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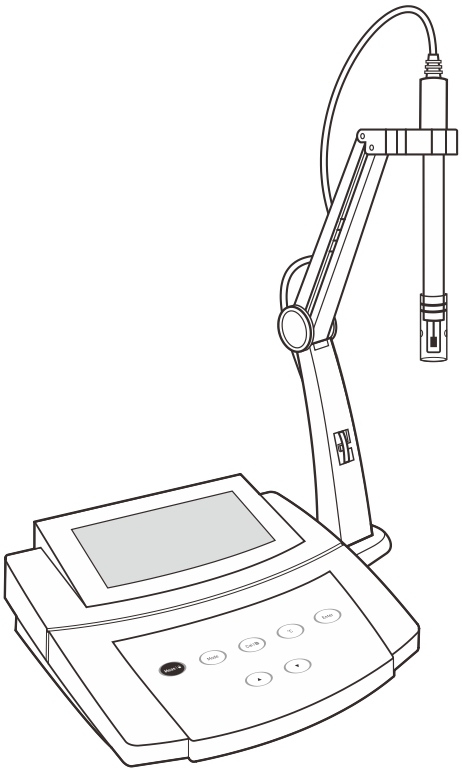
BANTE instruments

Bante 510 Benchtop Conductivity Meter

USER MANUAL



Bante Instruments Inc.

Introduction

Thank you for selecting the 510 benchtop conductivity meter. This user manual provides a step-by-step guide to help you operate the meter, please carefully read the following instructions before use. Any use outside of these instructions may invalidate your warranty and cause permanent damage to the meter.

Environmental Conditions

Before unpacking, ensure that current environmental conditions meet the following requirements.

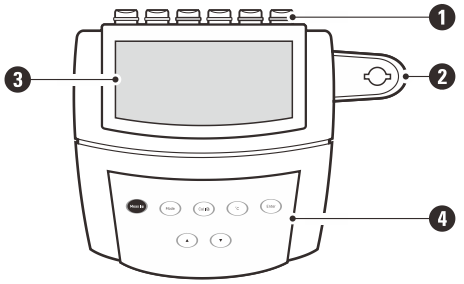
- Relative humidity is less than 80%
- Ambient temperature between 0°C (32°F) and 50°C (122°F)
- No potential electromagnetic interference
- No corrosive gas exists

Packing List

The following list describes all components of the meter. If any items are missing or damaged, contact the supplier immediately.

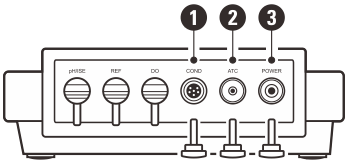
510 meter
Electrode arm
DC 9V power adapter
CON-1 conductivity electrode
TP-10K temperature probe
Conductivity standard solutions 84 µS/cm, 1413 µS/cm, 12.88 mS/cm

Meter Overview



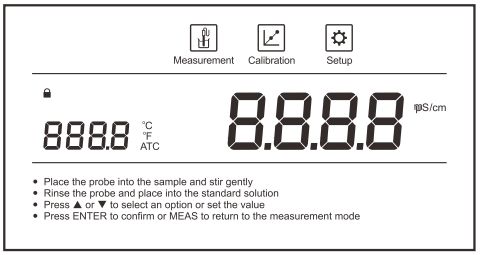
1	Sensor connections
2	Base plate of electrode arm
3	Display
4	Membrane keypad

Connectors



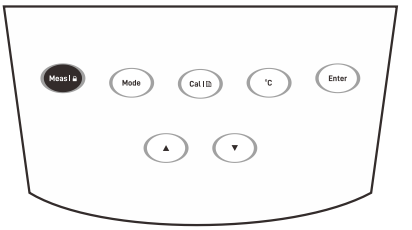
1	Socket for conductivity electrode (6-pin mini DIN)
2	Socket for temperature probe (3.5 mm jack)
3	Socket for power adapter

Display



Icon	Description
	Indicates that the meter is in the measurement mode
	Indicates that the meter is in the calibration mode
	Indicates that the meter is in the setup mode
	Indicates that the measurement is locked
ATC	Indicates that the automatic temperature compensation is enabled

