

S series Bluetooth pH/ORP/Ion/Conductivity/DO Tester

Instruction Manual

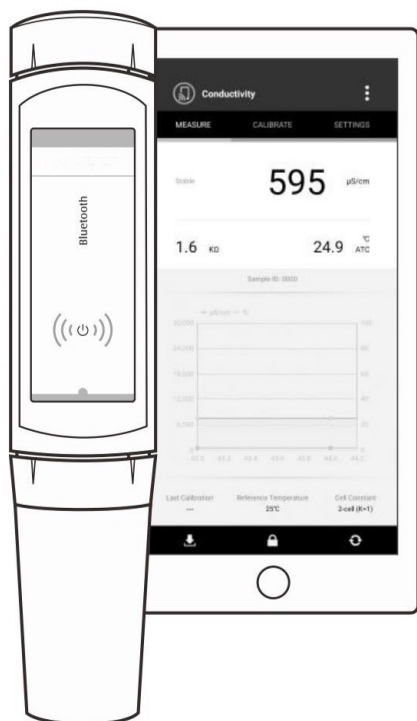


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Overview

This section is applicable to all models of the S series testers

Tester Overview

Thank you for selecting the S series bluetooth water quality tester, this product series includes 6 models.

Model	Measurement Parameters	Sensor ID
S10	pH	PH *****
S20	ORP (mV, relative mV)	POI *****
S30	Ion concentration	ION *****
S40	Water hardness	ION *****
S50	Conductivity, TDS, salinity, resistivity, conductivity ash	EC *****
S60	Dissolved oxygen, BOD, OUR, SOUR	DO *****

This manual provides a step-by-step guide to help you operate the tester and app, please carefully read the following instruction according to the model you have purchased.

Environmental Conditions

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

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

Packing List

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

Model	Components
S10	Tester, pH buffer solutions (4.01, 7.00, 10.01)
S20	Tester, solution storage bottles
S30	Tester, ion selective electrode, standard solutions (100, 1000 ppm), ionic strength adjuster
S40	Tester, water hardness electrode, standard solutions (10, 100 mmol/L), ionic strength adjuster
S50-M	Tester, conductivity standard solutions (84 µS/cm, 1413 µS/cm, 12.88 mS/cm)
S50-H	Tester, conductivity standard solutions (1413 µS/cm, 12.88 mS/cm, 111.8 mS/cm)
S60	Tester, dissolved oxygen electrode, electrolyte solution, membrane cap



i S30-Cn and S30-S ion testers do not provide above solutions.

Installing the Batteries

1. Take out the tester from carrying case. Twist the electrode collar counter clockwise, pull the electrode (or connector) away from the tester.
2. Insert the two AAA batteries into the battery compartment, note polarity.
3. Push the electrode (or connector) into the tester and twist the electrode collar clockwise until tight.



Switching the Tester On and Off

- Press the  key to switch on the tester.
- Press the  key again to switch off the tester.

BanteLab App



Download the Software

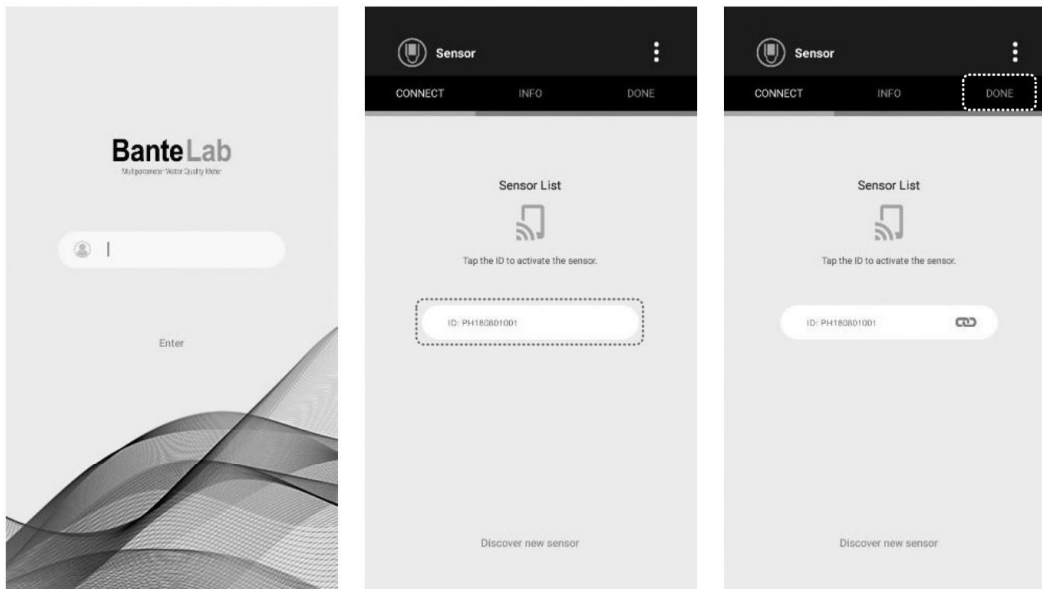
Bante Instruments provides a powerful app that is used for receiving the data from S series testers. You are able to download this software from our official website at www.bante-china.com or scan the QR code below. Before installation, make sure that you have Android smartphone or tablet and this device with Bluetooth 4.0 or newer.



Android

Connecting the Tester



1. Tap the BanteLab icon, the application starts.
2. If you want to print the data with an operator ID, tap and enter the username in the text field .
3. Tap the **Enter**, the app begins searching for connectable testers, the screen shows a sensor list.
4. Tap the **ID** and wait until the connection icon  appears.
5. Tap the **Done** to enter to the measurement screen.

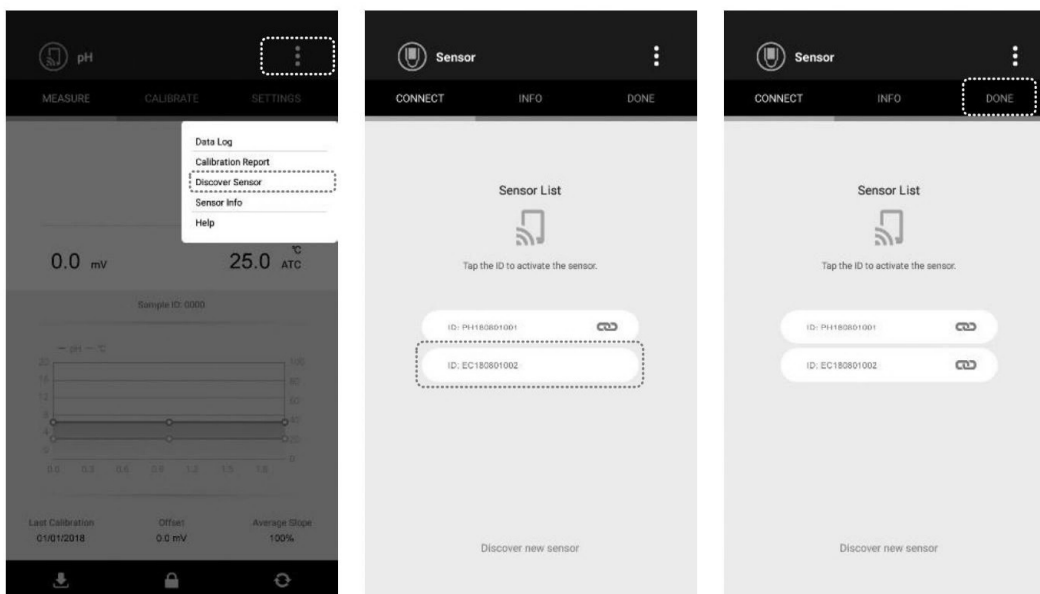


- The BanteLab app is capable of connecting up to 3 testers for multiparameter measurement. If the  icon does not appear during the connection, please do not tap the ID again.
- If the screen shows "The sensor has been connected", but the  icon does not appear for a long time. Please switch off the tester and wait for 10 seconds, then switch on the tester again. If necessary, restart the app.
- If the tester has switched off, but the ID still shows on the screen. Restart the app, the screen will refresh the sensor list.

Connecting Multiple Testers

During the measurement, if you want to connect multiple testers to app, please follow the steps below.

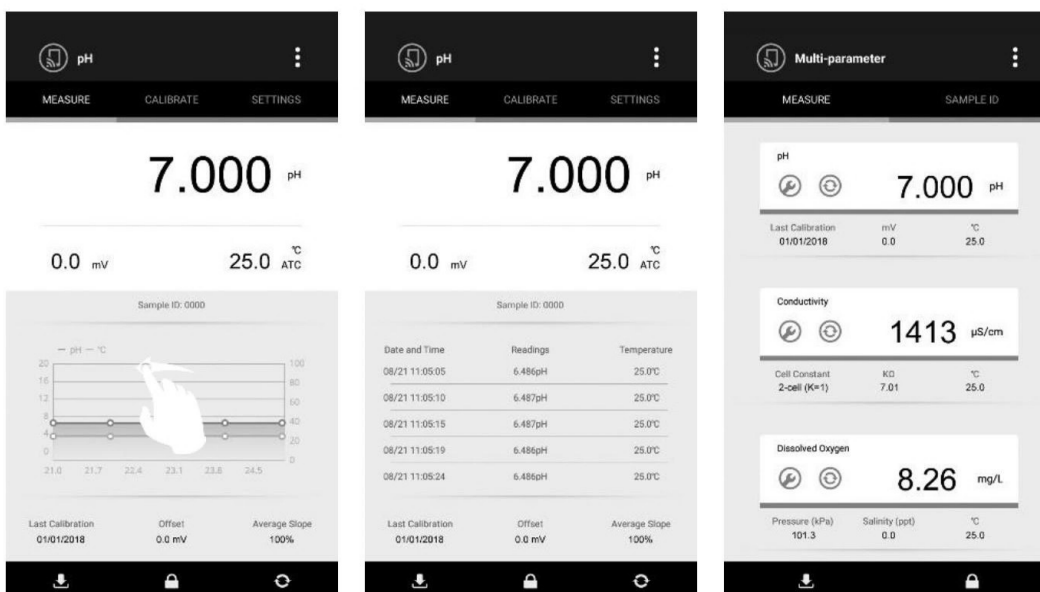
1. Tap the .
2. Tap the **Discover Sensor**.
3. Tap the **ID** and wait until the  icon appears.
4. Tap the **Done** to return to the measurement screen.









 Note: The pH, ORP, ion and water hardness testers can not connect to app simultaneously.

Switching the Measurement Screen

The BanteLab app contains two measurement screens in the single parameter measurement mode. The default is graph. Swipe the graphics area, the data table will show on the screen. If 2 or 3 testers have connected to app, the screen will automatically switch to the multiparameter measurement mode.



Function Keys

Icon	Function
	Store current reading to memory or send the data to printer (depending on the Data Transfer setting in setup menu)
	Lock or unlock the measurement
	Select the measurement mode
	Return to the single parameter measurement mode
	Switch the displayed parameter
	Return to the previous screen

General Settings

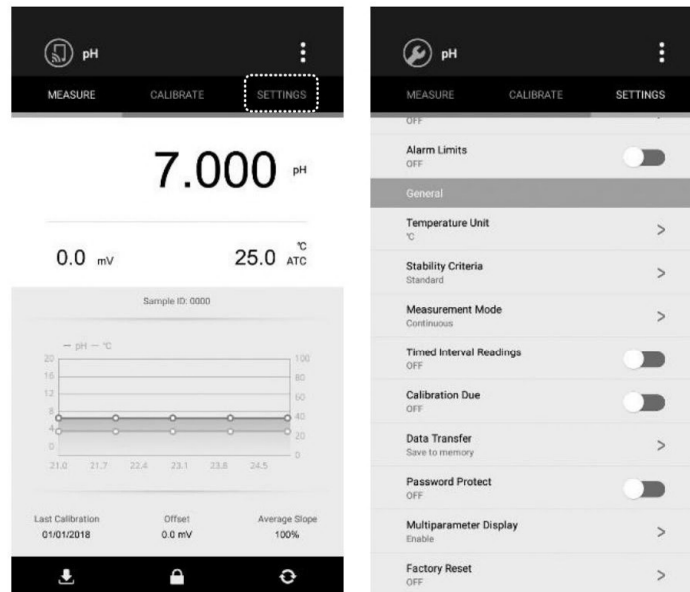
The BanteLab app contains an integrated setup menu that is used to customize the tester parameters. In the different modes, the screen will show the corresponding menu items. For the general settings, the option will be applied to all testers once setting is changed.

Menu	Options	Description	Default
Temperature Unit	°C	Set the default temperature unit.	°C
	°F		
Stability Criteria	Fast	Set when a measurement is recognized as stable. <ul style="list-style-type: none"> When the Fast option is selected, the screen will show Stable icon quickly, but the repeatability is not good. When the Slow option is selected, the icon will take longer to appear, but guarantees high accuracy of the measurement. When the Standard option is selected, the app will balance the response speed and accuracy. 	Standard
	Standard		
	Slow		
Measurement Mode	Auto-Read	Set the measurement read type. <ul style="list-style-type: none"> When the Auto-Read is selected, the app will automatically sense a stable reading and lock the measurement, the HOLD icon appears on the screen. When the Continuous read is selected, the reading will continuously update. 	Continuous
	Continuous		
Timed Interval Readings	10/30/60/300 seconds	Set the time interval for sending reading to memory or printer.	Off
	Off		
Calibration Due	1 to 99 days	Set the calibration interval to activate alarm. If the tester is not calibrated within a specified time period, the screen will show a reminder.	Off
	Off		
Data Transfer	Save to memory	Set the data transfer type.	Memory
	Send to printer		
Password Protect	Enable	Set the password protection for preventing the unauthorized calibration and settings. If enabled, the user must enter a 6-digit password to access above modes.	Disable
	Disable		
Multiparameter Display	Enable	If the multiple testers have connected to app, tap this option to return to the multiparameter measurement screen.	---
Factory Reset	Enable	Reset the tester to factory default settings. Note that the tester must be recalibrated.	Disable
	Disable		

Setting the Default Option

Single Parameter Measurement Mode:

- 1.1 Tap the **Settings** and select an option.
- 1.2 Tap the **Measure** to return to the measurement screen.

