Operating Instructions

FiveEasy™ FiveEasy Plus™
## Conductivity Meter F30, FP30

METTLER TOLEDO
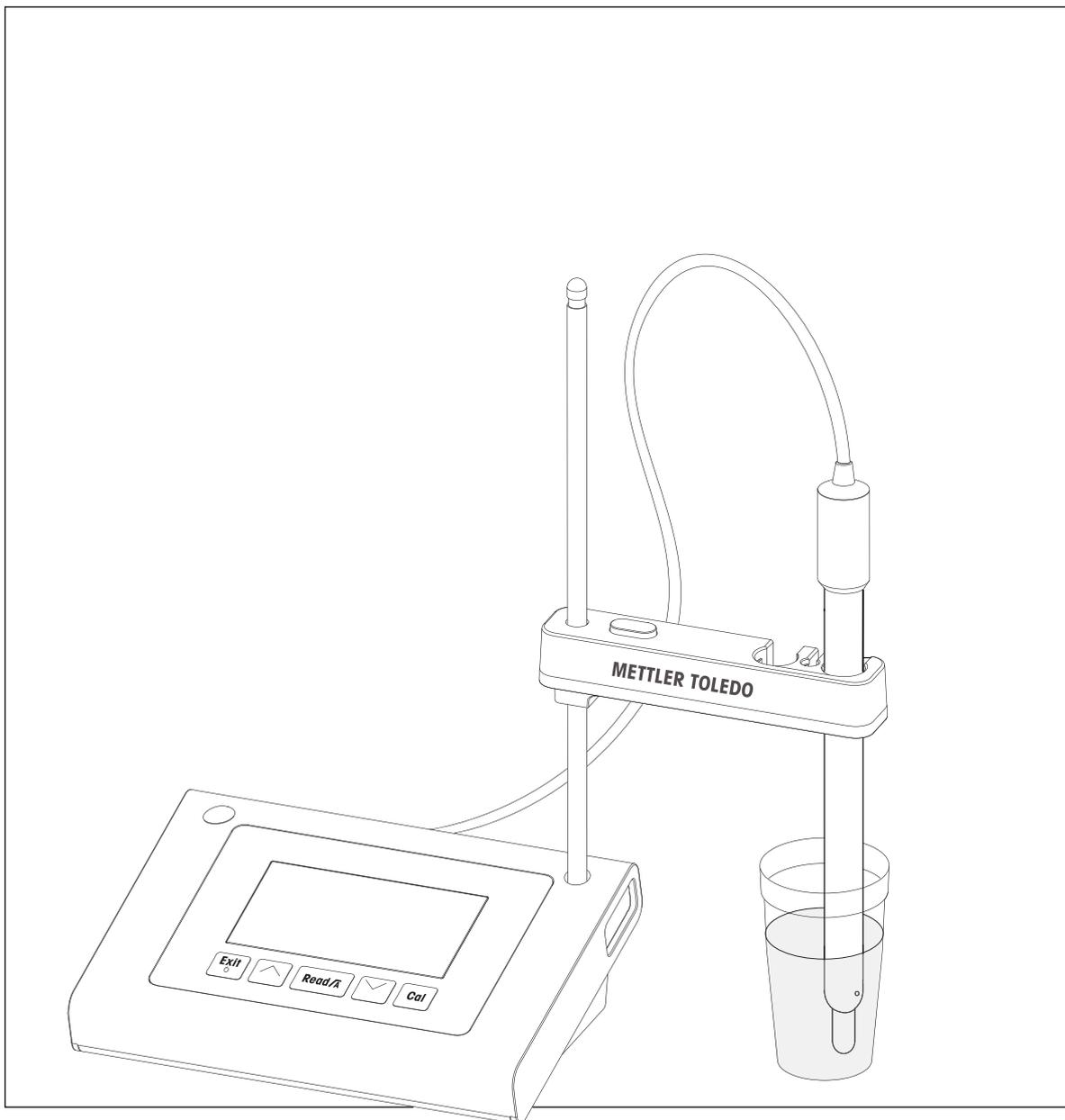
Table of Contents

1 Introduction

Thank you for purchasing this high quality METTLER TOLEDO laboratory meter. With the new FiveEasy™ and FiveEasyPlus™ bench line instruments for pH and conductivity measurement, we wish to simplify your measuring process and your workflows.