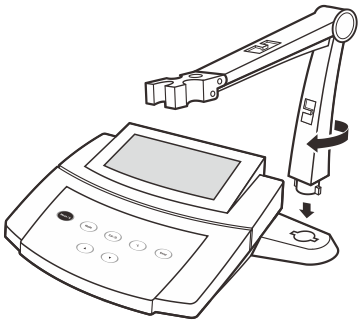
Keypad



Key	Function
Meas I	• Switch the meter on or off • Lock or unlock the measurement • Exit the calibration, settings and return to the measurement mode
Mode	Toggle between the conductivity and TDS measurement modes
Cal I	• Start calibration • Press and hold the key to enter the setup menu
°C	Set the temperature
▲	Increase value or scroll up through a list of options
▼	Decrease value or scroll down through a list of options
Enter	Confirm the calibration or displayed option

Installing the Electrode Holder

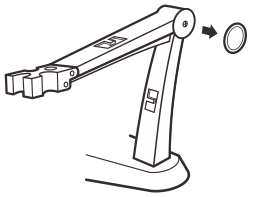
Take out the electrode arm from the accessory box. The base plate of electrode arm has a circular hole, the electrode arm has a connecting rod. Insert the connecting rod into the circular hole and swivel the electrode arm 90 degrees. The electrode holder is now ready to swing into desired position.



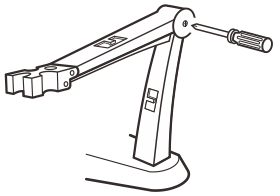
Adjusting the Electrode Arm

After installation, if the electrode arm automatically rises or falls, you are able to adjust the screw until arm locate at any position.

1. Remove the plastic cover from the right side of the electrode arm.



2. Use the screwdriver to tighten the screw moderately.

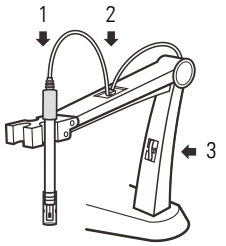


3. Insert the plastic cover to previous position.

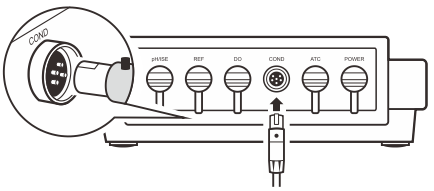
Connection

Connecting the Conductivity Electrode

1.1 Take out the electrode from packaging. Follow the steps below to place electrode into the left or right side of the electrode arm.



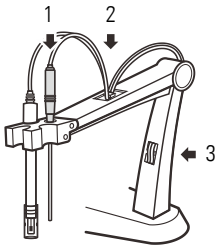
1.2 Insert 6-pin connector into the connector socket labeled COND. Ensure the connector is fully seated.



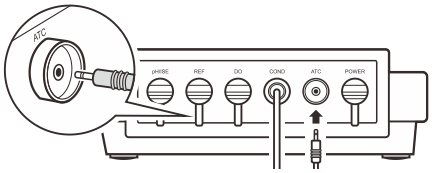
1.3 After the connection is completed, DO NOT pull on the cable. Always make sure that the connector is clean and dry.

Connecting the Temperature Probe

2.1 Place the temperature probe into the circular hole located at the center of the electrode arm.

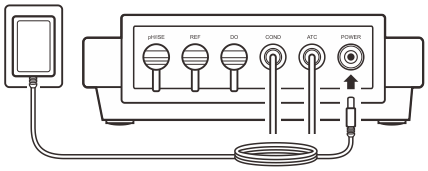


2.2 Insert the jack plug to the connector socket labeled ATC. Ensure the connector is fully seated.



Connecting the Power Adapter

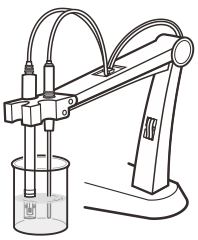
3.1 Insert the connector of power adapter to the power socket.
3.2 Plug the DC 9V power adapter into the wall outlet.



Prior to Use

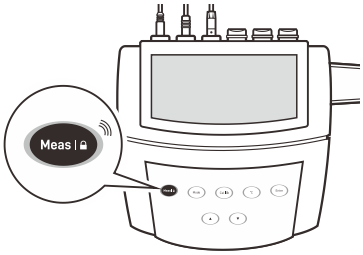
Soak the conductivity electrode for about 10 minutes in tap water to remove dirt and oil stains on the sensor surface.

10 minutes



Switching the Meter On and Off

- Press the **Meas** key for about 3 seconds and release to switch on the meter.
- Press and hold the **Meas** key to switch off the meter.



