Kalstein

Portable Series YR pH/ORP/Ion/Conductivity/DO Meters

Instruction Manual

- Single parameter meters
- Multiparameter meters

Thank you very much for purchasing our YR Serie Portable Meter.

Please read the "Operating Instructions" and "Warranty" before operating this unit to assure proper operation. After reading these documents, be sure to store them securely together with the "Warranty" at a hand place for future reference.

Warning: Before operating the unit, be sure to read carefully and fully understand important warnings in the operating instructions.

CE

Table of **Contents**

General Guide

This section is applicable to all models of meters

Introduction

Thank you for purchasing this high quality laboratory meter, this product series includes models below.

Single Parameter Meters

	Measurement Parameters
	pH/mV/ORP
	pH/mV/ORP/Ion
	Ion/mV
	Water hardness
	Conductivity/TDS
	Conductivity/Salinity
	Conductivity/TDS/Salinity/Resistivity
	DO

Multiparameter Meters

Model	Measurement Parameters
	pH/mV/ORP/Ion/Conductivity/TDS/Salinity/Resistivity/DO
	pH/mV/Conductivity/TDS
	pH/mV/ORP/Conductivity/TDS/Salinity/Resistivity
	pH/mV/ORP/DO
	Conductivity/TDS/Salinity/Resistivity/DO

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

Environmental Conditions

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

Relative humidity is less than 80%

Ambient temperature is greater than 0°C/32°F and less than 50°C/122°F

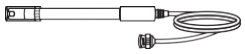
No potential electromagnetic interference

No corrosive gas exists

Packing List

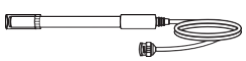
The following list describes all accessories of the meter. If any items are missing or damaged, contact the supplier immediately.

1



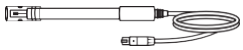
pH electrode, pH buffer sachets

2



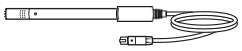
★ Ion selective electrode, standard solutions, ionic strength adjustor

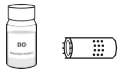
3



Conductivity electrode, conductivity standard solutions

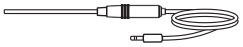
4





Dissolved oxygen electrode, electrolyte solution, membrane cap

5



Temperature probe

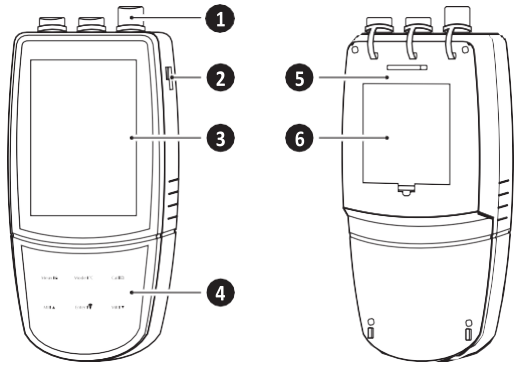
6

Electrode clip

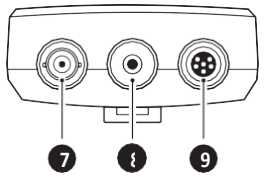
★ Cyanide and sulfide ion meters do not provide above solutions.

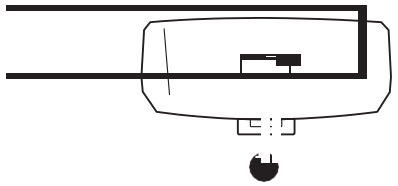
Model/Accessories	1	2	3	4	5	6
	•				•	•
YR01816	•				•	•
YR01817		•			•	•
		•			•	•
			•		•	•
			•		•	•
YR01818			•		•	•
YR01819				•		•
YR01835	•		•	•	•	•
YR01836	•		•		•	•
	•		•		•	•
	•			•	•	•
YR01837			•	•	•	•

Meter Overview



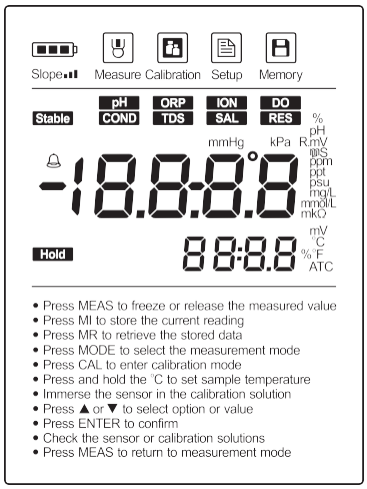
1	Sensor connections	4	Membrane keypad
2	Slot for electrode clip	5	Slot for hand strap
3	Display	6	Battery compartment





7	Socket for pH, ORP or ion selective electrode (BNC)
8	Socket for temperature probe (3.5mm jac)
9	Socket for condu tivity or dissolved oxyg n electrode (6-pin DIN)
10	USB-A interfa e to computer

Display



Icon	Description
Measure	Indicates that the meter is in the measurement mode
Calibration	Indicates that the meter is in the calibration mode
Setup	Indicates that the meter is in the setup mode
Memory	Indicates that you are viewing the stored readings or a reading is stored into the memory
	Low Battery Alarm - When the battery voltage falls below the minimum power requirements for normal operation, the icon automatically disappears
Slope	Electrode Condition Indicator - If the electrode slope is not within the allowed range after calibration, the icon automatically disappears
	Calibration Due Alarm - If the electrode has not been recalibrated within a specified time period, the icon automaticlly shows
ATC	Automatic Temperature Compensation Indicator - When the temperature probe is connected to meter, the icon automaticlly shows

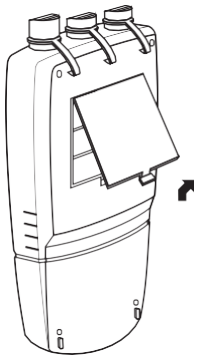
Stable	Indicates that the reading is stable
Hold	Indicates that the reading is locked
pH	pH mode
ORP	ORP mode
ION	Ion concentration mode
COND	Conductivity mode
TDS	Total dissolved solids mode
SAL	Salinity mode
RES	Resistivity mode
DO	Dissolved oxygen mode

Keypad

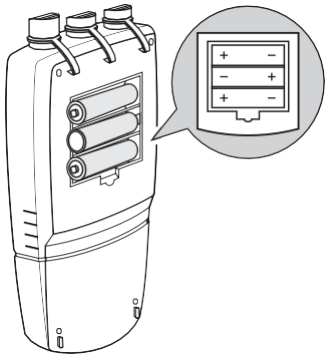
Key	Function
Meas | 🔓	• Switch the meter on or off • Lock the reading, press the key again to take a new measurement • Exit the calibration, settings, data log and return to the measurement mode
Mode|°C	• Select the measurement mode • Press and hold the key to enter the temperature setting
Cal | 🖹	• Start calibration • Press and hold the key to enter the setup menu
MI | ▲	• Store current reading to memory • Increase value or scroll up through a list of options
MR | ▼	• View the data log or calibration log • Decrease value or scroll down through a list of options
Enter | 💡	• Confirm the calibration, setting or displayed option • Press and hold the key to switch the backlight on or off

Installing the Batteries

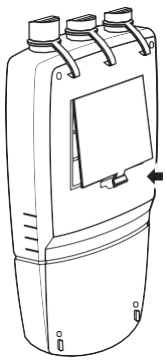
1. Remove the battery compartment cover from the backside of meter.