FiveEasy™ and FiveEasy Plus™ are much more than just a series of bench meters with an excellent price/performance ratio. The meters offer a number of user-friendly features, including:

- **Optimized ease of use**
  simple menus for quick and easy operation
- **Small footprint**
  while boasting a large display, the instrument requires little benchtop space
- **Flexibility**
  a number of useful accessories are available to further simplify your lab (e.g. printers, sensors, buffers and solutions)

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 experience 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 conductivity.

The use therefore requires knowledge and experience in working with toxic and caustic substances.

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 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	Left handed mounting position for sensor holder	**6**	Release button height adjustment
2	Keypad	**7**	Rod stand (height adjustment)
3	Display	**8**	Connection board
4	Housing	**9**	DC connection
5	Sensor holder	**10**	Storage compartment for rod stand

3.2 Connections on the instrument

FP30

F30
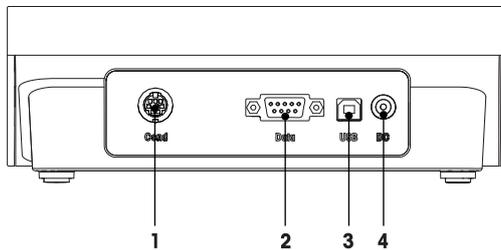
1	Mini Din socket for conductivity signal input	**3**	USB-B interface to PC
2	RS232 interface to printer	**4**	DC socket for power supply
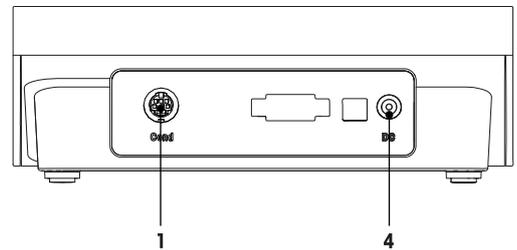
3.3 Keypad F30

	Key	Naming	Press and release (measurement mode)	Press and hold for 1 second (measurement mode)	Press and release (other mode)
1	Exit ⏻	On / Off / Exit	• Switch meter on	• Switch meter off	• Back to measurement screen
2	Setup	Setup	• Open setup		• Increase value during setting
3	Read /Ⱥ	Read / Endpoint format	• Start or endpoint measurement	• Set auto endpoint on / off	• Confirm setting
4	Mode	Mode	• Change measurement mode (Conductivity and TDS)		• Decrease value during setting
5	Cal	Calibration	• Start calibration	• Recall calibration data	

3.4 Keypad FP30

	Key	Naming	Press and release (measurement mode)	Press and hold for 1 second (measurement mode)	Press and release (other mode)
1	Exit	On / Off / Exit	• Switch meter on	• Switch meter off	• Back to measurement screen
2	STO RCL	Store / Recall	• Store current reading to memory	• Recall memory data	• Increase value during setting • Scroll up through the memory
3	Read /A	Read / Endpoint format	• Start or endpoint measurement	• Set auto endpoint on / off	• Confirm setting
4	Mode Setup	Mode / Setup	• Change measurement mode (Conductivity, TDS and Salinity)	• Enter set up mode	• Decrease value during setting • Scroll down through the memory
5	Cal	Calibration	• Start calibration	• Recall calibration data	

3.5 Display and icons F30

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 of these icons.

Startup screen
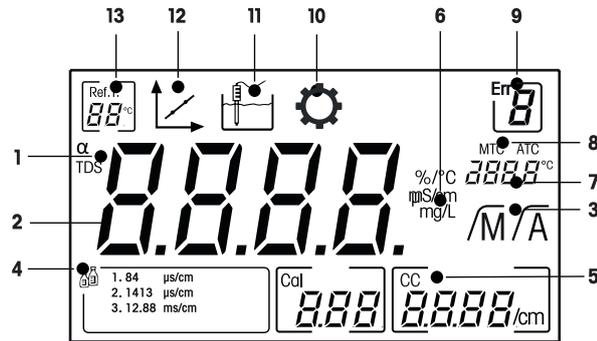
	Icon	Description
1	α / **TDS**	Temperature correction setting / TDS measurement mode
2	--	Measurement value
3	$\overline{/A}$ / $\overline{/M}$	Endpoint format: $\overline{/A}$ Automatic $\overline{/M}$ Manual
4		Calibration standard settings
5	**CC**	Cell constant, calibration result
6	**%/°C / mS/cm** **µS/cm / mg/L**	Currently used measurement unit
7	---	Temperature information
8	**MTC / ATC**	**MTC** (Manual temperature capture) **ATC** (Automatic temperature capture)
9	Err	Error code
10		Setup mode
11		Measurement mode
12		Calibration mode: Indicates calibration mode and appears whenever you are performing a calibration or reviewing calibration data.
13	Ref.T.	Reference temperature

