

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

Instruction Manual

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Bluetooth Tester

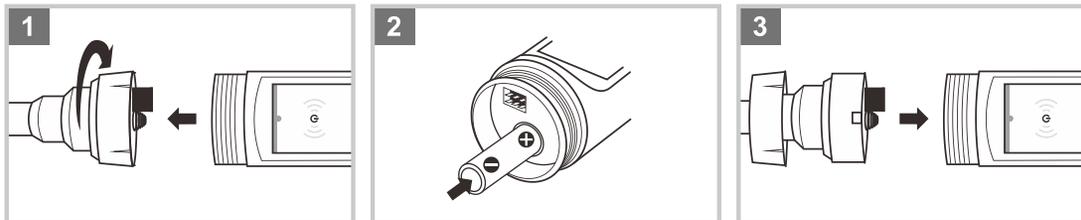
Thank you for selecting the S series bluetooth water quality tester, this product series includes 6 models.

Model	Measurement Parameters
S10	pH, mV
S20	mV, Relative mV (ORP)
S30	Ion, mV
S40	Water Hardness, mV
S50	Conductivity, TDS, Salinity, Resistivity, Conductivity Ash
S60	Dissolved Oxygen, BOD, OUR, SOUR

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

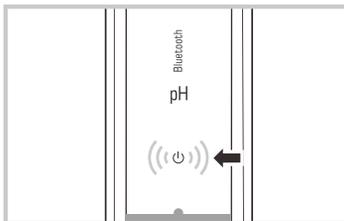
Installing the Batteries

1. Take out the tester from the carrying case. Twist the electrode collar counter clockwise, pull the electrode (or connector) away from the tester.
2. Insert two AAA batteries into the battery compartment, note polarity.
3. Align the slot on connector, gently push the electrode (or connector) into the tester.
4. Twist the electrode collar clockwise until it is tight.



Switching the Tester On and Off

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

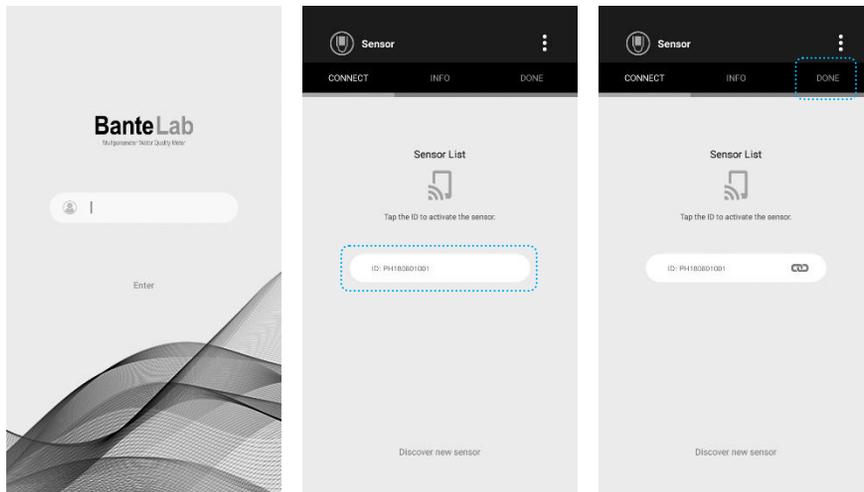


BanteLab APP

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

Connecting the Tester

1. Tap the BanteLab icon on device, 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 available testers, the screen will show a sensor list.
4. Tap the **ID** and wait until the connection icon  appears.
5. Tap the **Done** to enter to the measurement mode.



NOTE:

- The BanteLab APP allows to connect up to 3 testers. 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 turn off the tester and wait for 10 seconds, then turn on the tester again. If necessary, restart the APP.
- If the tester has turned off, but the ID still shows on the screen. Restart the APP, the screen will show the updated sensor list.
- The sensor ID is defined as follows.

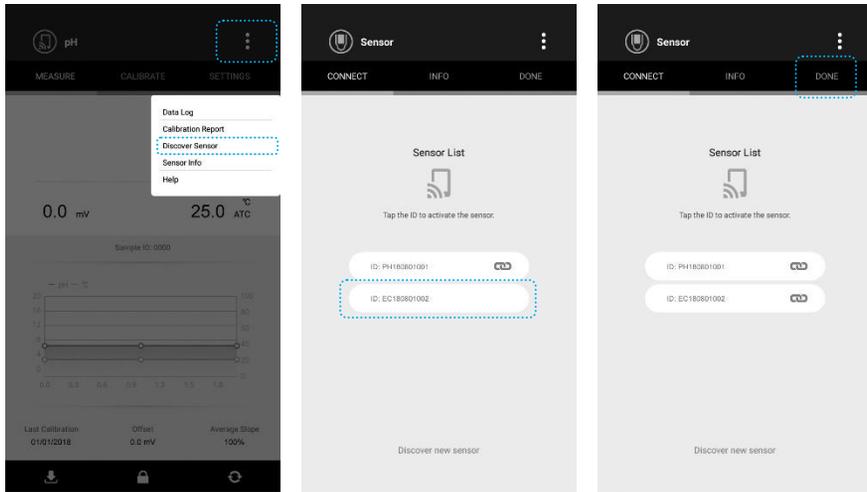
Measurement Parameters	Sensor ID
pH, mV	PH XXXXXXXXXX
mV, Relative mV (ORP)	POI XXXXXXXXXX
Ion, mV	ION XXXXXXXXXX
Water Hardness	ION XXXXXXXXXX
Conductivity, TDS, Salinity, Resistivity, Conductivity Ash	EC XXXXXXXXXX
Dissolved Oxygen, BOD, OUR, SOUR	DO XXXXXXXXXX

 NOTE, the pH, ORP, ion and water hardness testers can not be connected to APP simultaneously.

Adding the Testers

During the measurement process, if you want to add a tester to APP, please follow the steps below.

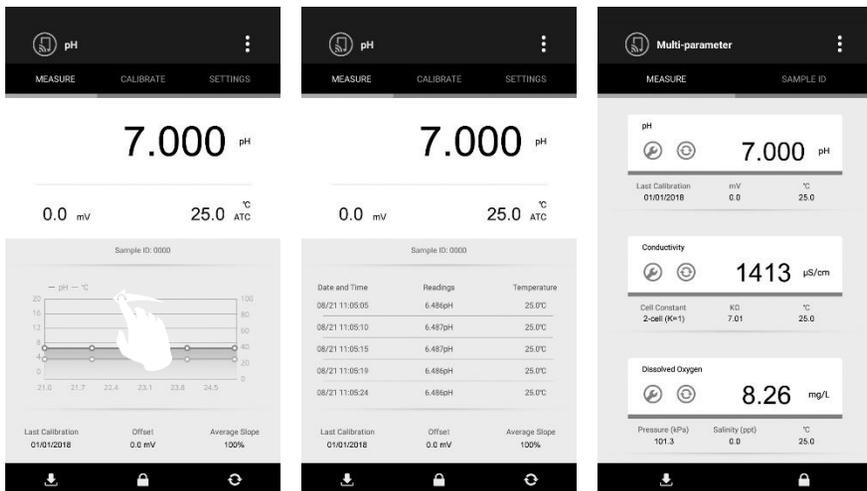
1. Tap the .
2. Tap the **Discover Sensor**, the APP will automatically search the available testers.
3. Tap the **ID** and wait until the connection icon  appears.
4. Tap the **Done** to return to the measurement mode.



Switching the View

The BanteLab APP contains two views in the single parameter measurement mode. The default is graph. Swipe the graphics area, the data table will show on the screen (1 measurement value every 5 seconds).

If two or three testers have connected to the APP, the screen will automatically switch to the multiparameter measurement mode. Note, the pH, ORP, ion and water hardness can not be measured simultaneously.



Function Keys

Key	Description
	Stores current reading to memory or sends the data to printer (Depending on the Data Transfer settings in the setup menu).
	Locks or unlocks the measurement.
	Selects the measurement mode.
	Returns to the single parameter measurement mode.
	Switches the displayed parameter.

General Options in Setup Menu

The BanteLab APP contains an integrated setup menu that is used to customize the displayed option to meet measurement requirements.

Menu	Options	Description	Default
Temperature Unit	°C	Set the default temperature unit.	°C
	°F		
Stability Criteria	Fast	The Stability option allows the user to set when a measurement is recognized as stable by the APP. When the Fast option is selected, the screen will show the 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	The measurement mode option is used to select a read type for data. When the Auto-Read is selected, the APP will automatically sense a stable reading and lock the measurement endpoint, the HOLD icon appears on the screen. Tap the  to take a new measurement. When the Continuous read is selected, the reading will continuously update.	Continuous
	Continuous		
Timed Interval Readings	10 seconds	The Interval Readings option is capable of recording the measurements at the predefined time intervals. If enabled, the tester will continue to send measured values to the memory or printer until the measurement is exited.	Off
	30 seconds		
	60 seconds		
	300 seconds		
	Off		
Calibration Due	1 to 99 days	The Calibration Due option is used to set the calibration interval to activate alarm. If user does not calibrate the tester within a specified time period, the screen will show a reminder.	Off
	Off		
Data Transfer	Save to memory	Set the data transfer mode.	Save to memory
	Send to printer		
Password Protect	Enable	The password protection option is used to prevent the unauthorized calibration and setting. If enabled, the user must enter the 6-digit password to access the calibration or settings.	Disable
	Disable		

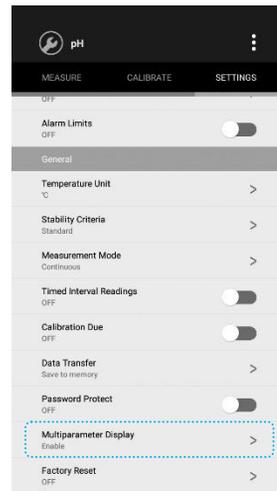
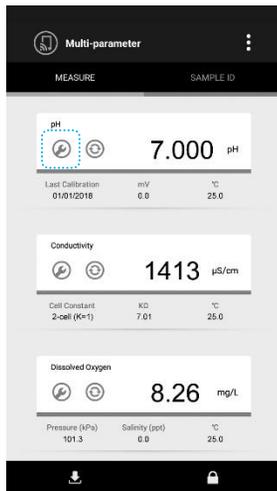
Multiparameter Display	Enable	If the multiple testers are connected to APP, tap this option, the screen will return to the multiparameter measurement mode.	---
Factory Reset	Enable	The Factory Reset option will restore the tester back to factory default settings. If enabled, all of the calibration data and selected parameters will be deleted or reset, the tester must be recalibrated.	Disable
	Disable		

Setting the default option in the single parameter measurement mode

- 1.1 Tap the **Settings** to enter the setup menu.
- 1.2 Tap the menu option and set the desired parameter.
- 1.3 Tap the **Measure** to return to the measurement mode.

Setting the default option in the multiparameter measurement mode

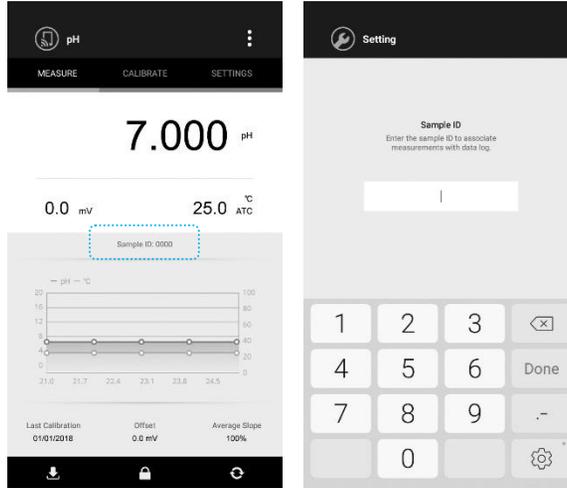
- 2.1 Tap the ↻ to return to the single parameter measurement mode.
- 2.2 Tap the **Settings** to enter the setup menu.
- 2.3 Tap the menu option and set the desired parameter.
- 2.4 Tap the **Multiparameter Display** to return to the measurements.



Sample ID

The sample ID is used to associate readings with the data log. If assigned, stored data will include this ID.

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

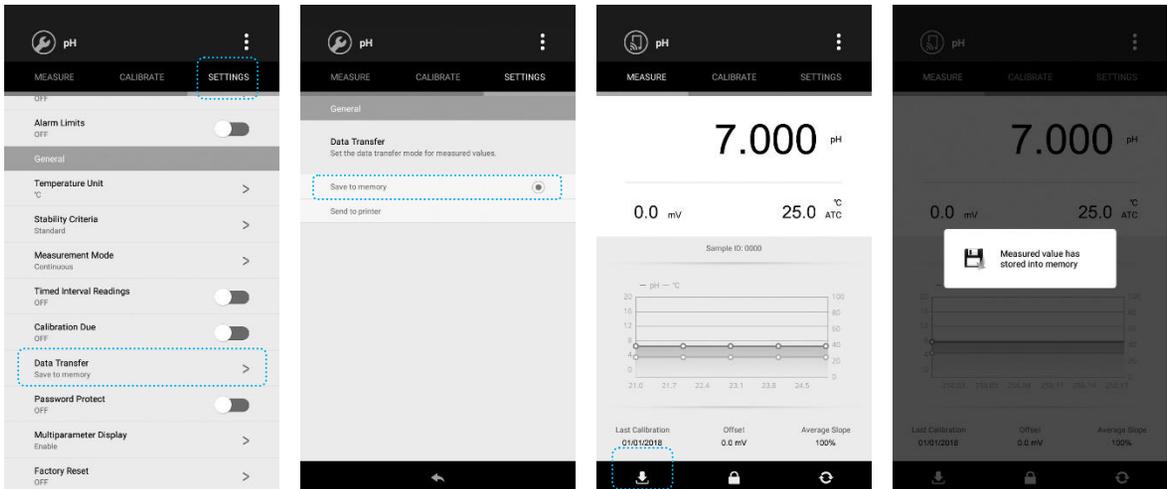


Data Storage

The BanteLab APP is capable of storing a large amount of data in the memory (Depending on the RAM on the device).

Storing a measurement data

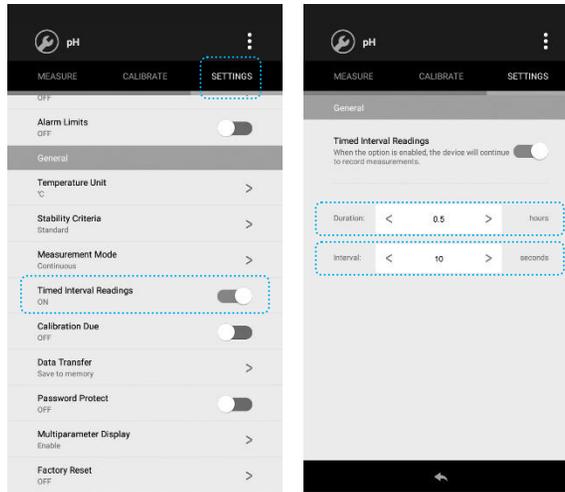
- 1.1 Ensure that the Data Transfer option in setup menu is switched to "Save to memory".
- 1.2 Tap the  , the screen automatically shows "Measured value has stored into memory".



Storing the measurement data at a specified time interval

If you want to record the measurement data continuously, ensure that the "Screen timeout" option on your device is turned off.

