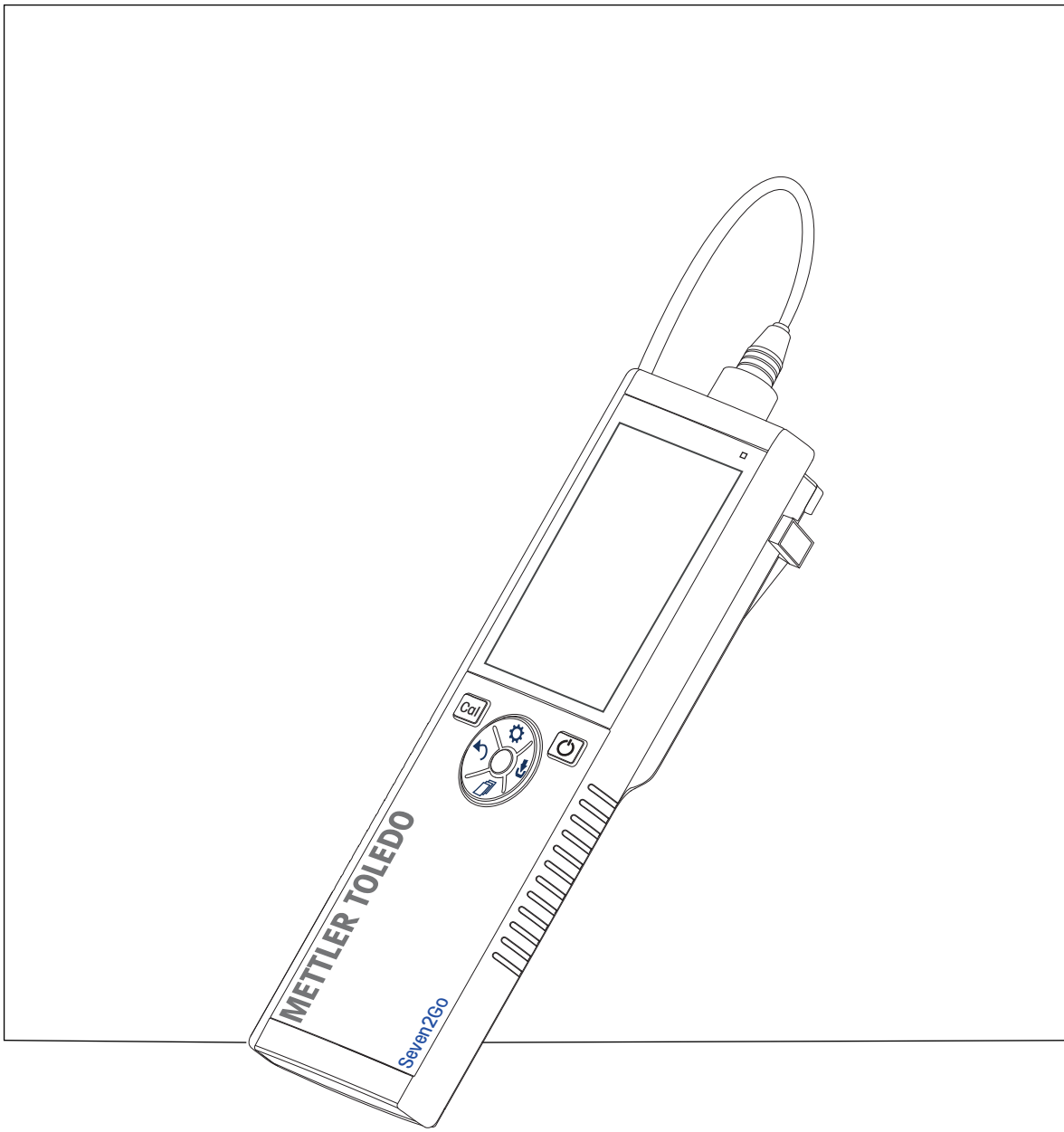
Operating Instructions

Seven2Go™ Conductivity Meter

S3



METTLER TOLEDO

Table of Contents

1 Introduction

Thank you for purchasing this high quality METTLER TOLEDO portable meter. Everywhere you measure pH, conductivity or dissolved oxygen - the Seven2Go™ portables are designed to offer you fast quality data, one-handed operation and an investment that lasts. Whether you work in the laboratory, at-line or outdoors, the Seven2Go™ meters will provide you with high quality measurement everywhere you go. The Seven2Go™ offers many exciting features, including:

- Simple and intuitive menus that shorten steps needed for setting up measurements and calibration
- T-pad hard keys for comfortable and fast navigation
- Rubber side-guards for comfortable, one-handed operation
- IP67 rating for the entire measurement system, including meter, sensor and the connection cables
- Useful accessories such as the electrode clip, the meter base stabilizing unit, the wrist strap and the uGo™ carrying case with hermetically sealed interior for easy cleaning

2 Safety Measures

2.1 Definition of signal warnings and symbols

Safety notes are marked with signal words and warning symbols. These show safety issues and warnings. Ignoring the safety notes may lead to personal injury, damage to the instrument, malfunctions and false results.

Signal words

WARNING	for a hazardous situation with medium risk, possibly resulting in severe injuries or death if not avoided.
CAUTION	for a hazardous situation with low risk, resulting in damage to the device or the property or in loss of data, or minor or medium injuries if not avoided.
Attention	(no symbol) for important information about the product.
Note	(no symbol) for useful information about the product.

Warning symbols

General hazard

Toxic substance

Inflammable or explosive substance

2.2 Product specific safety notes

Your instrument represents state-of-the-art technology and complies with all recognized safety rules, however, certain hazards may arise in extraneous circumstances. Do not open the housing of the instrument; it does not contain any parts that can be maintained, repaired or replaced by the user. If you ever have problems with your instrument, contact your authorized METTLER TOLEDO dealer or service representative.

Intended use

This instrument is designed for a wide range of applications in various areas and is suitable for measuring pH (S2, S8), conductivity (S3, S7) or dissolved oxygen (S4, S9).

The use therefore requires knowledge and experience in working with toxic and caustic substances as well as knowledge and experience working with application-specific reagents, which may be toxic or hazardous.

The manufacturer shall not be held liable for any damage resulting from incorrect usage divergent to the operating instructions. Furthermore, the manufacturer`s technical specifications and limits must be adhered to at all times and in no way exceeded.

Location

The instrument has been developed for indoor and outdoor operation and may not be used in explosive environments.

Use the instrument in a location which is suitable for the operation, protected from direct sunlight and corrosive gases. Avoid powerful vibrations, excessive temperature fluctuations and temperatures below 0 °C and above 40 °C.

Protective Clothing

It is advisable to wear protective clothing in the laboratory when working with hazardous or toxic substances.

A lab coat should be worn.

Suitable eye protection such as goggles should be worn.

Use appropriate gloves when handling chemicals or hazardous substances, checking their integrity before use.

Safety notes

WARNING

Chemicals

All relevant safety measures are to be observed when working with chemicals.

a) Set up the instrument in a well-ventilated location.

b) Any spills should be wiped off immediately.

c) When using chemicals and solvents, comply with the instructions of the producer and the general lab safety rules.

WARNING

Flammable solvents

All relevant safety measures must be observed when working with flammable solvents and chemicals.

a) Keep all sources of flame away from the workplace.

b) When using chemicals and solvents, comply with the instructions of the producer and the general lab safety rules.