3.6 Display and icons FP30

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.

Startup screen
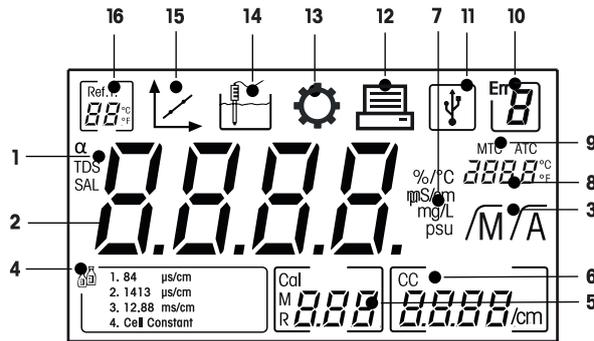
	Icon	Description
1	α / **TDS / SAL**	Temperature correction setting / Measurement modes TDS or salinity
2	--	Measurement value
3	/Ā / /M̄	Endpoint format: /Ā Automatic /M̄ Manual
4		Calibration standard settings
5	M	Memory information
6	**CC**	Cell constant, calibration result
7	**%/°C / mS/cm μS/cm / mg/L psu**	Currently used measurement unit
8	---	Temperature information
9	**MTC / ATC**	**MTC** (Manual temperature capture) **ATC** (Automatic temperature capture)
10	Err	Error code
11		USB connection to PC
12		Data transfer activated
13		Setup mode
14		Measurement mode
15		Calibration mode: Indicates calibration mode and appears whenever you are performing a calibration or reviewing calibration data.
16	Ref.T.	Reference temperature

3.7 Setup menu navigation

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

• Press and hold **Setup** to enter the setup menu.
• Press **Exit** to exit the setup menu.
• Use ⌃ and ⌄ do increase or decrease values.
• Press **Read** to confirm a change.

The following parameters can be changed in the order as shown.

Parameter	Description	Range
MTC	Manual temperature setting	0.0…100.0 °C / 32.0…212 °F
	Calibration standard setting	1, 2, 3, 4, Cell constant (for FP30 only)
Ref.T.	Reference temperature	25 °C (68 °F), 20 °C (77 °F)
α	α-coefficient	0.0...10.00 %/°C
TDS	TDS factor	0.4…1.00
°C, °F	Temperature unit	°C, °F (FP30 only)

3.8 Measurement modes

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

• Conductivity (µS/cm and mS/cm)
• TDS (mg/L and g/L)
• Salinity (psu) for FiveEasy Plus™ only.

To change the measurement mode, press **Mode**.

4 Putting into Operation

4.1 Scope of delivery
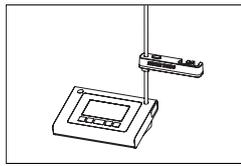
FiveEasy™ F30 instrument
for conductivity / TDS measurement

FiveEasy Plus™ FP30 instrument
for conductivity / TDS / salinity measurement
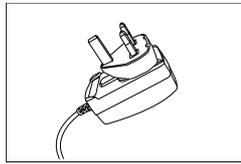
Power adapter
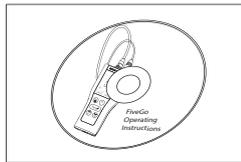
CD-ROM including operating instructions