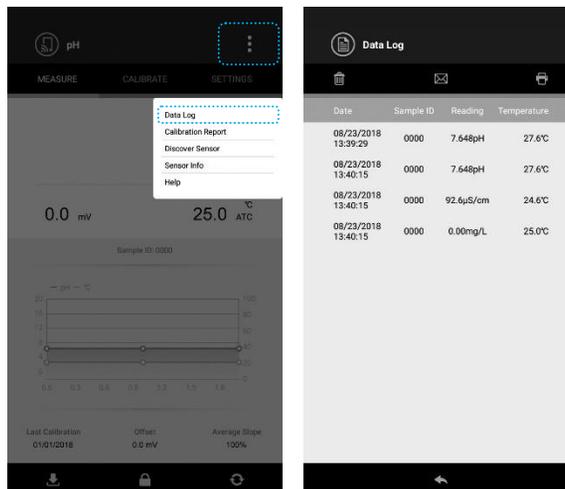
- 2.1 Tap the **Settings** to enter the setup menu.
- 2.2 Turn on the **Timed Interval Readings** option.
- 2.3 Tap the **<** or **>** to set the time interval.
- 2.4 Tap the **Measure**, the APP begins to record the measured values into the data log automatically.



① NOTE, the Timed Interval Readings is only valid in the single parameter measurement mode.

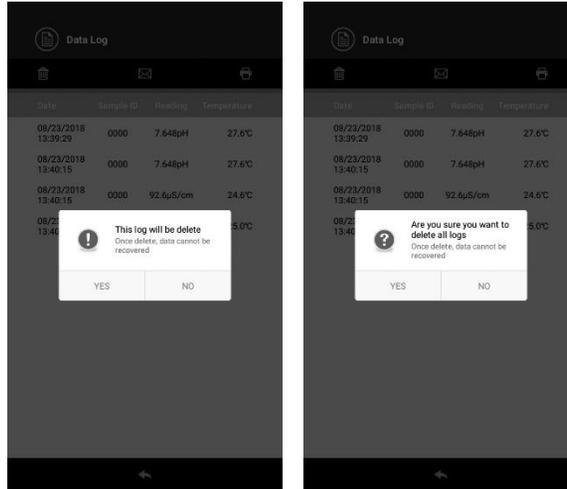
Viewing the Data

1. Tap the **⋮**.
2. Tap the **Data Log**, the screen shows the stored data.



Deleting the Data

1. If you want to delete a data in the list, tap and hold this data bar, the screen will show "This log will be delete". Tap the **Yes** to confirm.
2. If you want to delete all of data, tap the , the screen will show "Are you sure you want to delete all logs?". Tap the **Yes** to confirm.

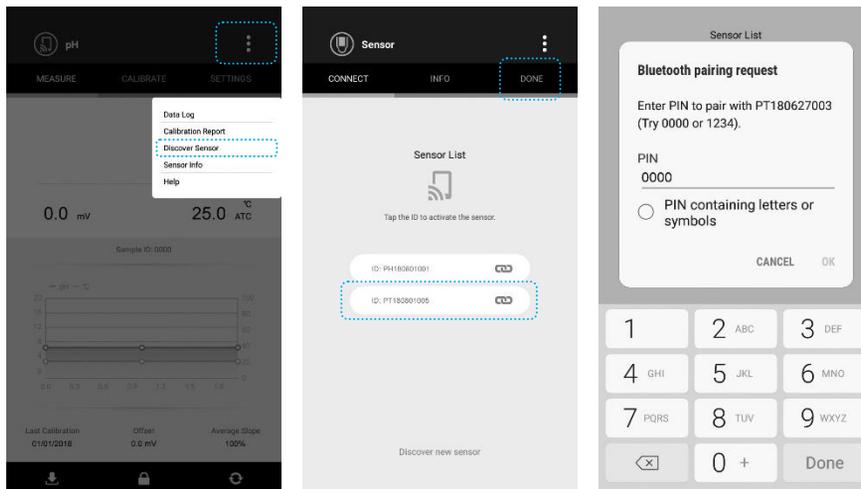


Printing the Data

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

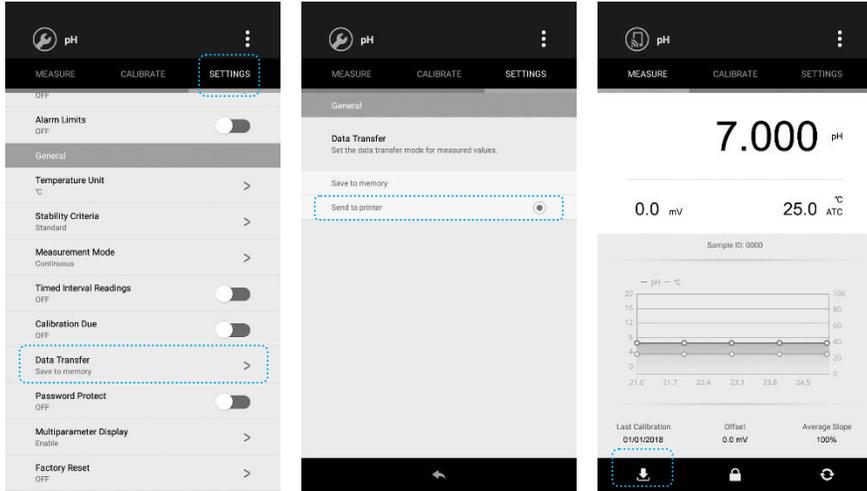
Connecting the printer

- 1.1 Switch on the printer and tap the  on the screen.
- 1.2 Tap the **Discover Sensor**, the APP will automatically search an available printer.
- 1.3 Tap the **ID: PT XXXXXXXXXXX** and wait until the connection icon  appears.
- 1.4 Tap the **Done**, the screen shows "Bluetooth pairing request" and wait for entering the PIN code.
- 1.5 Enter the 0000 and confirm, the printer will automatically print the "Printer is ready". The connection is completed.



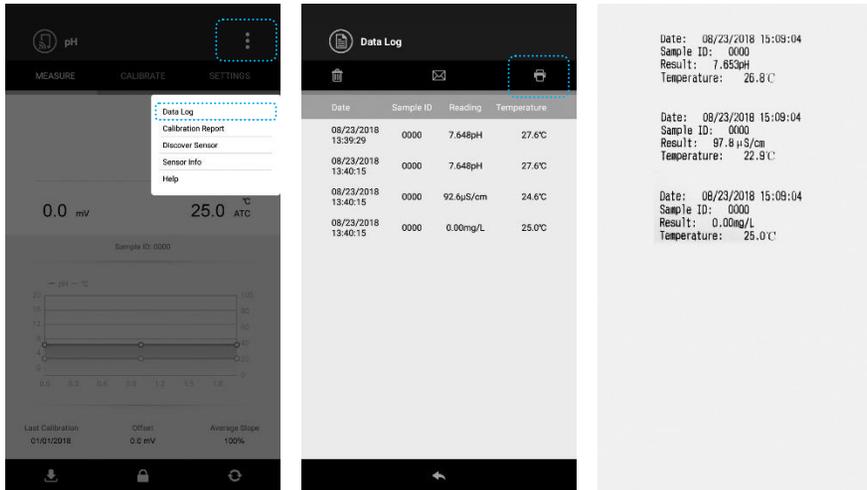
Printing the data in the measurement mode

- 2.1 Ensure that the Data Transfer option in setup menu is switched to "Send to printer".
- 2.2 Tap the  to print the displayed data.



Printing the data in the data log

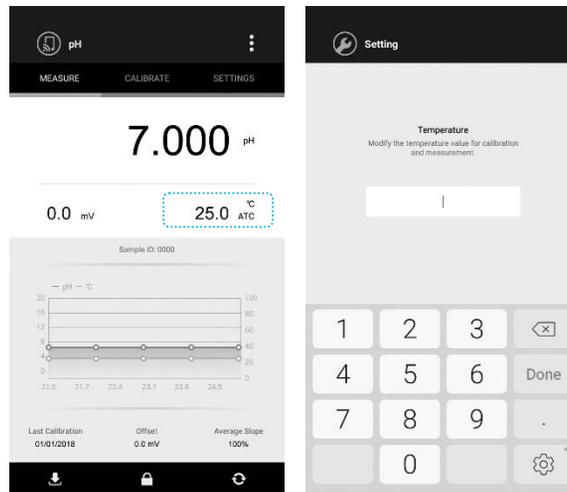
- 3.1 Tap the .
- 3.2 Tap the **Data Log**.
- 3.3 Tap the , the printer will print the all of stored data.



Temperature Calibration

The BanteLab APP contains a calibration function that used for correcting the measured temperature. During the measurement process, if the temperature reading displayed differs from that of an accurate thermometer, you need to calibrate the tester.

1. Tap the displayed temperature in the measurement mode.
2. Tap the numeric keypad to enter the temperature value.
3. Tap the **Done** and return to the measurement mode.

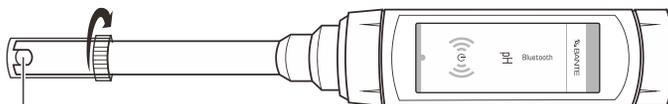


- ① If the entered value is out of range, the APP will automatically correct the temperature to 0°C or 105°C.

S10 pH Tester

Prior to Use

Remove the protective cap from the bottom of the tester. If the glass sensitive membrane has dried out, soak the electrode in 3M KCL solution for at least 30 minutes (pH adjusted to 4.0).



Glass Sensitive Membrane

Setup Menu

The BanteLab APP contains 5 menu options in the pH mode.

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	The solution temperature coefficient is used to correct the pure water samples with a conductivity of less than 30 μ S. If enabled, the readings will automatically reference to 25°C.	Off
	Sample contained the ammonia or phosphate		
	Off		
Alarm Limits	Enable	Set the high and low limit values to activate alarm. (Range: -2.000 to 20.000pH)	Disable
	Disable		

Setting the default option

1. Tap the **Settings** to enter the setup menu.
2. Tap the menu option and set the desired parameter.
3. Tap the **Measure** to return to the measurement mode.

pH Calibration

The BanteLab APP 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.

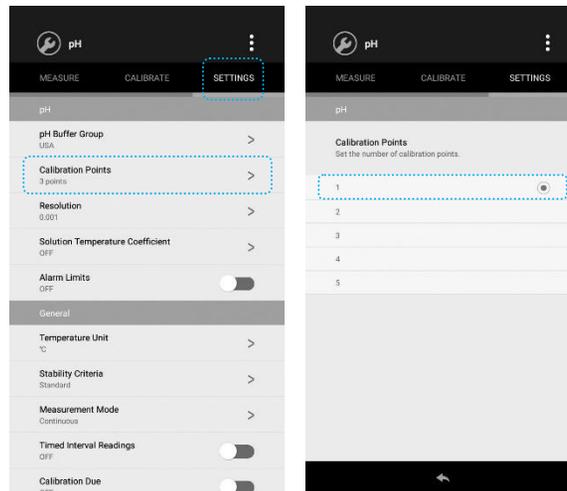
- USA Standard Buffers: pH1.68, 4.01, 7.00, 10.01, 12.45
- NIST Standard Buffers: pH1.68, 4.01, 6.86, 9.18, 12.45
- DIN Standard Buffers: pH1.09, 3.06, 4.65, 6.79, 9.23, 12.75

If the Custom option is selected, the tester will allow only 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.

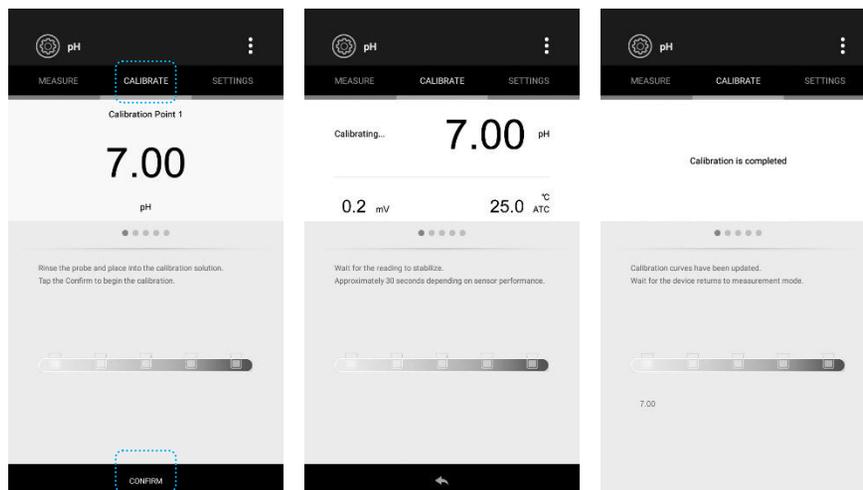
Make sure to calibrate the tester when attaching a new electrode. Do not reuse the calibration solution after calibration, contaminants in solution will affect the calibration and eventually the accuracy of the measurement.

Single point calibration

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

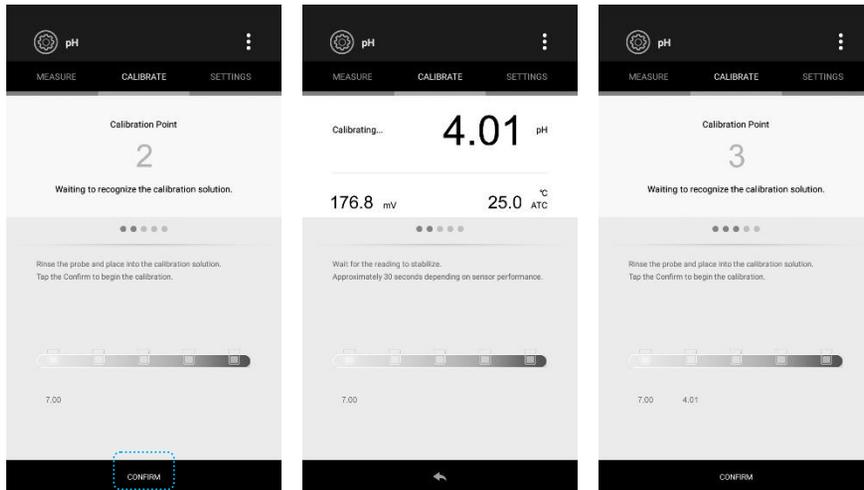


- 1.2 Tap the **Calibrate**, the screen shows “Calibration Point 1, 7.00” or 6.86, or 6.79, depending on the pH buffer group you selected.
- 1.3 Rinse the pH electrode with distilled water, place the electrode into the pH7.00 (or 6.86, or 6.79) buffer solution. The end of the electrode must be completely immersed into the calibration solution. Stir the tester gently to create a homogeneous solution.
- 1.4 Wait for 5 seconds. Tap the **Confirm**, the Calibrating... icon shows on left of the screen.
- 1.5 Wait for the mV value to stabilize, the APP automatically shows “Calibration is completed” and returns to the measurement mode.