2. Insert the three AA batteries into the battery compartment, note polarity.

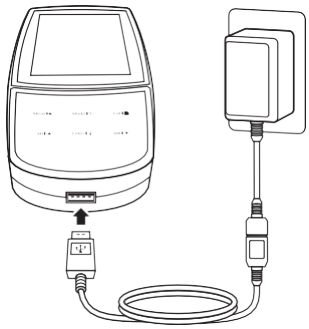


3. Replace the battery compartment cover to its original position, push the limiter until it locks.



Using the Power Adapter

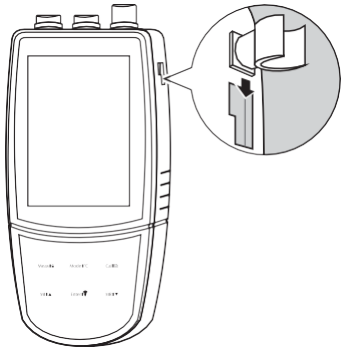
The meter allows using the DC5V power adapter (order code: DCPA-5V) or the USB port on computer as a power supply.



Note, take out the batteries before connecting an external power supply.

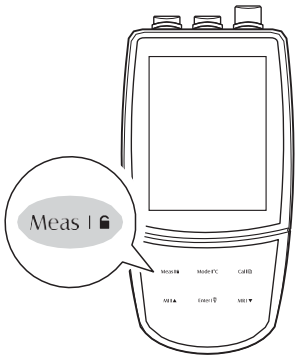
Installing the Electrode Clip

The electrode clip is designed for mounting a sensor, but not a necessary component of the meter. If you want to install this accessory, insert the electrode clip into the slot on the right of the meter.



Switching the Meter On and Off

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



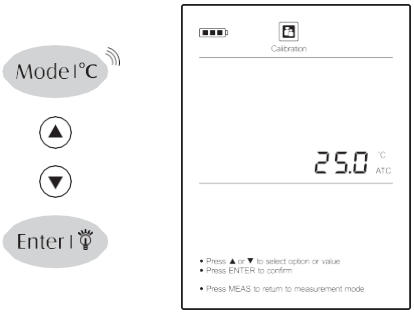
Temperature Calibration

The meter is suppiled with a TP-10K temperature probe. If the measured temperature reading differs from that of an accurate thermometer, the probe needs to be calibrated.

Note, the dissolved oxygen electrode has a built-in temperature sensor and do not need to use this probe.

1. Connect the temperature probe to the meter and place into a solution with a known accurate temperature.

2. Press and hold the **℃** key to enter the temperature setting.
3. Press the ▲ / ▼ key to modify the temperature value.
4. Press the **Enter** key to save.



To exit the calibration without saving changes, press the **Meas** key.

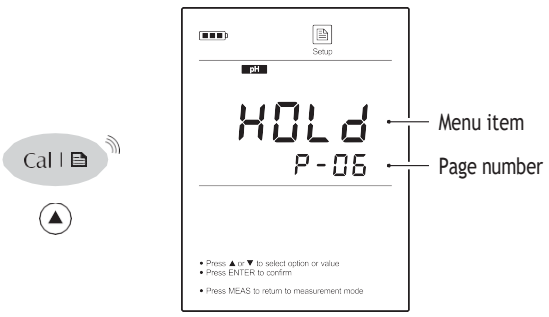
General Settings

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

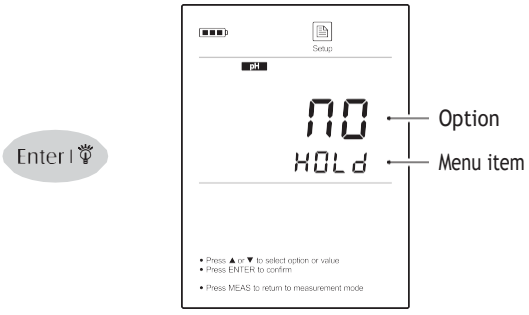
Menu	Options and Description	
StA	**Stability Criteria** Set when a measurement is recognized as stable.	
	LO	Standard (default)
	HI	High accuracy
HOLd	**Auto-Hold** If enabled, the meter will automatically sense a stable reading and lock the measurement.	
	YES	Enable
	NO	Disable (default)
OFF	**Auto-Power Off** If enabled, the meter will automatically switch off if no key is pressed within a specified time period.	
	10	10 minutes
	20	20 minutes
	30	30 minutes
	NO	Disable (default)
CAH	**Calibration Due** Set the calibration interval to activate alarm	
	...31	1 to 31 days
	OFF	Disable (default)
dAtE	**Date and Time** Set the date and time for data log and calibration log.	
CLr	**Clear Stored Data** Delete all data logs in the memory.	
	YES	Enable
	NO	Disable (default)
rSt	**Factory Reset** Reset the meter to factory default settings. Note, the meter must be recalibrated.	
	YES	Enable
	NO	Disable (default)

Setting a Default Option

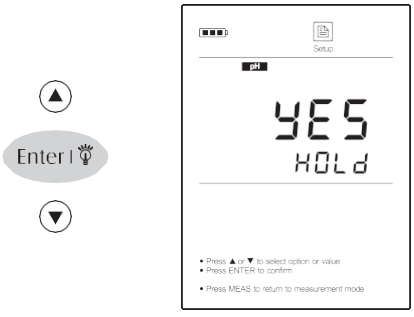
1. In the measurement mode, press and hold the 🗎 key to enter the setup menu.
2. Press the ▲ key to select a menu item.



3. Press the **Enter** key, the meter shows the current option.



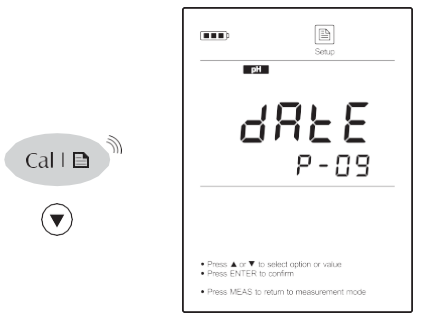
4. Press the ▲ / ▼ key to select a desired option.
5. Press the **Enter** key to save and return to the measurement mode.



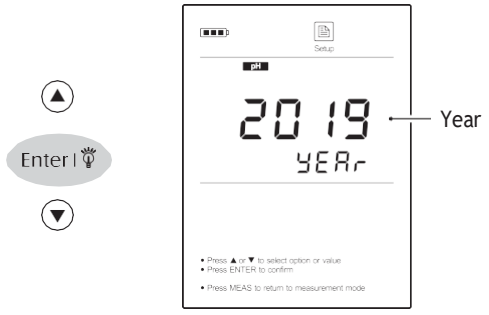
To exit the setup menu without saving changes, press the **Meas** key.

