 3.2)
 flashing	Undervoltage, Change batteries! (see chapter 3.2)

4 Operating Modes

4.1 Measurement and Inspection on Track Circuits

This mode is used for taking measurements on audio and low frequency track circuits. The user can choose between voltage and current measurements. Current is measured with no need of electrical contacts or interrupting the current path.

You can carry out voltage measurements by connecting the measuring leads to the two 4 mm sockets on the measuring device. Since AC voltage is measured, the polarity at the input sockets is not important.

For current measurements please connect the suitable Current Sensor with the eight-pole round socket on the front panel. The Current sensor can be wound around rails as well as around cables. To achieve an exact measuring result, the Current Sensor loop must be closed completely.

Select one of the track circuits with the navigation keys ▲ and ▼ (D / F) and open the belonging frequency list by confirming your selection with ► (E). Again with the navigation keys, the required measuring frequency is selected and again confirmed by pressing the navigation key ► (E). The measuring result is now displayed.

You can connect a Current Sensor and measuring leads simultaneously to the measuring device without any interference. As soon as a Current Sensor is connected to the eight-pole round socket, the *current measurement* operating mode is selected automatically. Nevertheless, you can choose to toggle between current and voltage measurement manually by pressing the **mode** key (right multi-function softkey, C).

You can always return to the previous menu level with the navigation key ◀ (G).

4.2 Multimeter

These functions are available from the operating mode *Uni - DMM*:

- Voltage AC (also mains alternating voltage),
- Voltage DC or
- Frequency.

For most *Uni - DMM* mode measurements, both 4 mm safety sockets are to be used. When measuring DC voltage, a positive result (without a sign) is read with the more positive terminal of the circuitry being connected to the red socket (L). For AC or frequency measurement, the polarity does not matter. Regarding the frequency measurement, readings can instead of being voltage-related be obtained from a current input as well. By pressing the **mode** key (right multi-function softkey, C) you can – with a suitable Current Sensor connected to the eight-pole round socket – enable this function and toggle between the voltage and current inputs. An icon (O) above the measuring unit indicates that the frequency reading is obtained from the Current Sensor.