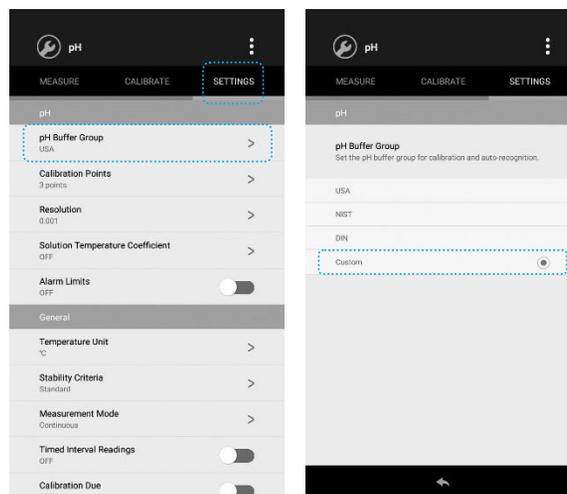
Multi-point calibration

- 2.1 Ensure that you have selected 2 to 5 points calibration in the setup menu.
- 2.2 Repeat steps 1.2 to 1.4 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.
- 2.3 Rinse the pH electrode with distilled water, place the electrode into the next buffer solution (e.g., pH4.01), stir the tester gently.
- 2.4 Wait for 5 seconds. Tap the **Confirm**, the tester automatically recognizes the current calibration solution and begins the calibration.
- 2.5 Wait for the mV value to stabilize, the screen will show "Calibration Point 3". The APP prompts you to continue with third point calibration.
- 2.6 Repeat the steps 2.3 to 2.4 above until the APP returns to the measurement mode. Calibration is completed.



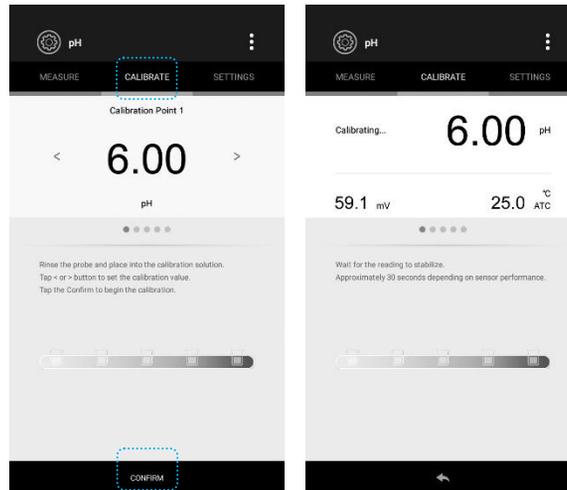
pH calibration with custom buffers

- 3.1 Ensure 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.



- 3.2 Rinse the pH electrode with distilled water, place the electrode into the custom calibration solution. Stir the tester gently and wait until the measurement is stable.

- 3.3 Tap the **Calibrate**, the tester enters the calibration mode.
- 3.4 If necessary, tap the **<** or **>** to set the calibration value.
- 3.5 Tap the **Confirm**, the tester begins the calibration.



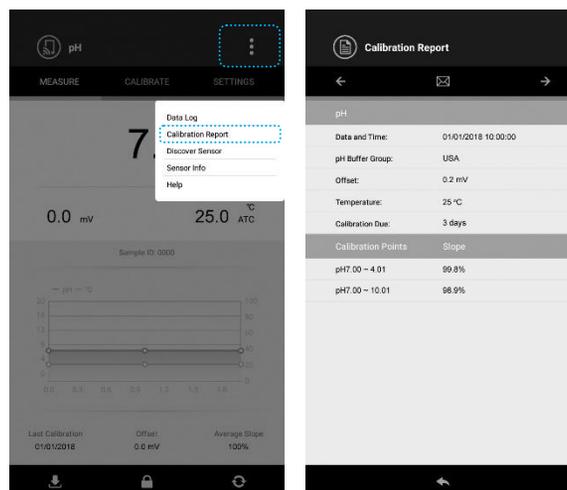
- 3.6 Wait for the mV value to stabilize, the screen will show "Calibration Points 2". The APP prompts you to continue with second point calibration.
- 3.7 Repeat steps 3.4 to 3.5 above until the APP returns to the measurement mode. Calibration is completed.

① If you want to exit the calibration mode, tap the **Measure** or **←**.

Viewing the Calibration Report

The BanteLab APP provides a detailed report for pH calibration. If the custom buffers used in the last pH calibration, the calibration report will not be available.

1. Tap the **⋮**.
2. Tap the **Calibration Report**, the screen shows the updated calibration information.



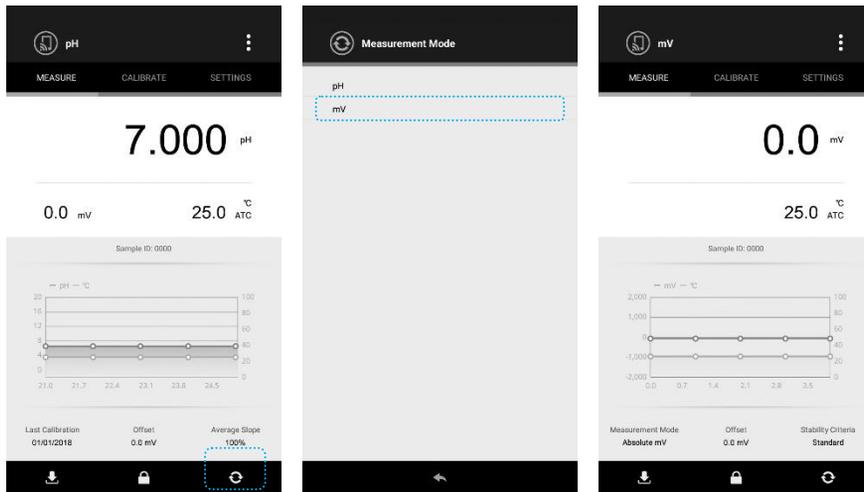
- ① If the electrode slope is less than 70% or greater than 110%, please check the pH electrode and ensure the pH buffers are fresh and uncontaminated. If the calibration solutions are in the good condition, you should consider replacing the pH electrode.

pH Measurement

1. If necessary, tap the **Measure**.
2. Rinse the pH electrode with distilled water to remove any impurities adhering to the probe body.
3. Place the electrode into the sample solution, stir the tester gently. Record the measured value when the reading is stable.

mV Measurement

1. Tap the  and select the **mV** measurement mode.
2. Rinse the electrode with distilled water.
3. Place the electrode into the sample solution, stir the tester gently. Record the measured value when the reading is stable.



Electrode Maintenance

Since pH electrode is susceptible to dirt and contamination, clean as necessary depending on the extent and condition of use.

- After measuring: rinse the electrode in distilled water, store the electrode into the 3M KCL solution.
- Salt deposits: soak the electrode in warm tap water to dissolve deposits, then thoroughly rinse with distilled water.
- Oil or Grease film: wash the glass sensitive membrane of electrode gently in some detergents and water. If necessary, using the alcohol to clean the sensitive membrane, then rinse with distilled water. Place the electrode in the 3M KCL solution for at least 30 minutes.
- Clogged reference junction: heat a diluted KCl solution to 50°C or 60°C. Place the electrode into the heated solution for about 10 minutes. Allow the electrode to cool in some unheated KCl solution.
- Protein deposits: prepare a 1% pepsin solution in 0.1M of HCL. Place the electrode in the solution for 10 minutes. Rinse the electrode with distilled water.

Rectivating the pH electrode

If stored and cleaned properly, the electrode should be ready for immediate use. However, a dehydrated sensitive membrane may cause sluggish response. To rehydrate the sensitive membrane, immerse the electrode in a pH4.01 buffer solution for 10 to 30 minutes. If this fails, the electrode requires activation.

1. Soak the electrode in 0.1M HCl for 5 minutes.
2. Remove and rinse with deionized water, then place in 0.1M NaOH for 5 minutes.
3. Remove and rinse again, and soak in 3M KCL solution for at least 30 minutes.

Addendum: Preparation of pH Buffer Solutions

Bante Instruments provides 3 buffer packets required for pH calibration (Order code: PHR-USA).

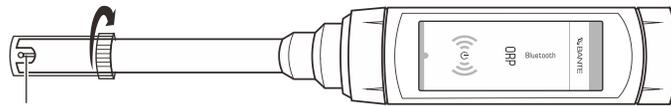
_____	_____	_____
pH Buffer 1	pH Buffer 2	pH Buffer Powder
pH10.01	pH7.00	pH4.01 @25°C
_____	_____	_____
250ml	250ml	250ml
_____	_____	_____

- Open the pH7.00 buffer packet, place the reagent into a 250ml volumetric flask. Pour the distilled water 250ml to scale line, mix the solution until the reagent is completely dissolved.
- Preparation of pH4.01 and 10.01 standard buffer solutions are the same as above. Prepared standard buffer solutions should be stored in hermetically sealed glass containers.

S20 ORP Tester

Prior to Use

Remove the protective cap from the bottom of the tester. If the platinum sensing element has dried out, soak the electrode in 4M KCL solution for at least 20 minutes.



Platinum sensing element

Setup Menu

The BanteLab APP contains 2 menu options in the ORP mode.

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. (Range: -2000 to 2000mV)	Disable
	Disable		

Setting the default option

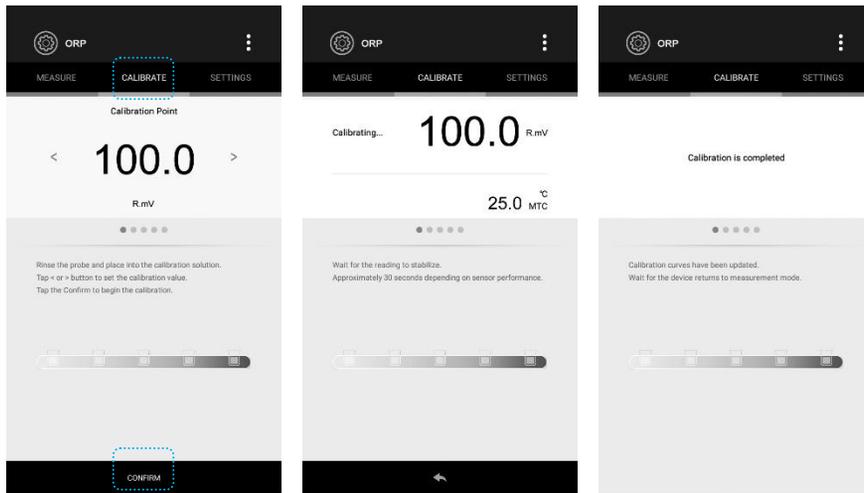
1. Tap the **Settings** to enter the setup menu.
2. Tap the menu option and set the desired parameter.
3. Tap the **Measure** to return to the measurement mode.

ORP Calibration

The BanteLab APP 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.

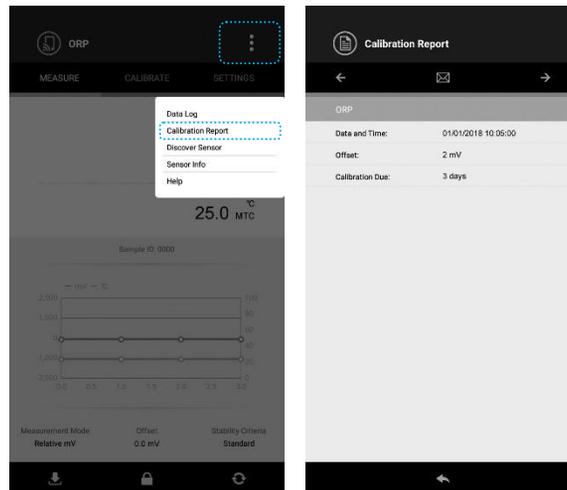
1. Tap the  and select the ORP measurement mode.
2. Rinse the ORP electrode with distilled water, place the electrode into the calibration solution. Stir the tester gently and wait until the measurement is stable.
3. Tap the **Calibrate**, the tester enters the calibration mode.
4. If necessary, tap the **<** or **>** to set the calibration value.
5. Tap the **Confirm**, the tester begins the calibration.
6. Wait for the mV value to stabilize, the APP automatically shows "Calibration is completed" and returns to the measurement mode.

 If you want to exit the calibration mode, tap the **Measure** or .



Viewing the Calibration Report

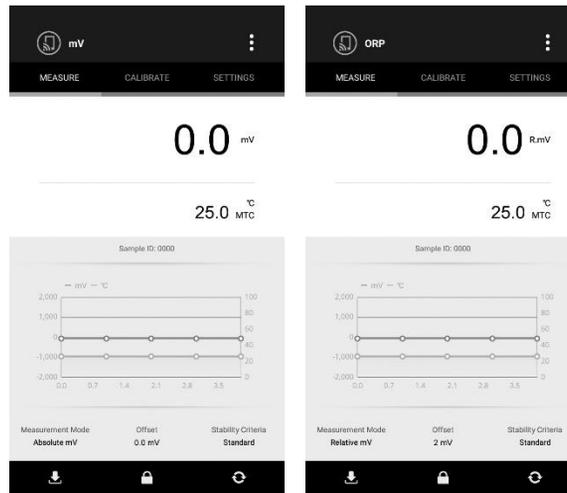
1. Tap the .
2. Tap the **Calibration Report**, the screen shows the updated calibration information.



ORP Measurement

The BanteLab APP contains two millivolt measurement modes.

- Absolute millivolt:
Tap the  and select the **mV**, the tester is now enters the absolute millivolt measurement mode.
- Relative millivolt:
Tap the  and select the **ORP**, the tester enters the relative millivolt measurement mode.
- Select one of the above modes. Place the ORP electrode into the sample solution, stir the tester gently. Record the measured value when the reading is stable.



Electrode Maintenance

- Ensure that the ORP electrode is thoroughly washed with distilled water after use.
- In aggressive chemicals, dirty or viscous solutions, and solutions with heavy metals or proteins, take readings quickly and rinse electrode immediately.
- If you do not use the electrode for long periods, store the electrode with 4M KCL solution.

Cleaning the electrode

Contamination of the platinum sensing element often results in slow response and inaccurate readings. If necessary, clean the element by one of the following procedures.

Inorganic Deposits:

- 1.1 Soak the ORP electrode in 0.1M HCl for 10 minutes.
- 1.2 Remove and rinse with distilled water, then place in alcohol for 5 minutes.
- 1.3 Remove and rinse again, and soak in pH4.01 buffer solution for 15 minutes.

Oil and Grease Films:

- 2.1 Wash the electrode gently in some detergents and water.
- 2.2 Soak the electrode in the 4M KCL solution for at least 30 minutes.

Addendum: Preparation of ORP Standard Solutions

- Add 3 grams of quinhydrone to 500ml buffer pH4.01 and stir for 15 minutes. Un-dissolved quinhydrone powder must be present.
Potential @ 25°C = + 263mV (±10mV)
- Add 3 grams of quinhydrone to 500ml buffer pH7.00 and stir for 15 minutes. There must be an excess of undissolved quinhydrone powder.
Potential @ 25°C = + 87mV (±10mV)

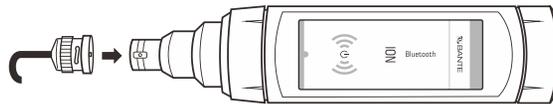
S30 Ion Tester

Prior to Use

Remove the protective cap from the bottom of the ion selective electrode. Soak the electrode in the 100ppm standard solution for at least 20 minutes.

Connecting the Electrode

Insert the connector of electrode into the BNC connector socket on the tester. Rotate and push the connector clockwise until it locks. After the connection is completed, DO NOT pull on the cable. Always make sure that the connector is clean and dry.



Setup Menu

The Bantelab APP contains 5 menu options in the ion mode.