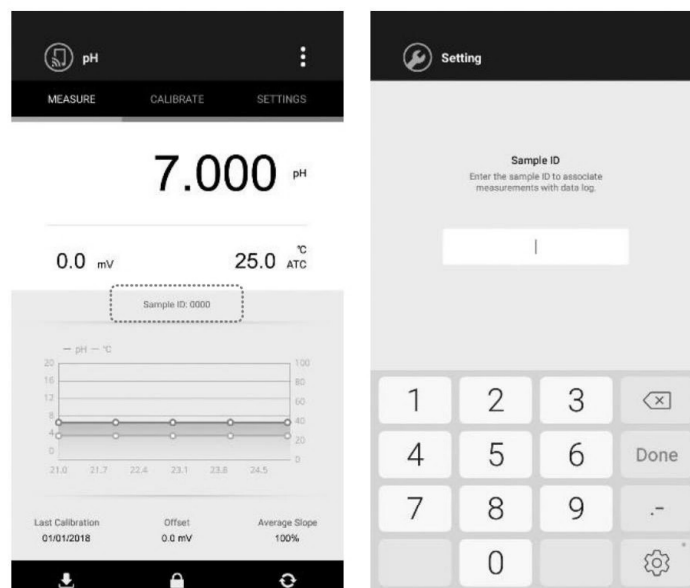


Multiparameter Measurement Mode:

- 2.1 Tap the  to enter to the single parameter measurement mode.
- 2.2 Tap the **Settings** and select an option.
- 2.3 Tap the **Multiparameter Display** to return to the measurement screen.


Setting the Sample ID

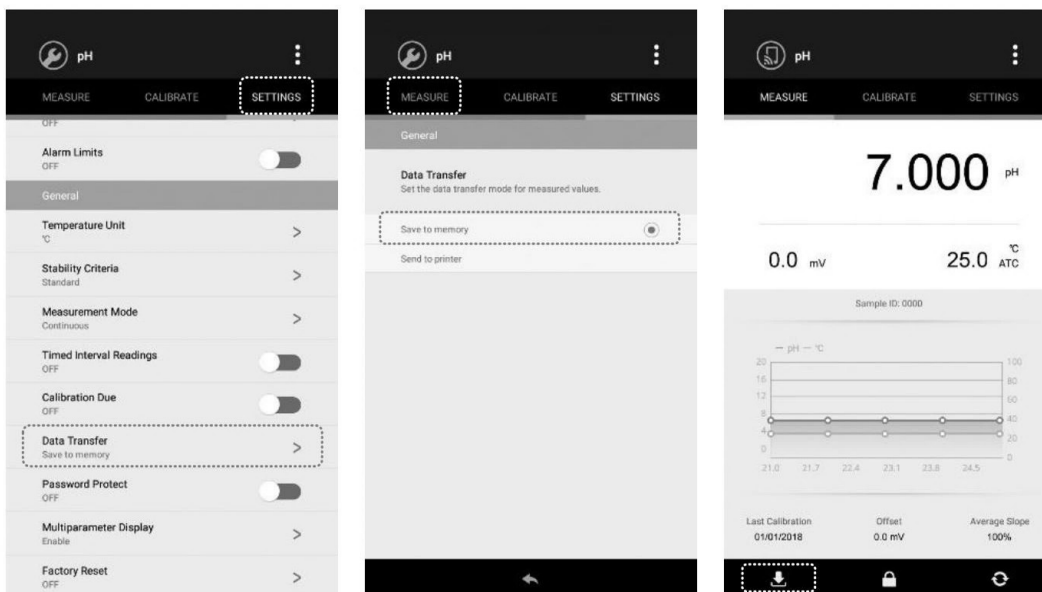
1. Tap the **Sample ID** on the measurement screen.
2. Tap the numeric keypad to enter the 4-digit number.
3. Tap the **Done** to return to the measurement screen.




Storing the Measurement Data

The BanteLab app is capable of storing the data with time and date stamps in the memory.


1. Make sure that the Data Transfer option in setup menu is switched to "Save to memory".
2. Tap the , the screen will show "Measured value has stored into memory".



Viewing the Data Log

1. Tap the .
2. Tap the **Data Log**.

Deleting the Data Log


- Delete single data: Tap and hold the data bar, the screen shows "This log will be delete". Tap the **Yes** to confirm.
- Delete all of data: Tap the , the screen shows "Are you sure you want to delete all logs?" Tap the **Yes** to confirm.

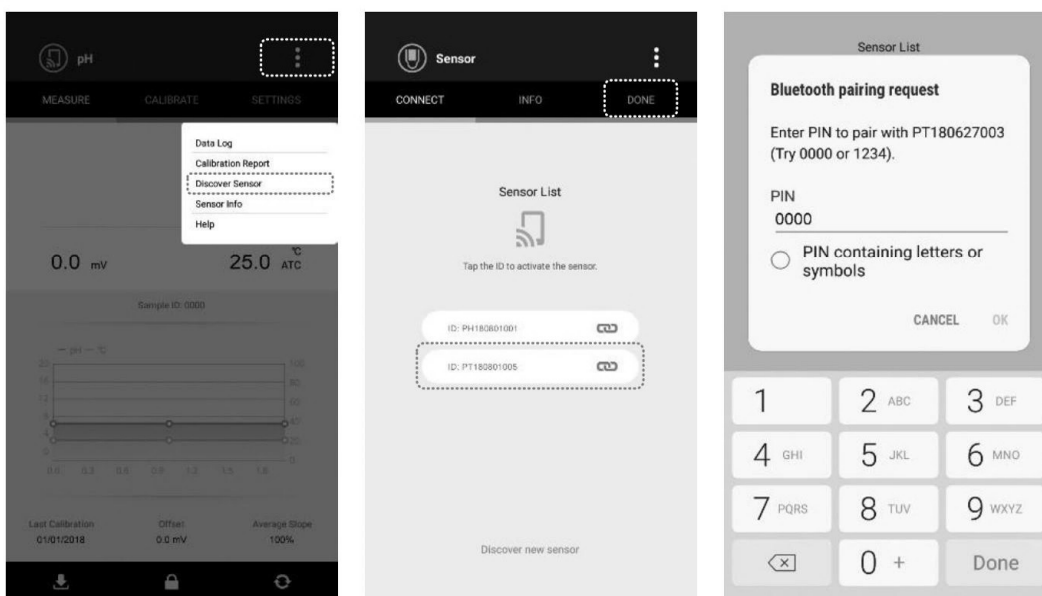
 Note: Deleted data can not be restored.




Connecting the Printer

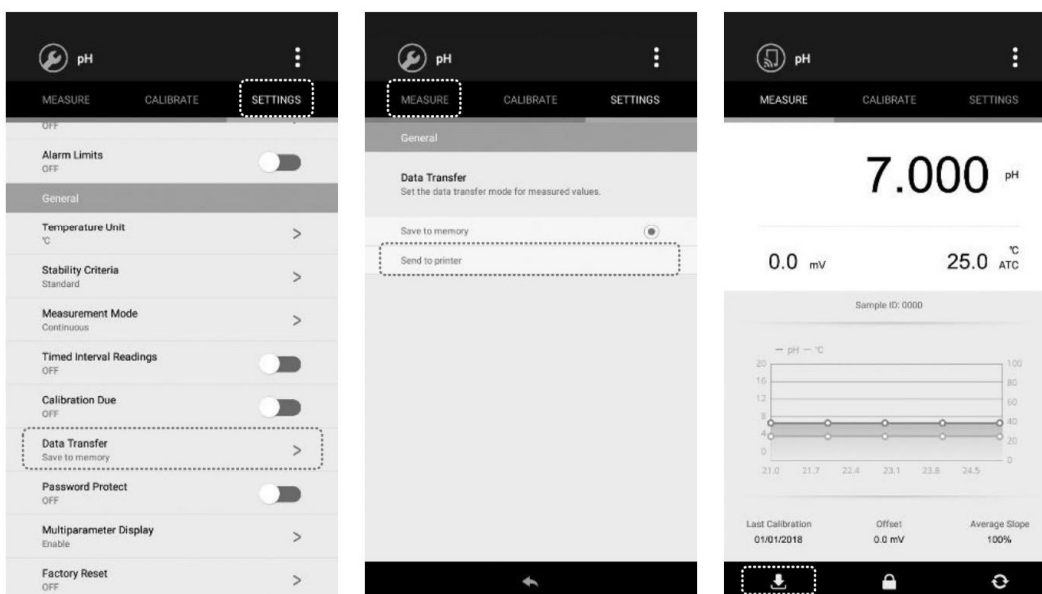
Bante Instruments provides a model ZJ5890C bluetooth printer for printing the measurement data (sold separately).

1. Switch on the printer.
2. Tap the .
3. Tap the **Discover Sensor**.
4. Tap the **ID: PT ******* and wait until the  icon appears.
5. Tap the **Done**, the screen shows "Bluetooth pairing request" and waits for entering the PIN code.
6. Enter the **0000** and confirm, the printer will automatically print the "Printer is ready".



Printing the Measurement Data

1. Make sure that the Data Transfer option in setup menu is switched to "Send to printer".
2. Tap the  to print the displayed reading.

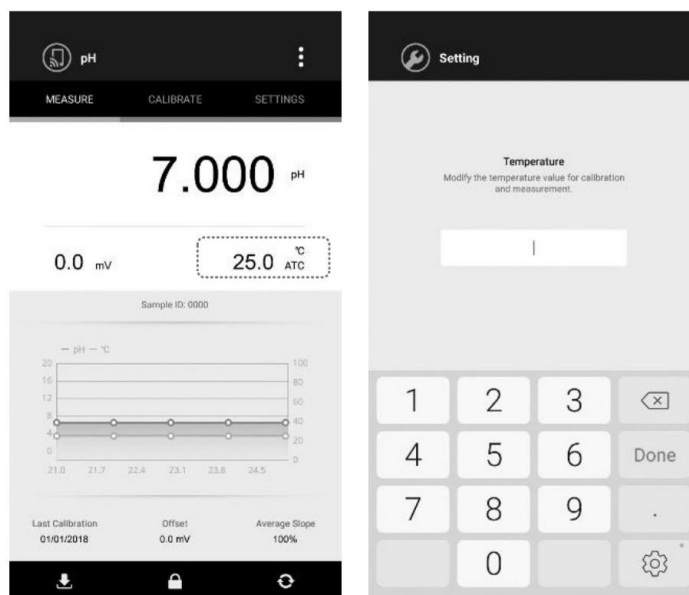


 If you need to print all of the stored readings, tap the , tap the **Data Log**, tap the .

Temperature Calibration

The BanteLab app allows 1 point temperature calibration. If the measured temperature reading differs from that of an accurate thermometer, we recommend calibrating the tester.

1. Place the tester into a solution with a known accurate temperature.
2. Tap the temperature reading on the measurement screen.
3. Tap the numeric keypad to modify the temperature.
4. Tap the **Done** and return to the measurement screen.



i If the entered value exceeds the allowable range, the app will automatically correct the temperature to 0°C or 105°C.

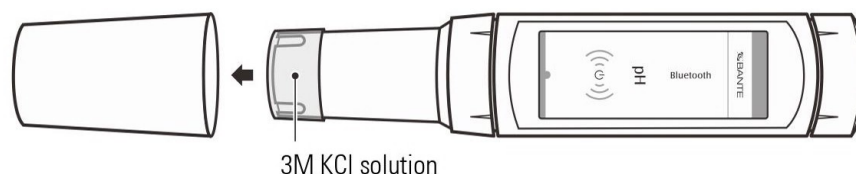
S10

pH Calibration and Measurement

This section is applicable to model S10 tester

Prior to Use

1. Remove the protective cap from the bottom of the tester. If some salt crystals deposited on the translucent cover, rinse with tap water to clean these deposits.
2. Remove the translucent cover. If tiny air bubbles are present inside the pH-sensitive glass membrane, gently shake the tester downward to remove air bubbles. If the glass membrane has dried out, soak the electrode in 3M KCl or pH 4.01 buffer solution for about 30 minutes.



pH Settings

The BanteLab app contains 5 measurement settings and 9 general settings in the setup menu.

Menu	Options	Description	Default
pH Buffer Group	USA	Set the pH buffer group for calibration and auto-Recognition.	USA
	NIST		
	DIN		
	Custom (any 2 to 5 values >1 pH apart)		
Calibration Points	1 to 5 points	Set the number of calibration points.	3 points
Resolution	0.001	Set the resolution of the pH measurement.	0.001
	0.01		
	0.1		
Solution Temperature Coefficient	High purity water	Solution temperature coefficient is used to correct the pure water sample with a conductivity of less than 30 $\mu\text{S}/\text{cm}$. If enabled, the readings will automatically reference to 25°C/77°F.	Off
	Sample contained the ammonia or phosphate		
	Off		
Alarm Limits	Enable	Set the high and low limit values to activate alarm.	Disable
	Disable		

To change the current settings, refer to the *Setting the Default Option* section on page 7.

pH Calibration

The S10 tester allows 1 to 5 points calibration in the pH mode. We recommend that you perform at least 2 points calibration for high accuracy measurement. The tester will automatically recognize and calibrate to following standard buffer values.

pH Buffer Group	Calibration Points
USA	pH 1.68, 4.01, 7.00, 10.01, 12.45
NIST	pH 1.68, 4.01, 6.86, 9.18, 12.45
DIN	pH 1.09, 4.65, 6.79, 9.23, 12.75

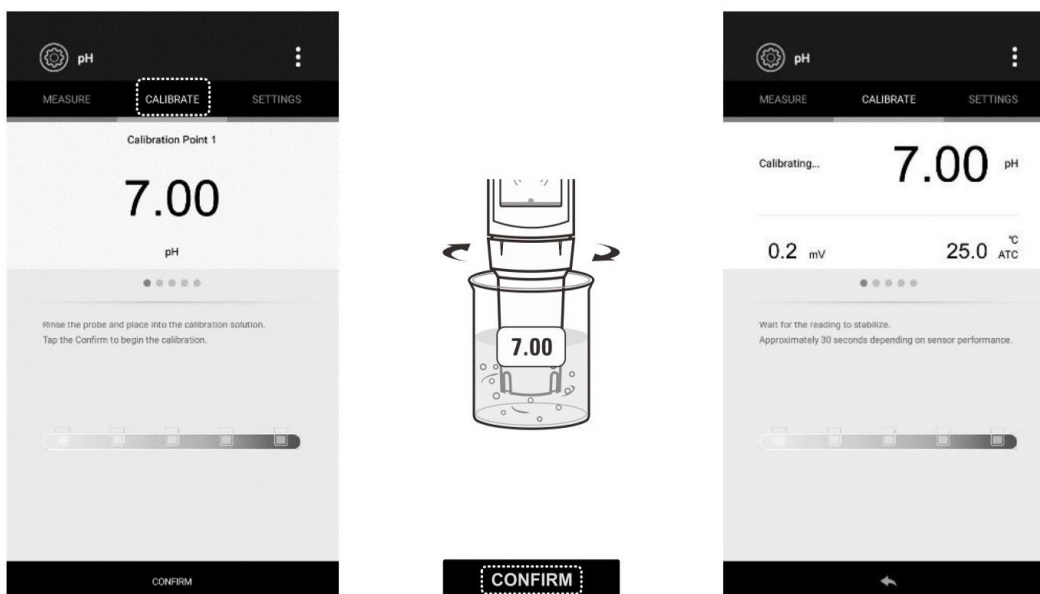
If the Custom option is selected, the tester will only allow 2 to 5 points calibration. Single point calibration should only be carried out with pH7.00, 6.86 or 6.79, otherwise calibration will not be accepted.