Meter Setup

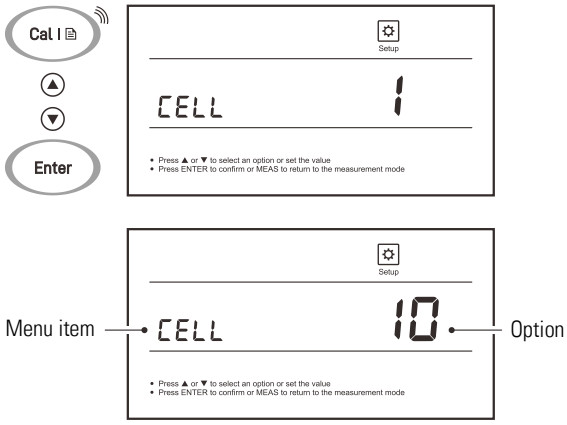
The 510 meter contains an integrated setup menu for customizing the displayed option to meet measurement requirements. The following table describes the functions of each menu item.

Menu Item	Option and Description	
CELL	**Cell Constant** Set the cell constant to match connected conductivity electrode.	
	0.1	K = 0.1
	1	K = 1 (default)
	10	K = 10
	USEr	Custom
CAL	**Calibration Points** Set the number of calibration points.	
	1	1 point (default)
	2	2 points
	3	3 points
COE	**Temperature Coefficient** Set the temperature coefficient for linear temperature compensation.	
	2.1	0.0 to 9.9%/°C (default 2.1)
tdS	**TDS Factor** Set the default TDS conversion factor.	
	0.5	0.1 to 1.0 (default 0.5)

UNIt	**Measurement Unit** Set the default temperature unit.	
	°C	Degrees Celsius (default)
	°F	Degrees Fahrenheit
HOLd	**Auto-Hold** If enabled, the meter will automatically sense and lock the measurement endpoint.	
	YES	Enable
	nO	Disable (default)
OFF	**Auto-Power Off** If enabled, the meter will automatically switch off if no key is pressed within 3 hours.	
	YES	Enable
	nO	Disable (default)
rSt	**Factory Reset** Reset the meter to factory default settings. Note, the meter must be recalibrated.	
	YES	Enable
	nO	Disable (default)

Setting the Default Option

1. In the measurement mode, press and hold the 🗎 key to enter the setup menu.
2. Press the ▲ / ▼ key to select an option, press the **Enter** key to confirm and switch to the next menu item.
3. Repeat the steps above until the meter returns to the measurement mode.



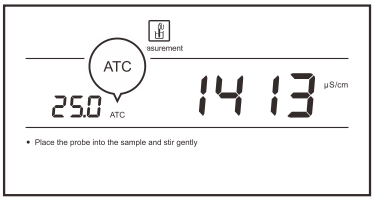
ⓘ To exit the setup menu without saving changes, press the **Meas** key.

Temperature Compensation

The temperature compensation has a large effect on the conductivity measurement. If enabled, the meter will use the measured conductivity and temperature readings to calculate the results and automatically compensate to the selected reference temperature. If the temperature coefficient is set to 0, the temperature compensation will be disabled and the meter only shows the actual conductivity at the measured temperature.

Automatic Temperature Compensation

Connect the temperature probe to meter, the ATC icon appears on the display, the meter is now switched to the automatic temperature compensation mode.



ⓘ Refer to the ***Connecting the Temperature Probe*** section on page 3.

Manual Temperature Compensation

If the meter does not detect a temperature probe, the degrees Celsius icon (°C) will show on the display indicating the meter is switched to the manual temperature compensation mode. To set the temperature value follow the steps below.

1. Press the **°C** key to enter the temperature setting.
2. Press the ▲ / ▼ key to modify the temperature value.
3. Press the **Enter** key to save.

ⓘ Press and hold the ▲ / ▼ key will make the value change faster.

Selecting a Conductivity Electrode

The 510 meter is capable of using three types of the conductivity electrodes. Before the calibration and measurement, ensure that you have selected a suitable electrode according to the anticipated sample conductivity. The following table lists the selectable electrode and its effective measurement ranges.

Electrode	Measurement Range	Cell Constant
CON-0.1	0.5 to 100 µS/cm	K = 0.1
CON-1	10 µS/cm to 20 mS/cm	K = 1
CON-10	100 µS/cm to 200 mS/cm	K = 10

Conductivity Calibration

Automatic Calibration

The 510 meter allows 1 to 3 points conductivity calibration. Before calibration, ensure that selected cell constant (K=0.1, 1, 10) matches connected electrode. If you have selected the manual calibration (USEr), the meter will wait to enter a cell constant.