4.2 Sensor holder installation
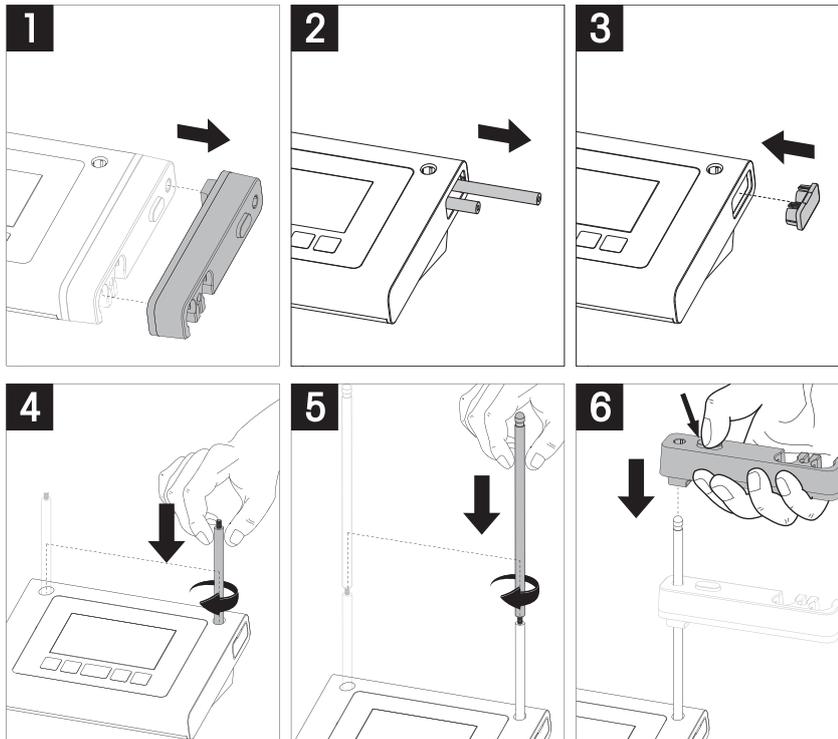
4.3 Connecting the power adapter

The instrument is supplied with an universal AC adapter. The AC adapter is suitable for all line voltages in the range of 100 to 240 V, 50/60 Hz.

Attention

- Before operating, check cables for damage!
- Ensure the cables are tidily arranged so that they cannot be damaged or interfere with the installation!
- Take care that the AC adapter does not come into contact with liquids!
- The power plug must be accessible at all times!

1 Insert the correct connector plug into the AC adapter until it is completely inserted.
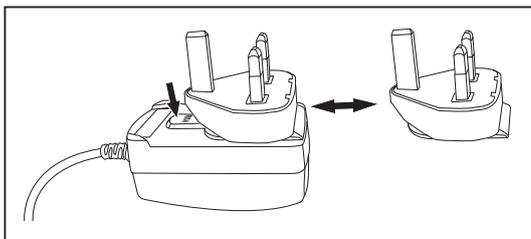
2 Connect the cable of the AC adapter with the DC socket of the instrument.
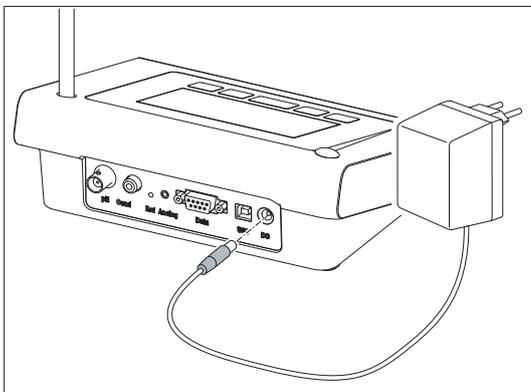
3 Plug the AC adapter into the wall socket.

Note

To remove the connector plug, push the release button and withdraw the connector plug.