For better accuracy, we recommend calibrating the tester regularly. Do not reuse the buffer solutions after calibration, contaminants in solution will affect the calibration and eventually the accuracy of the measurement.

Single Point Calibration

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

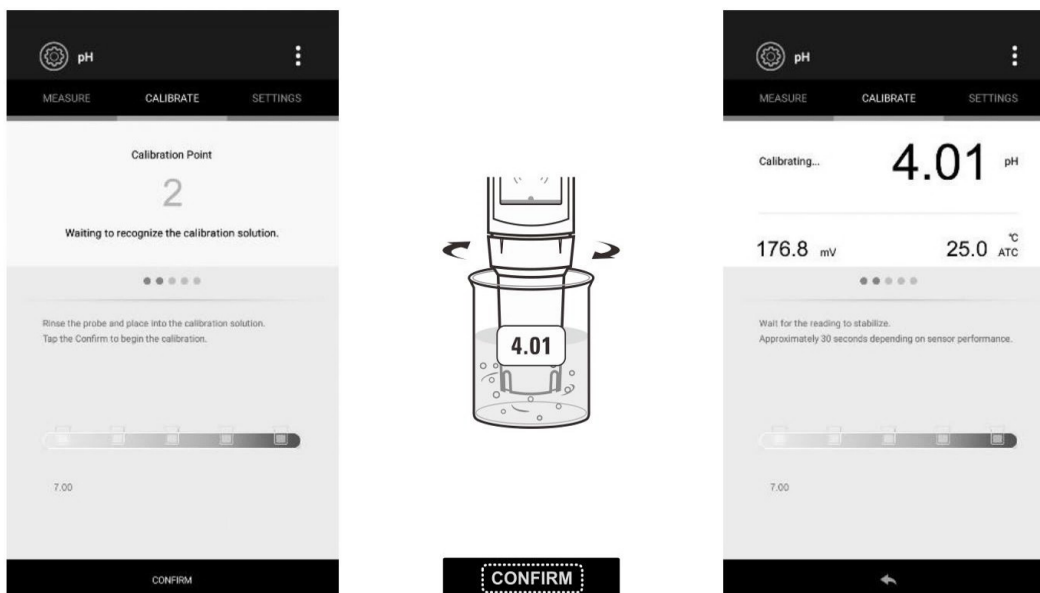
- 1.1 Tap the **Calibrate**, the screen shows "Calibration Point 1, 7.00" (or 6.86, or 6.79, depending on the selected pH buffer group).
- 1.2 Rinse the electrode with deionized water and place into the pH 7.00 buffer solution. Stir the tester gently to create a homogeneous solution.
- 1.3 Wait for 5 seconds, tap the **Confirm** to begin the calibration. When the reading has stabilized, the screen will show "Calibration is completed".



Multipoint Calibration

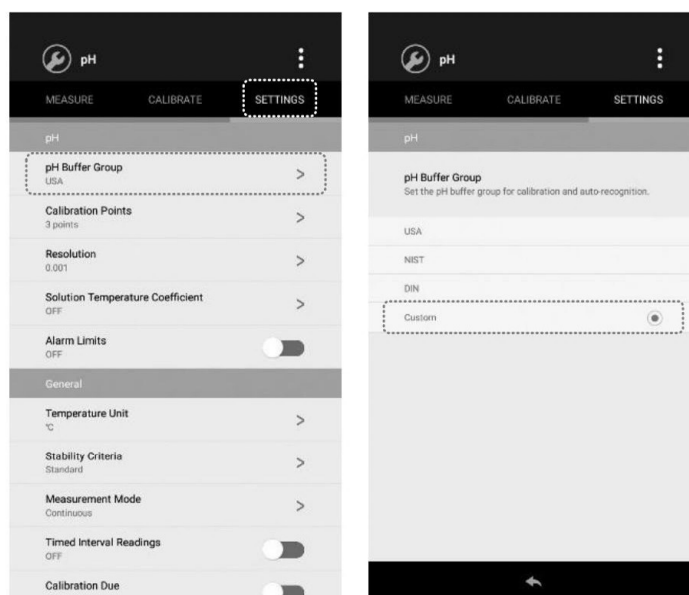
Make sure that you have selected 2 to 5 points calibration in the setup menu.

- 2.1 Repeat steps 1.1 through 1.3 above. When the first calibration point is completed, the screen will show "Calibration Point 2", the app prompts you to continue with second point calibration.
- 2.2 Rinse the electrode with deionized water and place into the next buffer solution (e.g., pH 4.01). Stir the tester gently.
- 2.3 Wait for 5 seconds, tap the **Confirm**, the tester automatically recognize the buffer solution and begin the calibration.
- 2.4 When the reading has stabilized, the screen will show "Calibration Point 3", the app prompts you to continue with third point calibration.
- 2.5 Repeat steps 2.2 and 2.3 above until the screen shows "Calibration is completed".



pH Calibration with Custom Buffers

Make sure that you have select the Custom option in the setup menu, the calibration solutions should be at least 1 pH unit apart from each other.



- 3.1 Rinse the electrode with deionized water, place the electrode into the solution, stir gently and wait until the measurement is stable.
- 3.2 Tap the **Calibrate**.
- 3.3 If necessary, tap the < or > to set the calibration value.
- 3.4 Wait for 5 seconds, tap the **Confirm** to begin the calibration.
- 3.5 When the reading has stabilized, the screen will show "Calibration Point 2", the app prompts you to continue with second point calibration.
- 3.6 Repeat steps 3.1 and 3.3 above until the screen shows "Calibration is completed".

Viewing the Calibration Log

- 4.1 Tap the **⋮**.
- 4.2 Tap the **Calibration Report**.



- If the custom buffers is used in the last pH calibration, the calibration report will not available.
- If the displayed pH slope is not within 70% to 110%, please check the electrode and make sure that the buffer solutions are fresh and uncontaminated. If the pH buffers are in the good condition, replace the electrode.

Measurement

pH Measurement

Rinse the electrode with deionized water. Place the electrode into the sample solution and stir gently. Note that the end of the electrode must be completely immersed into the solution. Wait for the measurement to stabilize and record the reading.



- During the measurement, never wipe the pH-sensitive glass membrane as this will cause static interference, blot dry with a lint-free tissue to remove waterdrops on electrode.
- If the Auto-Read option is enabled in the setup menu, the app will automatically lock a measurement endpoint and show HOLD icon. Tap the **🔒** to resume measuring.

mV Measurement

1. Tap the **🔄**.
2. Tap the **mV**, the screen shows millivolt readings.

Electrode Maintenance

- Since pH electrode is susceptible to contamination, thoroughly clean with deionized water as necessary after each use.
- If your samples contain the oil or grease, soak the electrode in mild detergent or electrode cleaning solution for at least 15 minutes.
- If you do not use the tester for long periods, store the electrode in 3M KCl solution or electrode storage solution.

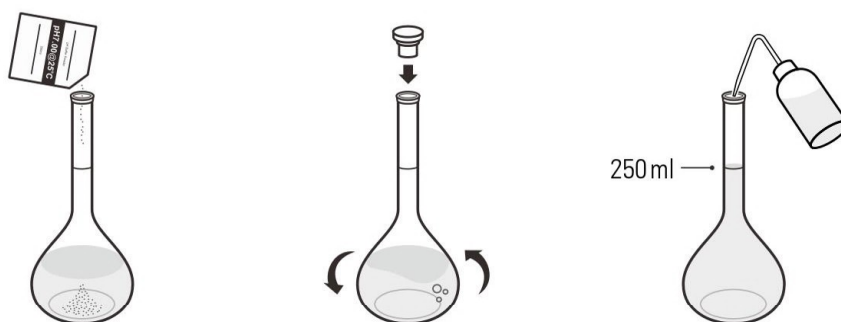
! DO NOT store the electrode in distilled or deionized water, which will deplete the hydration layer of the pH-sensitive glass membrane and render the electrode useless.

Appendix

Preparation of pH Buffer Solutions

The S10 tester is packaged with pH 4.01/7.00/10.01 buffer sachets required for calibration.

- Open the pH 7.00 buffer sachet, pour the reagent into a 250 ml volumetric flask. Fill the deionized water to the mark and mix the solution until the reagent is completely dissolved.
- Preparation of pH 4.01 and 10.01 buffer solutions are the same as above.
- Prepared standard buffer solutions should be stored in hermetically sealed glass containers and avoid direct sunlight.



Preparation of Electrode Storage Solution

Dissolve 24.6 grams of analytical grade KCl reagent in 100 ml deionized water. Add pH 4.01 standard buffer and adjust solution to pH 4.

Optional Accessories

Electrodes

Order Code	Description
E-S10-ST-10K	<ul style="list-style-type: none"> • Circular pH-sensitive membrane • For measuring the general water samples (non-viscous, non-corrosive liquids)
E-S10-FT-10K	<ul style="list-style-type: none"> • Flat surface pH-sensitive membrane • For measuring the semisolids, e.g., creams, meats, paper, etc.

Solutions

Order Code	Description
PHCS-USA	pH 4.01/7.00/10.01 buffer solutions, 480 ml
PHCS-OG	Electrode cleaning solution, removes oil and grease contaminants, 480 ml
PHCS-PR	Electrode cleaning solution, removes protein contamination, 480 ml
PHCS-ES	pH electrode storage solution, 480 ml

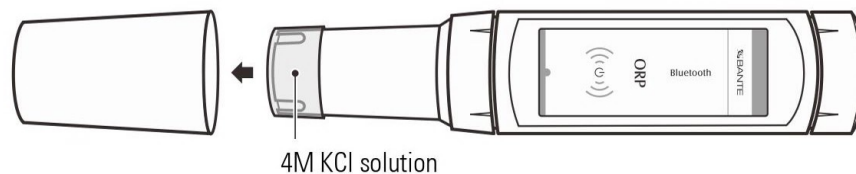
S20

ORP Calibration and **mV** Measurement

This section is applicable to model S20 tester

Prior to Use

1. Remove the protective cap and translucent cover from the bottom of the tester. If some salt crystals deposited on electrode, rinse with tap water to clean these deposits. If the platinum sensor has dried out, soak the electrode in 4M KCl solution for about 30 minutes.



2. Tap the  and select the **ORP** measurement mode.

ORP Settings

The BanteLab app contains 2 measurement settings and 9 general settings in the setup menu.

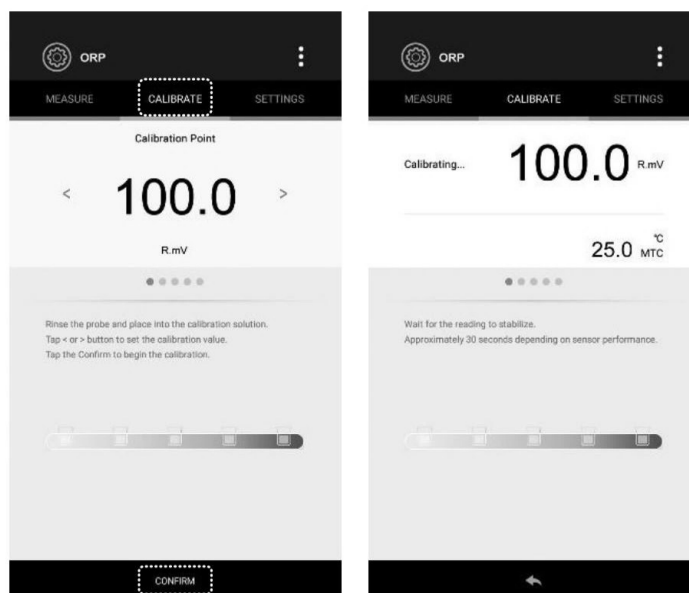
Menu	Options	Description	Default
Resolution	0.1	Set the resolution of the mV measurement.	0.1
	1		
Alarm Limits	Enable	Set the high and low limit values to activate alarm.	Disable
	Disable		

To change the current settings, refer to the *Setting the Default Option* section on page 7.


ORP Calibration

The S20 tester allows 1 point calibration in the ORP mode, but calibration is not necessary unless exact readout agreement with a work standard and at a specific ORP value is needed.

- 1.1 Rinse the electrode with deionized water and place into the standard solution. Stir tester gently and wait until the measurement is stable.
- 1.2 Tap the **Calibrate** and tap the < or > to set the calibration value.
- 1.3 Tap the **Confirm** to begin the calibration. When the reading has stabilized, the screen will show "Calibration is completed".





Viewing the Calibration Log


- 2.1 Tap the .
- 2.2 Tap the **Calibration Report**.

Measurement

The S20 tester contains two millivolt measurement modes.