Menu	Options	Description	Default
Electrode Type	1	Set the electrode type and the storage location of slope.	1
	2		
	3		
Measurement Mode	Direct Reading	Set the default ion concentration measurement method.	Direct Reading
	Known Addition		
	Known Subtraction		
	Sample Addition		
	Sample Subtraction		
Concentration Unit	ppm	Set the displayed measurement unit.	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. (Range: 0 to 30000)	Disable
	Disable		

Setting the default option

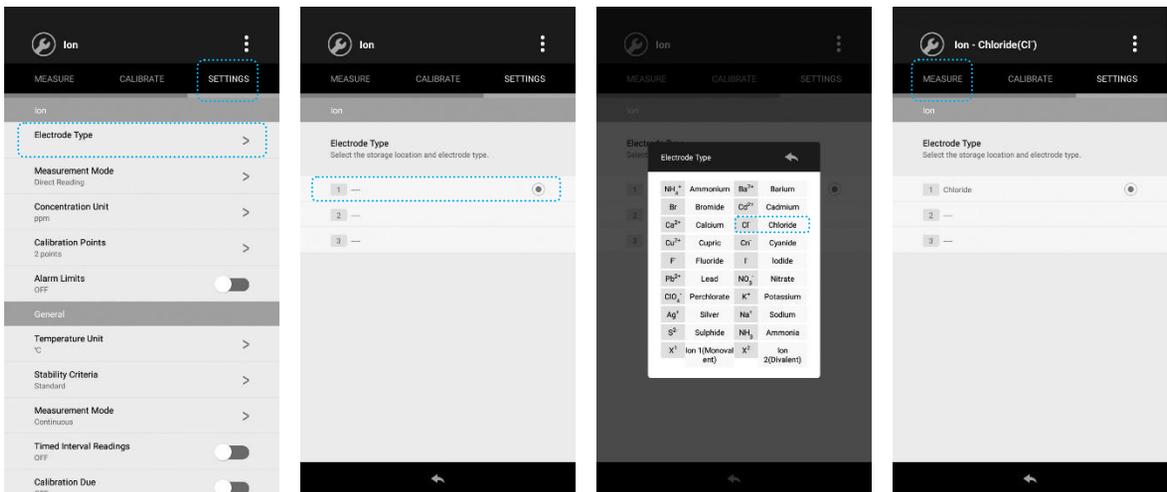
1. Tap the **Settings** to enter the setup menu.
2. Tap the menu option and set the desired parameter.
3. Tap the **Measure** to return to the measurement mode.

Electrode Type and Storage Location

The BanteLab APP reserves 3 storage locations for storing the slope of ion selective electrodes. For example, you selected the storage location 1 and using the fluoride ion electrode to calibrate the tester. Selecting the storage location 2 and using the chloride ion 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 storage location will be 1, the electrode type will show “Ion”.

Setting the electrode type

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



Ion Concentration Calibration

The BanteLab APP is capable of 2 to 5 points ion calibration with standard solutions, available calibration points include the following options.

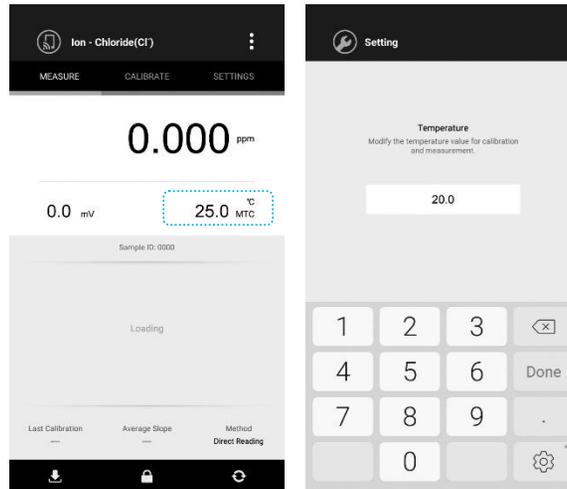
Measurement Unit	Calibration Points
ppm	0.001, 0.01, 0.1, 1, 10, 100, 1000, 10000
mg/L	0.001, 0.01, 0.1, 1, 10, 100, 1000, 10000
mol/L	0.001, 0.01, 0.1, 1, 10
mmol/L	0.001, 0.01, 0.1

In order to get accurate measurement results, we recommend that adding the Ionic Strength Adjuster (ISA) to all standard solutions and samples. A typical addition would be 2ml ISA to 100ml of standard and sample.

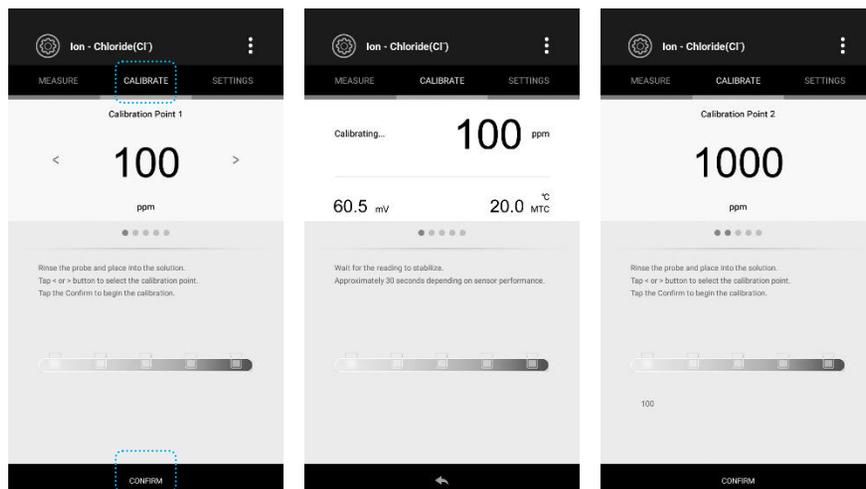
If the tester has not been calibrated or the measurement unit has converted from ppm (or mg/L) to mol/L (or mmol/L), the screen will always show “Could not find the electrode slope” and waits for calibrating the tester.

Calibrating the tester

1. Ensure that you selected standard solutions cover the anticipated range of the samples.
2. Use an accurate thermometer to measure the temperature of standard solution.
3. Tap the displayed temperature in the measurement mode and enter the temperature value.
4. Tap the **Done**.



- ① If the screen shows “Could not find the electrode slope”, tap the **Exit**, then tap the displayed temperature and set the temperature value. The value will automatically convert to setting value in the calibration mode.
5. Tap the **Calibrate**, the screen shows “Calibration Point 1, 100ppm”.
 6. If necessary, tap the **<** or **>** to select the calibration point. The tester will automatically perform the calibration from the low to high concentrations.
 7. Rinse the ion selective electrode with distilled water, then rinse with a small amount of standard solution.
 8. Place the electrode into corresponding standard solution (e.g., 100ppm), stir the electrode gently to create a homogeneous solution.
 9. Tap the **Confirm**, the tester begins the calibration.
 10. Wait for the mV value to stabilize, the screen will show “Calibration Point 2, 1000ppm”. The APP prompts you to continue with second point calibration.

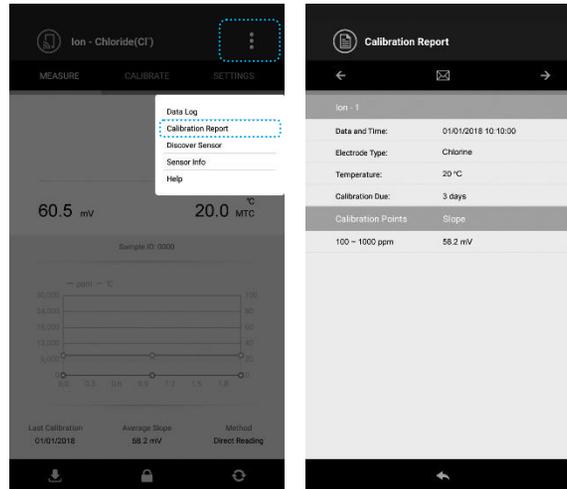


11. Repeat steps 7 to 9 above until the screen shows "Calibration is completed", the APP will automatically return to the measurement mode.

① If you want to exit the calibration mode, tap the **Measure** or .

Viewing the Calibration Report

1. Tap the .
2. Tap the **Calibration Report**, the screen shows the updated calibration information.



Ion Concentration Measurement

The BanteLab APP contains the direct reading method and 4 incremental methods for the ion concentration measurements. Available incremental methods include the 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.

The Ionic Strength Adjuster is used to adjust the pH and ionic strength of the sample and minimise the interferences. For the low concentration sample, adding the ISA to sample and using the plastic beaker are necessary.

If you want to use the different ion selective electrodes during the measurement, ensure that these electrodes have been calibrated and you have labeled the electrode type at the storage location (Refer to page 21 "Electrode Type and Storage Location"). When the electrode is replaced, tap the corresponding electrode type in the setup menu, the APP will automatically recall the stored electrode slope, the tester does not need to recalibrate.

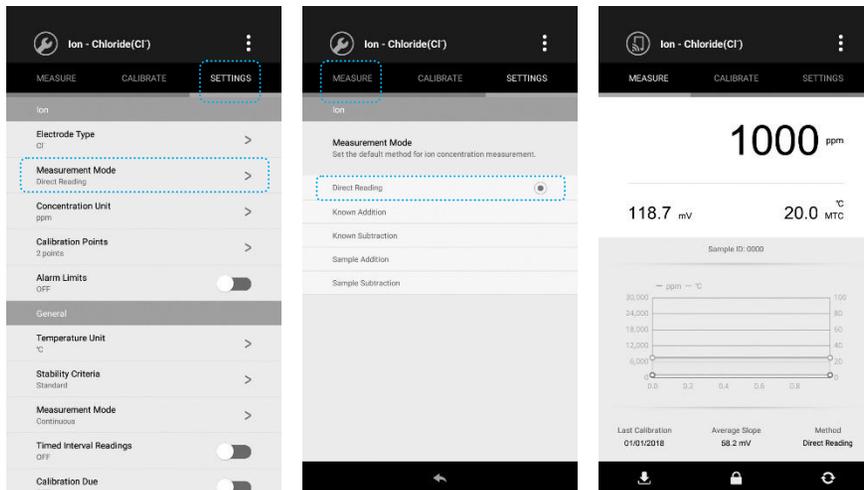
Manual temperature compensation

For better accuracy, we recommend that the standard solutions and samples should be measured at the same temperature, the maximum error should be controlled within the 1°C. If the temperature of sample deviates from the standard solution, you must enable the manual temperature compensation.

1. Use a thermometer to measure the temperature of sample.
2. Tap the displayed temperature in the measurement mode and enter the temperature value.
3. Tap the **Done** to return to the measurement mode.

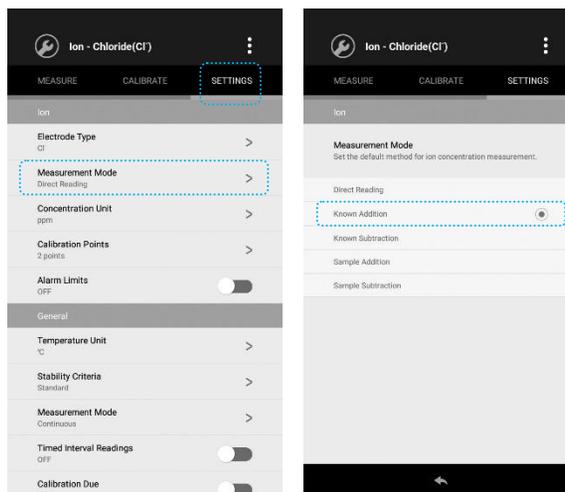
Direct reading method

- 1.1 If necessary, tap the **Settings**, then tap the **Measurement Mode** to select the **Direct Reading**.
- 1.2 Tap the **Measure**, the APP return to the measurement mode.
- 1.3 Rinse the ion selective electrode thoroughly with distilled water and place the electrode into the sample.
- 1.4 If necessary, add the Ionic Strength Adjuster to the sample (e.g., 2ml ISA to 100ml of sample).
- 1.5 Stir the electrode gently. Record the measured value when the reading is stable.



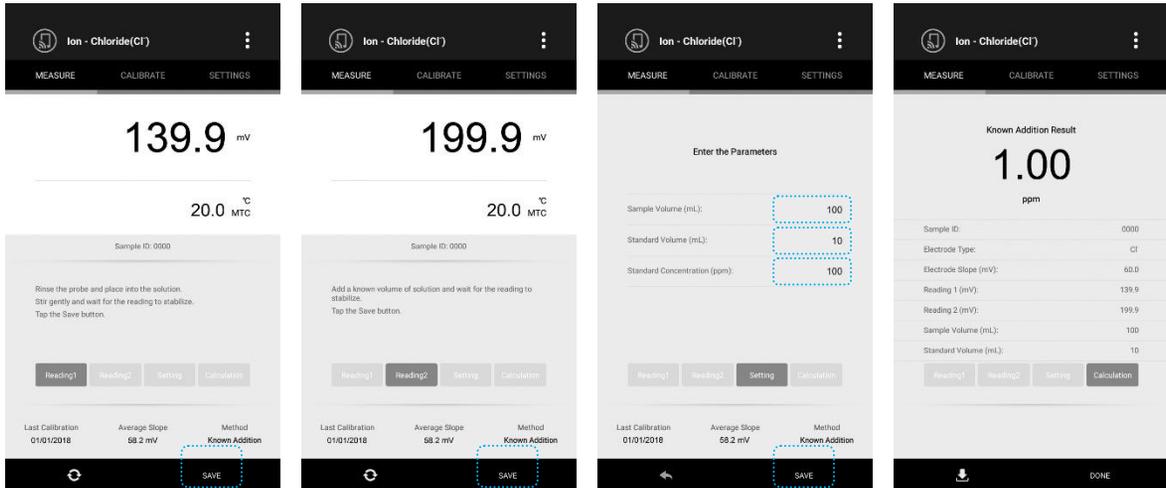
Known addition method

- 2.1 Tap the **Settings**, then tap the **Measurement Mode** to select the **Known Addition** method.



- 2.2 Tap the **Measure**, the tester begins to measure the first mV value, the indicator "Reading 1" shows on the screen.
- 2.3 Rinse the ion selective electrode thoroughly with distilled water and place the electrode in a known volume of sample, stir the electrode gently.
- 2.4 Wait for the reading to stabilize, tap the **Save** to store the reading 1. The tester begins to measure the second mV value, the indicator "Reading 2" shows on the screen.

- 2.5 Add a known volume of standard solution to the sample and stir the electrode gently. Wait for the reading to stabilize, tap the **Save**, the screen shows a parameter list and waits for user to enter the sample volume, stand volume and standard concentration.
- 2.6 Tap and enter the parameters above.
- 2.7 Tap the **Save**, the APP automatically calculates and shows the known addition result. The measurement is completed.
- 2.8 Tap the **Done**, the tester will take a new measurement.



Known subtraction method

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 Tap the **Settings**, then tap the **Measurement Mode** to select the **Known Subtraction** method.
- 3.2 Repeat the steps 2.2 to 2.7 above until the screen shows the known subtraction result.