4.4 Connecting sensors
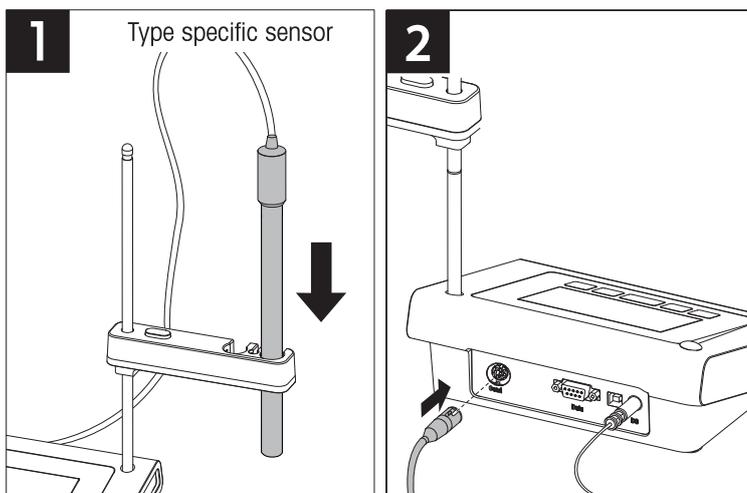
4.5 Switching the instrument on and off

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 3 seconds and release to switch off the instrument.
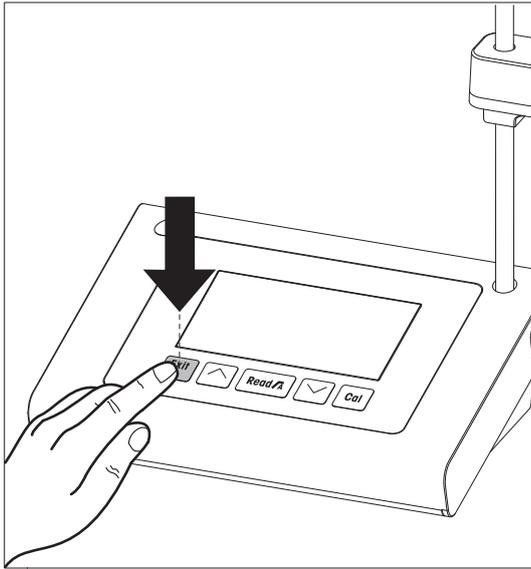
5 Operation of the Instrument

5.1 General settings

5.1.1 Endpoint Formats

The FiveEasy™ and FiveEasy Plus™ offers two different endpoint formats, automatic and manual. To switch between the automatic and manual endpoint modes, press and hold **Read**.

Automatic endpoint

With the automatic endpoint, the measurement stops automatically as soon as the input signal is stable. This ensures an easy, quick and precise measurement.

Manual endpoint

Unlike the automatic endpoint, user interaction is required to stop the measurement reading in manual mode. To manually endpoint a measurement, press **Read**.

5.1.2 Temperature capture

Automatic temperature capture (ATC)

For better accuracy, we recommend the use of either a sensor with a built-in or a separate temperature probe. If a temperature probe is recognized by the meter, **ATC** and the sample temperature are displayed.

Note

The meter accepts NTC 30 kΩ temperature sensors.

Manual temperature capture (MTC)

If the meter does not detect a temperature probe, it automatically switches to the manual temperature mode and **MTC** appears. The entered MTC temperature is used for temperature compensation.

1. To set the MTC temperature, press and hold **Setup**.
   ⇨ The temperature value is blinking. The default setting is 25 °C.

2. Choose the temperature value by using ⌒ and ⌄.

3. Press **Read** to confirm your settings.

4. Continue with calibration standard selection or press **Exit** to return to measurement screen.

5.1.3 Calibration standards

The calibration standard is selected in the setup menu.
The following three standards are available:

- 84 µS/cm
- 1413 µS/cm
- 12.88 mS/cm

Tables for conductivity values at different temperatures are programmed in the meter for each standard, see Appendix [▶ 30].

▪ After confirmation of the MTC temperature, the current calibration standard is blinking.

1. Select the standard by using ⌒ and ⌄.
   – or –
   Select **CC** if the cell constant of the conductivity sensor used is accurately known (FP30 only).

2. Press **Read** to confirm.

3. Continue with reference temperature selection or press **Exit** to return to measurement screen.

5.1.4 Reference temperature

You can select between the reference temperatures 20 °C and 25 °C. The conductivity of the sample is referenced to the selected temperature during measurement.

▪ After confirming the selection of standard, the reference temperature is blinking.

1   Select the targeted reference temperature using ⌃ and ⌄.

2   Press **Read** to confirm.

3   Continue with the α-coefficient setting or press **Exit** to return to measurement screen.

5.1.5 α-**coefficient**

The conductivity of a solution increases when the temperature rises. With most solutions, a linear interrelationship between conductivity and temperature is given.

The measured conductivity is corrected and displayed using the following formula:

$G_{TRef} = G_T / (1 + α (T - T_{Ref}) / 100\%)$

whereras

- 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)

▪   After confirming the setup of the reference temperature, the α-coefficient value is blinking.