Setting the Date and Time

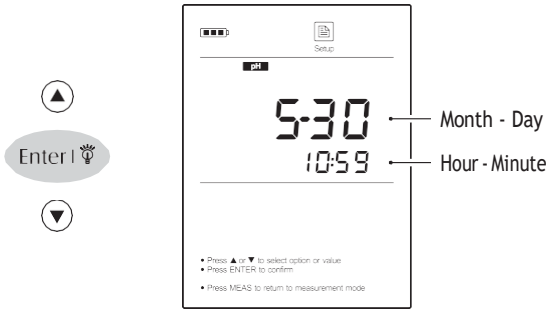
1. In the measurement mode, press and hold the 🗎 key to enter the setup menu.
2. Press the ▼ key until the meter shows dAtE.



3. Press the **Enter** key, the meter shows the current year.



4. Press the ▲ / ▼ key to set the year, press the **Enter** key to switch to the date and time options.



5. Press the ▲ / ▼ key to set the month, day, hour and minute, press the **Enter** key to save until the meter returns to the measurement mode.

pH Calibration and Measurement

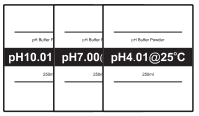
This section is applicable to models

- YR01816 +
- YR01835 +

Prior to Use

Preparing the pH Buffer Solutions

The meter is packaged with pH4.01 / 7.00 / 10.01 buffer sachets required for calibration.

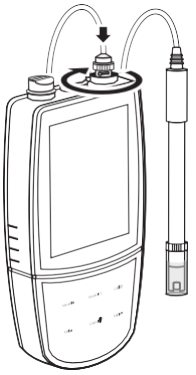


Open the pH7.00 buffer sachet, pour the reagent into a 250ml volumetric flask. Fill the distilled water to the 250ml mark, mix the solution until the reagent is completely dissolved.

Preparation of pH4.01 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.

Connecting the Electrode

1. Take out the pH electrode from the carrying case.
2. Insert the BNC connector into the connector socket on meter, rotate and push the connector clockwise until it locks.



3. Remove the protective cap from the bottom of the electrode. If tiny air bubbles are present inside the pH sensitive membrane, gently shake the electrode downward to remove air bubbles.

Selecting the Measurement Mode

Press the **Mode** key until the **pH** icon appears on the display, the meter enters the pH mode.

Mode/°C

pH Settings

The meter contains four measurement settings and seven general settings in the setup menu.

Menu	Options and Description	
bUF	**pH Buffer Group** Set the pH buffer group for calibration and auto-recognition.	
	USA	USA (default)
	nIST	NIST
	dIN	DIN
	USEr	Custom buffers (any 2 values >1 pH apart)
CAL	**Calibration Points** Set the number of calibration points.	
	...5	1 to 5 points (default 3 points)
rESO	**Resolution** Set the resolution of the pH measurement.	
	0.001	0.001pH (default)
	0.01	0.01pH
	0.1	0.1pH
UNIt	**Measurement Unit** Set the default temperature unit.	
	°C	Degrees Celsius (default)
	°F	Degrees Fahrenheit

If you want to change the current settings, press and hold the key to enter the setup menu. Press the ▲/▼ key to select an option and press the **Enter** key to confirm.

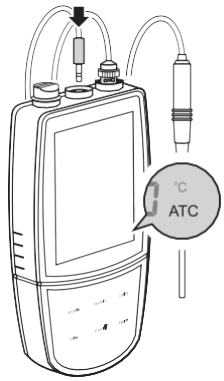
Refer to the ***Setting a Default Option*** section for detailed instructions on page 8.

Temperature Compensation

For better accuracy, we recommend the use of either a sensor with a built-in or a separate temperature probe. The meter will calculate the pH slope with measured temperature and shows the temperature compensated readings.

Automatic Temperature Compensation

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



Manual Temperature Compensation

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

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

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

pH Calibration

The meter allows up to 5 point pH calibration. We recommend that you perform at least 2 point calibration for high accuracy measurement. The meter 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 1 1 5 F 0 option is selected, the meter will allow 2 point calibration only. 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 meter when attaching a new pH electrode or during first use. DO NOT reuse the buffer solutions after calibration, contaminants in solution will affect the calibration and eventually the accuracy of the measurement.

For better accuracy, we recommend to enable the automatic temperature compensation mode. If you use the manual temperature compensation mode, all buffer and sample solutions must be at the same temperature and you have entered the correct temperature value to meter.

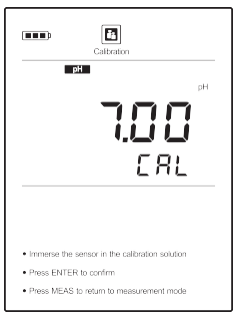
Stir the buffer and sample solutions at a uniform rate that will help you get most accurate readings.

Single Point Calibration

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

1.2 Press the **Cal** key, the display shows "7.00/CAL" (or 6.86/CAL, 6.79/CAL, depending on the selected pH buffer group).

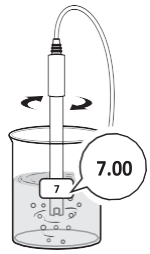
Cal | 🖹



1.3 Rinse the pH electrode with distilled water, place the electrode (and temperature probe) into the pH7.00 buffer solution, stir gently to create a homogeneous solution.

1.4 Press the **Enter** key, the Calibration icon begins flashing.

Enter | 💡

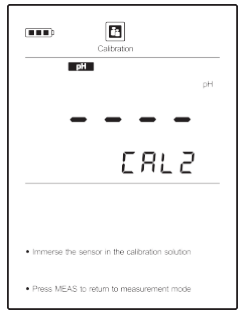


1.5 When the reading has stabilized, the meter will show E n d and return to the measurement mode.

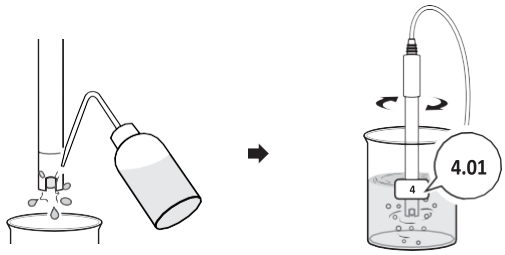
Multipoint Calibration

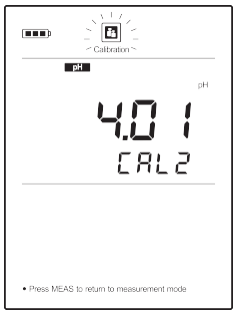
2.1 Ensure that you have selected 2 to 5 points calibration in the setup menu.

2.2 Repeat steps 1.2 through 1.4 above. When the first calibration point is completed, the display will show " --- /CAL2". The meter prompts you to continue with second point calibration.



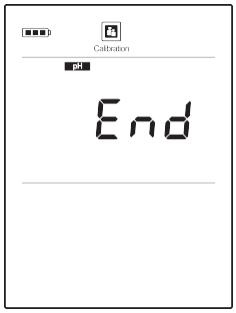
2.3 Rinse the pH electrode with distilled water, place the electrode (and temperature probe) into the next buffer solution (e.g., pH4.01). The meter will automatically recognize the buffer solution and begin the calibration, the Calibration icon continuously flashing.