For better accuracy, we recommend to perform 3 points calibration or select a standard solution closest to the sample conductivity you are measuring. The meter will automatically detect the standard solution and prompt the user to perform the calibration. The following table shows the default standard solution for each measurement range.

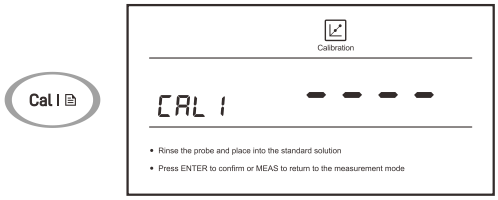
Measurement Range	Default Standard Solution
0 to 20 µS/cm	10 µS/cm
20 to 200 µS/cm	84 µS/cm
200 to 2000 µS/cm	1413 µS/cm
2 to 20 mS/cm	12.88 mS/cm
20 to 200 mS/cm	111.8 mS/cm

If you have changed the conductivity electrode, the meter must be recalibrated. Every electrode has a different cell constant.

Single Point Calibration

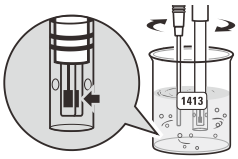
Ensure that you have selected 1 point calibration in the setup menu.

1.1 Press the **Cal** key, the display shows CAL1/----, the meter waits for recognizing the standard solution.



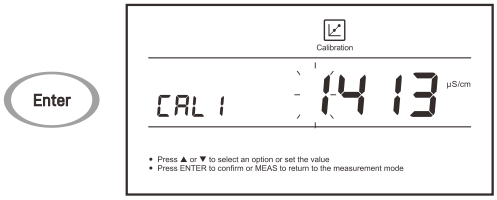
1.2 Rinse the conductivity electrode with distilled water, then rinse with a small amount of standard solution.

1.3 Place the electrode (and temperature probe) into the standard solution, stir gently to remove air bubbles trapped in the slot of the sensor.



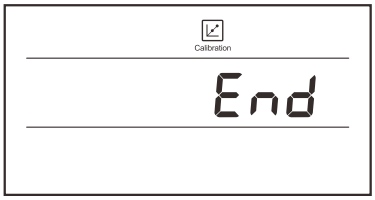
The meter will automatically show the calibration standard (e.g., 1413 µS/cm).

1.4 Press the **Enter** key, the default calibration value begins flashing.



1.5 If necessary, press the ▲ / ▼ key to modify the calibration value, press the **Enter** key to confirm and move to the next digit. When the setting is completed, make sure that the displayed value matches the calibration standard.

1.6 Press the **Enter** key, the Calibration icon begins flashing. When the reading has stabilized, the meter will show End and return to the measurement mode.



Multipoint Calibration

Ensure that you have selected 2 or 3 points calibration in the setup menu.

2.1 When the first calibration point is completed, the display will show CAL2/----. The meter prompts you to continue with second point calibration.

2.2 Repeat steps 1.2 through 1.6 above until the meter shows End. Calibration is completed.

Manual Calibration

The 510 meter provides an easy manual calibration mode. If the conductivity standard solution is not ready, you are able to use this method to calibrate the meter.

3.1 Press and hold the ⊜ key to enter the setup menu.

3.2 Press the ▲ / ▼ key until the display shows USEr/CELL.

3.3 Press the **Enter** key, the default value begins flashing.

3.4 Press the ▲ / ▼ key to set the cell constant, press the **Enter** key to confirm until the setting values stop flashing.

3.5 Press the **Meas** key to return to the measurement mode.

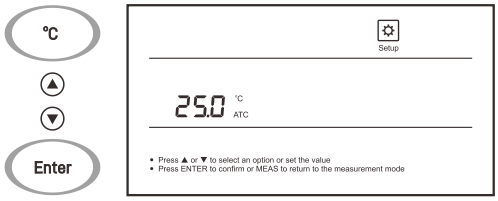
ⓘ

- Performing the conductivity calibration will simultaneously calibrate the corresponding TDS value.
- To exit the calibration without saving changes, press the **Meas** key.

Temperature Calibration

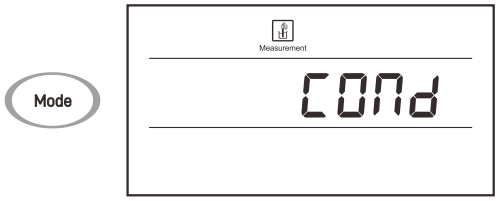
The 510 meter is supplied with a temperature probe for measurement and temperature compensation. If the measured temperature reading differs from that of an accurate thermometer, the probe needs to be calibrated.