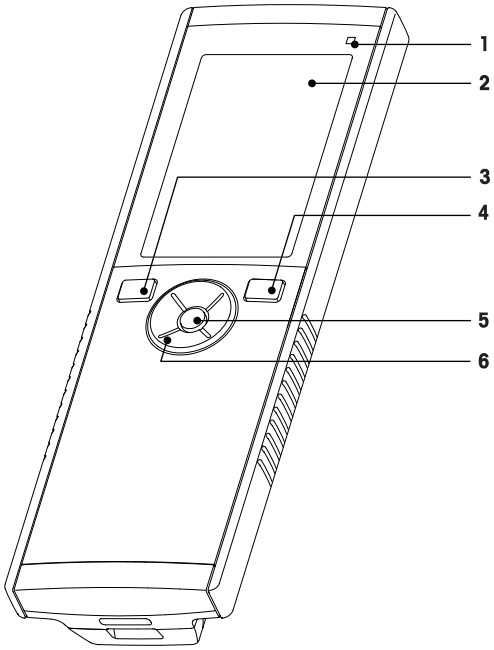
FCC Rules

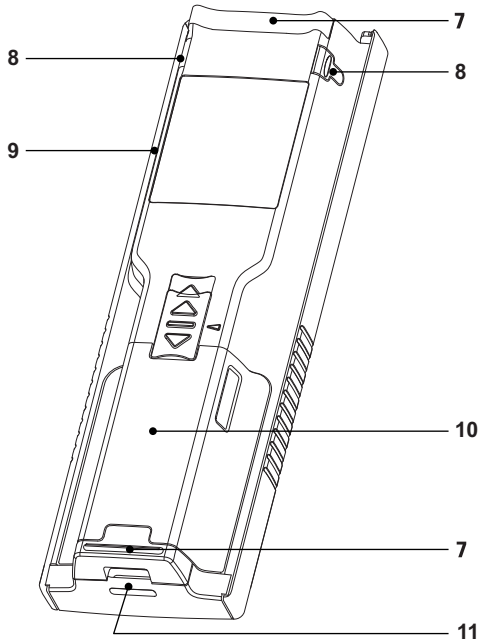
This device complies with Part 15 of the FCC Rules and Radio Interference Requirements of the Canadian Department of Communications. Operation is subject to the following conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

3 Design and Function

3.1 Overview

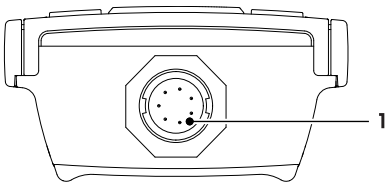




1 Status LED (only Pro-series)
2 Display
3 Calibration key
4 On/Off key
5 Read key
6 T-Pad

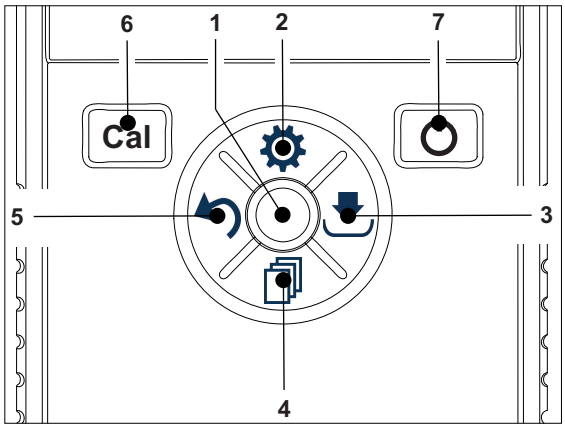
7 Rubber feet
8 Fixing points for electrode holder
9 Micro-USB port (only Pro-series)
10 Battery compartment
11 Slot for wrist strap

3.2 Sensor connections



1 LTW socket for conductivity signal input

3.3 T-Pad and hard keys



In Standard Screen

	Key	Press and Release	Press and hold
1	**Read**	Start and manually stop a measurement	---
2	Settings/Up ☼	Open setup menu	---
3	Store/Right 🖫	Save last measurement data	---
4	Mode/Down 🗍	Switch measurement mode	---
5	Recall/Left ↶	Recall measurement data	---
6	**Cal**	Start calibration	Recall last calibration result
7	On/Off ⏻	---	Switch instrument on (hold for 1 second) or off (hold for 3 seconds)

In calibration mode (indicated by ⟀)

	Key	Press and Release	Press and hold
1	**Read**	Manually stop calibration Save calibration result	---
2	Settings/Up ☼	---	---
3	Store / Right 🖫	---	---
4	Mode/Down 🗍	---	---
5	Recall/Left ↶	---	Discard calibration result
6	**Cal**	---	
7	On/Off ⏻	---	---

In Setup mode (indicated by ☼)

	Key	Press and Release	Press and hold
1	**Read**	Select submenu Confirm setting	Leave setup mode
2	Settings/Up ☼	Edit value (increase)	Fast value increase
3	Store / Right 🖫	Switch between changeable values	---
4	Mode/Down 🗍	Edit value (decrease)	Fast value decrease
5	Recall/Left ↶	Switch between changeable values	One level up (back to setup menu or leave setup mode)
6	**Cal**	---	---
7	On/Off ⏻	---	---

In Recall mode (indicated by ↶)

	Key	Press and Release	Press and hold
1	**Read**	Clear memory and confirm deletion	---
2	Settings/Up ☼	Navigate up	---
3	Store / Right 🖫	---	Cancel data deletion
4	Mode/Down 🗍	Navigate down	---
5	Recall/Left ↶	---	Leave recall mode
6	**Cal**	---	
7	On/Off ⏻	---	---

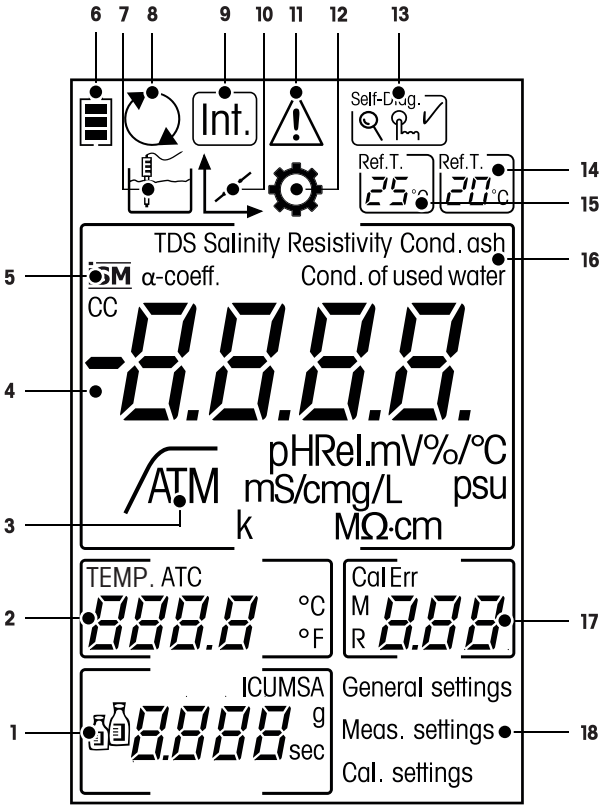
3.4 Display and icons

When turning on the instrument, the startup screen appears for 3 seconds. The startup screen shows all icons which can appear on the display. In the following table you find a short description about these icons.

Note

Some icons are shown specific to the other Seven2Go routine level instruments (S2 pH/mV and S4 DO). These icons are not relevant to the operation of S3 and are not further explained below.

Startup screen



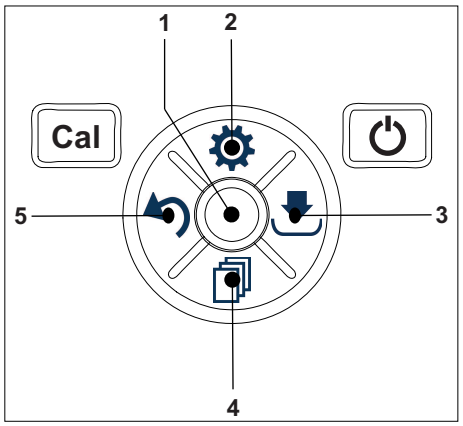
	Icon	Description
1		Calibration settings
2	---	Temperature reading
3		Endpoint format /A Automatic /T Timed /M Manual
4	---	Conductivity reading
5		ISM sensor is detected
6		Power status fully charged, half-charged, lowly-charged fully discharged
7		Measurement mode
8		Hot power on (Never shut down automatically until power is used up or press shut down manually)
9	Int.	Interval reading is on
10		Calibration mode Indicates calibration mode and appears whenever you are performing a calibration or reviewing calibration data.
11		Error occured
12		Setup mode
13		Self-diagnosis mode Self-diagnosis indicator Indication to press key ✓ Self-diagnosis passed
14		Reference temperature 20°
15		Reference temperature 25°
16	---	Current measurement method
17	---	Memory indicator / Calibration point / Error messages
18	---	Main setup menu structure

3.5 Setup menu

3.5.1 Navigation

For general navigation in the setup menu read the following information:

- Press ☼ to enter the setup menu.
- Press and hold ↶ to exit the setup menu.
- Press **Read** to confirm a change.
- Press and hold **Read** to exit the setup menu and return directly to the measurement screen from every position in the setup menu.