Sample addition method

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

- 4.1 Tap the **Settings**, then tap the **Measurement Mode** to select the **Sample Addition** method.
- 4.2 Tap the **Measure**, the tester begins to measure the first mV value, the indicator "Reading 1" shows on the screen.
- 4.3 Rinse the ion selective electrode thoroughly with distilled water and place the electrode in a known volume of the standard solution, stir the electrode gently.
- 4.4 Wait for the reading to stabilize, tap the **Save** to store the reading 1. The tester begins to measure the second mV value, the indicator "Reading 2" shows on the screen.
- 4.5 Add a known volume of sample solution to the standard solution and wait for the reading to stabilize.
- 4.6 Tap the **Save**, the screen shows a parameter list and waits for user to enter the sample volume, stand volume and standard concentration.
- 4.7 Tap and enter the parameters above.
- 4.8 Tap the **Save**, the APP will automatically calculates and shows the sample addition result. The measurement is completed.
- 4.9 Tap the **Done**, the tester will take a new measurement.

Sample subtraction method

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

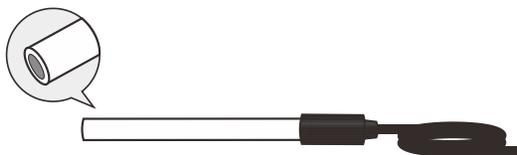
- 5.1 Tap the **Settings**, then tap the **Measurement Mode** to select the **Sample Subtraction** method.
- 5.2 Repeat the steps 4.2 to 4.7 above until the screen shows the sample subtraction result.

mV Measurement

1. Tap the  and select the **mV** measurement mode.
2. Rinse the ion selective electrode with distilled water.
3. Place the electrode into the sample solution, stir the electrode gently. Record the measured value when the reading is stable.

Electrode Maintenance

- Ensure that the ion selective electrode is thoroughly washed with distilled water after use.
- DO NOT scratch the sensitive membrane on electrode.
- If you do not use the electrode for long periods, store the electrode in a dry, cool and well-ventilated area.



Addendum 1: Ion Selective Electrode Selection Guide

The S30 tester is capable of connecting a variety of the ion selective electrodes. The following table shows the selectable electrodes and measuring ranges.

Order Code	Ion Type	Range
F-US	Fluoride (F ⁻)	0.02ppm~Saturation
CL-US	Chloride (Cl ⁻)	1.8~35500ppm
Br-US	Bromide (Br ⁻)	0.4~79900ppm
Cn-US	Cyanide (Cn ⁻)	0.2~260ppm
Na-US	Sodium (Na ⁺)	0.1~23000ppm
NO3-US	Nitrate (NO ₃ ⁻)	0.4~62000ppm
Ca-US	Calcium (Ca ²⁺)	0.02~40000ppm
NH4-US	Ammonium (NH ₄ ⁺)	0.1~18000ppm
Cd-US	Cadmium (Cd ²⁺)	0.01~11200ppm
Cu-US	Cupric (Cu ²⁺)	0.006~6400ppm
I-US	Iodide (I ⁻)	0.06~127000ppm
Pb-US	Lead (Pb ²⁺)	0.2~20700ppm
K-US	Potassium (K ⁺)	0.04~39000ppm
Ag-US	Silver (Ag ⁺)	0.01~107900ppm
S-US	Sulphide (S ²⁻)	0.003~32100ppm
NH3-US	Ammonia (NH ₃)	0.02~17000ppm

Addendum 2: Preparation of Ion Standard Solutions (1000ppm)

1. To prepare these standard solutions, half fill a 1 liter volumetric flask with distilled water and add the analytical grade reagent listed in the table.
2. Swirl the flask gently to dissolve the reagent and fill to the mark with distilled water.
3. Cap the flask and upend several times to mix the solution.

Ion Type	Reagent	Weight
Fluoride (F ⁻)	Sodium Fluoride	2.21g
Chloride (Cl ⁻)	Sodium Chloride	1.65g
Bromide (Br ⁻)	Sodium Bromide	1.29g
Cyanide (Cn ⁻)	Sodium Cyanide	1.88g
Sodium (Na ⁺)	Sodium Chloride	2.542g
Nitrate (NO ₃ ⁻)	Sodium Nitrate	1.37g
Calcium (Ca ²⁺)	Calcium Chloride	3.67g
Ammonium (NH ₄ ⁺)	Ammonium Chloride	2.97g
Cadmium (Cd ²⁺)	Cadmium Nitrate	2.74g
Cupric (Cu ²⁺)	Copper Nitrate	3.80g
Iodide (I ⁻)	Sodium Iodide	1.18g
Lead (Pb ²⁺)	Lead Perchlorate	2.22g
Potassium (K ⁺)	Potassium Chloride	1.91g
Silver (Ag ⁺)	Silver Nitrate	1.57g
Sulphide (S ²⁻)	Sodium Sulfide	7.49g
Ammonia (NH ₃)	Ammonium Chloride	3.82g

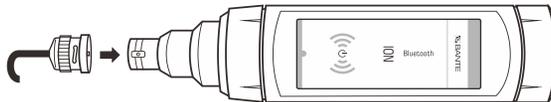
S40 Water Hardness Tester

Prior to Use

Remove the protective cap from the bottom of the water hardness electrode. Soak the electrode in the 100ppm calcium standard solution for at least 20 minutes.

Connecting the Electrode

Insert the connector of electrode into the BNC connector socket on the tester. Rotate and push the connector clockwise until it locks. After the connection is completed, DO NOT pull on the cable. Always make sure that the connector is clean and dry.



Setup Menu

The BanteLab APP contains 3 menu options in the water hardness mode.

Menu	Options	Description	Default
Measurement Unit	°dH	Set the default measurement 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. (Range: 0 to 30000)	Disable
	Disable		

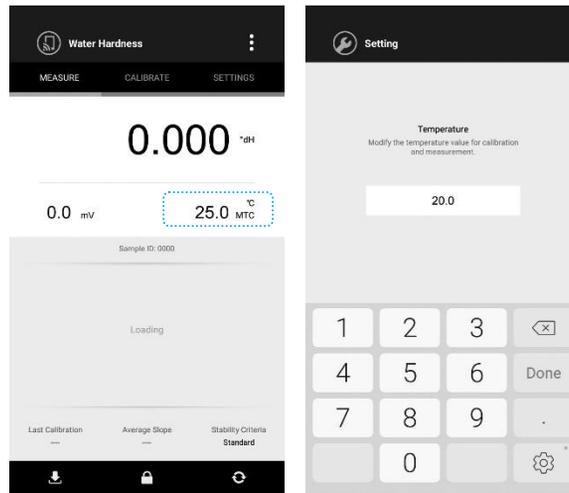
Setting the default option

1. Tap the **Settings** to enter the setup menu.
2. Tap the menu option and set the desired parameter.
3. Tap the **Measure** to return to the measurement mode.

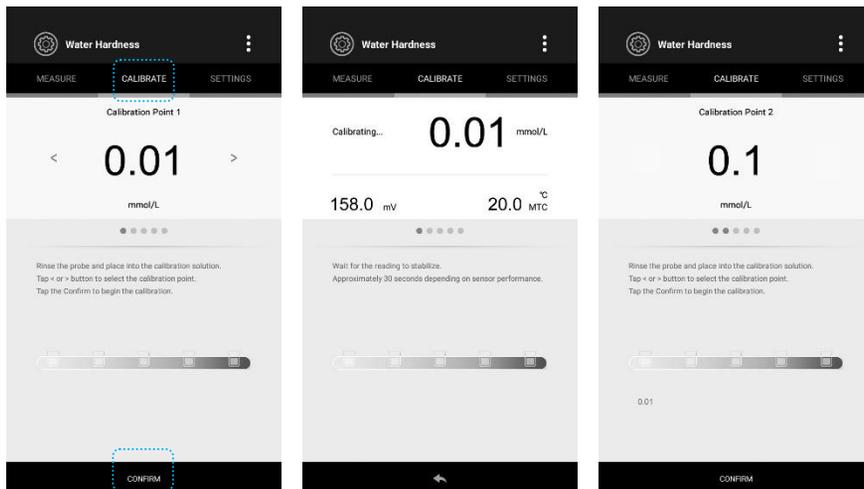
Water Hardness Calibration

The BanteLab APP is capable of 2 to 5 points calibration in the water hardness mode, available calibration points include the 0.01, 0.1, 1, 10 and 100mmol/L. During the calibration process, the tester will automatically perform the calibration from low to high concentrations.

1. Ensure that you selected standard solutions cover the anticipated range of the samples.
2. Use an accurate thermometer to measure the temperature of standard solution.
3. Tap the displayed temperature in the measurement mode and enter the temperature value.
4. Tap the **Done**.



- ① If the screen shows “Could not find the electrode slope”, tap the **Exit**, then tap the displayed temperature and set the temperature value. The value will automatically convert to setting value in the calibration mode.
5. Tap the **Calibrate**, the screen shows “Calibration Point 1, 0.01 mmol/L”.
6. If necessary, tap the **<** or **>** to select the desired calibration point.
7. Rinse the water hardness electrode with distilled water, then rinse with a small amount of standard solution.
8. Place the electrode into corresponding standard solution (e.g., 0.01 mmol/L). Stir the electrode gently to create a homogeneous solution.
9. Tap the **Confirm**, the tester begins the calibration.
10. Wait for the mV value to stabilize, the screen will show “Calibration Point 2, 0.1 mmol/L”. The APP prompts you to continue with second point calibration.

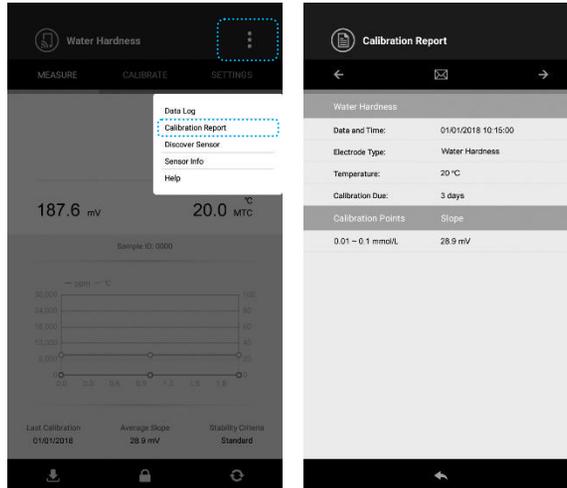


11. Repeat steps 7 to 9 above until the screen shows “Calibration is completed”, the APP will automatically return to the measurement mode.

- ① If you want to exit the calibration mode, tap the **Measure** or **←**.

Viewing the Calibration Report

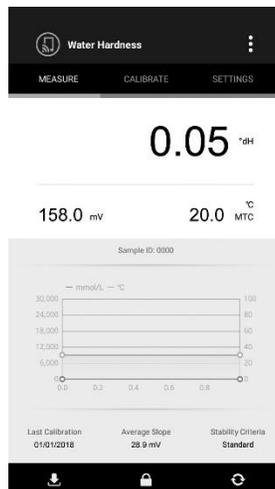
1. Tap the ⋮ .
2. Tap the **Calibration Report**, the screen shows the updated calibration information.



Water Hardness Measurement

For better accuracy, we recommend that the standard solutions and samples should be measured at the same temperature, the maximum error should be controlled within the 1°C.

1. Use a thermometer to measure the temperature of sample.
2. Tap the displayed temperature in the measurement mode and enter the temperature value.
3. Tap the **Done** to return to the measurement mode.
4. Rinse the water hardness electrode thoroughly with distilled water and place the electrode into the sample.
5. Stir the electrode gently. Record the measured value when the reading is stable.



mV Measurement

1. Tap the  and select the **mV** measurement mode.
2. Rinse the water hardness electrode with distilled water.
3. Place the electrode into the sample solution, stir the electrode gently. Record the measured value when the reading is stable.

Electrode Maintenance

- Ensure that the water hardness electrode is thoroughly washed with distilled water after use.
- DO NOT scratch the sensitive membrane on electrode.
- If performance becomes sluggish, rinse with dilute detergent, rinse with deionised water and immerse the electrode in a 1000ppm calcium solution for 1 hour.

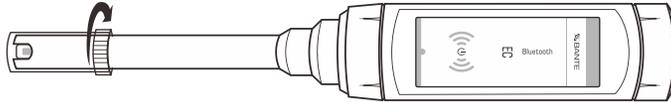
Addendum: Preparation of Water Hardness Standard Solution (0.1mol/L)

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

S50 Conductivity Tester

Prior to Use

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



Setup Menu

The BanteLab APP contains 8 menu options in the conductivity and relevant TDS, salinity, resistivity and conductivity ash modes.

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-L: 2-cell (K=0.1) 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 point
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 measurements.	Disable
	Disable		
Reference Temperature	20°C	Set the normalization temperature for measurement and calibration.	25°C
	25°C		
TDS Factor	Range: 0.01 to 1.00	Set the default TDS conversion factor.	0.50
Alarm Limits	Enable	Set the high and low limit values to activate alarm. (Range: 0µS/cm to 200mS/cm)	Disable
	Disable		



- The BanteLab APP contains 5 temperature compensation options. The linear compensation is appropriate for most samples. If the current sample is belong to the 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. If the temperature value is out of above range, the screen will show a warning.

- In the USP and EP modes, the APP will automatically sense whether the measured conductivity is greater than the permissible values according to the United States Pharmacopoeia and European Pharmacopoeia. The screen will automatically show a warning if the reading is out of range. NOTE, you must use the pure water 2-cell conductivity electrode (Order code: ECAPP-0.1) and set the Temperature Coefficient to 0%/°C.
- The pure water coefficient is used to correct the samples with a conductivity of less than 5µS/cm. If enabled, the APP will be automatically calculated and applied coefficient for ultra-pure water measurements.

Setting the default option

1. Tap the **Settings** to enter the setup menu.
2. Tap the menu option and set the desired parameter.
3. Tap the **Measure** to return to the measurement mode.

Measurement Range of Tester

The S50 conductivity tester includes 3 models, the table below describes the effective measurement ranges of each tester.

Tester	Measurement Range	Cell Constant
S50-L	0.01µS/cm to 200µS/cm	K=0.1
S50-M	10µS/cm to 20mS/cm	K=1
S50-H	100µS/cm to 200mS/cm	K=10

Conductivity Calibration

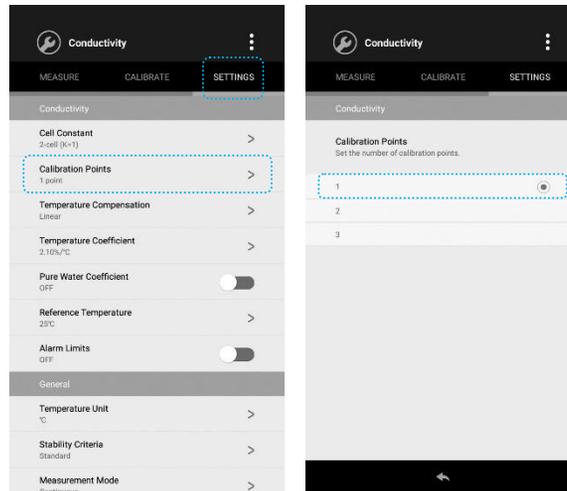
The BanteLab APP allows 1 to 3 points calibration in the conductivity mode. To ensure higher accuracy, we recommend that you perform 3 points calibration or select a standard value close to the sample value you are measuring. The tester will automatically detect these standard solutions and prompt the user to calibrate the tester. When the calibration is completed, all new calibration values will automatically override existing data.

The following table shows acceptable conductivity range of standard solution for each measurement range.