- Raw millivolt (mV): Tap the  and tap the **mV** to enter the absolute millivolt measurement mode.
- Relative millivolt (R.mV): Tap the  and tap the **ORP** to enter the relative millivolt measurement mode.
- Select one of the above modes. Rinse the electrode with deionized water. Place the electrode into the sample solution and stir gently. Wait for the measurement to stabilize and record the reading.



- The platinum ORP electrode may give unstable readings in solutions that contain chromous, vanadous and titanous ions or other ions that are stronger reducing agents than hydrogen or platinum.
- If the Auto-Read option is enabled in the setup menu, the app will automatically lock a measurement endpoint and show HOLD icon. Tap the  to resume measuring.

Electrode Maintenance

- Rinse the electrode thoroughly with deionized water after use.
- In the corrosive chemicals, viscous solutions and solutions with heavy metals or proteins, take readings quickly and rinse electrode immediately.

Appendix

Preparation of ORP Standard Solutions

Quinhydrone solution A: Dissolve 3 grams of quinhydrone reagent in 500 ml of the pH 4.01 buffer solution, stir the solution for about 10 minutes. Undissolved quinhydrone reagent must be present. If necessary, add the reagent.

Quinhydrone solution B: Dissolve 3 grams of quinhydrone reagent in 500 ml of the pH 7.00 buffer solution, stir the solution for about 10 minutes. Undissolved quinhydrone reagent must be present. If necessary, add the reagent.

Temperature	Quinhydrone in pH 4.01 (± 10 mV)	Quinhydrone in pH 7.00 (± 10 mV)
20°C/68°F	268 mV	94 mV
25°C/77°F	263 mV	87 mV
30°C/86°F	260 mV	80 mV



Due to the quinhydrone solution is susceptible to air oxidation in storage, make sure to prepare the fresh solution before use.

Preparation of Electrode Storage Solution

Dissolve 29.82 grams of analytical grade KCl reagent in 100 ml deionized water. Add pH 4.01 standard buffer and adjust solution to pH 4.

Optional Accessories

Order Code	Description
E-S20-S	General purpose ORP electrode, platinum sheet. For measuring the general water samples.
PHCS-ES	Electrode storage solution, 480 ml

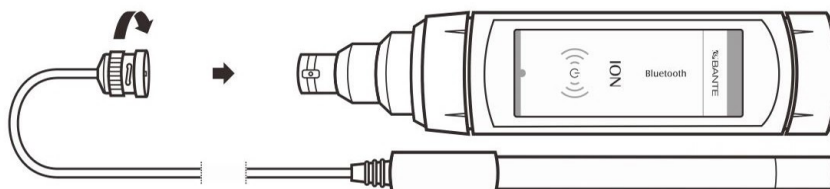
S30

Ion Calibration and Measurement

This section is applicable to model S30 tester

Prior to Use

1. Take out the ion selective electrode from the carrying case. Remove the protective cap and soak the electrode in 100 ppm standard solution for about 10 minutes.
2. Insert the BNC connector into the connector socket on tester, rotate and push the connector clockwise until it locks.



Ion Settings

The BanteLab app contains 5 measurement settings and 9 general settings in the setup menu.

Menu	Options	Description	Default
Electrode Type	1	Set the electrode type and storage location.	1
	2		
	3		
Measurement Mode	Direct Reading	Set the ion measurement method.	Direct Reading
	Known Addition		
	Known Subtraction		
	Sample Addition		
	Sample Subtraction		
Concentration Unit	ppm	Set the measurement unit. Note: The tester must be recalibrated if the concentration unit is changed from ppm (or mg/L) to mol/L (or mmol/L), the screen will always show "Could not find the electrode slope" and wait for calibration.	ppm
	mg/L		
	mol/L		
	mmol/L		
Calibration Points	2 to 5 points	Set the number of calibration points.	2 points
Alarm Limits	Enable	Set the high and low limit values to activate alarm.	Disable
	Disable		

To change the current settings, refer to the *Setting the Default Option* section on page 7.

Temperature Compensation

Due to the temperature difference between standard and sample solutions will cause approximately 2% measurement error for every degree centigrade of temperature change, we recommend to enable the temperature compensation during the calibration and measurement.

1. Use an accurate thermometer to measure the solution.
2. Tap the temperature reading on the measurement screen.
3. Tap the numeric keypad to enter the temperature.
4. Tap the **Done** to return to the measurement screen.

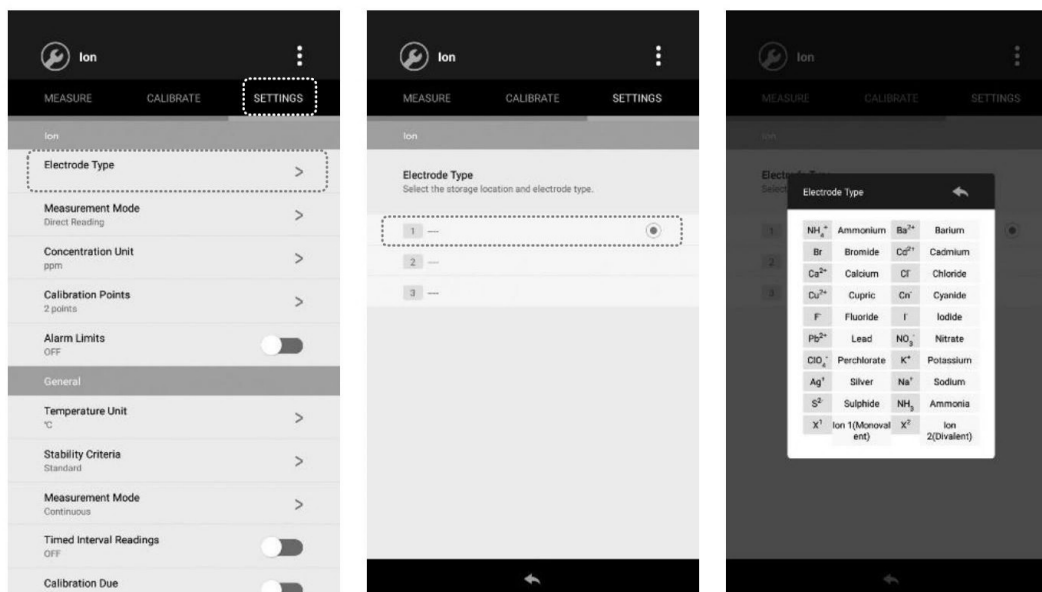


If the screen shows "Could not find the electrode slope", tap the **Exit**, then tap the temperature reading. When the setting is completed, the app will show the user entered temperature in the calibration screen.

Selecting the Electrode Type

The BanteLab app reserves 3 storage locations for storing or recalling the slope of ion selective electrode. For example, you selected the storage location 1 and use the fluoride electrode to calibrate the tester. Selecting the storage location 2 and use the chloride electrode to calibrate the tester. The electrode slopes will be stored in the selected location separately after the calibration. If you have not set this option, the default will be 1, the electrode type will show "Ion".

1. Tap the **Settings** to enter the setup menu.
2. Tap the **Electrode Type**, the screen shows selectable storage locations.
3. Tap the storage location, the screen shows a sensor list.
4. Tap the electrode type as per the ion selective electrode connected.
5. Tap the **Measure** to return to the measurement screen.



Ion Calibration

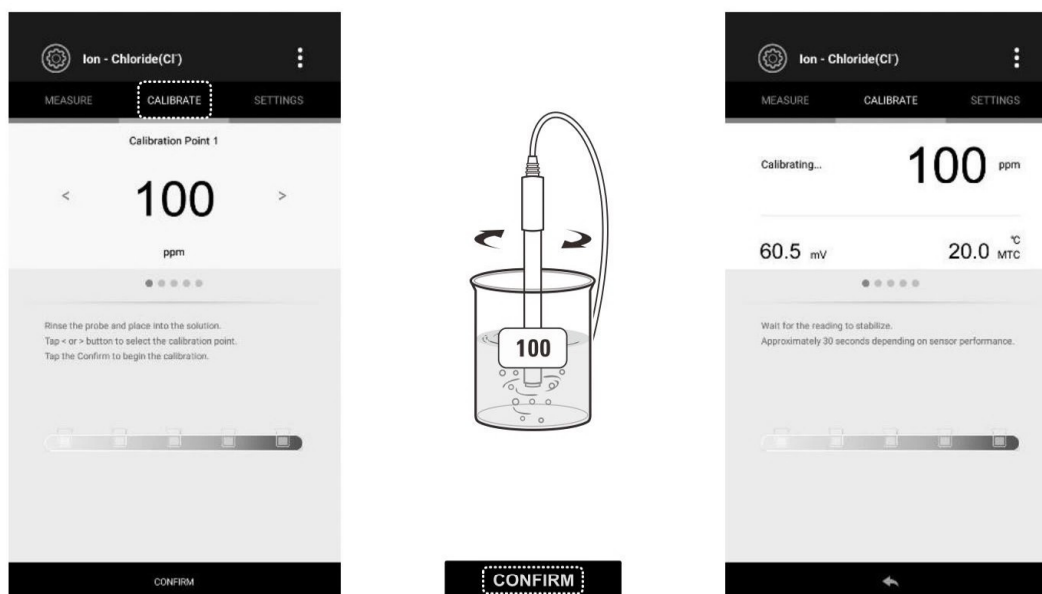
The S30 tester allows 2 to 5 points calibration in the ion mode, acceptable calibration points include the following options.

Measurement Unit	Calibration Points
ppm or mg/L	0.001, 0.01, 0.1, 1, 10, 100, 1000, 10000
mol/L or mmol/L	0.001, 0.01, 0.1, 1, 10


Before beginning calibration, make sure that you have selected the corresponding electrode type in the setup menu. All standard and sample solutions should be at the same temperature and selected calibration points cover the anticipated range of sample.

For the low concentration or sample contains the interference ions, we recommend to add the ionic strength adjuster (ISA) to all standards and samples. A typical addition would be 2 ml ISA to 100 ml of standard and sample.

- 1.1 Tap the **Calibrate**, the screen shows "Calibration Point 1, 100 ppm".
- 1.2 If necessary, tap the < or > to select first calibration point, the tester will perform the calibration from the low to high concentrations.
- 1.3 Rinse the electrode with deionized water. Place the electrode into the standard solution, stir gently to create a homogeneous solution.
- 1.4 Wait for 5 seconds, tap the **Confirm** to begin the calibration.
- 1.5 When the reading has stabilized, the screen will show "Calibration Point 2, 1000 ppm", the app prompts you to continue with second point calibration.
- 1.6 Repeat steps 1.3 and 1.4 above until the screen shows "Calibration is completed".



Viewing the Calibration Log

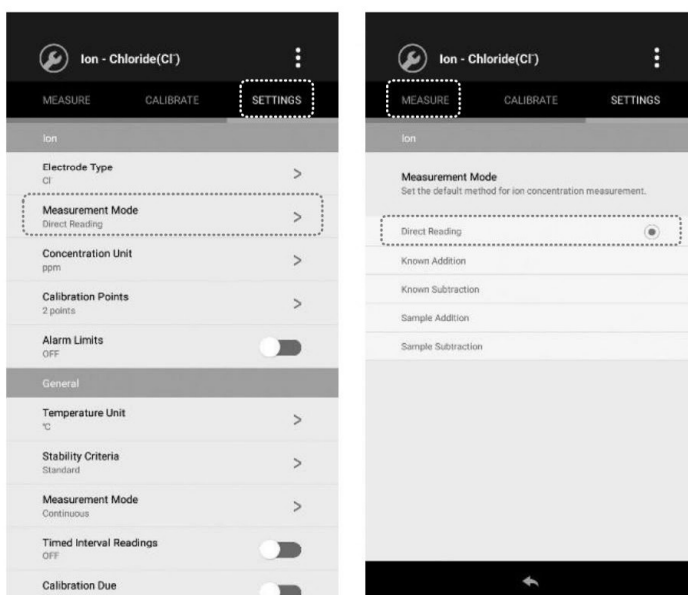
- 2.1 Tap the .
- 2.2 Tap the **Calibration Report**.

Measurement

The BanteLab app provides the 5 ion measurement methods, including the direct reading, known addition, known subtraction, sample addition and sample subtraction. If the concentration unit mol/L or mmol/L is selected, the incremental methods will be disabled, the screen will always show "Could not find the electrode slope", the tester must be recalibrated in the ppm or mg/L.



Selecting the Measurement Mode

1. Tap the **Settings**.
2. Tap the **Measurement Mode** and select an option.
3. Tap the **Measure** to return to the measurement screen.



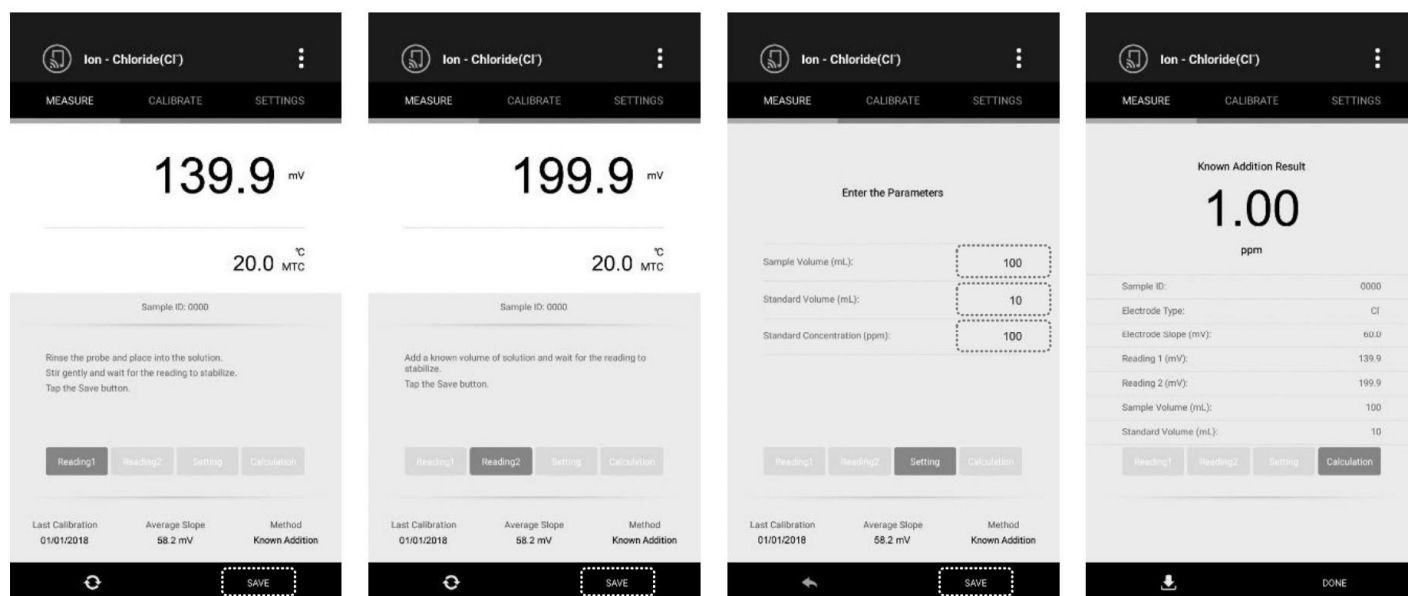
Direct Reading

- 1.1 Make sure that you have selected the Direct Reading in setup menu.
- 1.2 Use a thermometer to measure the sample solution and tap the temperature reading to set the temperature value.
- 1.3 Rinse the electrode with deionized water. Place the electrode into the sample solution and stir gently. Wait for the measurement to stabilize and record the reading.