1 --- **Read**

- Read / save cal data
- Confirm entered values

2 **Setup / Up**

- Enter the setup menu.
- Move up in the menu structure.
- Edit value (increase).

3 **Save / Right**

- Save measurement data.
- Store last calibration point to end calibration.
- Go right.

4 **Mode / Down**

- Change measurement mode.
- Move down in the menu structure.
- Edit value (decrease).

5 **Recall / Left**

- Recall data / recall the last step.
- Go left.
- For menu or data memory exit (press >1 s).

3.5.2 Menu structure

1.	**General Settings**	
	1.	**Endpoint Formats**
	1.1	**Automatic**
	1.2	**Timed**
	1.2.1	**Measurement Time**
	1.3	**Manual**
2.	**Measurement Settings**	
	1.	**Reference Temperature**
	2.	**Enter Alpha-coefficient**
	3.	**Enter TDS Factor**
	4.	**Measurement Time**
	5.	**Conductivity Ash**
3.	**Calibration Settings**	
	1.	**Buffer Group / Standard**
	1.1	**Standard 1**
	1.2	**Standard 2**
	1.3	**Standard 3**
	1.4	**Standard 4**

3.6 Measurable parameters

With the S3 conductivity meter it is possible to measure the following parameters of a sample:

- Conductivity (µS/cm and mS/cm)
  The instrument will switch automatically to µS/m and mS/m depending on the measurement value (e.g. conductivity of ethanol according to the ABNT/ABR 10547 method).
- TDS (mg/L)
- Salinity (psu)
- Resistivity (MΩ·cm)
- Conductivity ash (%)

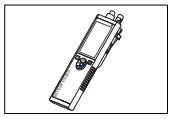
To change the measurement mode, press ⎙ as often as the desired appears.

See also

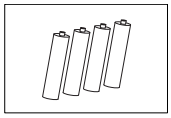
- Performing a conductivity measurement (page 26)
- Performing a TDS, salinity or resistivity measurement (page 26)

4 Putting into Operation

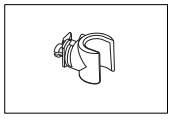
4.1 Scope of delivery



S3 instrument
for conductivity measurement



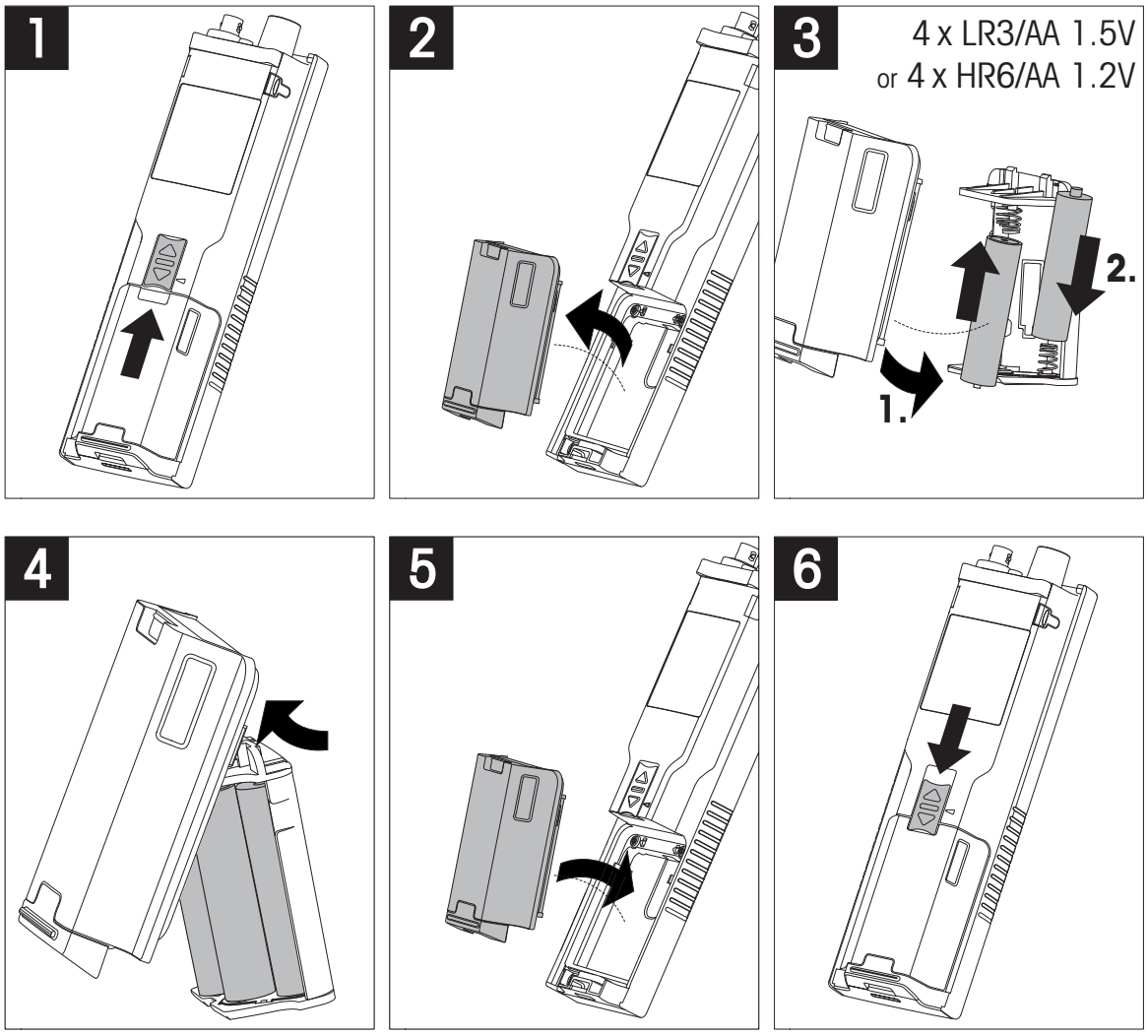
Battery LR3/AA 1.5V
4 pcs.



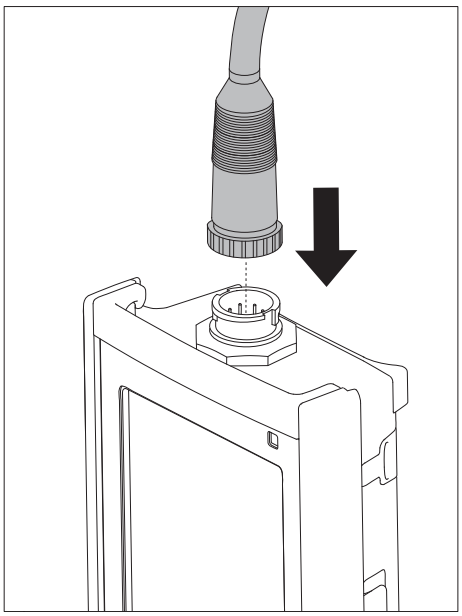
Electrode holder

CD-ROM including operating instructions

4.2 Installing the batteries



4.3 Connecting sensors



ISM® sensor

When connecting an ISM® sensor to the meter, one of the following conditions have to be met for the calibration data to be transferred automatically from the chip of the sensor into the meter and is used for further measurements. After attaching the ISM® sensor …

- The meter must be switched on.
- (If the meter is already switched on) the **READ** key is pressed.
- (If the meter is already switched on) the **CAL** key is pressed.

We strongly recommend you to switch off the meter when disconnecting an ISM sensor. In doing so, you make sure that the sensor is not removed while the instrument is reading data from or writing data to the ISM-chip of the sensor.