1   Set the α-coefficient value using ⌃ and ⌄.

2   Press **Read** to confirm.

3   Continue with TDS factor setting or press **Exit** to return to measurement screen.

5.1.6 **TDS factor**

TDS is calculated by multiplying the conductivity value by the TDS factor.

▪   After confirming the α-coefficient, the TDS value is blinking.

1   Set the TDS factor using ⌃ and ⌄.

2   Press **Read** to confirm.

3   Continue with Temperature unit setting (FP30 only) or press **Exit** to return to measurement screen.

5.1.7 **Temperature unit (FP30 only)**

▪   After confirming the TDS setting, the temperature unit is blinking.

1   Select the temperature unit (°C or °F) using ⌃ and ⌄.

2   Press **Read** to confirm and get back to the measurement screen.

5.2 Performing a calibration

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

- A sensor is connected to the instrument.

1 Place the sensor in a calibration standard and press **Cal**.
   - ⇨ ⌁ and 🗐 appear on the display.
     The instrument endpoints according to the preselected endpoint mode (manual or auto). After the signal has stabilized or after pressing **Read** (manual endpoint) the meter display freezes and shows the relevant standard value.
   - ⇨ 🗐 disappears from the display.
   - ⇨ The new cell constant of the sensor is shown on the right side of the display.

2 Press **Read** to save the calibration.
   – or –
   Press **Exit** to discard the data of the calibration.

Note

To ensure reliable conductivity measurements, you should verify your cell constant with a standard solution once a day and recalibrate if necessary. Always use fresh standards.

Note (FP30 only)

If the cell constant of the conductivity sensor used is accurately known (certified cell constant), it can be entered directly into the meter (0.001 - 10.00/cm) if the calibration standard was set to **Cell constant**.

1 Press **Cal** and the default cell constant is blinking on the display.

2 Increase or decrease the cell constant value by pressing ⌒ and ⌄.

3 Press **Read** to confirm the value.

5.3 Performing a measurement

5.3.1 Measurement mode

The FiveEasy™ conductivity meter offers two different reading modes: Conductivity and TDS.
The FiveEasyPlus™ conductivity meter offers three different reading modes: Conductivity, TDS and salinity.

- Press the **Mode** button to switch between the modes.

5.3.2 Performing a conductivity measurement

- A sensor is connected to the instrument.

- Make sure that the conductivity reading mode is selected.

1 Place the sensor in the sample and press **Read** to start the measurement.
   ⇨ The decimal point blinks.
   ⇨ The display shows the conductivity of the sample.
   ⇨ If the automatic endpoint is selected, and the signal has stabilized, the display freezes, $\overline{A}$ appears and the decimal point stops blinking. In case the **Read** button was pressed before the automatic endpoint, the display freezes and $\overline{M}$ appears.

2 If the manual endpoint is chosen, press **Read** to manually endpoint the measurement. The display freezes and $\overline{M}$ appears.

Note

Press and hold **Read** to switch between the automatic and manual endpoint format.

5.3.3 Performing a TDS measurement

- A sensor is connected to the instrument.

- Make sure that the TDS mode is selected.

- Continue as described in steps 1 and 2 of the section Performing a conductivity measurement [▶ 21].

5.3.4 Performing a salinity measurement (FP30 only)

- A sensor is connected to the instrument.

- Make sure that the salinity mode is selected.

- Continue as described in steps 1 and 2 of the section Performing a conductivity measurement [▶ 21].

5.4 Using the memory (FP30 only)

5.4.1 Storing a measurement result

The instrument can store up to 200 endpointed results.

- Press **STO** when the measurement has endpointed.
  - ⇨ **M001** indicates that one result has been stored, and **M200** that the maximum of 200 results have been stored.

Note

If you press **STO** when **M200** is displayed, **Err 6** indicates that the memory is full. To store further data, you will have to clear the memory.

5.4.2 Recalling from memory

1 Press and hold **RCL** to recall the stored values.

2 Press ⌒ or ⌄ to scroll through the stored results.
  - ⇨ **MR 001** to **MR 200** indicates which result is currently displayed.