2.4 When the reading has stabilized, the display will show "----/CAL3". The meter prompts you to continue with third point calibration.

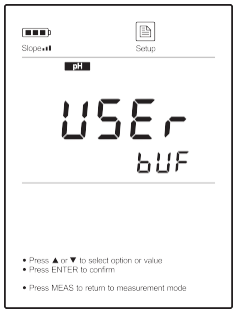
2.5 Repeat the step 2.3 above until the meter shows End. Calibration is completed.



3.4 If necessary, press the ▲/▼ key to set the calibration value, press the **Enter** key to begin the calibration.

pH Calibration with Custom Buffers

3.1 Ensure that you have selected the USEr 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 (and temperature probe) into the custom buffer solution, stir gently and wait until the measurement is stable.

- Press the **Cal** key, the meter enters the calibration mode.

3.5 When the reading has stabilized, the display will show "CAL2". The meter prompts you to continue with second point calibration.

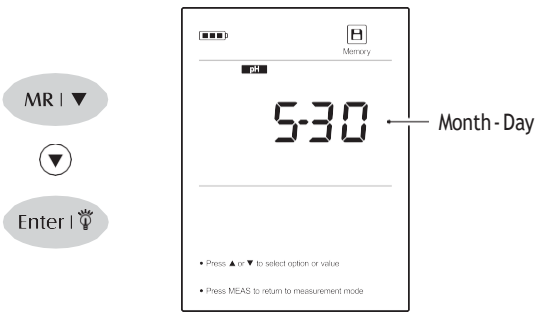
3.6 Repeat the steps 3.2 and 3.4 above until the meter shows End. Calibration is completed.

- During the calibration, if the display shows -----indicating the meter is waiting for recognizing the pH buffer solution.
- If the display shows Err indicating the measured mV value for the current calibration point deviates by more than 60mV (approximately ±1pH) from the theoretical value of the pH buffer. The calibration will not be accepted. Please check the pH electrode and ensure the buffer solutions are fresh and uncontaminated.
- If the calculated electrode slope is not within 70% to 110%, Slope icon will disappear from the display. The pH electrode may need to be replaced.
- To exit the calibration without saving changes, press the **Meas** key.

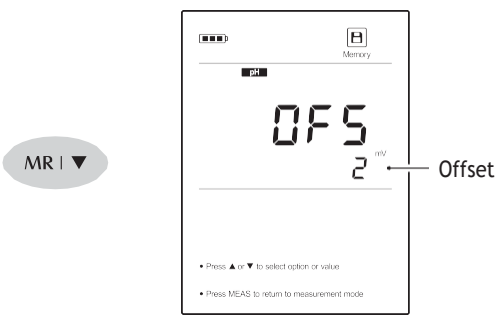
Viewing the Calibration Log

4.1 Press the **MR** key in the pH measurement mode and press the ▼ key until the meter shows F1 F/P-02.

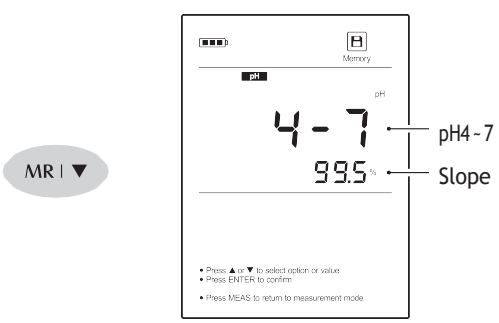
4.2 Press the **Enter** key, the meter shows the last calibration date.



4.3 Press the ▼ key to view the zero-point offset.



4.4 Press the ▼ key to view the calibration points and slope.

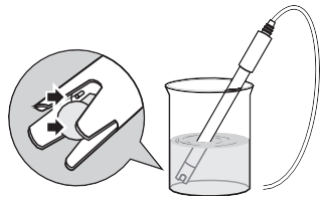


4.5 To exit the calibration log, press the **Meas** key.

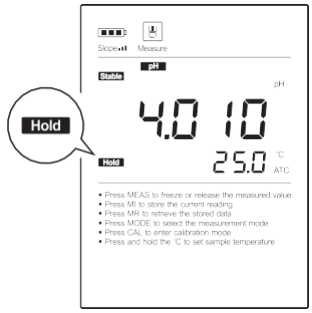
If the meter is not calibrated or the custom buffers are used, the display will show ---- only.

pH Measurement

1. Rinse the pH electrode with distilled water. Place the electrode (and temperature probe) into the sample solution and stir gently. Note, the pH sensitive membrane and liquid junction must be completely immersed into the solution.



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



3. Wait for the measurement to stabilize and record the readings.
4. When all of the samples have been measured, rinse the electrode according to the instructions in the Electrode Maintenance.

- During the measurement, never wipe the pH sensitive membrane as this will cause static interference, blot dry with a lint-free tissue to remove waterdrops on electrode.
- If the meter shows ---- indicating the measurement exceeds the range, remove the electrode from the sample immediately.
- If your sample is pure water, low ionic or low conductivity water, we recommend measuring the pH in the smallest sample volume possible or adding 0.3ml of 3M KCl to 100ml of the sample solution. Note that only high purity KCl can be used.
- To record the measurement at the predefined time intervals, refer to the ***Interval Readings*** section on page 40.

Electrode Maintenance

Cleaning the Electrode

Since pH electrode is susceptible to contamination, thoroughly clean as necessary after each use.

- General Cleaning
  Rinse the electrode with distilled water and soak in 3M KCl solution.

- Salt Deposits
  Dissolve the deposit by immersing the electrode in warm tap water.
  Rinse the electrode with distilled water and soak in 3M KCl solution.

- Oil or Grease
  Place the electrode in detergent or ethanol solution for 15 minutes.
  Rinse the electrode with distilled water and soak in 3M KCl solution.

- Protein
  Add 1% pepsin to 0.1M HCl solution.
  Place the electrode in above solution for 15 minutes.
  Rinse the electrode with distilled water and soak in 3M KCl solution.

- Clogged Liquid Junction
  Heat a diluted KCl solution to 60°C.
  Place the electrode into the heated solution for 10 minutes.
  Allow the electrode to cool in unheated KCl solution.

Reactivating the Electrode

If the pH sensitive membrane has dried out, the electrode response will becomes sluggish. Immerse the electrode in a pH4.01 buffer solution for about 30 minutes to rehydrate. If this fails, the electrode requires activation.

1. Soak the electrode in 0.1M HCl for 10 minutes.
2. Remove and rinse with deionized water, then place in 0.1M NaOH for 10 minutes.
3. Remove and rinse again, and soak in 3M KCl solution for at least 6 hours.

If these steps fail to restore electrode response, replace the electrode.

Storing the Electrode

- For best results, always soak the electrode in 3M KCl solution.

- DO NOT store the electrode in distilled or deionized water, which will deplete the hydration layer of the pH sensitive membrane and render the electrode useless.
- If you do not use the electrode for a period longer than 1 month, store the electrode in storage solution.