The **ISM** icon iSM appears on the display and the sensor ID of the sensor chip is registered and appears on the display.

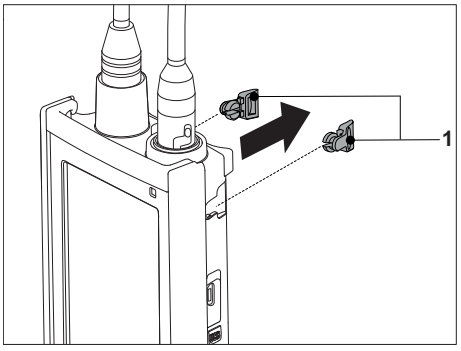
The calibration history, the initial certificate and the maximum temperature can be reviewed and printed in the data memory.

4.4 Installing optional equipment

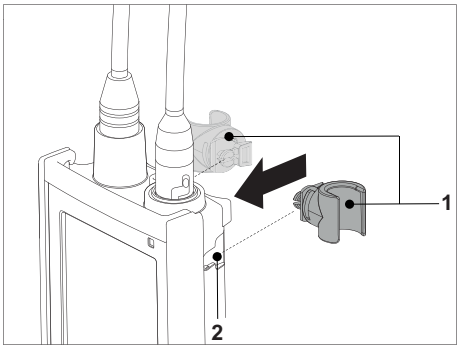
4.4.1 Electrode holder

For a safe placing of the electrode you can mount an electrode holder on the side of the instrument. The elctrode holder is part of delivery. You can mount it on either sides of the instrument for your personal handling.

1 Remove the protective clips (1).



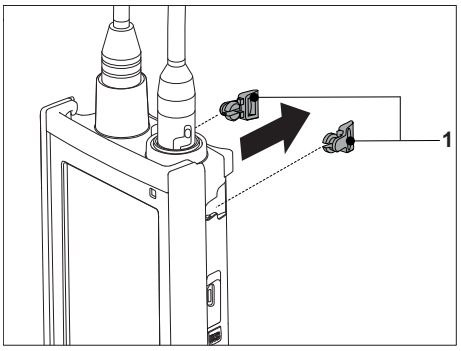
2 Push the electrode holder (1) into the recess (2) of the instrument.



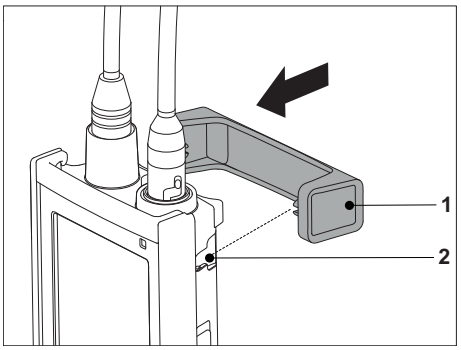
4.4.2 Meter base stabilizing unit

The meter base stabilizing unit should be mounted when using the instrument on a desk. It ensures a more firm and secure stand when pressing the keys.

1 Remove the protective clips (1).

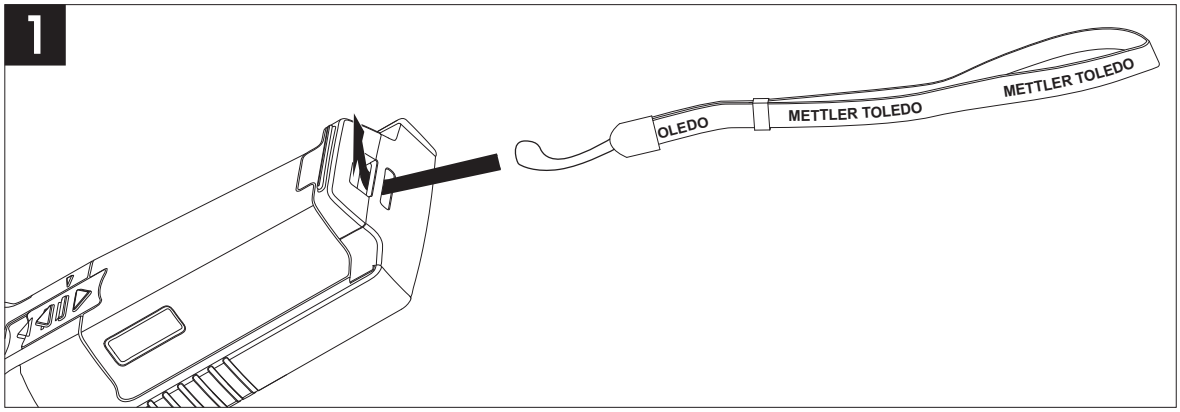


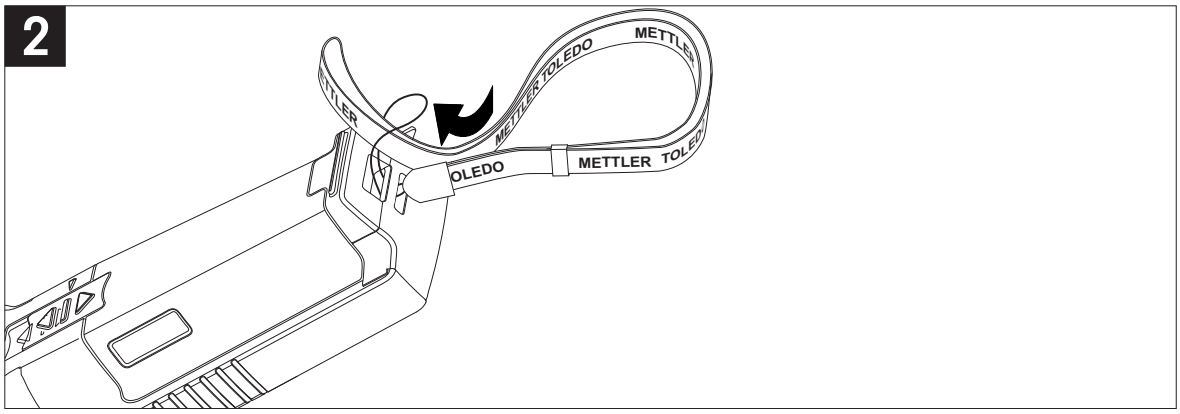
2 Push the meter base stabilizing unit (1) into the recesses (2) of the instrument.