3 Press **Exit** to go back to the measurement screen.

5.4.3 Clearing the memory

1 Press and hold **RCL** to recall the stored values from memory.

2 Press **RCL** until **ALL** appears on the display.

3 Press **Read** to delete all measurement results.
  - ⇨ **CLr** starts blinking on the display.

4 Press **Read** to confirm the deletion
  - or -
  Press **Exit** to cancel the deletion.

5.5 Print out (FP30 only)

5.5.1 Connection and configuration

A printer can be connected to the RS-232 interface of the FP30. The use of the RS-P25, RS-P26 or RS-P28 printer is recommended, because they recognize the FP30 and adjust the correct parameters automatically.

In case a different printer is used, the following parameters need to be set:
Baud rate: 1,200bps
Data bit: 8 bit
Parity bit: None
Stop bit: 1

5.5.2 Print-out following measurement / calibration

If a printer is connected to the FP30, a print out is automatically generated after each endpointed measurement or calibration.

5.5.3 Printing from memory

When scrolling through the memory, you can print the entry that is currently viewed by pressing and holding the key **RCL**.

5.6 Data transfer to PC (FP30 only)

Measurement data can be transferred to a PC after each endpointed measurement or calibration, using **LabX direct pH** PC software.

To transfer the currently viewed memory data to the PC, press and hold the **RCL**.

5.7 Self-diagnosis

1   Switch the meter on.

2   Press **Read** and **Cal** simultaneously until the meter displays the full screen.

   ⇨ Each icon blinks one after the other whereby you can check if all icons are correctly shown on the display.

   ⇨ After that, b starts to blink and 5 hardkey-icons are shown on the display.

3   Press any hardkey.

   ⇨ The specific icon disappears from the display.

4   Press each hardkey once.

⇨ When the self-diagnosis is completed successfully, **PAS** appears. If the self-diagnosis has failed, **Err 2** appears.

Note

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

5.8 Factory reset

> **Note**
>
> **Loss of data!**
>
> With a factory reset all user-specific settings will be set to standard. Also all data memories will be deleted.

▪   The instrument is switched off.

1   Press and hold **Read**, **Cal** and **Exit** simultaneously for 2 seconds.

   ⇨ **RST** appears on the display.

2   Press **Read**.

3   Press **Exit**.

   ⇨ The instrument switches off.

   ⇨ All settings are reset.

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 meter does not require any maintenance other than an occasional wipe with a damp cloth. The housing is made of acrylonitrile butadiene styrene (ABS). 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	Description	Resolution
Err 1	Memory access error	Reset to factory settings
Err 2	Self-diagnosis failed	Repeat the self-diagnosis procedure and make sure that you finish pressing all five keys within two minutes.
Err 3	Measured values out of range	Make sure that the electrode wetting cap has been removed and the electrode is properly connected and placed in the sample solution.
Err 4	Calibration standard temperature out of range (5 to 35 °C)	Keep the temperature within the range for calibration (5 to 35 °C).
Err 5	Cell constant out of range	Make sure you have the correct standard and that it is fresh. Disconnect, clean and/or replace the sensor.
Err 6	Memory is full	Clear the memory
Err 7	Measurement data cannot be stored twice	---

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	Description	Order No.
F30-Meter	FiveEasy™ conductivity meter without sensor	30266942
F30-Standard	FiveEasy™ conductivity kit with LE703 sensor	30266943
FP30-Meter	FiveEasy Plus™ conductivity meter without sensor	30266944
FP30-Standard	FiveEasy Plus™ conductivity kit with LE703 sensor	30266945

8 Accessories

Item	Order No.
Power adapter	11120270
Electrode arm (includes sensor holder and 2 poles)	30239139
Electrode arm extension (additional pole)	30239140
Rubber caps to cover electrode arm holes (2pcs.)	51302952
Side cover to cover holes for electrode arm poles	30239146

Sensors	Order No.
LE703 (10 µS/cm...200 mS/cm	51340335
LE740 (0,01 µS/cm...500 µS/cm	51340336

Solutions	Order No.
84 µS/cm conductivity standard solution, 250 mL	51302153
84 µS/cm conductivity standard, 30 x 20 mL	30111140
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