 If the Auto-Read option is enabled in the setup menu, the app will automatically lock a measurement endpoint and show HOLD icon. Tap the  to resume measuring.

Known Addition

- 2.1 Make sure that you have selected the Known Addition in setup menu.
- 2.2 Rinse the electrode with deionized water. Place the electrode in a known volume of sample solution and stir gently. Wait for the reading to stabilize, tap the **Save** to store reading 1.
- 2.3 Add a known volume of standard solution to the sample. Wait for the reading to stabilize, tap the **Save** to store reading 2.
- 2.4 Enter the sample volume, stand volume and standard concentration to parameter list, tap the **Save**, the app automatically calculates and shows the known addition result.
- 2.5 Tap the **Done**, the tester will take a new measurement.



The screenshots illustrate the steps of the Known Addition method in the Ion-Chloride (Cl⁻) app:

- Screenshot 1:** Shows the initial measurement with a reading of 139.9 mV and a temperature of 20.0 °C. The bottom bar has a 'SAVE' button.
- Screenshot 2:** Shows the second measurement with a reading of 199.9 mV and a temperature of 20.0 °C. The bottom bar has a 'SAVE' button.
- Screenshot 3:** Shows the 'Enter the Parameters' screen where the user inputs:

Parameter	Value
Sample Volume (mL):	100
Standard Volume (mL):	10
Standard Concentration (ppm):	100

 The bottom bar has a 'SAVE' button.
- Screenshot 4:** Shows the 'Known Addition Result' screen with a final result of 1.00 ppm. The bottom bar has a 'DONE' button.

Known Subtraction

The procedure for known subtraction is similar to the known addition method. The difference is that the standard solution does not contain the same ionic species that you are trying to measure in the sample. Instead, it contains an ion that will complex or precipitate the ion of interest, removing it from the sample.

- 3.1 Make sure that you have selected the Known Subtraction in setup menu.
- 3.2 Repeat steps 2.2 through 2.4 above until the screen shows the known subtraction result.

Sample Addition

This method is similar to the known addition method, except that the sample is added to the standard solution.


- 4.1 Make sure that you have selected the Sample Addition in setup menu.
- 4.2 Rinse the electrode with deionized water. Place the electrode in a known volume of standard solution and stir gently. Wait for the reading to stabilize, tap the **Save** to store reading 1.
- 4.3 Add a known volume of sample to the standard solution. Wait for the reading to stabilize, tap the **Save** to store reading 2.
- 4.4 Enter the sample volume, stand volume and standard concentration to parameter list, tap the **Save**, the app automatically calculates and shows the known addition result.
- 4.5 Tap the **Done**, the tester will take a new measurement.

Sample Subtraction

This method is similar to the known subtraction method, except that the sample is added to the standard solution.

- 5.1 Make sure that you have selected the Sample Subtraction in setup menu.
- 5.2 Repeat steps 4.2 through 4.4 above until the screen shows the sample subtraction result.

mV Measurement

- 6.1 Tap the .
- 6.2 Tap the **mV**, the screen shows millivolt readings.

Electrode Maintenance

- Rinse the electrode thoroughly with deionized water after use, wipe clean with a lint-free tissue, then replace protective cap and store the electrode in a dry, cool and well-ventilated area.
- Never scratch the ion sensitive membrane on the bottom of the electrode.
- If the electrode response becomes sluggish, soak the electrode in 100 ppm standard solution for about 1 hour.

Appendix

Preparation of Ion Standard Solution (1000 ppm)

1. Half fill a 1 liter volumetric flask with deionized water and add the analytical grade reagent according to the instructions in table below.
2. Swirl the volumetric flask gently to dissolve the reagent and fill to the mark with deionized water.
3. Cap the and upend volumetric flask several times to mix the solution.

Ion Type	Reagent	Weight (g)			
Ammonium	NH ₄ Cl	2.97	Iodide	NaI	1.18
Bromide	NaBr	1.29	Lead	Pb(NO ₃) ₂	1.60
Cadmium	Cd(NO ₃) ₂ • 4H ₂ O	2.74	Nitrate	NaNO ₃	1.37
Calcium	CaCl ₂ • 2(H ₂ O)	3.67	Potassium	KCl	1.91
Chloride	NaCl	1.65	Silver	AgNO ₃	1.57
Cupric	Cu(NO ₃) • 3H ₂ O	3.80	Sodium	NaCl	2.54
Cyanide	NaCN	1.88	Sulphide	Na ₂ S • 9H ₂ O	7.49
Fluoride	NaF	2.21	Ammonia	NH ₄ Cl	3.15

Optional Accessories

Ion Selective Electrodes

Order Code	Description	Range (ppm)			
NH4-US	Ammonium (NH ₄ ⁺)	0.1 to 18000	I-US	Iodide (I ⁻)	0.06 to 127000
Br-US	Bromide (Br ⁻)	0.4 to 79900	Pb-US	Lead (Pb ²⁺)	0.2 to 20700
Cd-US	Cadmium (Cd ²⁺)	0.01 to 11200	NO3-US	Nitrate (NO ₃ ⁻)	0.4 to 62000
Ca-US	Calcium (Ca ²⁺)	0.02 to 4000	K-US	Potassium (K ⁺)	0.04 to 39000
CL-US	Chloride (Cl ⁻)	1.8 to 35500	Ag-US	Silver (Ag ⁺)	0.01 to 107900
Cu-US	Cupric (Cu ²⁺)	0.006 to 6400	Na-US	Sodium (Na ⁺)	0.1 to 23000
Cn-US	Cyanide (Cn ⁻)	0.2 to 260	S-US	Sulphide (S ²⁻)	0.003 to 32100
F-US	Fluoride (F ⁻)	0.02 to saturation	NH3-US	Ammonia (NH ₃)	0.02 to 17000

Standard Solutions

Order Code	Description				
ION-NH4	1000 ppm ammonium standard	480 ml	ION-I	1000 ppm iodide standard	480 ml
ION-Br	1000 ppm bromide standard	480 ml	ION-Pb	1000 ppm lead standard	480 ml
ION-Cd	1000 ppm cadmium standard	480 ml	ION-NO3	1000 ppm nitrate standard	480 ml
ION-Ca	1000 ppm calcium standard	480 ml	ION-K	1000 ppm potassium standard	480 ml
ION-CL	1000 ppm chloride standard	480 ml	ION-Ag	1000 ppm silver standard	480 ml
ION-Cu	1000 ppm cupric standard	480 ml	ION-Na	1000 ppm sodium standard	480 ml
ION-F	1000 ppm fluoride standard	480 ml	ION-NH3	1000 ppm ammonia standard	480 ml

Ionic Strength Adjusters

Order Code	Description				
ISA-NH4	Ammonium (NH ₄ ⁺)	480 ml	ISA-I	Iodide (I ⁻)	480 ml
ISA-Br	Bromide (Br ⁻)	480 ml	ISA-Pb	Lead (Pb ²⁺)	480 ml
ISA-Cd	Cadmium (Cd ²⁺)	480 ml	ISA-NO3	Nitrate (NO ₃ ⁻)	480 ml
ISA-Ca	Calcium (Ca ²⁺)	480 ml	ISA-K	Potassium (K ⁺)	480 ml
ISA-CL	Chloride (Cl ⁻)	480 ml	ISA-Ag	Silver (Ag ⁺)	480 ml
ISA-Cu	Cupric (Cu ²⁺)	480 ml	ISA-Na	Sodium (Na ⁺)	480 ml
ISA-Cn	Cyanide (Cn ⁻)	480 ml	ISA-NH3	Ammonia (NH ₃)	480 ml
ISA-F	Fluoride (F ⁻)	480 ml			

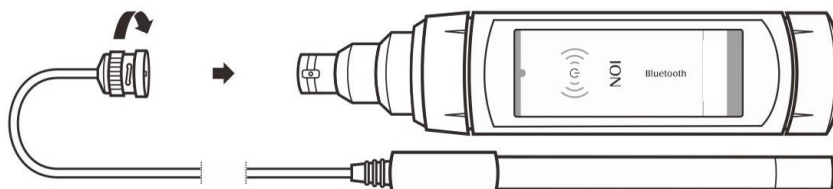
S40

Water Hardness Calibration and Measurement

This section is applicable to model S40 tester

Prior to Use

1. Take out the water hardness electrode from the carrying case. Remove the protective cap and soak the electrode in 10 mmol/L standard solution for about 10 minutes.
2. Insert the BNC connector into the connector socket on tester, rotate and push the connector clockwise until it locks.



3. Tap the  and select the **Water Hardness** measurement mode.

Water Hardness Settings

The BanteLab app contains 3 measurement settings and 9 general settings in the setup menu.

Menu	Options	Description	Default
Measurement Unit	°dH	Set the water hardness unit.	°dH
	°e		
	°fH		
	gpg		
	mg/L (CaCO ₃)		
	mg/L (CaO)		
	mg/L (Ca ²⁺)		
	mmol/L		
Calibration Points	2 to 5 points	Set the number of calibration points.	2 points
Alarm Limits	Enable	Set the high and low limit values to activate alarm.	Disable
	Disable		

To change the current settings, refer to the *Setting the Default Option* section on page 7.

Temperature Compensation

For better accuracy, we recommend to enable the manual temperature compensation during the calibration and measurement.

1. Use an accurate thermometer to measure the solution.
2. Tap the temperature reading on the measurement screen.
3. Tap the numeric keypad to enter the temperature.
4. Tap the **Done** to return to the measurement screen.

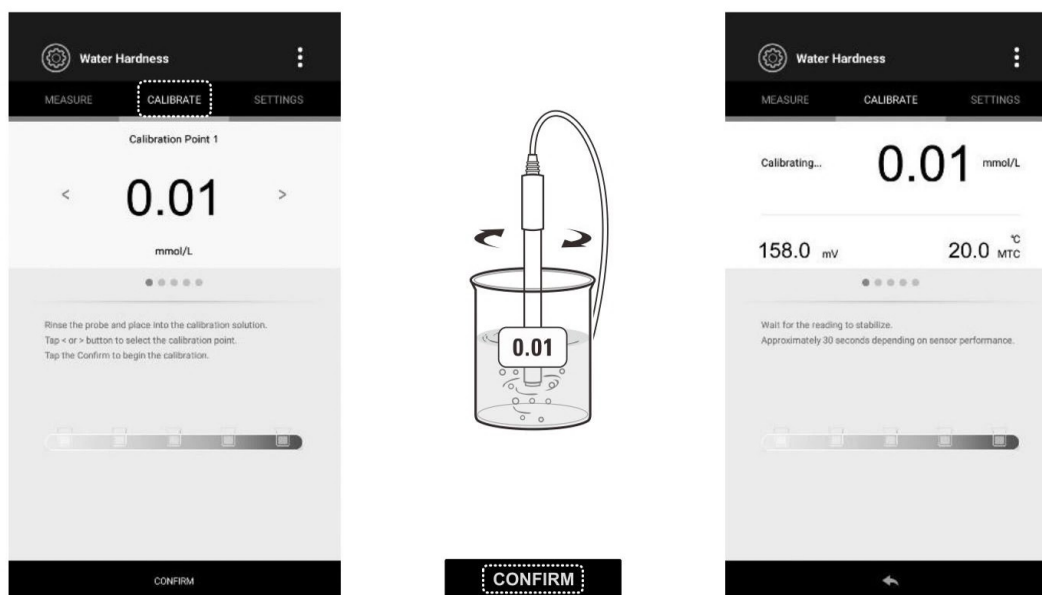


If the screen shows "Could not find the electrode slope", tap the **Exit**, then tap the temperature reading. When the setting is completed, the app will show the user entered temperature in the calibration screen.

Water Hardness Calibration

The S40 tester allows 2 to 5 points calibration in the water hardness mode, acceptable calibration points include the 0.001, 0.01, 0.1, 0.1, 1, 10 and 100 mmol/L. For better accuracy, we recommend to add the ionic strength adjuster (ISA) to all standards and samples and selected calibration points cover anticipated range of the sample. A typical addition would be 2 ml ISA to 100 ml of standard and sample.

- 1.1 Tap the **Calibrate**, the screen shows "Calibration Point 1, 0.01 mmol/L".
- 1.2 If necessary, tap the < or > to select first calibration point, the tester will perform the calibration from the low to high concentrations.
- 1.3 Rinse the electrode with deionized water. Place the electrode into the standard solution, stir gently to create a homogeneous solution.
- 1.4 Wait for 5 seconds, tap the **Confirm** to begin the calibration.
- 1.5 When the reading has stabilized, the screen will show "Calibration Point 2, 0.1 mmol/L", the app prompts you to continue with second point calibration.
- 1.6 Repeat steps 1.3 and 1.4 above until the screen shows "Calibration is completed".