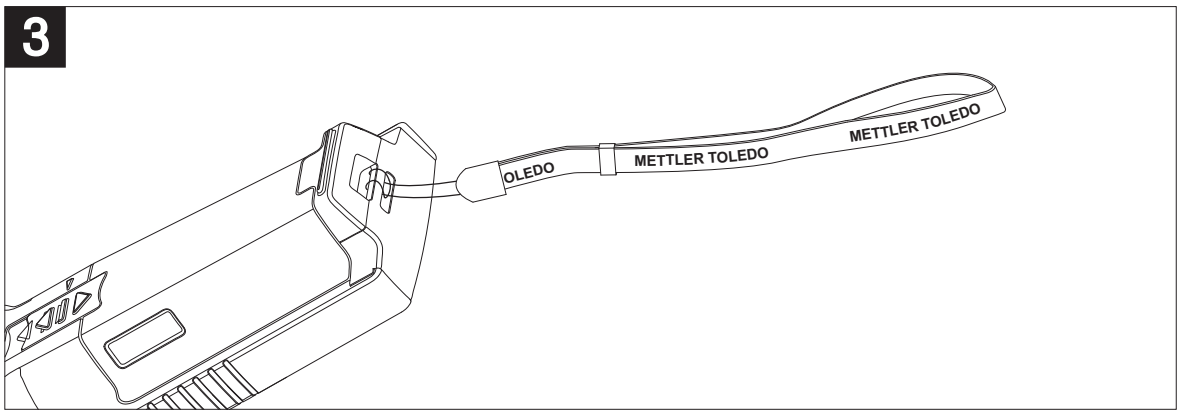


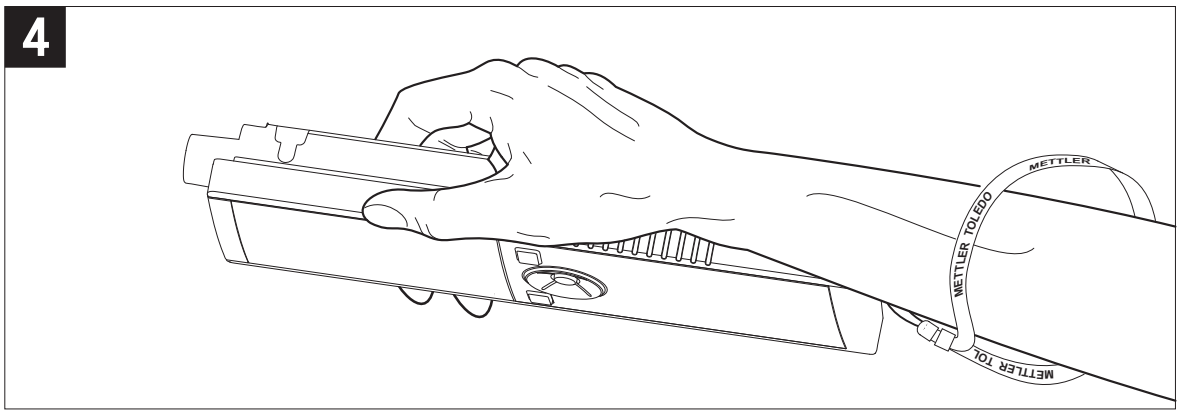
4.4.3 Wrist strap

For better protection against damage caused by dropping, you can mount the wrist strap as shown in the following diagrams.







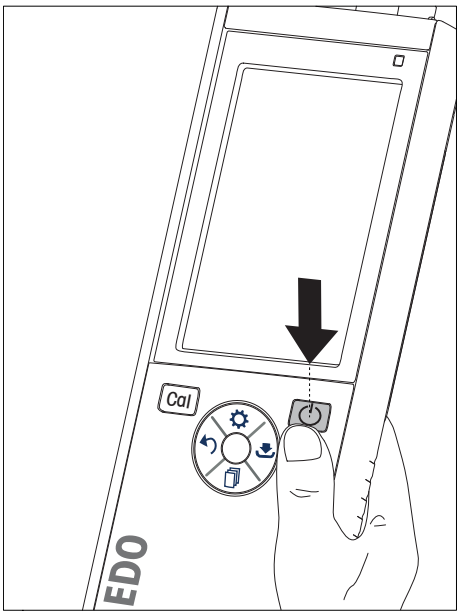


4.5 Switching the instrument on and off

1 Press and release ⏻ to switch on the instrument.

⇨ All segmented digital numbers and icons are displayed for 2 seconds. After that the installed software version appears (e.g. 1.00) and the instrument is ready for use.

2 Press ⏻ for 2 seconds and release to switch off the instrument.



Note

- By default after 10 minutes not in use, the instrument shuts down automatically. The auto-off function can be turned on/off in the setup menu, under **General settings**.

See also

- Hot power on/off (page 28)

5 Operation of the Instrument

5.1 Calibration

Note

To determine the cell constant of a conductivity sensor, perform a calibration as described below.

5.1.1 Selecting a calibration standard

1 Press ☼ to enter the setup menu.

2 Select **Calibration Settings** and press **Read**.

3 Select your standard by using ☼ and ⎘ and press **Read** to confirm.

By default the following 3 standards are available:

- 84 µS/cm
- 1413 µS/cm
- 12.88 mS/cm

Tables for automatic temperature compensation are programmed in the meter for each standard.

See also

- Appendix (page 34)

5.1.2 Enter a cell constant

If the cell constant of the conductivity cell being used is accurately known, it can be entered directly in the meter (0.01 - 500.0 uS/cm).

1 Press ☼ to enter the setup menu.

2 Select **Calibration Settings** and press **Read**.

3 Select **Standard 0** by using ☼ and ⎘ and press ⮋ to confirm.

4 Increase or decrease the cell constant value by using ☼ and ⎘ and press **Read** to confirm.

5 Press and hold ⮌ to exit the setup menu.

5.1.3 Enter a user-defined standard

There are 4 standards to choose from in the **Calibration Settings**. **Standard 1** - **Standard 3** are fixed. **Standard 4** can be altered (user-defined).

- **Standard 1** = 84 uS/cm (fix)
- **Standard 2** = 1413 uS/cm (fix)
- **Standard 3** = 12.88 mS/cm (fix)
- **Standard 4** = 0.01 - 200.00 mS/cm (user-defined)

To define a user-defined standard follow these steps:

1 Press ☼ to enter the setup menu.

2 Select **Calibration Settings**, press **Read** and select **Standard 4** using ☼ and ⎘.

3 Press ⮋ to confirm.

4 Change the value by using ☼ and ⎘.

5 Press **Read** to confirm.

6 Press and hold ⮌ to exit the setup menu.

5.1.4 Performing a calibration

- ▸ A sensor is connected to the instrument.

1 Place the sensor in a defined calibration standard and press **Cal**.

⇨ The calibration icon and the measurement icon appear on the display.

2 The automatic endpoint **A** is the default setting of the meter. When the signal has stabilized, the display freezes automatically, ⍓ appears and the measurement icon disappears.
- or -
To manually endpoint a measurement, press **Read**. The display freezes and ⍔ appears.

⇨ The relevant value is displayed and stored and the measurement icon disappears from the display.

3 Press **Read** to accept the calibration and return to sample measurement or press ↶ to reject the calibration.

Note

- To ensure the most accurate conductivity readings, you should verify your cell constant with a standard solution regularly and recalibrate if necessary. Use always fresh standards.

5.2 Settings

5.2.1 General settings

Stability criteria for conductivity measurement:

The sensor input signal must not deviate by more than 0.4% from the measured average conductivity of the sample in 6 seconds. There is no user-defined configuration needed.

5.2.1.1 Endpoint Formats

The Seven2Go™ offers three different endpoint formats:

Automatic endpoint:
With the automatic endpoint the selected stability criterion (fast, normal) determines the end of an individual reading depending on the behavior of the sensor used. This ensures an easy, quick, and precise measurement.

Timed endpoint:
The measurement stops after a user-defined period of time (5 s - 3600 s).

Manual endpoint:
Unlike Auto, user interaction is required to stop the measurement reading in manual mode. The three different endpoint formats can be selected in the General settings.

1 Press ☼ to enter the setup menu.

2 Select **General Settings** and press **Read** twice.

3 Choose the endpoint format by using ☼ or 🗍.

4 Press **Read** to confirm.

5 Press and hold ↶ to exit the setup menu.

5.2.2 Measurement Settings

5.2.2.1 Timed Interval Reading

A reading is taken every time after a certain interval (1 - 200 s) defined in the menu has elapsed. When working in the **Timed Interval Readings** mode, the interval can be defined by entering the seconds. The measurement series stops according to the selected endpoint format (**Automatic**, **Manual**, or **Timed**). When **Timed Interval Readings** is **On**, Int. appears on the screen.

1 Press ☼ to enter the setup menu.

2 Select **Measurement Settings** and press **Read**.

3 Choose interval time by using ☼ or 🗍.

4 Press **Read** to confirm.

5 Press and hold ↶ to exit the setup menu.

5.2.2.2 Reference temperature

The reference temperature can be set in the Measurement settings.

Two reference temperatures are available:

- 20 °C (68 °F)
- 25 °C (77 °F).