9 Technical Data F30

General

Power rating AC adapter	Line voltage	100 - 240 V AC ~ ± 10%
	Input frequency	50/60 Hz
	Output voltage	12 V DC ⎓ For use with CSA certified (or equivalent approved) power source, which must have a limited circuit output.
Power rating instrument	Input voltage	9 - 12 V ⎓
	Power consumption	1 W
Dimensions	Height (without sensor stand)	70 mm
	Width	227 mm
	Depth	147 mm
	Weight	0.63 kg
Display	LCD	4.3" Segmented LCD
Ambient conditions	Operating temperature	0…40 °C
	Relative humidity	5%…85% (noncondensing) from 31 °C to 40 °C linearly descending to 50%
	Overvoltage category	Class II
	Pollution degree	2
	Maximum operating altitude	2000 m above sea level
	Range of application	For indoor use
Materials	Housing	ABS
	Window	Polymethyl methacrylate (PMMA)

Measurement

Parameters	mS/cm, µS/cm, mg/L, °C (°F)	
Sensor inputs	mS/cm, µS/cm, mg/L, °C (°F)	Mini-DIN
Conductivity	Measuring range	0.00 µS/cm…200.0 mS/cm
	Limits of error	± 0.5%
TDS	Measuring range	0.0 mg/L…200.0 g/L
	Limits of error	±0.5% of measured value
Temperature	Measuring range	0…100 °C (32...212 °F)
	Resolution	0.1°C
	Limits of error	± 0.5 °C
	ATC/MTC	Yes
	Compensation	Linear: 0.00%/°C...10.00%/°C, ref. Temp. 20 or 25°C
Calibration	Calibration points	1
	Predefined standards	3
General measurement	Automatic and manual endpoint recording	Yes
	Acoustic endpoint signal	Yes
	Visual endpoint signal	Yes
Data security / storage	Memory size	Current calibration

10 Technical Data FP30

General

Power rating AC adapter	Line voltage	100 - 240 V AC ~ ± 10%
	Input frequency	50/60 Hz
	Output voltage	12 V DC ⎓ For use with CSA certified (or equivalent approved) power source, which must have a limited circuit output.
Power rating instrument	Input voltage	9 - 12 V ⎓
	Power consumption	1 W
Dimensions	Height (without sensor stand)	70 mm
	Width	227 mm
	Depth	147 mm
	Weight	0.63 kg
Display	LCD	4.3" Segmented LCD
Ambient conditions	Operating temperature	0…40 °C
	Relative humidity	5%…85% (noncondensing) from 31 °C to 40 °C linearly descending to 50%
	Overvoltage category	Class II
	Pollution degree	2
	Maximum operating altitude	2000 m above sea level
	Range of application	For indoor use
Materials	Housing	ABS
	Window	Polymethyl methacrylate (PMMA)

Measurement

Parameters	mS/cm, µS/cm, mg/L, psu, °C (°F)	
Sensor inputs	mS/cm, µS/cm, mg/L, psu, °C (°F)	Mini-DIN
Connectors	RS232 interface	yes
	USB interface	yes
Conductivity	Measuring range	0.00 µS/cm…500.0 mS/cm
	Limits of error	± 0.5%
Salinity	Measuring range	0.00…42.00 psu
	Resolution	0.01…0.1 psu
TDS	Measuring range	0.0 mg/L…300.0 g/L
	Limits of error	±0.5% of measured value
Temperature	Measuring range	-5…105 °C (23...221 °F)
	Resolution	0.1 °C
	Limits of error	± 0.3 °C
	ATC/MTC	Yes
	Compensation	Linear: 0.00%/°C…10.00%/°C, ref. Temp. 20 or 25 °C
Calibration	Calibration points	1
	Predefined standards	3, manual cell constant input

General measurement	Automatic and manual endpoint recording	Yes
	Acoustic endpoint signal	Yes
	Visual endpoint signal	Yes
Data security / storage	Memory size	200 measurements / current calibration

11 Appendix

International Standard (at ref. temp. 25°C)

T [°C]	84 µS/cm	1413 µS/cm	12.88 mS/cm
5	53.02	896	8.22
10	60.34	1020	9.33
15	67.61	1147	10.48
20	75.80	1278	11.67
25	**84.00**	**1413**	**12.88**
30	92.19	1552	14.12
35	100.92	1667	15.39

Examples of temperature coefficients (α-value)

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 of 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

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	0.5270	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

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