Viewing the Calibration Log

- 2.1 Tap the **⋮**.
- 2.2 Tap the **Calibration Report**.

Measurement

Water Hardness Measurement

- 1.1 Use a thermometer to measure the sample solution and tap the temperature reading to set the temperature value.
- 1.2 Rinse the electrode with deionized water. Place the electrode into the sample solution and stir gently. Wait for the measurement to stabilize and record the reading.

i If the Auto-Read option is enabled in the setup menu, the app will automatically lock a measurement endpoint and show HOLD icon. Tap the **🔒** to resume measuring.

mV Measurement

- 2.1 Tap the **🔄**.
- 2.2 Tap the **mV**, the screen shows millivolt readings.

Electrode Maintenance

- Rinse the electrode thoroughly with deionized water after use, wipe clean with a lint-free tissue, then replace protective cap and store the electrode in a dry, cool and well-ventilated area.
- Never scratch the ion sensitive membrane on the bottom of the electrode.
- If the electrode response becomes sluggish, soak the electrode in 10 mmol/L standard solution for about 1 hour.

Appendix

Preparation of Ion Standard Solution (100 mmol/L)

1. To half fill a 1 liter volumetric flask with deionized water and add 14.7 grams of analytical grade calcium chloride ($\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$) reagent.
2. Swirl the volumetric flask gently to dissolve the reagent and fill to the mark with deionized water.
3. Cap the and upend volumetric flask several times to mix the solution.

Optional Accessories

Order Code	Description
WH-UK	Water hardness electrode, range: 0.05 to 200 mmol/L
ION-WH	100 mmol/L standard solution, 480 ml
ISA-WH	Ionic strength adjuster, 480 ml

S50

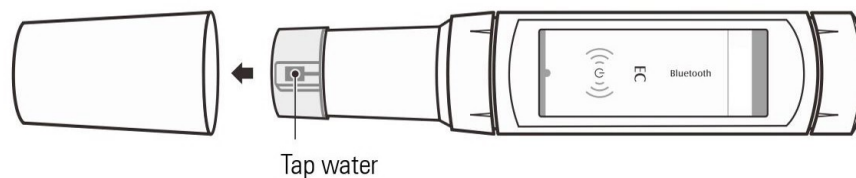
Conductivity/TDS/Salinity/Resistivity/Conductivity Ash

Calibration and Measurement

This section is applicable to model S50 tester

Prior to Use

Remove the protective cap and translucent cover from the bottom of the tester. Soak the electrode for a few minutes in tap water to remove dirt and oil stains on the electrode.



Conductivity/TDS/Salinity Settings

The BanteLab app contains 10 measurement settings and 9 general settings in the setup menu.

Menu	Options	Description	Default
Cell Constant	2-cell (K=0.1)	Set the cell constant to match the connected electrode. <ul style="list-style-type: none"> Model S50-M: 2-cell (K=1) Model S50-H: 2-cell (K=10) 	---
	2-cell (K=1)		
	2-cell (K=10)		
	4-cell		
Calibration Points	1 to 3 points	Set the number of calibration points.	3 points
Temperature Compensation	Linear	Set the temperature compensation type.	Linear
	Non-linear		
	USP		
	EP (Highly Purified Water)		
	EP (Purified Water)		
Temperature Coefficient	Range: 0.0 to 10.0%/°C	Set the linear temperature compensation coefficient.	2.10%/°C
Pure Water Coefficient	Enable	Set the pure water coefficient for ultra-pure water measurement.	Disable
	Disable		
Reference Temperature	20°C	Set the normalization temperature for measurement, the readings will automatically compensate to the selected temperature during measurement.	25°C
	25°C		
Alarm Limits	Enable	Set the high and low limit values to activate alarm.	Disable
	Disable		
TDS Factor	Range: 0.01 to 1.00	Set the TDS conversion factor. (This option shows on the TDS settings only)	0.50
Salinity type	Practical Salinity (PSU)	Set the salinity measurement mode. (This option shows on the salinity settings only)	PSU
	Seawater (ppt)		
	Percentage (%)		
Measurement Method	Refined Sugar	Set the measurement method for conductivity ash. (This option shows on the conductivity ash settings only)	Refined Sugar
	Raw Sugar		

If you want to change the current settings, refer to the **Setting the Default Option** section on page 7.



The BanteLab app contains 5 temperature compensation options, the linear compensation is appropriate for most samples. If your sample is natural water (e.g., natural ground, well, or surface waters), using the non-linear compensation is necessary. Note, the non-linear compensation can only be performed at temperature range from 0°C to 36°C (32°F to 96.8°F). If the sample temperature is out of above range, the screen will show a warning.

Conductivity Calibration

The S50 tester allows 1 to 3 points calibration in the conductivity mode, we recommend that you perform 3 points calibration or select a standard solution closest to the sample conductivity you are measuring. The tester will automatically detect the standard solution and prompt the user to perform the calibration. When the calibration is completed, all new calibration values will automatically override existing data. The following table shows acceptable standard solution for each tester.

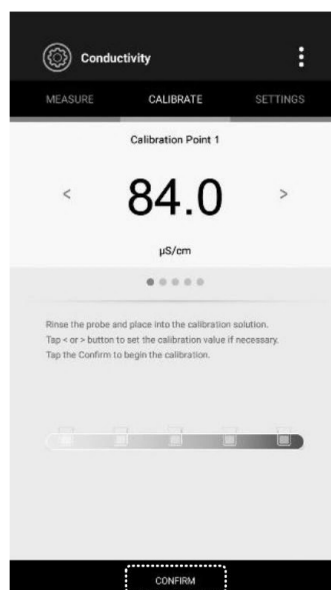
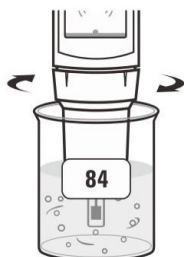
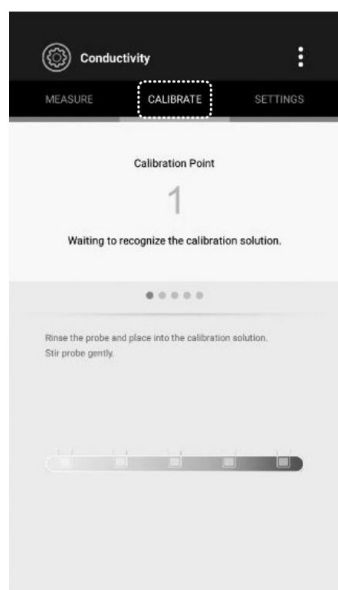
Model	Measurement Range	Standard Solution Range	Default
S50-M	0 to 200 $\mu\text{S}/\text{cm}$	70 to 170 $\mu\text{S}/\text{cm}$	84 $\mu\text{S}/\text{cm}$
S50-M/S50-H	200 to 2000 $\mu\text{S}/\text{cm}$	700 to 1700 $\mu\text{S}/\text{cm}$	1413 $\mu\text{S}/\text{cm}$
S50-M/S50-H	2 to 20 mS/cm	7 to 17 mS/cm	12.88 mS/cm
S50-H	20 to 200 mS/cm	70 to 170 mS/cm	111.8 mS/cm

Make sure that using the fresh standard solution during the calibration. DO NOT reuse the standard solution after calibration, contaminants in solution will affect the calibration and eventually the accuracy of the measurement.

Single Point Calibration

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

- 1.1 Rinse the electrode with deionized water and place into the standard solution. Stir tester gently to remove air bubbles trapped in the slot of the sensor.
- 1.2 Tap the **Calibrate**. The screen shows "Calibration Point 1", the tester automatically recognizes the standard solution and shows the calibration standard.
- 1.3 If necessary, tap the < or > to set the calibration value.
- 1.4 Wait for 5 seconds. Tap the **Confirm**, the tester begin the calibration. When the reading has stabilized, the screen will show "Calibration is completed".




Multipoint Calibration

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

- 2.1 Repeat steps 1.1 through 1.4 above. When the first calibration point is completed, the display will show "Calibration Point 2", the tester prompts you to continue with second point calibration.
- 2.2 Repeat steps 1.1 and 1.4 above until the screen shows "Calibration is completed".


i Performing the conductivity calibration will simultaneously calibrate the corresponding TDS, salinity, resistivity and conductivity ash values.


Viewing the Calibration Log

- 3.1 Tap the .
- 3.2 Tap the **Calibration Report**.

Measurement


Conductivity/TDS/Salinity/Resistivity Measurement

- 1.1 Tap the  and select a desired measurement mode.
- 1.2 Rinse the electrode with deionized water. Place the electrode into the sample solution and stir gently. Wait for the measurement to stabilize and record the reading.

i If the Auto-Read option is enabled in the setup menu, the app will automatically lock a measurement endpoint and show HOLD icon. Tap the  to resume measuring.

Conductivity Ash Measurement

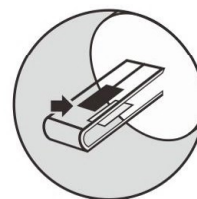
The BanteLab app contains 2 conductivity ash measurement modes - Refined Sugar (ICUMSA GS2/3-17 standard) and Raw Sugar (ICUMSA GS1/3/4/7/8-13 standard).

- 2.1 Prepare the sugar sample according to the selected ICUMSA method.
- 2.2 Tap the  and select the **Conductivity Ash** measurement mode.
- 2.3 Tap the **Settings** and tap the **Conductivity of Used Water** to set the conductivity of the used water for preparing sugar solutions (range: 0.00 to 100.0 $\mu\text{S}/\text{cm}$).
- 2.4 Tap the **Measure**.
- 2.5 Rinse the electrode with deionized water and place into the sample solution. Stir tester gently to remove air bubbles trapped in the slot of the sensor. Wait for the measurement to stabilize and record the reading.

i Note: The conductivity ash measurement can only be performed at temperature range from 15°C to 25°C (59°F to 77°F). If the temperature reading is out of above range, the screen will show a warning.

Electrode Maintenance

- Rinse the electrode thoroughly with deionized water after use.
- Do not touch the platinum black coating on sensor surface and always keep it clean.
- If there is a build-up of solids inside the sensor, remove very carefully, then recalibrate the tester.
- If you do not use the tester for long periods, store the electrode with tap water.



Appendix

Preparation of Conductivity Standard Solutions

Place the analytical grade potassium chloride (KCl) reagent in a beaker and dry in an oven for about 3 hours at 105°C (221°F), then cool to room temperature. Add the reagent to a 1 litre volumetric flask according to the instructions in table below. Fill the deionized water to the mark, mix the solution until the reagent is completely dissolved.

Conductivity Standard	Reagent	Weight
146.5 µS/cm	KCl	47.4 mg
1413 µS/cm	KCl	745.9 mg
12.88 mS/cm	KCl	7.45 mg
111.8 mS/cm	KCl	74.5 mg

Calculating the TDS Conversion Factor

The following formula describes the calculation method of TDS conversion factor, the factory default is 0.50.

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

Where:

Actual TDS = Value from the high purity water and precisely weighed NaCl or KCl reagent


Actual Conductivity = The tester measured conductivity value

For example, dissolve 64 grams of KCl reagent in 1 litre deionized water. If measured conductivity value 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	0.5048	38.04	0.4755
1413 µS/cm	744.7	0.527	702.1	0.4969
12.88 mS/cm	7447	0.5782	7230	0.5613

Calculating the Temperature Coefficient

1. Tap the  and tap **Temperature Coefficient**, set the coefficient to 0.
2. Place the electrode into the sample solution, record the temperature value T_A and conductivity value C_{TA} .
3. Condition the sample solution and electrode to a temperature T_B that is about 5°C to 10°C different from T_A . Record the conductivity value C_{TB} .
4. Calculate the temperature coefficient using the following formula.

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

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

Optional Accessories

Order Code	Description
S50-C1-10K	Platinum conductivity electrode, cell constant K=1, measurement range: 10 μ S/cm to 20 mS/cm
S50-C10-10K	Platinum conductivity electrode, cell constant K=10, measurement range: 100 μ S/cm to 200 mS/cm
ECCS-84	Conductivity standard solution 146.5 μ S/cm, 480 ml
ECCS-1413	Conductivity standard solution 1413 μ S/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

S60

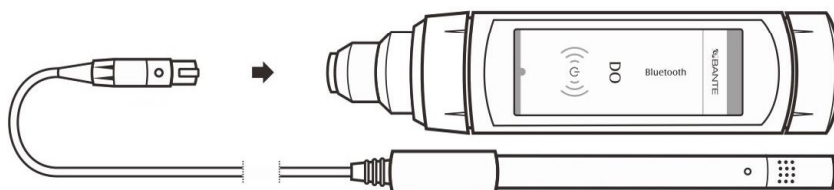
Dissolved Oxygen/BOD/OUR/SOUR

Calibration and Measurement

This section is applicable to model S60 tester

Prior to Use

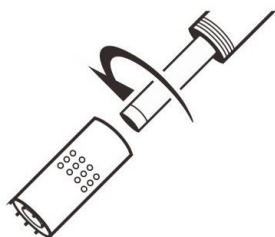
Take out the dissolved oxygen electrode from carrying case. Insert the 6-pin connector into the connector socket on tester, make sure that the connector is fully seated.



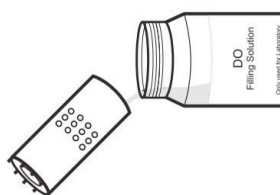
Filling the Electrolyte Solution

1. Unscrew the membrane cap from the bottom of the electrode, rinse the inside and outside with deionized water and blot dry.
2. Fill the membrane cap halfway with electrolyte solution.
3. Screw the membrane cap back onto the electrode. Some electrolyte solution will overflow during this process.
4. Check the electrode, make sure that no air bubbles are trapped in the electrolyte solution and the membrane is not creased or damaged.

1



2



3



Polarizing the Electrode

Connect the electrode to tester, switch on the tester and wait 10 minutes for the electrode to polarize.

Dissolved Oxygen Settings

The BanteLab app contains 6 measurement settings and 9 general settings in the setup menu.