To change the reference temperature follow these steps:

1 Press ☼ to enter the setup menu.

2 Select **Measurement Settings** and press **Read** twice.

3 Select the reference temperature by using ↶ or 🡻.

4 Press **Read** to confirm.

5 Press and hold ↶ to exit the setup menu.

5.2.2.3 Temperature correction/alpha-coefficient

If needed, you can define the alpha-coefficient In the measurement settings as follows:

1 Press ☼ to enter the setup menu.

2 Select **Measurement Settings** and press **Read** three times.

3 Edit the alpha-coefficient value by using ↶ or ⮟.

4 Press **Read** to confirm.

5 Press and hold ↶ to exit the setup menu.

With most solutions, a linear interrelationship between conductivity and temperature is given. In such cases, select the linear temperature correction method. Enter a linear temperature correction factor (alpha-coefficient) to define this dependency. You can define a temperature correction coefficient between 0.000 – 10.000 %/°C. The measured conductivity is corrected and displayed using the following formula:

$GT_{Ref} = GT/(1 + (\alpha(T - T_{Ref}))/100\ \%)$

Formula definitions

- GT = conductivity measured at temperature T (mS/cm)
- GT_{Ref} = conductivity (mS/cm) displayed by the instrument, calculated back to the reference temperature T_{Ref}
- α = linear temperature correction coefficient (%/°C); α = 0: no temperature correction
- T = measured temperature (°C)
- T_{Ref} = Reference temperature (20 °C or 25 °C)

No temperature correction

In some cases, for example, when measuring according to USP/EP (United States/European Pharmacopeia) you need to switch off the temperature correction. This can be done by entering a linear correction factor of 0 %/ °C.

Each sample has different temperature behavior. For pure salt solutions the correct coefficient can be found in literature, otherwise you need to determine the α-coefficient by measuring the conductivity of the sample at two temperatures and calculate the coefficient by using the formula below.

α = (GT1 - GT2) * 100% / (T1 - T2) / GT2

T1: Typical sample temperature

T2: Reference temperature

GT1: Measured conductivity at typical sample temperature

GT2: Measured conductivity at reference temperature

Non-linear

The conductivity of natural water shows strong non-linear temperature behavior. For this reason, use the non-linear correction for natural water. The measured, non-temperature corrected conductivity is multiplied by the factor f_{25} for the measured temperature (see value table in Appendix) and thus corrected to the reference temperature of 25 °C:

$G_{T25} = GT \cdot f_{25}$

The conductivity corrected to 25 °C is divided by 1.116 (see f_{25} for 20.0 °C)

$GT_{20} = (GT \cdot f_{25})/1.116$

Note

Conductivity measurements of natural water can only be performed at temperatures ranging from 0 °C to 36 °C. Otherwise, the warning message "Temp. out of nLF correction range" appears.

5.2.2.4 TDS factor

TDS (Total dissolved solids) is calculated by multiplying the conductivity value with the TDS factor. A factor between 0.40 and 1.00 can be entered. To edit the TDS factor follow these steps:

1 Press ☼ to enter the setup menu.

2 Select **Measurement Settings** and press **Read** four times.

3 Edit the TDS value by using ↶ or ⮟.

4 Press **Read** to confirm.

5 Press and hold ↶ to exit the setup menu.

5.2.2.5 Conductivity Ash

Conductivity Ash (%) is an important parameter that reflects the content of soluble inorganic salts in refined sugar or raw sugar/melasses. The value expresses the amount of such impurities in the analyzed sugar sample. This meter can measure conductivity ash according to the following two ICUMSA methods (see "Appendix: Conductivity ash methods"):

- 28 g / 100 g solution (refined sugar - ICUMSA GS2/3-17)
- 5 g / 100 mL solution (raw sugar – ICUMSA GS1/3/4/7/8-13)

The instrument will directly convert the measured conductivity to conductivity ash % according to the selected method. The user has the possibility to enter the conductivity of the used water for preparing the sugar solutions in µS/cm (0.0 to 100.0 µS/cm). This value is then used for correcting the measured conductivity ash values according to the formula given in the Appendix.

Note

Conductivity ash measurements are only possible in the temperature range from 15 °C to 25 °C.

To edit the conductivity ash of used water follow these steps:

1 Press ☼ to enter the setup menu.

2 Select **Measurement Settings** and press **Read** five times.

3 Select the conductivity ash by using ↶ or ⮟.

4 Press **Read** to confirm.

5 Press and hold ↶ to exit the setup menu.

5.3 Sample measurement

Note

Stability criterion for conductivity measurement

The sensor input signal must not deviate by more than 0.4% from the measured average conductivity of the sample in 6 seconds.

5.3.1 Performing a conductivity measurement

- A sensor is connected to the instrument.
- The measurement parameters are fully set.

1 Place the sensor in the sample and press **Read** to start the measurement.
   ⇨ The measurement icon appears on the display and the decimal point blinks.
   ⇨ The display shows the value of the sample.

2 The automatic endpoint **A** is the default setting of the meter. When the signal has stabilized, the display freezes automatically, /A appears and the measurement icon disappears.
   - or -
   To manually endpoint a measurement, press **Read**. The display freezes and / appears.
   ⇨ The measured value is displayed.

3 Press to store the measured value.

Note

- Press **Read** to switch between the automatic and manual endpoint modes.

5.3.2 Performing a TDS, salinity or resistivity measurement

- A sensor is connected to the instrument.
- The measurement parameters are fully set.

1 Press **Mode** to switch between the measurement modes and select the desired. Press **Read** to confirm.

2 Place the sensor in the sample and press **Read** to start the measurement.
   ⇨ The measurement icon appears on the display and the decimal point blinks.
   ⇨ The display shows the value of the sample.

3 The automatic endpoint **A** is the default setting of the meter. When the signal has stabilized, the display freezes automatically, /A appears and the measurement icon disappears.
   - or -
   To manually endpoint a measurement, press **Read**. The display freezes and **M** appears.
   ⇨ The measured value is displayed.

4 Press to store the measured value.

Note

- For accurate measurement with the S3 conductivity meter it is important to use a sensor with a built-in temperature sensor.
- The use of the special IP67 conductivity and temperature sensor InLab®738-ISM or InLab®742-ISM guarantees optimum performance even in very humid environments.

5.4 Using the memory

5.4.1 Storing a measurement result

The Seven2Go™ can store up to 200 endpointed results.

– Press ⬇ when the measurement has endpointed.

⇨ **M0001** indicates that one result has been stored, and **M2000** that the maximum of 200 results have been stored.

Note

- If you press ⬇ when **M2000** is displayed, **FUL** indicates that the memory is full. To store further data you will have to clear the memory.

See also

- Clearing the memory (page 27)

5.4.2 Recalling from memory

1 Press ↶ to recall the stored values from memory when the current measurement has endpointed.

2 Press ☼ or 🗍 to scroll through the stored results.

⇨ **R0001** to **R2000** indicates which result is currently displayed.

3 Press **Read** to exit.

5.4.3 Clearing the memory

1 Press ↶ to recall the stored values.

2 Press ☼ or 🗍 to scroll through the stored results until **ALL** appears.

3 Press **Read**.

⇨ **CLr** blinks on the display.

4 Press **Read** to confirm the deletion or long-press ↶ to cancel.

5.5 Hot power on/off

Generally the instrument shuts down automatically after 10 minutes of not in use. This is for saving battery life. With **hot power on** you can deactivate this setting. If **hot power on** is active, the instrument will never power off until battery power is used up or the user presses ⏻ manually.

Activate hot power on:

– Press ⏻ and **Read** simultaneously.

⇨ **Hot power on** is activated, ↻ appears on the display.

Deactivate hot power on:

– Press ⏻ and **Read** simultaneously.

⇨ **Hot power on** is deactivated, ↻ disappears from the display.

Note

On delivery and after doing a factory reset, the **hot power on** function is OFF.

5.6 Instrument self-test

1 Press **Read** and **Cal** simultaneously until Self-Diag appears.

⇨ First that each icon blinks one after the other whereby you can check if all icons are correctly shown on the display. After that, the full screen will be displayed.

⇨ After that, starts to blink and the 7 hardkey-icons are shown on the display.

2 Press any hardkey.

⇨ The specific icon disappears from the display.

3 Press each hardkey one time.

⇨ When the self-diagnosis is completed successfully, **PAS** and ✓ appears. If the self-diagnosis is failed, **Err 1** appears.

Note

- You must press all hardkeys within 2 minutes. Otherwise **Err 1** appears and the self-diagnosis has to be redone.

See also

- Error messages (page 29)

5.7 Factory reset

Note

Loss of data!