1. Connect the temperature probe to the meter and place into a solution with a known accurate temperature.
2. Press the **°C** key to enter the temperature setting.
3. Press the ▲ / ▼ key to modify the temperature value.
4. Press the **Enter** key to save.



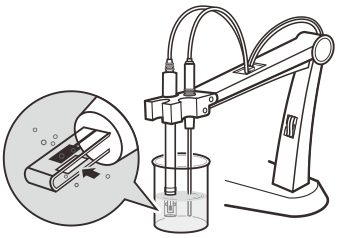
Measurement

1. Press the **Mode** key, the display shows COnd (conductivity), tdS (TDS) and automatically switch to the corresponding measurement mode.

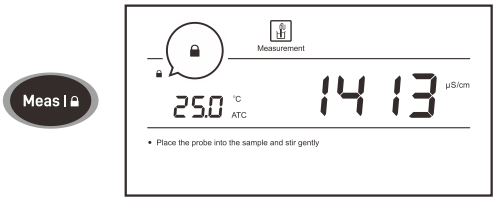


If the TDS (total dissolved solids) mode is selected, ensure that you have set a correct conductivity-to-TDS conversion factor in the setup menu (default 0.5).

2. Rinse the conductivity electrode with distilled water. Place the electrode (and temperature probe) into the sample solution and stir gently. Ensure that no air bubbles on the sensor surface.



3. If the Auto-Hold option in the setup menu is enabled, the meter will automatically sense a stable reading and lock measurement, the 🔒 icon appears on the display. Press the **Meas** key to resume measuring.
   If the option is disabled, the meter will continuously measure and update the readings.

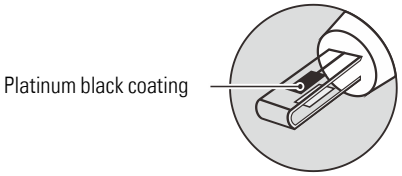


4. Wait for the measurement to stabilize and record the reading.
5. When all of the samples have been measured, rinse the electrode with distilled water.

If the meter shows ---- indicating the measurement exceeds the range, replace a conductivity electrode that is appropriate for the conductivity range of the sample solution you are measuring.

Electrode Maintenance

- Rinse the conductivity electrode thoroughly with distilled water after use.
- Do not touch the platinum black coating on the sensor surface and always keep it clean.



- If there is a build-up of solids inside the sensor, remove carefully, then recalibrate the electrode.
- If you do not use the electrode for long periods, wipe clean with a lint-free tissue and store the electrode in a dry and cool area.
- If your electrode is model CON-10, store the electrode with tap water. This sensor needs to be kept wet always.

Appendix

Preparation of Conductivity Standard Solutions

1. Place the analytical grade potassium chloride (KCl) in a beaker and dry in an oven for about 3 hours at 105°C (221°F), then cool to room temperature.
2. Add the reagent to a 1 liter volumetric flask according to the instructions in table below.

Conductivity Standard	Reagent	Weight
84 µS/cm	KCl	42.35 mg
1413 µS/cm	KCl	745.5 mg
12.88 mS/cm	KCl	7.45 g
111.8 mS/cm	KCl	74.5 g

3. Fill the distilled water to the mark, mix the solution until the reagent is completely dissolved.

Calculating the Cell Constant

1. Refer to the ***Manual Calibration*** section to set the cell constant to 1.00.
2. Place the electrode into a standard solution and record the reading.
3. Calculate the cell constant using the following formula.

$$K = \frac{C_{std}}{C_{meas}} \times G$$

Where:
K = Cell constant
C_{std} = Value of conductivity standard solution
C_{meas} = Measured value
G = Raw cell constant (0.1, 1 or 10)

Calculating the Temperature Coefficient

1. Do not connect the temperature probe to the meter.
2. Press and hold the **°C** key to enter the temperature setting.
3. Press the ▲ / ▼ key to set the temperature to 25°C and press the **Enter** key to confirm.
4. Place the conductivity electrode into the sample solution, record the temperature value T_A and conductivity value C_{TA}.
5. Condition the sample solution and electrode to a temperature T_B that is about 5 to 10°C different from T_A. Record the conductivity value C_{TB}.
6. Calculate the temperature coefficient using the formula below.

$$T_C = \frac{C_{TB} - C_{TA}}{C_{TA}(T_B - 25) - C_{TB}(T_A - 25)}$$

Where:
T_C = Temperature coefficient
C_{TA} = Conductivity at temperature A
C_{TB} = Conductivity at temperature B
T_A = Temperature A
T_B = Temperature B

Calculating the TDS Conversion Factor

To determine the TDS factor of sample solution use the formula below.

$$\text{Factor} = \frac{\text{Actual TDS}}{\text{Actual Conductivity @25°C}}$$

For example:
Dissolve 64 grams of the potassium chloride (KCl) reagent in 1 liter distilled water. If measured conductivity is 100 mS/cm, then TDS factor is 0.64.