Appendix

Preparation of Electrode Storage Solution

Dissolve 24.60g of analytical grade KCl reagent in 100ml distilled water. Add pH4.01 standard buffer and adjust solution to pH4.

Optional Accessories

pH Electrodes

Order Code	Description
E201-BNC	For general purpose applications
E202-BNC	For measuring the flat surface samples
P11	For measuring the non-high temperature liquids
P11-LiCl	For measuring the non-aqueous samples
P13	For measuring the micro-volume samples
P15	For measuring the low conductivity samples
P16	For measuring the liquids with Tris buffers
P18	For measuring the slurries or soils
P19	For measuring the semisolids
P21	For measuring the colloids
P22	For measuring the high temperature liquids (< 130°C)

Temperature Probe

Order Code	Description
TP-10K	3.5mm jack plug, 1 meter cable

Solutions

Order Code	Description
PHCS-USA	pH4.01/7.00/10.01 buffer solutions, 480ml
PHCS-NIST	pH4.01/6.86/9.18 buffer solutions, 480ml
PHCS-OG	Removes oil and grease contaminants, 480ml
PHCS-PR	Removes protein contamination, 480ml
PHCS-ES	pH electrode storage solution, 480ml

Communication and Power Supply

Order Code	Description
USB-A	USB connector, 1 meter cable
DCPA-5V	DC5V power adapter, european standard plug

ORP Calibration & **mV** Measurement

This section is applicable to models

- YR01816 +
- YR01835 +

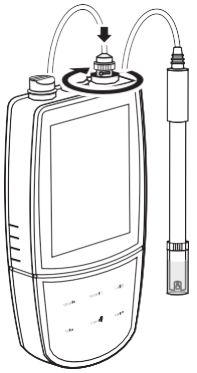
Prior to Use

The meter is capable of measuring the oxidation-reduction potential of aqueous solutions through connecting an ORP electrode, selectable sensor includes following options.

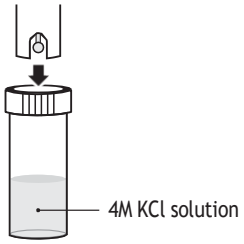
Order Code	Description
501	For measuring the sample with strong redox potential
502	For measuring the sample with weak redox potential
504	For measuring the high temperature samples (< 100°C)

Connecting the Electrode

1. Select a suitable ORP electrode.
2. Insert the BNC connector into the connector socket on meter, rotate and push the connector clockwise until it locks.



3. Remove the protective cap from the bottom of the electrode.

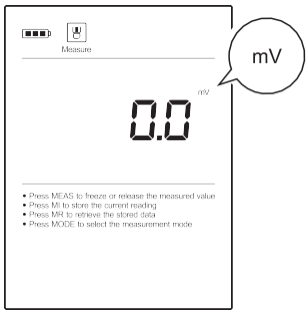


Selecting the Measurement Mode

The meter contains two millivolt measurement modes.

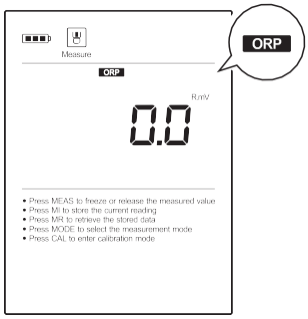
- Raw millivolt (mV)
  Press the **Mode** key until the measurement unit **mV** appears on the right of the measurement value, the meter enters the absolute millivolt mode.

Mode I°C



- Relative millivolt (R.mV)
  Press the **Mode** key until the ORP icon appears on the display, the meter enters the relative millivolt mode.

Mode I°C



The meter allows entering the setup menu or performing the calibration or viewing the calibration log in the ORP mode only.

ORP Settings

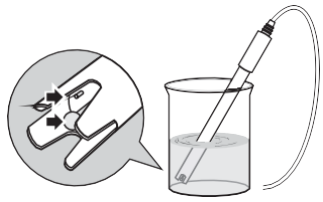
The meter contains one measurement setting and seven general settings in the setup menu.

Menu	Options and Description	
rESO	**Resolution** Set the resolution of the mV measurement.	
	0.1	0.1mV (default)
	1	1mV

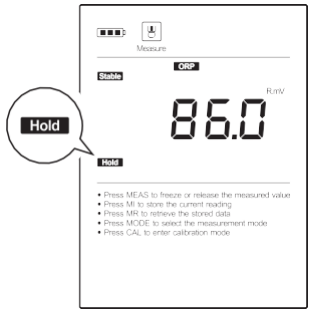
If you want to change the current settings, press and hold the key to enter the setup menu. Press the ▲/▼ key to select an option and press the **Enter** key to confirm.
Refer to the ***Setting a Default Option*** section for detailed instructions on page 8.

mV Measurement

1. Rinse the ORP electrode with distilled water. Place the electrode into the sample solution and stir gently. Note, the sensing element and liquid junction must be completely immersed into the solution.



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



Meas I

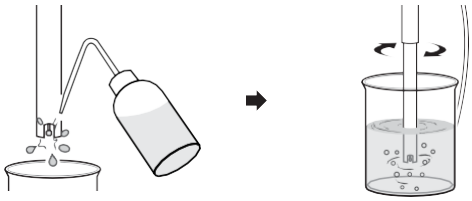
3. Wait for the measurement to stabilize and record the reading.
4. When all of the samples have been measured, rinse the electrode with distilled water and soak in 4M KCl solution.

- 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 meter shows indicating the measurement exceeds the range, remove the electrode from the sample immediately.
- To record the measurement at the predefined time intervals, refer to the ***Interval Readings*** section on page 40.

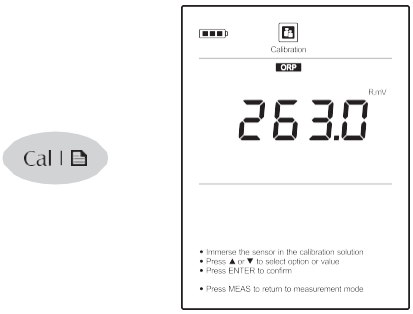
ORP Calibration

The meter 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.

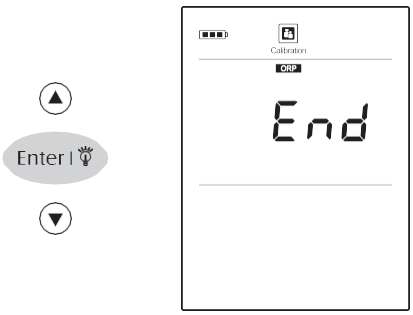
1.1 Rinse the ORP electrode with distilled water, place the electrode into the calibration solution. Stir the electrode gently and wait until the measurement is stable.