With a factory reset all user-specific settings will be set to standard. Also all data memories (e.g. sample IDs, User IDs) will be deleted.

▸ The instrument is switched on.

1 Press **Read** and ☼ simultaneously.

⇨ **RST** appears on the display.

2 Press ⏻.

⇨ The instrument switches off.

⇨ All settings are reset.

3 Press ⏻ to switch on the instrument.

6 Maintenance

6.1 Cleaning the housing

Note

Damage to the instrument!

Ensure that no liquid enters the interior of the instrument.

Wipe off any spills immediately.

The meters do not require any maintenance other than an occasional wipe with a damp cloth. The housing is made of acrylonitrile butadiene styrene/polycarbonate (ABS/PC). This material is sensitive to some organic solvents, such as toluene, xylene and methyl ethyl ketone (MEK).

– Clean the housing of the instrument using a cloth dampened with water and a mild detergent.

6.2 Error messages

Error 0	Error to access memory	• Switch Seven2Go off and on again. • If this error persists, call METTLER TOLEDO Service.
Error 1	Self-diagnosis failed: Not all key presses recognized within 2 minutes	• Repeat the self-diagnosis procedure and make sure that you finish pressing all seven keys within two minutes. • If the error appears again, call METTLER TOLEDO Service.
Error 2	Conductivity, resistivity, TDS, salinity or cond.ash reading is outside specified range (see technical data in chapter 9)	• Make sure the electrode placed in the sample solution. • Check the calibration data. If needed, re-calibrate the sensor. • Make sure that the sensor is not damaged. • Check if the sensor is properly connected. Neither the electrode plug nor the instrument's connector must be oxidized. • Verify that all pins of the sensor cable plugs are straight (not bent). • To exclude a problem with the meter, measure the conductivity without connected sensor; it must be 0 µS/cm.
Error 3	Measured temperature during calibration is outside specified range (see list of calibration standards in the appendix)	• Keep the calibration standard temperature within the range for calibration. • To check the temperature reading, perform a measurement in air at room temperature and verify correct reading.
Error 8	Meter is set to cond. ash and measured temperature is outside range 15 … 25 °C	• Adjust the temperature of the sample.
Error 9	Measurement data cannot be stored twice	• Measured value has already been stored.
Error 10	Memory is full	• Already 200 results have been saved. • Delete some results or clear the memory.

6.3 Disposal

In conformance with the European Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) this device may not be disposed of in domestic waste. This also applies to countries outside the EU, per their specific requirements.

Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment. If you have any questions, please contact the responsible authority or the distributor from which you purchased this device. Should this device be passed on to other parties (for private or professional use), the content of this regulation must also be related.

Thank you for your contribution to environmental protection.

7 Product Portfolio

Meter and Kits	Order No.
Seven2Go Conductivity meter S3 ONLY	30207954
S3-Standard Kit Seven2Go Conductivity meter S3-Standard Kit with InLab® 738-ISM	30207955
S3-Field Kit Seven2Go Conductivity meter S3-Field Kit with InLab® 738-ISM and uGo™ carrying case	30207956
S3-Bioethanol Kit Seven2Go Conductivity meter S3-Bioethanol Kit with InLab® 725 and uGo™ carrying case	30207957

8 Accessories

Parts	Order No.
uGo™ carrying case	30122300
Seven2Go meter benchtop stabilizing base	30122303
Seven2Go electrode clip and electrode clip covers (4 pcs.)	30137805
Seven2Go wrist strap (METTLER TOLEDO)	30122304
InLab® 738-ISM, 4 graphite poles, epoxy shaft, ATC, cell constant: 0.57cm^{-1}	51344110
InLab® 742-ISM 2 steel poles, steel V4A shaft, ATC, cell constant: 0.105 cm^{-1}	51344116
InLab® 725, 2 platinum poles, glass shaft, ATC, cell constant: 0.1 cm^{-1}	30014160
Mini-DIN to LTW adapter (for InLab 725)	51302329
uPlace electrode arm	30019823

Solutions	Order No.
1.3 µS/cm conductivity check solution (single use), 250 mL:	30090847
10 µS/cm conductivity standard solution, 250 mL	51300169
10 µS/cm conductivity standard, 30 x 20 mL	30111141
84 µS/cm conductivity standard solution, 250 mL	51302153
84 µS/cm conductivity standard, 30 x 20 mL	30111140
500 µS/cm conductivity standard solution, 250 mL	51300170
1413 µS/cm conductivity standard solution, 30 x 20 mL	51302049
1413 µS/cm conductivity standard solution, 6 x 250 mL	51350096
12.88 mS/cm conductivity standard solution, 30 x 20 mL	51302050
12.88 mS/cm conductivity standard solution, 6 x 250 mL	51350098

Documents	Order No.
A Guide to Conductivity Measurement	3009912

9 Technical data

General

Power requirements	Batteries	4 x LR6/AA 1.5 V Alkaline - or - 4 x HR6/AA 1.3 V NiMH rechargeable
	Battery life	250...400 h
Dimensions	Height	222 mm
	Width	70 mm
	Depth	35 mm
	Weight	270 g
Display	LCD	Segmented LCD, b/w
Ambient conditions	Operating temperature	0…40°C
	Relative humidity	5%...85% (non-condensing) at 31 °C, linearly descending to 50% at 40 °C
	Overvoltage category	Class II
	Pollution degree	2
	Maximum operating altitude	Up to 2000 m
	Range of application	For indoor and outdoor use
Materials	Housing	ABS/PC reinforced
	Window	Polymethyl methacrylate (PMMA)
	IP Protection class	IP67

Measurement

Parameters	Conductivity, TDS, salinity, specific resistance, conductivity ash	
Sensor input	Conductivity	Standard LTW 7-pin (IP67)
Conductivity	Measuring range	0.01 µS/cm…500 mS/cm
	Resolution	0.01…1 (auto-range)
	Accuracy (sensor input)	± 0.5%
TDS	Measuring range	0.01 mg/L...300 g/L
	Resolution	0.01…1
	Accuracy (sensor input)	± 0.5%
Specific Resistance	Measuring range	0.00..100.0 MΩ·cm
	Resolution	0.01…0.1
	Accuracy (sensor input)	± 0.5%
Salinity	Measuring range	0.00…42 psu
	Resolution	0.01…0.1
	Accuracy (sensor input)	± 0.5%
Conductivity Ash	Measuring range	0.00…2022 %
	Resolution	0.01, 0.1, 1% (auto-range)
	Accuracy (sensor input)	0.5%
Temperature	Measuring range	–5…105 °C
	Resolution	0.1 °C
	Accuracy (sensor input)	± 0.2 °C
	ATC	Yes
	Reference temperature	20/25 °C
	Temperature correction mode	Linear
Calibration	Calibration points	1
	Predefined conductivity standards	3
Data security / storage	ISM® (light version)	Yes
	Memory size	200

10 Appendix

10.1 Conductivity standards

International (Ref. 25°C)

T [°C]	10 µS/cm	84 µS/cm	500 µS/cm	1413 µS/cm	12.88 mS/cm
5	6.13	53.02	315.3	896	8.22
10	7.10	60.34	359.6	1020	9.33
15	7.95	67.61	402.9	1147	10.48
20	8.97	75.80	451.5	1278	11.67
25	**10.00**	**84.00**	**500.0**	**1413**	**12.88**
30	11.03	92.19	548.5	1552	14.12
35	12.14	100.92	602.5	1667	15.39

Chinese Standards (Ref. 25°C)

T [°C]	146.5 µS/cm	1408 µS/cm	12.85 mS/cm	111.3 mS/cm
15	118.5	1141.4	10.455	92.12
18	126.7	1220	11.163	97.8
20	132.2	1273.7	11.644	101.7
25	**146.5**	**1408.3**	**12.852**	**111.31**
35	176.5	1687.6	15.353	131.1

Japanese Standards (Ref. 20°C)

T [°C]	1330.00 µS/cm	133.00 µS/cm	26.6 µS/cm
0	771.40	77.14	15.428
5	911.05	91.11	18.221
10	1050.70	105.07	21.014
15	1190.35	119.04	23.807
20	**1330.00**	**133.00**	**26.6**
25	1469.65	146.97	29.393
30	1609.30	160.93	32.186
35	1748.95	174.90	34.979