Menu	Options	Description	Default
Measurement Unit	mg/L	Set the measurement unit.	mg/L
	%		
Calibration Points	1 or 2 points	Set the number of calibration points.	1 point
Resolution	0.01	Set the resolution of dissolved oxygen measurement.	0.01
	0.1		
Barometric Pressure	450 to 850 mmHg	Set the barometric pressure coefficient.	760 mmHg
	60.0 to 113.3 kPa		
Salinity Coefficient	0.0 to 50.0 ppt	Set the salinity coefficient of sample.	0.0 ppt
Alarm Limits	Enable	Set the high and low limit values to activate alarm.	Disable
	Disable		

If you want to change the current settings, refer to the **Setting the Default Option** section on page 7.

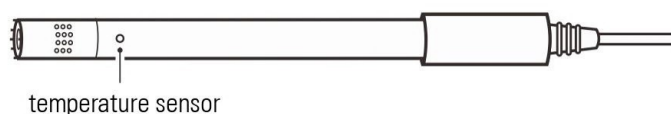
i The following table describes the relationship between the altitude and barometric pressure. Make sure to set the compatible parameter before the calibration and measurement.

Altitude (m)	kPa	mmHg	Altitude (m)	kPa	mmHg
0	101.3	760	1800	80.9	607
100	100.1	750	1900	79.9	599
200	98.8	741	2000	78.9	592
300	97.6	732	2100	77.9	584
400	96.4	723	2200	76.9	577
500	95.2	714	2300	76.0	570
600	94.0	705	2400	75.0	563
700	92.8	696	2500	74.1	556
800	91.7	688	2600	73.2	549
900	90.5	679	2700	72.3	542
1000	89.4	671	2800	71.4	536
1100	88.3	662	2900	70.5	529
1200	87.2	654	3000	69.6	522
1300	86.1	646	3100	68.7	515
1400	85.0	638	3200	67.9	509
1500	84.0	630	3300	67.0	502
1600	82.9	622	3400	66.2	496
1700	81.9	614	3500	65.4	490

Dissolved Oxygen Calibration

The S60 tester allows 1 or 2 points calibration. If you have selected the 1 point calibration in the setup menu, we recommend that you perform a 100% saturation calibration or dissolved oxygen concentration calibration in the air-saturated water. If the 2 points calibration is selected, the zero oxygen solution needs to be used.

During the calibration and measurement, the temperature sensor on electrode must be immersed in solution completely, the solution keeps 0.3 m/s of minimum flow rate to avoid oxygen starvation at the membrane.



DO Calibration in mg/L Mode

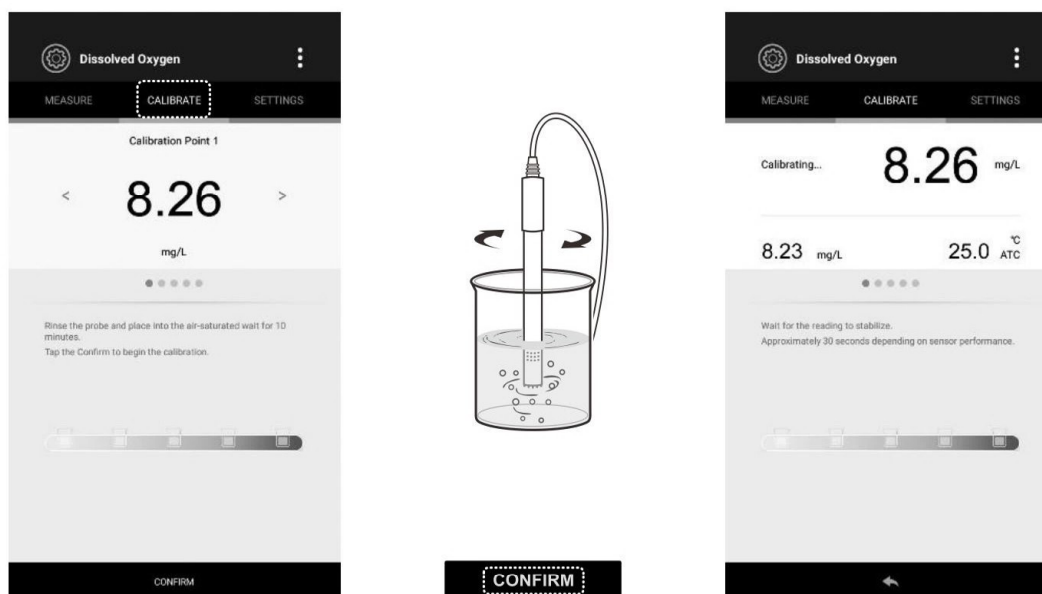
Make sure that you have selected the measurement unit "mg/L" and 1 point calibration in the setup menu.

- 1.1 Tap the **Calibrate**, the screen shows "Calibration Point 1, 8.26 mg/L".
- 1.2 Place the dissolved oxygen electrode into the air-saturated water for 10 minutes and stir gently. Tap the **Confirm** to begin the calibration.
- 1.3 When the reading has stabilized, the screen will show "Calibration is completed".

2 Points Calibration:

Make sure that you have selected the 2 points calibration in the setup menu.

- 2.1 Tap the **Calibrate** and tap the < or > until the screen shows "Calibration Point 1, 0.00 mg/L".
- 2.2 Place the dissolved oxygen electrode into the zero oxygen solution for 10 minutes and stir gently. Tap the **Confirm** to begin the calibration.
- 2.3 When the reading has stabilized, the screen will show "Calibration Point 2, 8.26 mg/L". The tester prompts you to continue with second point calibration.
- 2.4 Place the dissolved oxygen electrode into the air-saturated water for 10 minutes and stir gently. Tap the **Confirm** to begin the calibration.
- 2.5 When the reading has stabilized, the screen will show "Calibration is completed".



DO Calibration in % Saturation Mode

Make sure that you have selected the measurement unit "%" and 1 point calibration in the setup menu.

- 3.1 Tap the **Calibrate**, the screen shows "Calibration Point 1, 100.0%".
- 3.2 Hold the dissolved oxygen electrode in the air at 100% relative humidity or place the electrode into the air-saturated water for about 10 minutes. Tap the **Confirm** to begin the calibration.
- 3.3 When the reading has stabilized, the screen will show "Calibration is completed".

2 Points Calibration:

Make sure that you have selected the 2 points calibration in the setup menu.

- 4.1 Tap the **Calibrate** and tap the < or > until the screen shows "Calibration Point 1, 0.0%".
- 4.2 Place the dissolved oxygen electrode into the zero oxygen solution for 10 minutes and stir gently. Tap the **Confirm** to begin the calibration.
- 4.3 When the reading has stabilized, the screen will show "Calibration Point 2, 100.0%". The tester prompts you to continue with second point calibration.
- 4.4 Place the dissolved oxygen electrode into the air-saturated water for 10 minutes and stir gently. Tap the **Confirm** to begin the calibration.
- 4.5 When the reading has stabilized, the screen will show "Calibration is completed".

Viewing the Calibration Log

- 5.1 Tap the **⋮**.
- 5.2 Tap the **Calibration Report**.

Dissolved Oxygen Measurement

The S60 tester can be used to measure the water, wastewater, brine and other liquids. If your sample is seawater or water containing large amounts of salt, make sure to set the salinity coefficient before measurement. Some gas and steam such as chloride, sulfur dioxide, sulfureted hydrogen and carbon dioxide can permeate the membrane via diffusion. Their existence will influence the measurements. If the sample contains solvent, grease, sulfide and alga, the membrane will be damaged or eroded.

1. Set the barometric pressure and salinity coefficient in the setup menu if necessary.
2. Rinse the electrode with deionized water.
3. Place the electrode into the sample solution and stir gently. Wait for the measurement to stabilize and record the reading.

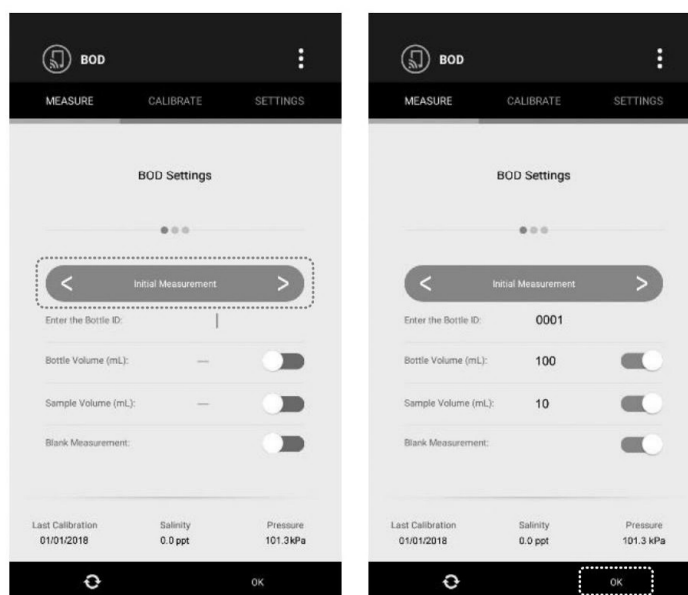
i If the Auto-Read option is enabled in the setup menu, the app will automatically lock a measurement endpoint and show HOLD icon. Tap the **🔒** to resume measuring.

BOD Measurement

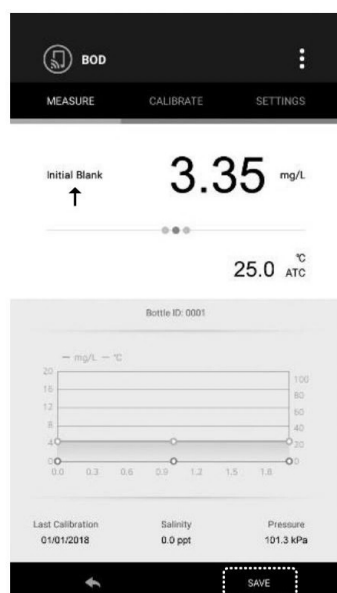
The BanteLab app contains a BOD measurement mode. A typical process for BOD determination consists of 4 steps: Sample preparation, initial measurement, incubation, final measurement.

Initial Measurement

- 1.1 Tap the  and select the **BOD** measurement mode.
- 1.2 Tap the < or > to select the "Initial measurement".
- 1.3 Tap the **Enter the Bottle ID** and set the 4-digit number.
- 1.4 If necessary, turn on the **Bottle Volume** and **Sample Volume** options and enter the values. If the blank solution need to be measured, turn on the **Blank Measurement** option as well.



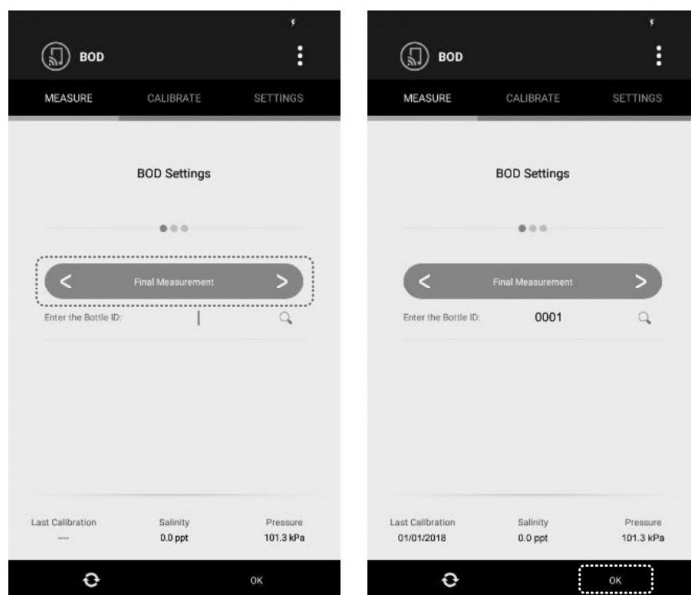
- 1.5 Tap the **OK** to begin the measurement.
- 1.6 If the Blank Measurement option is turned on, the "Initial Blank" indicator will show on the top left of the screen. Place the dissolved oxygen electrode in the blank solution and stir gently, wait for the measurement to stabilize. Tap the **Save**, the app will automatically switch to the Initial Sample measurement screen.



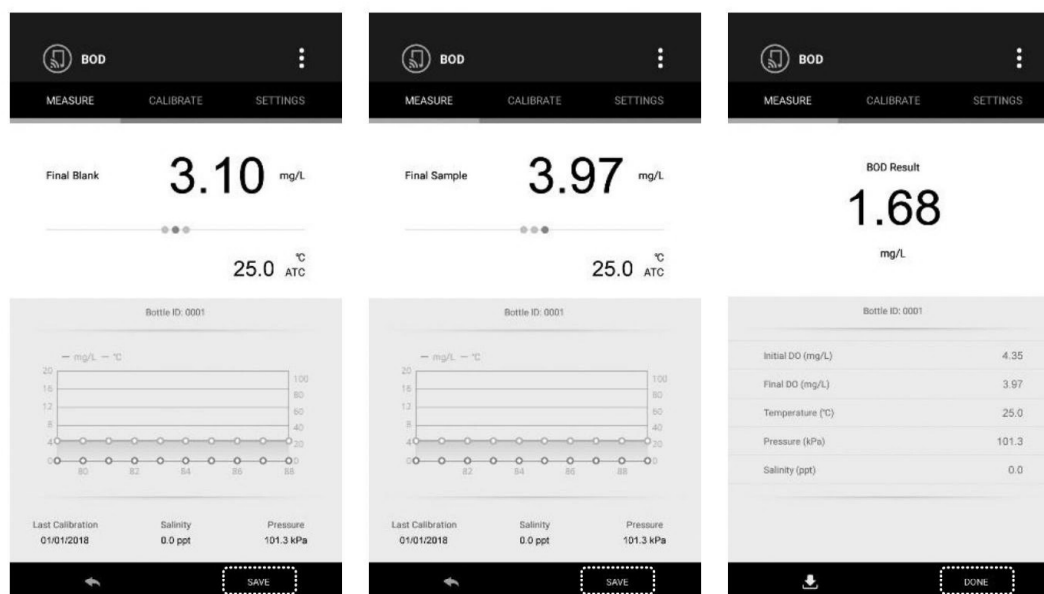
If the Blank Measurement option is turned off, the "Initial Sample" indicator will show on the screen. Place the dissolved oxygen electrode in the sample solution and stir gently, wait for the measurement to stabilize. Tap the **Save** to store the reading. Measurement is completed.