Conductivity to TDS Conversion Factors

Conductivity at 25°C	TDS (KCl)		TDS (NaCl)	
	ppm	Factor	ppm	Factor
84 µS/cm	40.38	0.5	38.04	0.4
1413 µS/cm	744.7	0.5	702.1	0.5
12.88 mS/cm	7447	0.5	7230	0.5

Optional Accessories

Conductivity Electrodes

Order Code	Description
CON-0.1	For measuring low conductivity liquids / pure water
CON-1	For general purpose applications
CON-10	For measuring high conductivity liquids / wastewater

Conductivity Flow Cell

Order Code	Description
CON-FC	Compatible with the CON-0.1 conductivity electrode for measuring pure and ultrapure water below 10 µS/cm

Temperature Probe

Order Code	Description
TP-10K	Range: 0 to 100°C (32 to 221°F), 1 m (3.3 ft.) cable

Solutions

Order Code	Description
ECCS-84	Conductivity standard solution 84 µS/cm, 480 ml
ECCS-1413	Conductivity standard solution 1413 µS/cm, 480 ml
ECCS-1288	Conductivity standard solution 12.88 mS/cm, 480 ml
ECCS-1118	Conductivity standard solution 111.8 mS/cm, 480 ml

Power Supply

Order Code	Description
DCPA-9V	DC 9V power adapter, european standard plug

Meter Specifications

Model	Bante 510
Conductivity	
Range	0.01 µS/cm to 200.0 mS/cm
Resolution	0.001, 0.01, 0.1, 1
Accuracy	±1% F.S.
Calibration Points	1 to 3 points
Calibration Solutions	10 µS/cm, 84 µS/cm, 1413 µS/cm, 12.88 mS/cm, 111.8 mS/cm
Temperature Compensation	0 to 100°C (32 to 212°F), manual or automatic
Temperature Coefficient	0.0 to 9.9%/°C
Reference Temperature	25°C
Cell Constant	K = 0.1, 1, 10 or custom
TDS	
Range	0.00 to 200.0 ppt
Resolution	0.01, 0.1, 1
Accuracy	±1% F.S.
TDS Factor	0.1 to 1.0 (default 0.5)
Temperature	
Range	0 to 105°C (32 to 221°F)
Resolution	0.1°C (0.1°F)
Accuracy	±1°C (±1.8°F)
Calibration Point	1 point
Other Specifications	
Operating Temperature	0 to 50°C (32 to 122°F)
Storage Temperature	0 to 60°C (32 to 140°F)
Relative Humidity	< 80% (non-condensing)
Display	LCD, 135 × 75 mm (5.3 × 2.9 in.)
Power Requirements	DC 9V/400mA power adapter
Auto-Off	3 hours after last key pressed
Dimensions	210 (L) × 205 (W) × 75 (H) mm, (8.2 × 8.0 × 2.9 in.)
Weight	1.5 kg (3.3 lb)

Troubleshooting

Fault	Cause and Corrective Action
Screen shows - - - -	Electrode dried out. Soak the conductivity electrode in tap water for about 10 minutes.
	Measurement exceeded the maximum range. Check the electrode and sample.
Drifting erratic readings	Check whether electrode is contaminated, clogged or broken.
Screen shows Err	Setting value does not match calibration solution. Reset the calibration value or check the calibration solution.
	Electrode is broken. Replace the conductivity electrode.

Disposal

This product is required to comply with the European Union's Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC and may not be disposed of in domestic waste. Please dispose of product in accordance with local regulations at the collecting point specified for electrical and electronic equipment.

Warranty

The warranty period for meter is one year from the date of shipment. Above warranty does not cover the electrode and standard solutions. Out of warranty products will be repaired on a charged basis.

The warranty on your meter shall not apply to defects resulting from:

- Improper or inadequate maintenance by customer
- Unauthorized modification or misuse
- Operation outside of the environment specifications of the products

For more information, please contact the supplier.

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