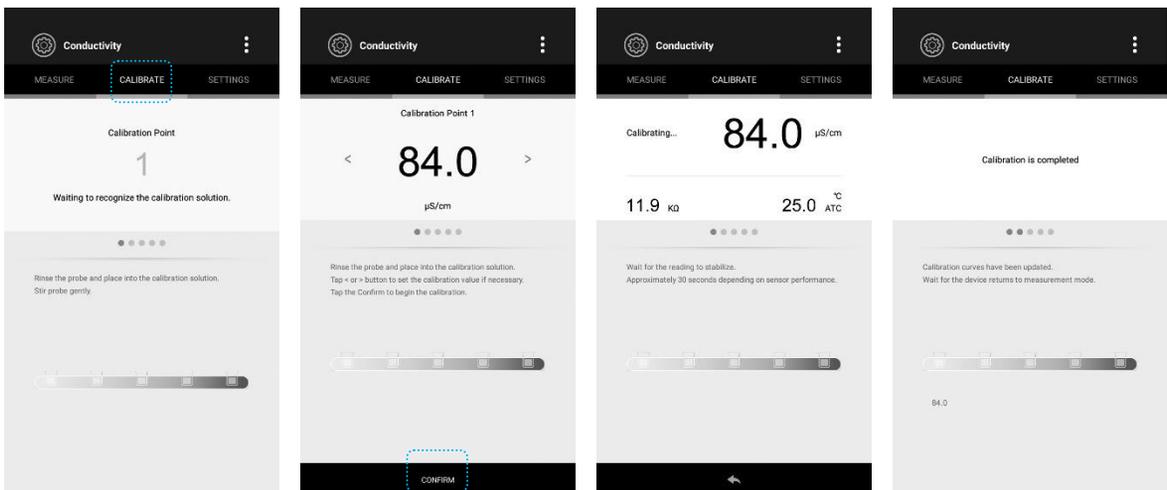
Measurement Range	Calibration Solution Range	Default
0~20µS/cm	7~17µS/cm	10µS/cm
20~200µS/cm	70~170µS/cm	84µS/cm
200~2000µS/cm	700~1700µS/cm	1413µS/cm
2~20mS/cm	7~17mS/cm	12.88mS/cm
20~200mS/cm	70~170mS/cm	111.8mS/cm

Single point calibration

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



- 1.2 Rinse the conductivity electrode with distilled water, then rinse with a small amount of standard solution.
 1.3 Tap the **Calibrate**, the screen shows “Calibration Point 1” and waits for recognizing the standard solution.
 1.4 Place the electrode into the standard solution, the screen automatically shows current calibration standard (e.g., 84 μ S/cm).
 1.5 If necessary, tap the < or > to set the calibration value.
 1.6 Wait for 5 seconds. Tap the **Confirm**, the Calibrating... icon shows on left of the screen.
 1.7 Wait for the reading to stabilize, the APP automatically shows “Calibration is completed” and returns to the measurement mode.



Multi-point calibration

- 2.1 Ensure that you have selected 2 or 3 points calibration in the setup menu.
 2.2 Repeat steps 1.2 to 1.6 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.

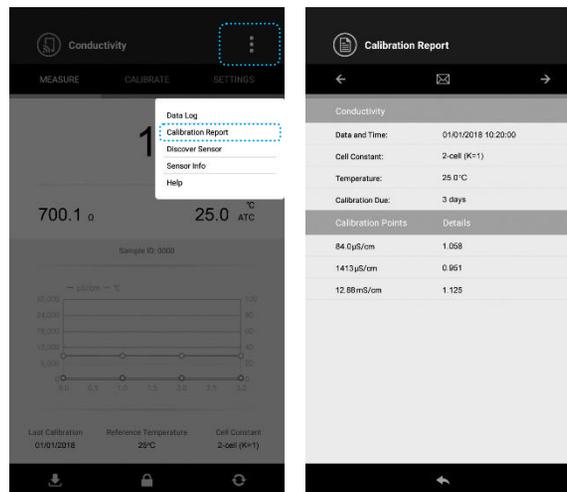
- 2.3 Rinse the conductivity electrode with distilled water. Place the electrode into the next standard solution, the screen automatically shows current calibration standard (e.g., 1413 μ S/cm).
- 2.4 If necessary, tap the < or > to set the calibration value.
- 2.5 Wait for 5 seconds. Tap the **Confirm**, the tester begins the calibration.
- 2.6 Wait for the reading to stabilize, the screen automatically shows "Calibration Point 3". The APP prompts you to continue with third point calibration.
- 2.7 Repeat the steps 2.3 to 2.5 above until the APP returns to the measurement mode. Calibration is completed.



- Performing the conductivity calibration will simultaneously calibrate the corresponding TDS, salinity, resistivity and conductivity ash value.
- If you want to exit the calibration mode, tap the **Measure** or

Viewing the Calibration Report

1. Tap the
2. Tap the **Calibration Report**, the screen shows the updated calibration information.



Conductivity/TDS/Resistivity Measurement

1. Tap the and select the desired measurement mode.
2. Rinse the conductivity electrode thoroughly with distilled water and place the electrode into the sample.
3. Stir the tester gently. Record the measured value when the reading is stable.

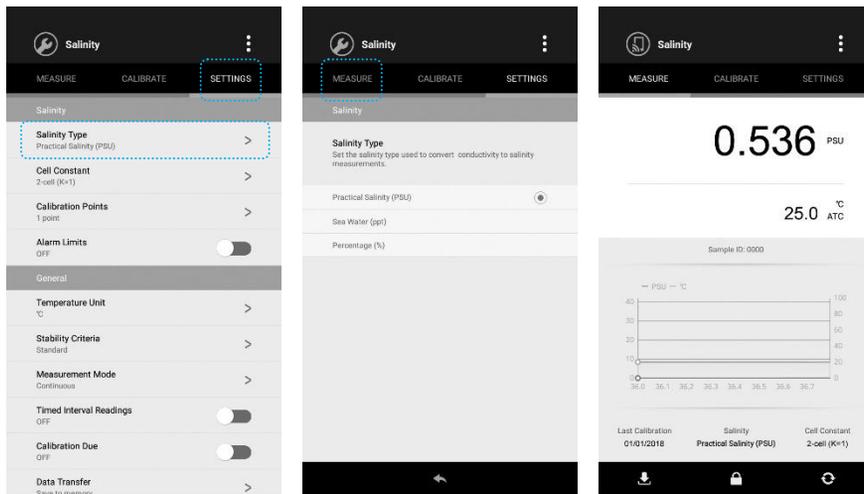


If you need to calculate the temperature coefficient and TDS factor, please refer to page 37.

Salinity Measurement

The BanteLab APP contains 3 salinity measurement modes - practical salinity (PSU), natural seawater (ppt) and percentage (%).

1. Tap the and select the **Salinity** measurement mode.
2. Tap the **Settings**, than tap the **Salinity Type** to select the desired measurement mode.
3. Rinse the conductivity electrode thoroughly with distilled water and place the electrode into the sample.
4. Stir the tester gently. Record the measured value when the reading is stable.

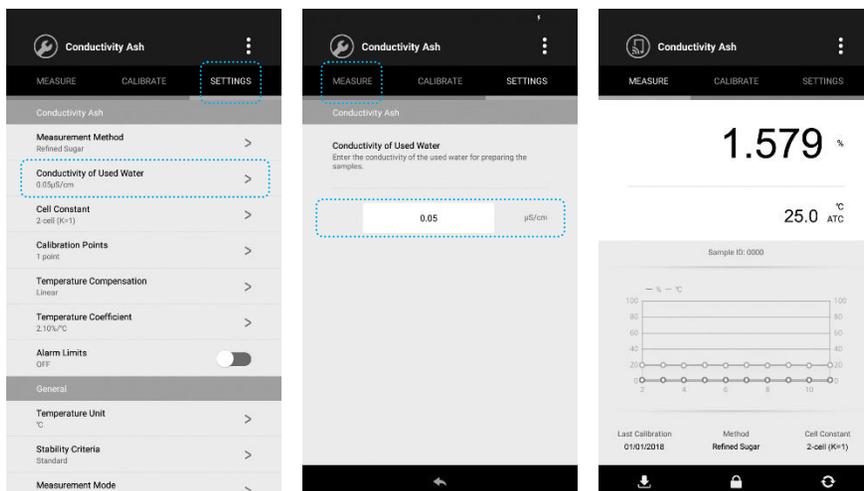


Conductivity Ash Measurement

The 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).

1. Prepare the sugar sample according to the selected ICUMSA method.
2. Tap the and select the **Conductivity Ash** measurement mode.
3. Tap the **Settings**, than tap the **Conductivity of Used Water** to set the conductivity of the used water for preparing sugar solutions (Range: 0.00 to 100.0 μ S/cm).
4. Tap the **Measure**.
5. Rinse the conductivity electrode thoroughly with distilled water.
6. Place the electrode into the sample solution, stir the tester gently. Record the measured value when the reading is stable.

① NOTE, the conductivity ash measurement can only be performed at temperature range from 15°C to 25°C. If the temperature value is out of above range, the screen will show a warning.



Electrode Maintenance

- DO NOT touch the measurement area of the conductivity electrode and always make sure that is clean.
- If there is a build-up of solids inside the measurement area, these should be removed very carefully with a cotton bud soaked in solvent, taking care not to touch the metal parts of the inner cell. After the solids are removed, the tester must be recalibrated.

Addendum 1: Preparation of Conductivity Standard Solutions

- Place AR potassium chloride reagent in a 50ml beaker and dry in an oven for 3 to 5 hours at 105°C, then cool to room temperature in the desiccator.
- Stir the solution until the reagent has thoroughly mixed.

Calibration Solutions	Reagent
84µS/cm	Accurately weigh out 42.35mg of KCL and dissolve in 1 litre deionised water.
1413µS/cm	Accurately weigh out 745.9mg of KCL and dissolve in 1 litre deionised water.
12.88mS/cm	Accurately weigh out 7.45g of KCL and dissolve in 1 litre deionised water.
111.8mS/cm	Accurately weigh out 74.5g of KCL and dissolve in 1 litre deionised water.

Addendum 2: Calculating the Temperature Coefficient

To determine the temperature coefficient of sample solution use the formula below:

$$T_c = \frac{C_{TB} - C_{TA}}{C_{TA}(T_B - 25) - C_{TB}(T_A - 25)} \times 100\%$$

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

1. In the conductivity measurement mode, set the temperature to 25°C.
2. Place the conductivity electrode into the sample solution A and record the temperature value T_A and conductivity value C_{TA} .
3. Condition the sample solution and electrode to a temperature that is about 5°C to 10 °C different from T_A .
4. Record the temperature value T_B and conductivity value C_{TB} .
5. Calculate the temperature coefficient according to the formula above.

Addendum 3: Calculating the TDS Conversion Factor

To determine the TDS conversion factor use the formula below:

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

Where:

Actual TDS: value from the high purity water and precisely weighed NaCl or KCL reagent.

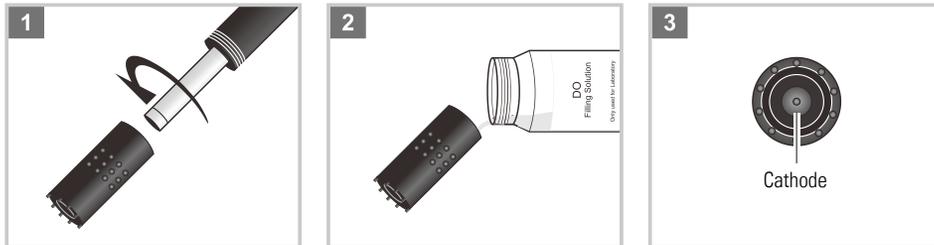
Actual Conductivity: the tester measured conductivity value.

For example: dissolve 64g of potassium chloride reagent in 1 litre distilled water. If its conductivity value is 100mS/cm, then TDS conversion factor is 0.64.

S60 Dissolved Oxygen Tester

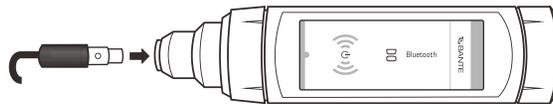
Filling the Electrolyte Solution

1. Take out the dissolved oxygen probe and electrolyte solution from the packaging. Unscrew the membrane cap.
2. Fill the membrane cap halfway with electrolyte solution.
3. Screw the membrane cap onto the probe, excess electrolyte solution will drain out.
4. Be sure the cathode of probe makes contact with membrane cap, the electrolyte solution in membrane cap should be without an air bubble.



Prior to Use

Insert the 6-pin connector of probe into the tester. Turn on the tester 10 to 15 minutes and wait for the probe to polarize.



Setup Menu

The BanteLab APP contains 6 menu options in the dissolved oxygen mode.

Menu	Options	Description	Default
Measurement Unit	mg/L	Set the default 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 the dissolved oxygen measurement.	0.01
	0.1		
Barometric Pressure	450 to 850mmHg	Set the barometric pressure coefficient.	760mmHg
	60.0 to 113.3kPa		
Salinity Coefficient	0.0 to 50.0ppt	Set the salinity coefficient of sample.	0.0ppt
Alarm Limits	Enable	Set the high and low limit values to activate alarm. (Range: 0 to 20.00mg/L or 0 to 200.0%)	Disable
	Disable		

Setting the default option

1. Tap the **Settings** to enter the setup menu.
2. Tap the menu option and set the desired parameter.
3. Tap the **Measure** to return to the measurement mode.

Barometric Pressure

The following table describes the relationship between altitude and barometric pressure. You need to set the compatible parameter according to the local altitude before the calibration or measurements.

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

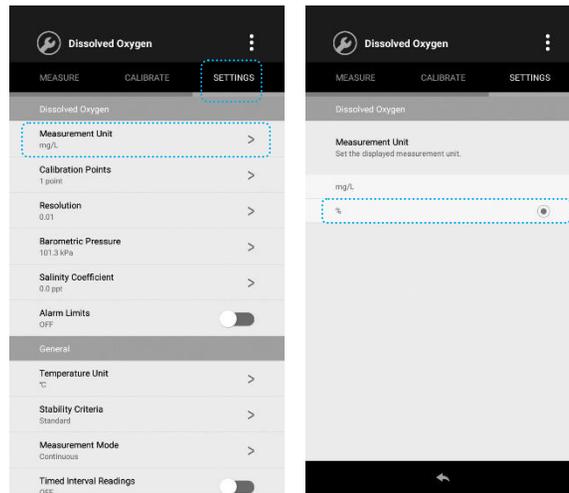
1. Tap the **Settings** to enter the setup menu.
2. Tap the **Barometric Pressure** to set the measurement unit and parameter.
3. Tap the **Measure** to return to the measurement mode.

DO Calibration in % Saturation Mode

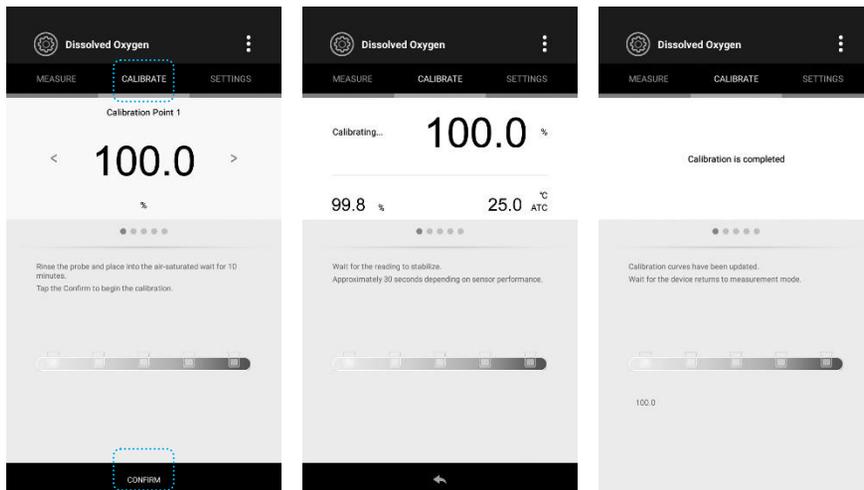
The BanteLab APP is able to perform either 1 or 2 points calibration in the dissolved oxygen mode. For single point calibration, we recommend that you perform 100% saturation calibration in the air-saturated water. If the 2 points calibration is selected, the zero oxygen solution needs to be used.