Final Measurement

- 2.1 Tap the < or > to select the "Final measurement".
- 2.2 Tap and **Enter the bottle ID** (e.g., 0001).
- 2.3 Tap the **OK**.

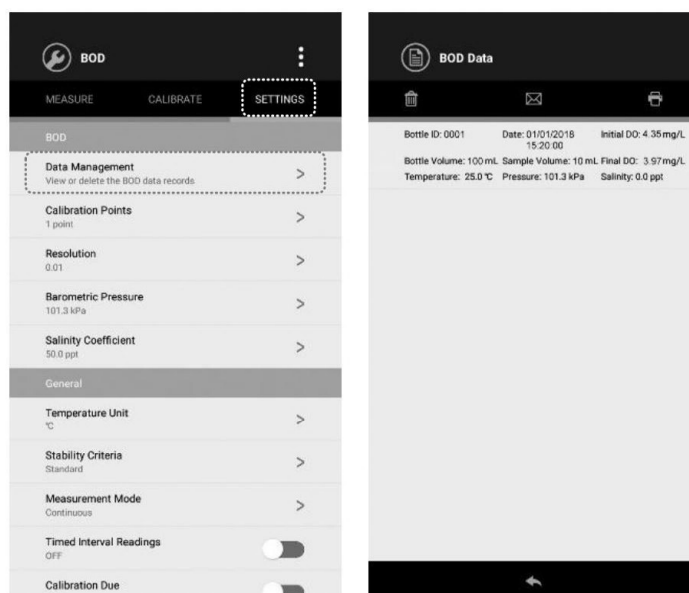


- 2.4 If the "Final Blank" indicator shows on the top left of the screen. Place the dissolved oxygen electrode in the blank solution and stir gently, wait for the measurement to stabilize. Tap the **Save**, the app will automatically switch to the Final Sample measurement screen. If the "Final Sample" indicator shows on the top left of the screen. Place the dissolved oxygen electrode in the sample solution and stir gently, wait for the measurement to stabilize. Tap the **Save**, the screen will show the BOD result.
- 2.5 Tap the **Done**, the tester will take a new measurement.



Viewing the BOD Data

The BanteLab app will automatically store the BOD data into the memory when the measurement is completed. Tap the **Settings** and tap the **Data Management**, the screen will show details.



OUR/SOUR Measurement

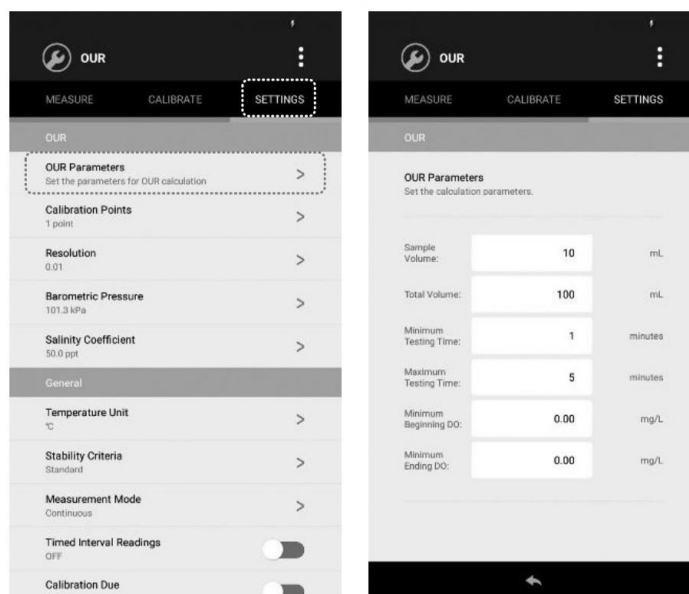
The BanteLab app contains a function for the calculations of Oxygen Uptake Rate (OUR) and Specific Oxygen Uptake Rate (SOUR). If the SOUR measurement is selected, the app will automatically calculate the reading and reference to 20°C (68°F). Note that this calculation is only valid for temperature ranges from 10°C to 30°C (50°F to 86°F). If the sample temperature is out of this range, the screen will show a warning.

Setting the Parameters

Make sure that the OUR or SOUR parameters have been set to desired values before the measurement.

OUR/SOUR Parameters	Parameter	Description
	Sample Volume (mL)	Set the sample volume.
	Total Volume (mL)	Set the total volume.
	Minimum Testing Time (minutes)	Set the minimum time of measurement. When the minimum time is reached, the measurement will start.
	Maximum Testing Time (minutes)	Set the maximum time of measurement. When the maximum time is reached, the measurement will end.
	Minimum Beginning DO (mg/L)	Set the minimum DO value allowed at the start of the measurement.
	Minimum Ending DO (mg/L)	Set the minimum DO value allowed during the measurement. If the measured value falls below this value, the measurement will end.
Only for SOUR Measurement	Solids weight (g/L)	Set the Total Solids or Volatile Suspended Solids concentration of the sample.

1. Tap the **Settings**.
2. Tap **OUR** or **SOUR** parameter.
3. Tap the parameter bar and enter the value.
4. Tap the **Measure** to return to the measurement screen.

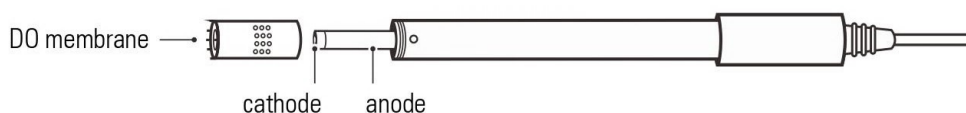


Measurement

1. Place the dissolved oxygen electrode in the sample solution and stir gently, make sure that no air bubbles are trapped.
2. Tap the **Start** to begin the measurement, the screen shows the dissolved oxygen readings.
3. When the maximum time is reached, the screen automatically shows "End" and calculates the result.
4. Tap the **Done**, the tester will take a new measurement.

Electrode Maintenance

- Rinse the electrode thoroughly with deionized water after use.
- DO NOT touch the membrane and always keep it clean and wet.
- If you do not use the electrode for long periods, screw off the membrane cap and rinse the electrode anode/cathode and membrane with deionized water and blot dry. Install the electrode and store dry.



Appendix

Preparation of Zero Oxygen Solution

Dissolve 500 mg of sodium sulfate (Na_2SO_3) reagent and a small amount of cobalt (II) chloride hexahydrate ($\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$) in the 250 ml deionized water, mix the solution until reagent is completely dissolved.

Preparation of Air-Saturated Water

Use an air-pump to blow air into deionized water at least 1 hour, while stirring the solution.



Optional Accessories

Order Code	Description
DO100	Polarographic dissolved oxygen electrode, 12 mm (0.47") diameter
DO-MEM	Membrane cap, 2 PCS/set
DO-ES	Electrolyte solution, 480 ml

Specifications & Troubleshooting

This section is applicable to all models of the S series testers

Troubleshooting Guide

Fault	Solution
The tester turns off automatically after about 1 minute	The batteries are depleted, replace the batteries.
The tester can not connect to app	<ul style="list-style-type: none"> Tap the sensor ID and wait until the  icon appears, then connect the next sensor. The pH, ORP, ion and water hardness testers can not connect to app simultaneously. The batteries are depleted, replace the batteries.
The tester has connected to app, but the screen shows an incorrect measurement mode	Tap the  and select the correct measurement mode.
Calibration error	Check the electrode and recalibrate the tester with fresh standard solutions.
Standard solution does not meet criteria	Check the pH electrode and make sure that the standard solutions should be at least 1 pH unit apart from each other.
Electrode slope is out of the normal range	Recalibrate the tester with fresh standard solutions. If the electrode slope still out of the range, replace the electrode.
In the ion or water hardness modes, the screen shows "Could not find the electrode slope"	Make sure that selected the measurement unit and ion type are same as the calibration. Recalibrate the tester with fresh standard solutions.
Forget the password	Contact the manufacturer.

Specifications

S10 pH Tester

pH	Range	-2.000 to 20.000 pH
	Resolution	0.1, 0.01, 0.001 pH, selectable
	Accuracy	±0.002 pH
	Calibration Points	1 to 5 points
	pH Buffer Options	USA (pH 1.68, 4.01, 7.00, 10.01, 12.45)
		NIST (pH 1.68, 4.01, 6.86, 9.18, 12.45)
		DIN (pH 1.09, 3.06, 4.65, 6.79, 9.23, 12.75)
	Temperature Compensation	0 to 100°C (32 to 212°F), automatic
mV	Solution Temperature Coefficient	25°C (77°F)
	Range	±2000.0 mV
	Resolution	0.1, 1 mV, selectable
	Accuracy	±0.2 mV

S20 ORP Tester

ORP	Range	±2000.0 mV
	Resolution	0.1, 1 mV, selectable
	Accuracy	±0.2 mV
	Calibration Point	1 point (only for relative mV mode)
	Measurement Modes	Absolute or relative mV

S30 Ion Tester

Ion Concentration	Range	0.001 to 30000 (depending on range of the ion selective electrode)
	Resolution	0.001, 0.01, 0.1, 1
	Accuracy	±0.5% F.S. (monovalent), ±1% F.S. (divalent)
	Measurement Units	ppm, mg/L, mol/L, mmol/L
	Calibration Points	2 to 5 points
	Calibration Solutions	0.001, 0.01, 0.1, 1, 10, 100, 1000, 10000
	Temperature Compensation	0 to 100°C (32 to 212°F), manual
	Measurement Methods	Direct reading, known addition, known subtraction, sample addition and sample subtraction
	Electrode Management	1 to 3 electrodes
mV	Range	±2000.0 mV
	Resolution	0.1, 1 mV, selectable
	Accuracy	±0.2 mV

S40 Water Hardness Tester

Water Hardness	Range	Concentration: 0.05 to 200 mmol/L German Degree: 0 to 1122°dH English Degree: 0 to 1404°e French Degree: 0 to 2000°fH Grains per gallon: 0 to 1170 gpg CaCO ₃ : 0 to 20000 mg/L CaO: 0 to 11220 mg/L Ca ²⁺ : 0 to 8020 mg/L
	Resolution	0.001, 0.01, 0.1, 1
	Accuracy	±1% F.S.
	Calibration Points	2 to 5 points
	Calibration Solutions	0.01, 0.1, 1, 10, 100 mmol/L
	Temperature Compensation	0 to 50°C (32 to 122°F), manual
mV	Range	±2000.0 mV
	Resolution	0.1, 1 mV, selectable
	Accuracy	±0.2 mV

S50 Conductivity Tester

Conductivity	Model	S50-M	S50-H
	Range	0 to 2000 μ S/cm, 20.00 mS/cm	100.0 to 2000 μ S/cm, 200.0 mS/cm
	Resolution	0.01, 0.1, 1	
	Accuracy	$\pm 0.5\%$ F.S.	
TDS	Range	0 to 1000 mg/L, 20.00 g/L	0 to 1000 mg/L, 200.0 g/L
	Resolution	0.01, 0.1, 1	
	Accuracy	$\pm 1\%$ F.S.	
	TDS Factor	0.01 to 1.00 (default 0.5)	
Salinity	Range	0.00 to 10.00 psu 0.00 to 10.00 ppt 0.00 to 1.00%	0.00 to 42.00 psu 0.00 to 80.00 ppt 0.00 to 8.00%
	Resolution	0.01	
	Accuracy	$\pm 1\%$ F.S.	
Resistivity	Range	0.00 to 10.00 M Ω	0.00 to 1.00 M Ω
	Resolution	0.01, 0.1, 1	
	Accuracy	$\pm 1\%$ F.S.	
Conductivity Ash	Range	0 to 100%	
	Resolution	0.01, 0.1, 1	
	Accuracy	$\pm 1\%$ F.S.	
	Measurement Modes	Refined sugar or Raw sugar	
Other	Calibration Points	1 to 3 points	
	Calibration Solutions	84 μ S/cm, 1413 μ S/cm, 12.88 mS/cm	1413 μ S/cm, 12.88 mS/cm, 111.8 mS/cm
	Temperature Compensation	0 to 100°C (32 to 212°F), automatic	
	Temperature Coefficient	Linear (0.0 to 10.0%/°C), non-linear, USP, EP	
	Pure Water Compensation	Yes	
	Reference Temperature	20°C or 25°C	

S60 Dissolved Oxygen Tester

Dissolved Oxygen	Range	0.00 to 20.00 mg/L
	Resolution	0.01, 0.1 mg/L, selectable
	Accuracy	± 0.2 mg/L
Saturation of Oxygen	Range	0.0 to 200.0%
	Resolution	0.1%
	Accuracy	$\pm 2.0\%$
Other	Calibration Points	1 or 2 points
	Temperature Compensation	0 to 50°C (32 to 122°F), automatic
	Barometric Pressure Correction	60.0 to 113.3 kPa, 450 to 850 mmHg, manual
	Salinity Correction	0.0 to 50.0 g/L, manual

Other Parameters

General Specifications	Stability Criteria	Fast, standard, slow
	Measurement Modes	Continuous or auto-read
	Timed Interval Readings	10, 30, 60, 300 seconds or off
	Calibration Due Alarm	1 to 99 days or off
	Data Transfer	Send to memory or printer
	Password Protection	6 digits
	Operating Temperature	0 to 50°C (32 to 122°F)
	Storage Temperature	-5 to 60°C (23 to 140°F)
	Relative Humidity	< 80% (non-condensing)
	IP Rating	IP54
	Connectivity	Bluetooth 4.0 or newer
	Max Wireless Range	10 m (32.8 ft)
	Power Requirements	2 × 1.2V lithium batteries or AAA batteries
	Dimensions	Model S10/20/50: 185 (L) × 40 (Dia.) mm (7.28 × 1.57") Model S30/40: 175 (L) × 40 (Dia.) mm (6.89 × 1.57")
	Weight	100 g (3.5 oz.)

Disposal

This tester 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 this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment.



Warranty

The warranty period for tester 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 tester 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.