1.2 Press the **Cal** key, the meter enters the calibration mode.



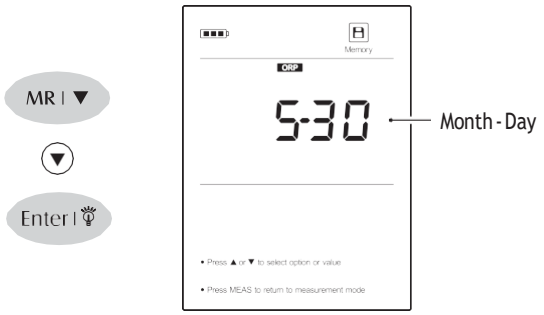
1.3 If necessary, press the ▲ / ▼ key to set the calibration value.
1.4 Press the **Enter** key, the meter will show End and return to the measurement mode. Calibration is completed.



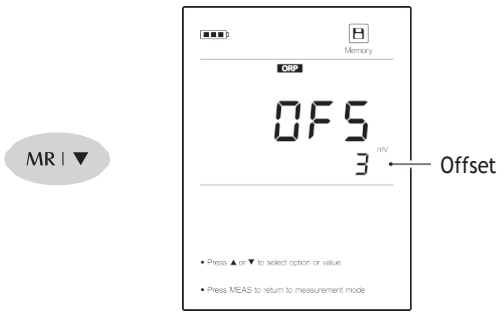
To exit the calibration without saving changes, press the **Meas** key.

Viewing the Calibration Log

2.1 Press the **MR** key in the ORP measurement mode and press the ▼ key until the meter shows F1 F/P-02.
2.2 Press the **Enter** key, the meter shows the last calibration date.



2.3 Press the ▼ key to view the offset potential.



2.4 To exit the calibration log, press the **Meas** key.

If the meter is not calibrated, the display will show ---- only.

Electrode Maintenance

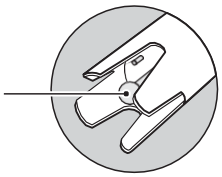
- Rinse the ORP electrode thoroughly with distilled water after use.
- In the corrosive chemicals, viscous solutions and solutions with heavy metals or proteins, take readings quickly and rinse electrode immediately.
- If the electrode response becomes sluggish, refer to the instructions below to clean the electrode.

1. Inorganic Deposits
   Place the electrode in 0.1M HCl solution for 10 minutes.
   Rinse the electrode with distilled water and soak in 4M KCl solution.

2. Oil or Grease
   Place the electrode in detergent such as dishwashing liquid for about 30 minutes.
   Rinse the electrode with distilled water and soak in 4M KCl solution.

3. If the platinum sensing element is severely contaminated, polish the platinum surface gently with an abrasive paper of 600 grid. Place the electrode in 0.1M HCl solution for 10 minutes. Remove and rinse with distilled water, then soak in 4M KCl solution for at least 6 hours.
   If the electrode does not restore normal performance, replace the electrode.

Platinum sensing element



Storing the Electrode

If you do not use the ORP electrode for long periods, store the electrode in storage solution.

Appendix

Preparation of ORP Standard Solutions

Quinhydrone solution A: Dissolve 3g of quinhydrone reagent in 500ml of the pH4.01 buffer solution, stir the solution for about 10 minutes. Undissolved quinhydrone reagent must be present. If necessary, add the reagent.

Temperature	Potential (±10mV)
20°C	268mV
25°C	263mV
30°C	260mV

Quinhydrone solution B: Dissolve 3g of quinhydrone reagent in 500ml of the pH7.00 buffer solution, stir the solution for about 10 minutes. Undissolved quinhydrone reagent must be present. If necessary, add the reagent.

Temperature	Potential (±10mV)
20°C	94mV
25°C	87mV
30°C	80mV

⚠

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 29.82g of analytical grade KCl reagent in 100ml distilled water. Add pH4.01 standard buffer and adjust solution to pH4.

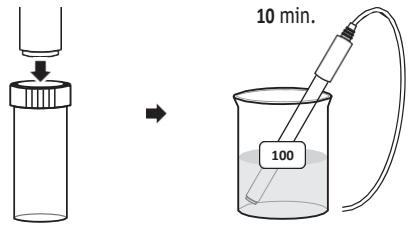
Ion Calibration and Measurement

This section is applicable to models

- YR01816 +
- YR01835 (only)

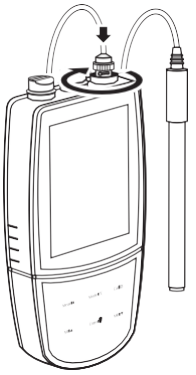
Prior to Use

1. Take out the ion selective electrode from the carrying case.
2. Remove the protective cap and soak the electrode in 100ppm standard solution for 10 minutes.



Connecting the Electrode

Insert the BNC connector into the connector socket on meter, rotate and push the connector clockwise until it locks.



Selecting the Measurement Mode

Press the **Mode** key until the ION icon appears on the display, the meter enters the ion concentration mode.

Mode/°C

Ion Settings

The meter contains three measurement settings and seven general settings in the setup menu.

Menu	Options and Description	
UNIT	**Measurement Unit** Set the default ion concentration and temperature units.	
	ppm	Parts per million (default)
	mg/L	Milligrams per liter
	mol/L	Moles per liter
	°C	Degrees Celsius (default)
	°F	Degrees Fahrenheit
CAL	**Calibration Points** Set the number of calibration points.	
	5	2 to 5 points (default 2 points)
ION	**Ionic Valency** Set the ion valence of electrode.	
	1	Monovalent (default)
	2	Divalent

If you want to change the current settings, press and hold the key to enter the setup menu. Press the ▲/▼ key to select an option and press the **Enter** key to confirm.
Refer to the ***Setting a Default Option*** section for detailed instructions on page 8.

If the ion concentration unit has converted, the meter will always show CAL and wait for calibration. Press the **Cal** key and refer to the ***Ion Calibration*** section to perform the calibration, the meter will switch to selected concentration unit when calibration is completed.

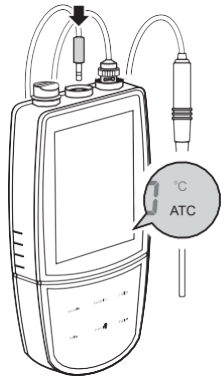
Temperature Compensation

Due to the temperature difference between standards and samples 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.

Automatic Temperature Compensation

Connect the temperature probe to the meter. The **ATC** icon immediately

appears on the display, the meter is now switched to the automatic temperature compensation mode.



Manual Temperature Compensation

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

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

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

Ion Calibration

The meter allows 2 to 5 point ion calibration with standard solutions, acceptable 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

Before beginning calibration, make sure that the ionic valency option in the setup menu matchs connected electrode. All standards and samples should be at the same temperature and selected calibration points cover the anticipated range of the samples.

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 2ml ISA to 100ml of standard and sample.

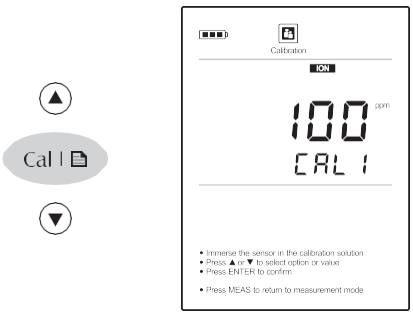
For the low level sodium determination (< 1ppm), make sure to use the laboratory plastic beaker as a container.

Stir the standards and samples at a uniform rate that will help you get most accurate readings.