Single point calibration - 100% saturation

- 1.1 Ensure that you have selected the measurement unit “%” and 1 point calibration in the setup menu.

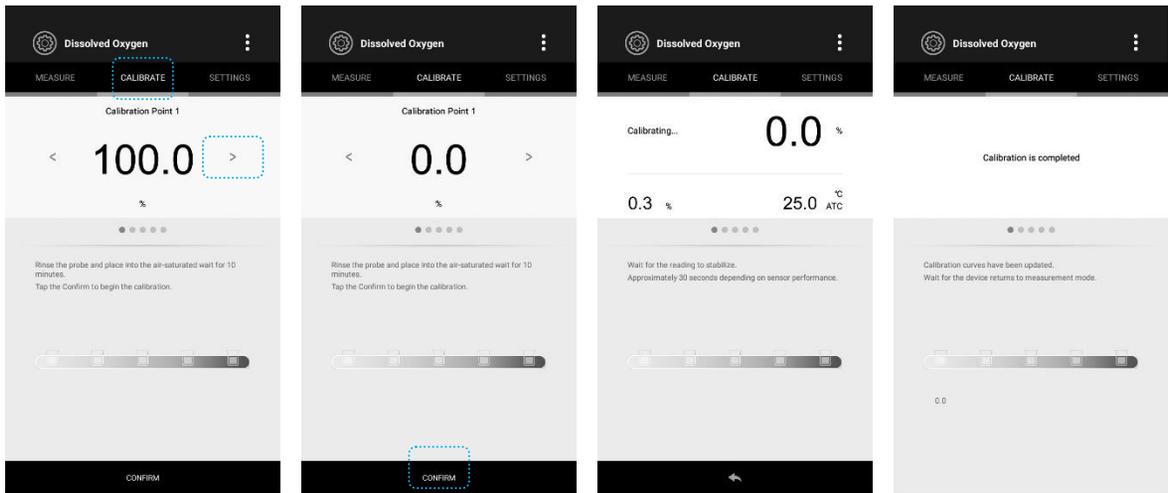


- 1.2 Hold the dissolved oxygen probe in the air at 100% relative humidity or place the probe into the air-saturated water for 15 minutes.
- 1.3 Tap the **Calibrate**, the screen shows “Calibration Point 1, 100.0%”.
- 1.4 Tap the **Confirm**, the tester begins calibration. Wait for the reading to stabilize, the screen automatically shows “Calibration is completed” and returns to the measurement mode.



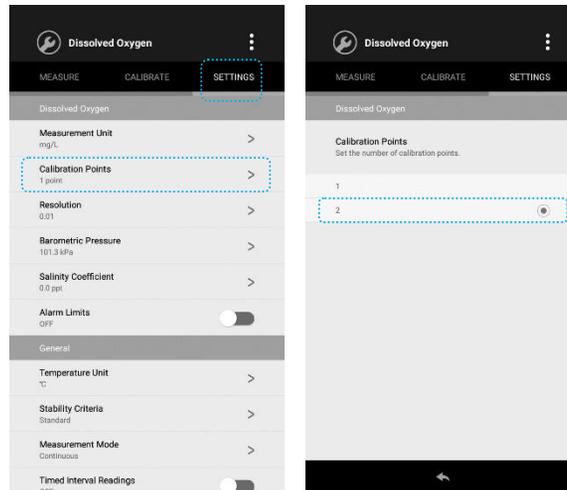
Single point calibration - zero oxygen

- 2.1 Immerse the dissolved oxygen probe into the zero oxygen solution for at least 10 minutes.
- 2.2 Tap the **Calibrate**, the screen shows “Calibration Point 1, 100.0%”.
- 2.3 Tap the < or > until the screen shows “Calibration Point 1, 0.0%”.
- 2.4 Tap the **Confirm**, the tester begins calibration. Wait for the reading to stabilize, the screen automatically shows “Calibration is completed” and returns to the measurement mode.



2 points calibration

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



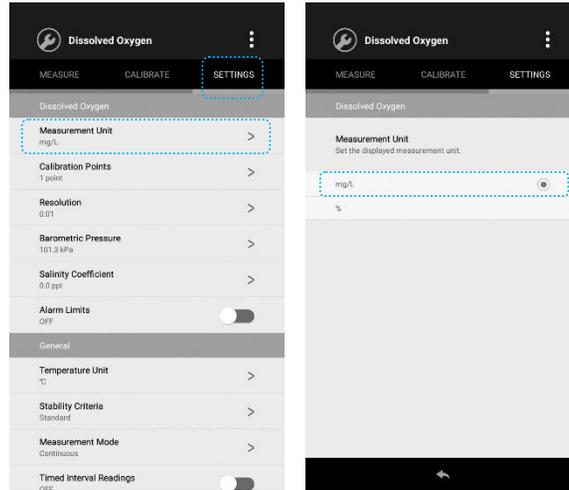
3.2 Repeat the steps 2.1 to 2.4 above. When the first calibration point is completed, the screen will show “Calibration point 2, 100.0%”.

3.3 Hold the dissolved oxygen probe in the air at 100% relative humidity or place the probe into the air-saturated water for 15 minutes. Tap the **Confirm**. Wait for the reading to stabilize, the screen automatically shows “Calibration is completed” and returns to the measurement mode.

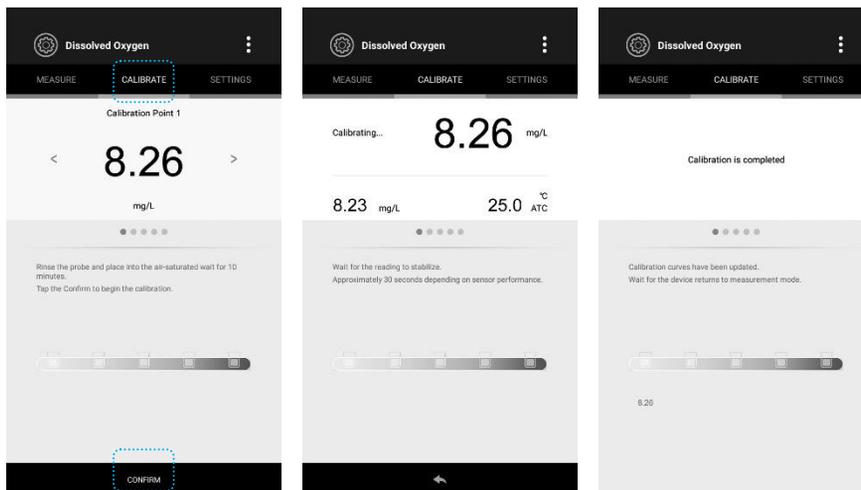
DO Calibration in mg/L Mode

Single point calibration - air-saturated water

- 1.1 Ensure that you have selected the measurement unit “mg/L” and 1 point calibration in the setup menu.



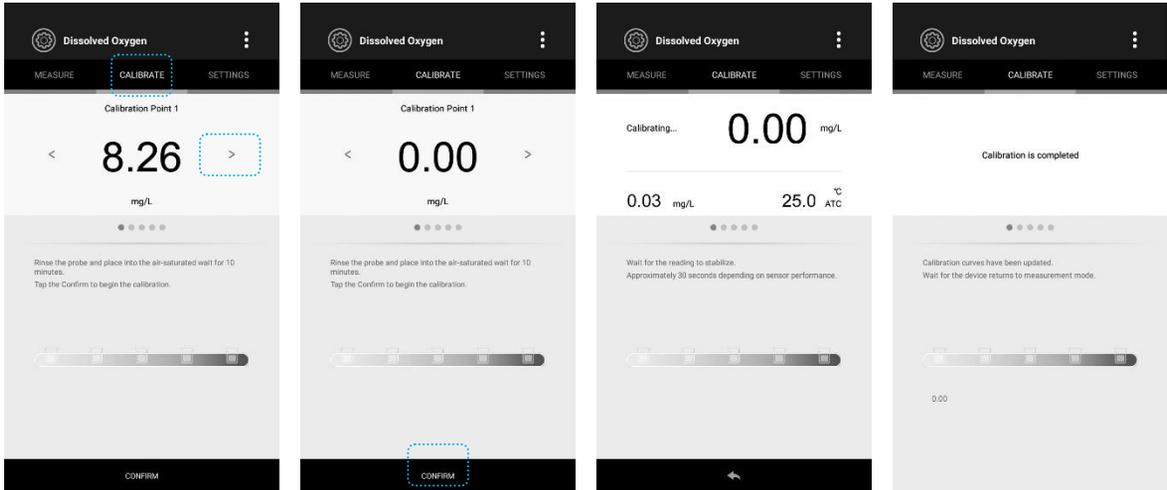
- 1.2 Place the dissolved oxygen probe into the air-saturated water for 15 minutes.
 1.3 Tap the **Calibrate**, the screen shows “Calibration Point 1, 8.26mg/L”.
 1.4 Tap the **Confirm**, the tester begins calibration. Wait for the reading to stabilize, the screen automatically shows “Calibration is completed” and returns to the measurement mode.



Single point calibration - zero oxygen

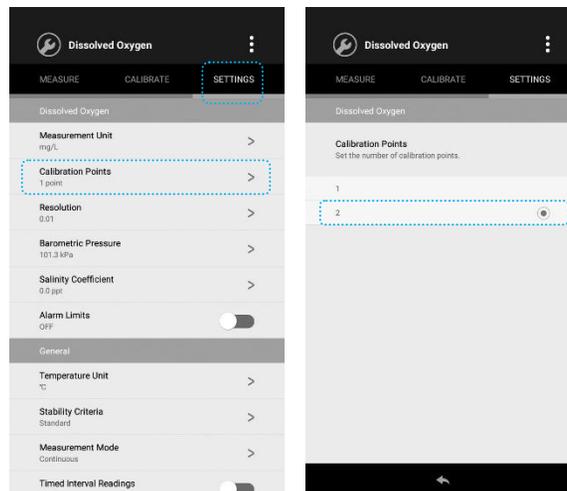
- 2.1 Immerse the dissolved oxygen probe into the zero oxygen solution for at least 10 minutes.
 2.2 Tap the **Calibrate**, the screen shows “Calibration Point 1, 8.26mg/L”.

- 2.3 Tap the **<** or **>** until the screen shows “Calibration Point 1, 0.00mg/L”.
- 2.4 Tap the **Confirm**, the tester begins calibration. Wait for the reading to stabilize, the screen automatically shows “Calibration is completed” and returns to the measurement mode.



2 points calibration

- 3.1 Ensure that you have selected the 2 points calibration in the setup menu.

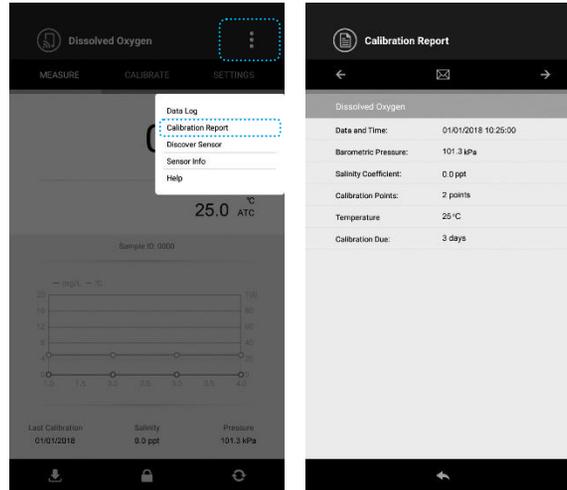


- 3.2 Repeat the steps 2.1 to 2.4 above. When the first calibration point is completed, the screen will show “Calibration Point 2, 8.26mg/L”.
- 3.3 Place the probe into the air-saturated water for 15 minutes. Tap the **Confirm**, the tester begins calibration. Wait for the reading to stabilize, the screen automatically shows “Calibration is completed” and returns to the measurement mode.

- i** If you want to exit the calibration mode, tap the **Measure** or **←**.

Viewing the Calibration Report

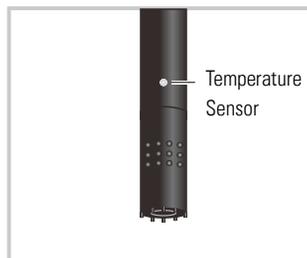
1. Tap the .
2. Tap the **Calibration Report**, the screen shows the updated calibration information.



Dissolved Oxygen Measurement

The S60 dissolved oxygen tester is suitable for measuring the water, wastewater, brine and other liquids. If the sample is belong to the seawater or other water containing large amounts of salt, please setting the salinity coefficient before measurement. Some gas and steam such as chloride, sulfur dioxide, sulfureted hydrogen, ammonium, carbon dioxide and iodine can permeate the membrane via diffusion. So their existence will influence the measurement of dissolved oxygen. If the sample contains the solvent, grease, sulfide and alga, the membrane on the probe will be blocked, damaged or eroded.

1. Connect the dissolved oxygen probe to tester and wait for 15 minutes to polarize the probe.
2. If necessary, to set the barometric pressure and salinity coefficient in the setup menu.
3. Immerse the probe in the sample solution, make sure the temperature sensor on the probe is fully immersed.
4. Stir the probe gently. Record the measured value when the reading is stable.

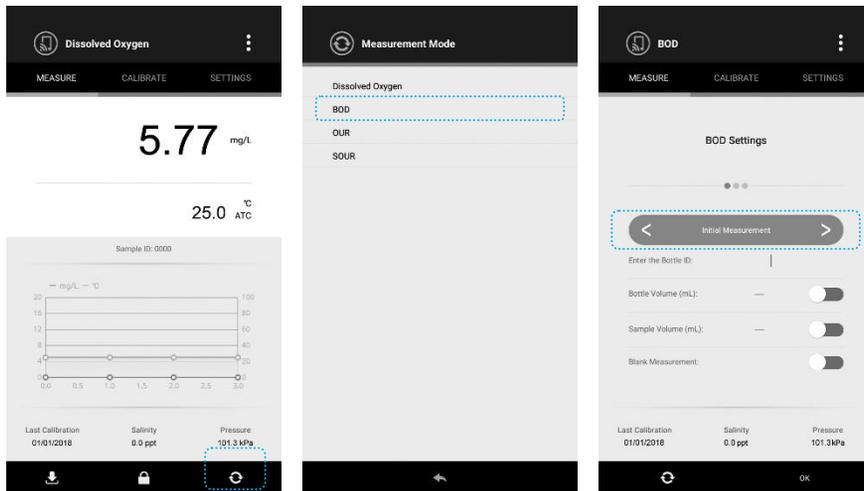


BOD Measurement

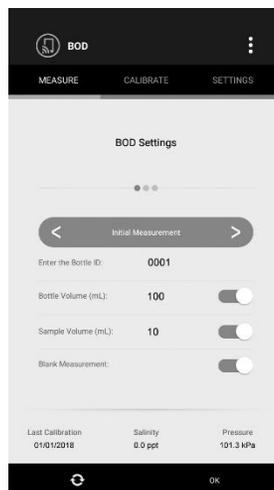
The BanteLab APP contains a BOD measurement mode. A typical process for BOD determination consists of 4 steps: sample preparation, initial measurement, incubation, final measurement.