Saturated NaCl (Ref. 25°C)

T [°C]	251.3 mS/cm
5	155.5
10	177.9
15	201.5
20	226.0
25	**251.3**
30	277.4
35	304.1

10.2 Temperature correction factors

Temperature correction factors f_{25} for non-linear conductivity correction

°C	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0	1.918	1.912	1.906	1.899	1.893	1.887	1.881	1.875	1.869	1.863
1	1.857	1.851	1.845	1.840	1.834	1.829	1.822	1.817	1.811	1.805
2	1.800	1.794	1.788	1.783	1.777	1.772	1.766	1.761	1.756	1.750
3	1.745	1.740	1.734	1.729	1.724	1.719	1.713	1.708	1.703	1.698
4	1.693	1.688	1.683	1.678	1.673	1.668	1.663	1.658	1.653	1.648
5	1.643	1.638	1.634	1.629	1.624	1.619	1.615	1.610	1.605	1.601
6	1.596	1.591	1.587	1.582	1.578	1.573	1.569	1.564	1.560	1.555
7	1.551	1.547	1.542	1.538	1.534	1.529	1.525	1.521	1.516	1.512
8	1.508	1.504	1.500	1.496	1.491	1.487	1.483	1.479	1.475	1.471
9	1.467	1.463	1.459	1.455	1.451	1.447	1.443	1.439	1.436	1.432
10	1.428	1.424	1.420	1.416	1.413	1.409	1.405	1.401	1.398	1.384
11	1.390	1.387	1.383	1.379	1.376	1.372	1.369	1.365	1.362	1.358
12	1.354	1.351	1.347	1.344	1.341	1.337	1.334	1.330	1.327	1.323
13	1.320	1.317	1.313	1.310	1.307	1.303	1.300	1.297	1.294	1.290
14	1.287	1.284	1.281	1.278	1.274	1.271	1.268	1.265	1.262	1.259
15	1.256	1.253	1.249	1.246	1.243	1.240	1.237	1.234	1.231	1.228
16	1.225	1.222	1.219	1.216	1.214	1.211	1.208	1.205	1.202	1.199
17	1.196	1.193	1.191	1.188	1.185	1.182	1.179	1.177	1.174	1.171
18	1.168	1.166	1.163	1.160	1.157	1.155	1.152	1.149	1.147	1.144
19	1.141	1.139	1.136	1.134	1.131	1.128	1.126	1.123	1.121	1.118
20	1.116	1.113	1.111	1.108	1.105	1.103	1.101	1.098	1.096	1.093
21	1.091	1.088	1.086	1.083	1.081	1.079	1.076	1.074	1.071	1.069
22	1.067	1.064	1.062	1.060	1.057	1.055	1.053	1.051	1.048	1.046
23	1.044	1.041	1.039	1.037	1.035	1.032	1.030	1.028	1.026	1.024
24	1.021	1.019	1.017	1.015	1.013	1.011	1.008	1.006	1.004	1.002
25	1.000	0.998	0.996	0.994	0.992	0.990	0.987	0.985	0.983	0.981
26	0.979	0.977	0.975	0.973	0.971	0.969	0.967	0.965	0.963	0.961
27	0.959	0.957	0.955	0.953	0.952	0.950	0.948	0.946	0.944	0.942
28	0.940	0.938	0.936	0.934	0.933	0.931	0.929	0.927	0.925	0.923
29	0.921	0.920	0.918	0.916	0.914	0.912	0.911	0.909	0.907	0.905
30	0.903	0.902	0.900	0.898	0.896	0.895	0.893	0.891	0.889	0.888
31	0.886	0.884	0.883	0.881	0.879	0.877	0.876	0.874	0.872	0.871
32	0.869	0.867	0.866	0.864	0.863	0.861	0.859	0.858	0.856	0.854
33	0.853	0.851	0.850	0.848	0.846	0.845	0.843	0.842	0.840	0.839
34	0.837	0.835	0.834	0.832	0.831	0.829	0.828	0.826	0.825	0.823
35	0.822	0.820	0.819	0.817	0.816	0.814	0.813	0.811	0.810	0.808

10.3 Temperature coefficients (alpha-values)

Substance at 25°C	Concentration [%]	Temperature coefficient alpha [%/°C]
HCl	10	1.56
KCl	10	1.88
CH_3COOH	10	1.69
NaCl	10	2.14
H_2SO_4	10	1.28
HF	1.5	7.20

α-coefficients of conductivity standards for a calculation to reference temperature 25 °C

Standard	Measurement temp.: 15 °C	Measurement temp.: 20 °C	Measurement temp.: 30 °C	Measurement temp.: 35 °C
84 µS/cm	1.95	1.95	1.95	2.01
1413 µS/cm	1.94	1.94	1.94	1.99
12.88 mS/cm	1.90	1.89	1.91	1.95

10.4 Practical salinity scale (UNESCO 1978)

The salinity is calculated according to the official definition of UNESCO 1978. Therefore the salinity Spsu of a sample in psu (practical salinity unit) at standard atmospheric pressure is calculated as follows:

$$S = \sum_{j=0}^{5} a_j R_T^{j/2} - \frac{(T-15)}{1+k(T-15)} \sum_{j=0}^{5} b_j R_T^{j/2}$$

$a_0 = 0.0080$	$b_0 = 0.0005$	$k = 0.00162$
$a_1 = -0.1692$	$b_1 = -0.0056$	
$a_2 = 25.3851$	$b_2 = -0.0066$	
$a_3 = 14.0941$	$b_3 = -0.0375$	
$a_4 = -7.0261$	$b_4 = 0.0636$	
$a_5 = 2.7081$	$b_5 = -0.0144$	

$$R_T = \frac{R_{Sample}(T)}{R_{KCl}(T)}$$

(32.4356 g KCl per 1000 g of solution)

10.5 Conductivity to TDS conversion factors

Conductivity	TDS KCl		TDS NaCl	
at 25 °C	ppm value	factor	ppm value	factor
84 µS/cm	40.38	0.5048	38.04	0.4755
447 µS/cm	225.6	0.5047	215.5	0.4822
1413 µS/cm	744.7	0.527	702.1	0.4969
1500 µS/cm	757.1	0.5047	737.1	0.4914
8974 µS/cm	5101	0.5685	4487	0.5000
12.880 µS/cm	7447	0.5782	7230	0.5613
15.000 µS/cm	8759	0.5839	8532	0.5688
80 mS/cm	52.168	0.6521	48.384	0.6048

10.6 Conductivity ash methods

The meter can measure the conductivity ash (%) according to the two ICUMSA methods:

10.6.1 Refined sugar (28 g/100 g solution) ICUMSA GS2/3-17

The formula that the instrument uses is:

`%(m/m)=0,0006x((C1/(1+0,026x(T-20)))-0,35x(C2/(1+0,026x(T-20)))xK)`

C1 = conductivity of the sugar solution in µS/cm with cell constant = 1 cm^{-1}

C2 = conductivity of the water used in µS/cm to prepare the sugar solution with cell constant = 1 cm^{-1}

T = temperature in °C between 15°C and 25°C

K = cell constant

10.6.2 Raw sugar or melasses (5 g / 100 mL solution) ICUMSA GS 1/3/4/7/8-13

The formula that the instrument uses is:

`%(m/V)=0,0018x((C1/(1+0,023x(T-20))-C2/(1+0,023x(T-20)))xK)`

C1 = conductivity of the sugar solution in µS/cm with cell constant = 1 cm^{-1}

C2 = conductivity of the water used to prepare the sugar solution in µS/cm with cell constant = 1 cm^{-1}

T = temperature in °C between 15°C and 25°C

K = cell constant of the used sensor

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For more information

Mettler-Toledo AG, Analytical
CH-8603 Schwerzenbach, Switzerland
Tel. +41 (0)44 806 77 11
Fax +41 (0)44 806 73 50
www.mt.com

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