Calibrating the Meter

1.1 Press the **Cal** key to enter the calibration mode, the display shows "0.001ppm/CAL1" (or mg/L, mol/L, mmol/L, depending on the selected concentration unit).

1.2 Press the ▲ / ▼ key to select first calibration point (e.g., 100ppm), the meter will automatically perform the calibration from the low to high concentrations.

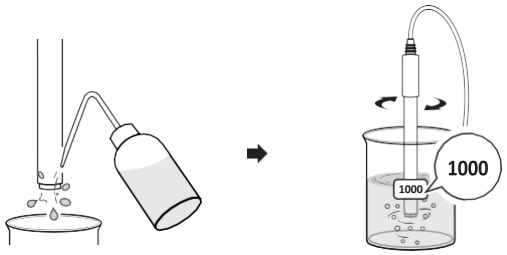


1.3 Rinse the ion selective electrode with distilled water, then rinse with a small amount of standard solution. Place the electrode (and temperature probe) into the standard solution, stir gently to create a homogeneous solution.

1.4 Press the **Enter** key, the Calibration icon begins flashing.

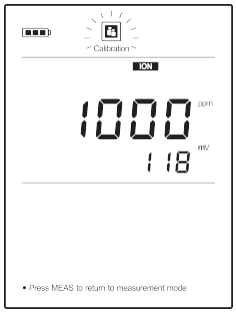
1.5 When the reading has stabilized, the display will show "1000ppm/ CAL2". The meter prompts you to continue with second point calibration.

1.6 Rinse the ion selective electrode with distilled water, then rinse with a small amount of standard solution. Place the electrode (and temperature probe) into the next standard solution and stir gently.

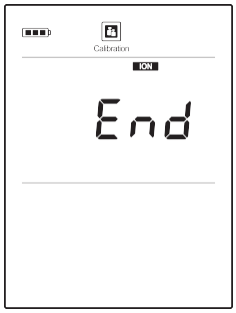


1.7 Press the **Enter** key, the Calibration icon begins flashing.

Enter |



1.8 When the reading has stabilized, the display will show "CAL3". The meter prompts you to continue with third point calibration.
1.9 Repeat the steps 1.6 and 1.7 above until the meter shows End. Calibration is completed.



To exit the calibration without saving changes, press the **Meas** key.

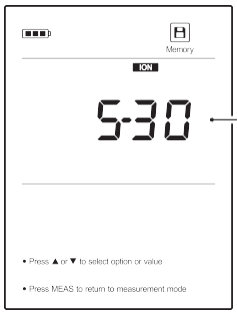
Viewing the Calibration Log

2.1 Press the **MR** key in the ion measurement mode and press the ▼ key until the meter shows F1 F/P-02.
2.2 Press the **Enter** key, the meter shows the last calibration date.

MR | ▼

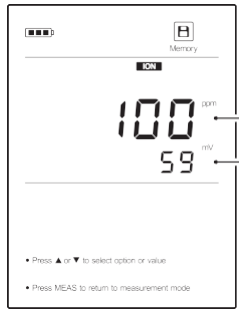
▼

Enter |



2.3 Press the ▼ key to view the calibration point and mV value.

MR | ▼

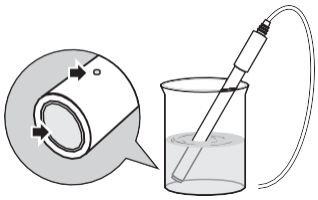


2.4 Press the ▼ key to view the next data set.
2.5 To exit the calibration log, press the **Meas** key.

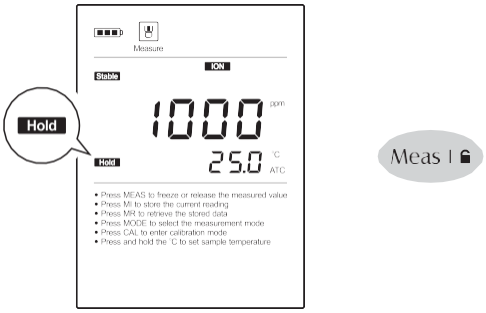
If the meter is not calibrated, the display will show----- only.

Ion Measurement

1. Rinse the ion selective electrode with distilled water. Place the electrode (and temperature probe) into the sample solution and stir gently. Note, the ion sensitive membrane and liquid junction must be completely immersed into the solution.



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

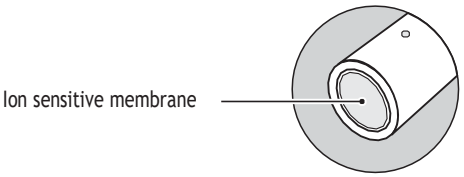


3. Wait for the measurement to stabilize and record the readings.
4. When all of the samples have been measured, rinse the electrode with distilled water.

- During the measurement, never wipe the ion sensitive membrane, blot dry with a lint-free tissue to remove waterdrops on electrode.
- If the meter is not calibrated with connected electrode, the display will always show 0.000.
- If the meter shows ----indicating the measurement exceeds the range, remove the electrode from the sample immediately.
- To record the measurement at the predefined time intervals, refer to the ***Interval Readings*** section on page 40.

Electrode Maintenance

- Rinse the ion selective electrode thoroughly with distilled 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 (1000ppm)

1. Half fill a 1 liter volumetric flask with distilled 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 distilled water.
3. Cap the volumetric flask and upend several times to mix the solution.

Ion Type	Reagent	Weight
Ammonium	NH_4Cl	2.97g
Bromide	NaBr	1.29g
Cadmium	$Cd(NO_3)_2 \cdot 4H_2O$	2.74g
Calcium	$CaCl_2 \cdot 2(H_2O)$	3.67g
Chloride	NaCl	1.65g
Cupric	$Cu(NO_3)_2 \cdot 3H_2O$	3.80g
Cyanide	NaCN	1.88g
Fluoride	NaF	2.21g
Iodide	NaI	1.18g
Lead	$Pb(NO_3)_2$	1.60g
Nitrate	$NaNO_3$	1.37g
Potassium	KCl	1.91g
Silver	$AgNO_3$	1.57g
Sodium	NaCl	2.54g
Sulphide	$Na_2S \cdot 9H_2O$	7.49g
Ammonia	NH_4Cl	3.15g

Optional Accessories

Ion Selective Electrodes

Order Code	Description	Range (ppm)
NH4-US	Ammonium (NH_4^+)	0.1 to 18000
Br-US	Bromide (Br^-)	0.4 to 79900
Cd-US	Cadmium (Cd^{2+})	0.01 to 11200
Ca-US	Calcium (Ca^{2+})	0.02 to 4000
CL-US	Chloride (Cl^-)	1.8 to 35500
Cu-US	Cupric (Cu^{2+})	0.006 to 6400
Cn-US	Cyanide (Cn^-)	0.2 to 260
F-US	Fluoride (F^-)	0.02 to saturation
I-US	Iodide (I^-)	0.06 to 127000
Pb-US	Lead (Pb^{2+})	0.2 to 20700
NO3-US	Nitrate (NO_3^-)	0.4 to 62000
K-US	Potassium (K^+)	0.04 to 39000
Ag-US	Silver (Ag^+)	0.01 to 107900
Na-US	Sodium (Na^+)	0.1 to 23000
S-US	Sulphide (S^{2-})	0.003 to 32100
NH3-US	Ammonia (NH_3)	0.02 to 17000