Initial measurement

- 1.1 Tap the  and select the **BOD** measurement mode.
- 1.2 Tap the **<** or **>** to select the "Initial measurement".

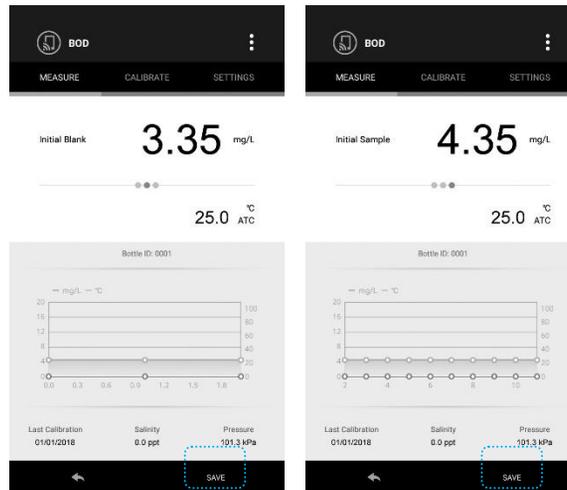


- 1.3 Tap the **Enter the Bottle ID** and set the 4-digit number.
- 1.4 If necessary, turn on the **Bottle Volume** and **Sample Volume** options and enter the values. If the blank solution need to be measured, turn on the **Blank Measurement** option as well.



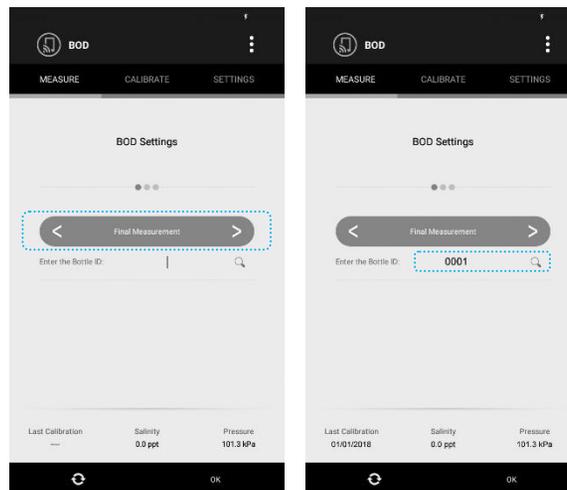
- 1.5 Tap the **OK**, the tester begins measurement.

- 1.6 If the Blank Measurement option is turned on, the “Initial Blank” indicator will show on the top left of the screen. Immerse the dissolved oxygen probe into the blank solution, stir the probe gently. Wait for the reading to stabilize, tap the **Save**. The screen will automatically switch to the Initial Sample measurement interface.
- 1.7 If the Blank Measurement option is turned off, the “Initial Sample” indicator will show on the screen. Immerse the dissolved oxygen probe into the sample, stir the probe gently. Wait for the reading to stabilize, tap the **Save** to store the measured value. Measurement is completed.

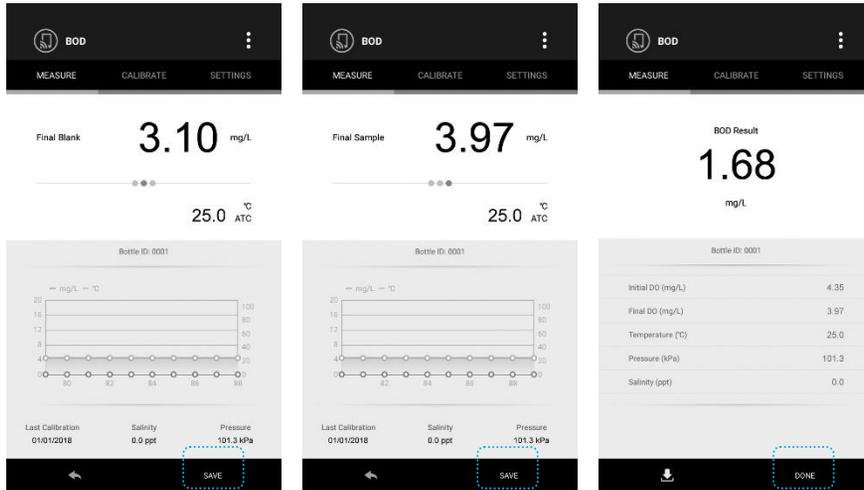


Final measurement

- 2.1 Tap the < or > to select the “Final measurement”.
- 2.2 Tap and enter the bottle ID.
- 2.3 Tap the **OK**.

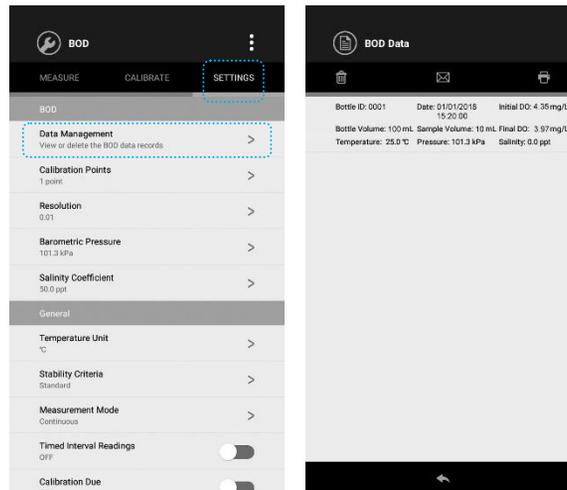


- 2.4 If the “Final Blank” indicator shows on the top left of the screen. Immerse the dissolved oxygen probe into the blank solution, stir the probe gently. Wait for the reading to stabilize, tap the **Save**. The screen will automatically switch to the Final Sample measurement interface.
- 2.5 If the “Final Sample” indicator shows on the top left of the screen. Immerse the dissolved oxygen probe into the sample, stir the probe gently. Wait for the reading to stabilize, tap the **Save**. The APP will automatically show the BOD result.
- 2.6 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**, then tap the **Data Management**, the screen will show details.



OUR/SOUR Measurement

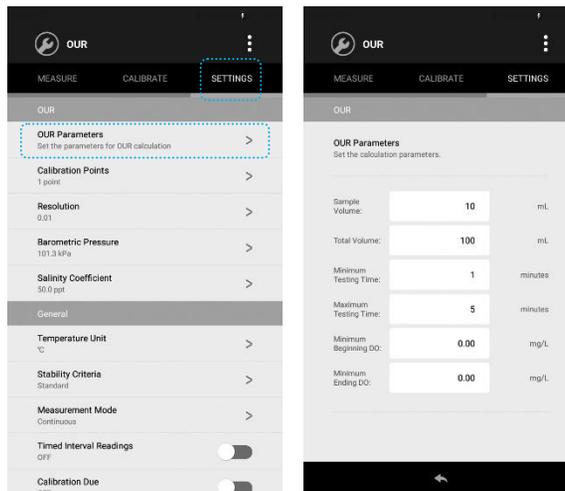
The BanteLab APP contains a function for the calculations of Oxygen Uptake Rate (OUR) and Specific Oxygen Uptake Rate (SOUR). If the SOUR measurement is selected, the APP will automatically calculate the readings and reference to 20°C. NOTE, this calculation is only valid for temperature ranges from 10 to 30°C. If the temperature value is out of this range, the screen will show a warning.

Setting the parameters

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

	Parameters	description
OUR/SOUR parameters	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 Parameters** option.
3. Tap the parameter bar and enter the value.
4. Tap the **Measure** to return to the measurement mode.



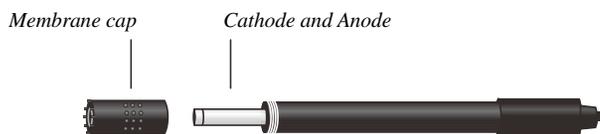
Measurement

1. Place the dissolved oxygen probe into the sample, stir the probe gently, ensure that no air bubbles are trapped.
2. Tap the **Start**, the tester begins the measurement. The screen shows the current dissolved oxygen readings.
3. When the maximum time is reached, the APP will automatically show "End" and calculated result.
4. Tap the **Done**, the tester will take a new measurement.



Electrode Maintenance

- Always keep the membrane of the dissolved oxygen probe is wet or moist.
- If you do not use the probe for long periods, please screw off membrane cap and rinse the cathode, anode and membrane with deionized water, then soak up residual water on them with filter paper. Install the probe again.



Addendum: Preparation of the Zero Oxygen Solution

Dissolve 500mg 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 250mL distilled water, mix the solution until reagent is completely dissolved.

Important Notes for Multiparameter Measurements

1. The BanteLab APP is capable of measuring and showing 2 or 3 parameters simultaneously. If any two of the pH, ORP, ion or water hardness testers are connected to the APP, the screen will not show the measuring values.
2. In the multiparameter measurement mode, the "Timed Interval Readings" can not be used.

Troubleshooting Guide

Problem	Solution
The tester automatically turns off after about 1 minute.	The batteries are depleted, please replace 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 new standard solutions.
Calibration solution does not meet criteria	Check the pH electrode and ensure the calibration solutions should be at least 1 pH unit apart from each other (e.g., pH6 and pH7).
Electrode slope exceeds the normal range	Recalibrate the tester with new calibration solutions. If the electrode slope still out of the range, please replace electrode.
Could not find the electrode slope	Ensure that selected the measurement unit and ion type are same as the calibration.
Measured temperature deviates from the calibration setting	Ensure that the calibration solutions and sample at the same temperature, the maximum error should be controlled within the 1°C
Lost the password	Contact the manufacturer.

Specifications

S10 pH Tester

pH	Range	-2.000~20.000pH
	Accuracy	±0.002pH
	Resolution	0.1/0.01/0.001pH, selectable
	Calibration Points	1 to 5 points
	pH Buffer Options	USA (pH1.68/4.01/7.00/10.01/12.45)
		NIST (pH1.68/4.01/6.86/9.18/12.45)
		DIN (pH1.09/3.06/4.65/6.79/9.23/12.75)
Temperature Compensation	0~100°C, 32~212°F, automatic	
mV	Range	±2000.0mV
	Accuracy	±0.2mV
	Resolution	0.1/1mV, selectable

S20 ORP Tester

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

S30 Ion Tester

Ion Concentration	Range	0.001~30000, depending on range of the ion selective electrode
	Measurement Units	ppm, mg/L, mol/L, mmol/L, selectable
	Accuracy	±0.5% F.S (monovalent), ±1% F.S (divalent)
	Resolution	0.001/0.01/0.1/1, automatic, up to 4 significant digits
	Calibration Points	2 to 5 points
	Calibration Solutions	0.001, 0.01, 0.1, 1, 10, 100, 1000, 10000 ppm, mg/L, mol/L, mmol/L
	Measurement Methods	Direct reading, known addition, known subtraction, sample addition and sample subtraction
	Temperature Compensation	0~100°C, 32~212°F, manual
	Electrode Management	1 to 3 electrodes
mV	Range	±2000.0mV
	Accuracy	±0.2mV
	Resolution	0.1/1mV, selectable

S40 Water Hardness Tester

Water Hardness	Range	Concentration	0.05–200mmol/L
		German Degree	0~1122°dH
		English Degree	0~1404°e
		French Degree	0~2000°fH
		Grains per gallon	0~1170gpg
		CaCO ₃	0~20000mg/L
		CaO	0~11220mg/L
		Ca ²⁺	0~8020mg/L
	Accuracy	±1% F.S	
	Resolution	0.01/0.1/1, automatic, up to 4 significant digits	
	Calibration Points	2 to 5 points	
Calibration Solutions	0.01, 0.1, 1, 10, 100 mmol/L		
Temperature Compensation	0~50°C, 32~122°F, manual		
mV	Range	±2000.0mV	
	Accuracy	±0.2mV	
	Resolution	0.1/1mV, selectable	

S50 Conductivity Testers

Conductivity	Model	S50-L	S50-M	S50-H
	Range	0.01µS/cm~200µS/cm	10µS/cm~20mS/cm	100µS/cm~200mS/cm
	Accuracy	±0.5% F.S		
	Resolution	0.001/0.01/0.1/1, automatic, up to 4 significant digits		
TDS	Range	0~200mg/L	0~20g/L	0~200g/L
	Accuracy	±1% F.S		
	Resolution	0.01/0.1/1, automatic		
	TDS Factor	0.01~1.00 (default 0.50)		
Salinity	Range	Practical Salinity	0~10.00psu	0~42.00psu
		Natural Seawater	---	0~80.00ppt
		%	0~1.00%	0~8.00%
	Resolution	0.01		
	Accuracy	±1% F.S		
Resistivity	Range	0~100MΩ	0~10MΩ	0~1MΩ
	Accuracy	±1% F.S		

Conductivity Ash	Range	0~100%		
	Accuracy	±1% F.S		
	Measurement Modes	Refined sugar or Raw sugar		
General	Calibration Points	1 to 3 points		
	Calibration Solutions	10µS/cm 84µS/cm	84µS/cm 1413µS/cm 12.88mS/cm	1413µS/cm 12.88 mS/cm 111.8mS/cm
	Temperature Compensation	0~100°C, 32~212 °F, Manual or Automatic		
	Cell Constant	K=0.1, 1, 10		
	Reference Temperature	20°C or 25°C		
	Temperature Coefficient	Linear (0.0~10.0%/°C), Non-linear, USP, EP (High purified water), EP (Purified water)		
	Pure Water Compensation	Yes		

S60 Dissolved Oxygen Tester

Dissolved Oxygen	Range	0.00~20.00mg/L
	Accuracy	±0.2mg/L
	Resolution	0.01/0.1mg/L, selectable
% Saturation of Oxygen	Range	0.0~200.0%
	Resolution	0.1%
	Accuracy	±2.0%
General	Calibration Points	1 or 2 points
	Temperature Compensation	0~50°C, 32~122°F, Automatic
	Pressure Correction	60.0~112.5kPa, 450~850mmHg
	Salinity Correction	0~50g/L
	Measurement Modes	DO, BOD, OUR, SOUR

General Specifications

Connectivity	Bluetooth 4.0 or newer
Max Wireless Range	10m
Operating Temperature	0~60°C
Relative Humidity	< 80%
Power Requirements	2 × 1.2V or 1.5V lithium batteries, or "AAA" batteries
Dimensions	250 (L) × 40 (Dia.) mm (model S10, S20, S50), 175 (L) × 40 (Dia.) mm (model S30, S40, S60)
Weight	100g

Hazardous Substance Statement

Bante Instruments is committed to the reduction and eventual elimination of all hazardous substances in both the manufacturing process and finished products we supply. We have an active manufacturing and procurement program to minimize and eliminate the use of harmful heavy metals such as cadmium, lead, mercury and the like. New technologies and design parameters are also promoting these efforts and we expect to have little or no such materials in our product in the coming years. We welcome our customer suggestions on how to speed up these efforts.



Warranty

The warranty period for tester is two years from the date of shipment. Above warranty does not cover the electrode and calibration 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 nearest authorized distributor.