Temperature Probe

Order Code	Description
TP-10K	3.5 mm jack plug, 1 meter cable

Standard Solutions

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

Ionic Strength Adjusters

Order Code	Description	Volume
ISA-NH4	Ammonium (NH_4^+)	480ml
ISA-Br	Bromide (Br^-)	480ml
ISA-Cd	Cadmium (Cd^{2+})	480ml
ISA-Ca	Calcium (Ca^{2+})	480ml
ISA-CL	Chloride (Cl^-)	480ml
ISA-Cu	Cupric (Cu^{2+})	480ml
ISA-Cn	Cyanide (Cn^-)	480ml
ISA-F	Fluoride (F^-)	480ml
ISA-I	Iodide (I^-)	480ml
ISA-Pb	Lead (Pb^{2+})	480ml
ISA-NO3	Nitrate (NO_3^-)	480ml
ISA-K	Potassium (K^+)	480ml
ISA-Ag	Silver (Ag^+)	480ml
ISA-Na	Sodium (Na^+)	480ml
ISA-NH3	Ammonia (NH_3)	480ml

Communication and Power Supply

Order Code	Description
USB-A	USB connector, 1 meter cable
DCPA-5V	DC5V power adapter, european standard plug

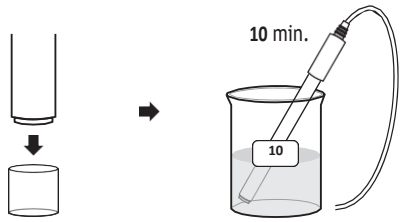
Water Hardness
Calibration and Measurement

This section is applicable to model

- Water Hardness Meters

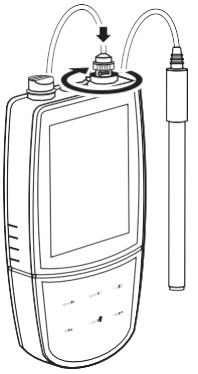
Prior to Use

1. Take out the water hardness electrode from the carrying case.
2. Remove the protective cap and soak the electrode in 10mmol/L standard solution for 10 minutes.



Connecting the Electrode

Insert the BNC connector into the connector socket on meter, rotate and push the connector clockwise until it locks.



Switching the Measurement Mode

The meter contains eight water hardness modes. Press the **Mode** key, the display will show corresponding mode icon.

LCD Display	Measurement Mode	Measurement Unit
ION	Ion concentration	mmol/L
CACO	$CaCO_3$	mg/L
CAO	CaO	mg/L
bOL	Boiler	mmol/L
CA	Ca^{2+}	mg/L
FH	French degree	°fH
dH	German degree	°dH
EH	English degress	°e

Note, the meter allows entering the setup menu or performing the calibration in the ION mode

Water Hardness Settings

The meter contains one measurement setting and seven general settings in the setup menu.

Menu	Options and Description
CAL	**Calibration Points** Set the number of calibration points.
	5 2 to 5 points (default 2 points)

If you want to change the current settings, press and hold the key to enter the setup menu. Press the ▲/▼ key to select an option and press the **Enter** key to confirm.

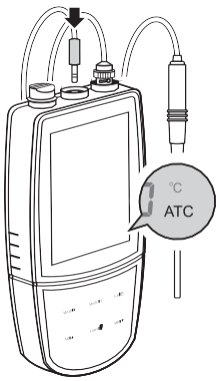
Refer to the ***Setting a Default Option*** section for detailed instructions on page 8.

Temperature Compensation

In order to get accurate measurement, we recommend that all standards and samples should be at the same temperature. If you want to enable the temperature compensation, use either of the following two methods.

Automatic Temperature Compensation

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



Manual Temperature Compensation

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

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

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

Water Hardness Calibration

The meter allows 2 to 5 point calibration with standard solutions, acceptable calibration points include the following options.

Measurement Unit	Calibration Points
mol/L	0.001, 0.01, 0.1
mmol/L	0.001, 0.01, 0.1

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 samples. A typical addition would be 2ml ISA to 100ml of standard and sample.

Calibrating the Meter

1.1 Press the **Mode** key until the display shows , the meter enters the ion concentration measurement mode.

1.2 Press the **Cal** key to enter the calibration mode, the display shows "0.001mmol/L / CAL1".

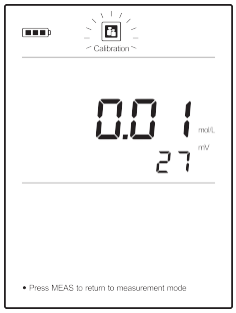
1.3 Press the ▲ / ▼ key to select first calibration point (e.g., 0.01mol/L), the meter will automatically perform the calibration from the low to high concentrations.

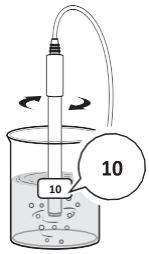
The meter is packaged with 10 and 100mmol/L standard solutions, its related calibration points are 0.01 and 0.1mol/L.

★ 1mol/L = 1000mmol/L

1.4 Rinse the water hardness electrode with distilled water, then rinse with a small amount of standard solution. Place the electrode (and temperature probe) into the standard solution, stir gently to create a homogeneous solution. Press the **Enter** key, the Calibration icon begins flashing.

Enter

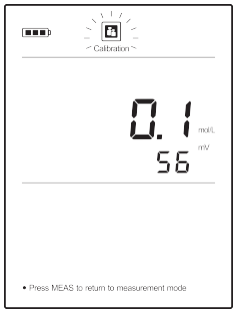


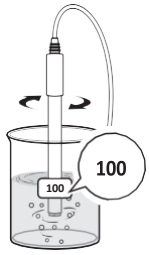


1.5 When the reading has stabilized, the display will show "0.1mol/L / CAL2". The meter prompts you to continue with second point calibration.

1.6 Rinse the water hardness electrode with distilled water, then rinse with a small amount of standard solution. Place the electrode (and temperature probe) into the next standard solution and stir gently. Press the **Enter** key, the Calibration icon begins flashing.

Enter





1.7 When the reading has stabilized, the display will show "CAL3". The meter prompts you to continue with third point calibration.

1.8 Repeat the step 1.6 above until the meter shows End. Calibration is completed.

To exit the calibration without saving changes, press the **Meas** key.

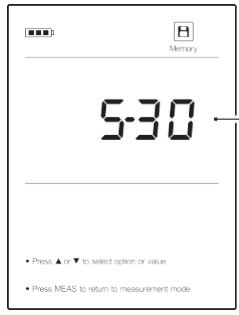
Viewing the Calibration Log

2.1 Press the **MR** key in the measurement mode and press the ▼ key until the meter shows FILE/P-02.

2.2 Press the **Enter** key, the meter shows the last calibration date.

MR | ▼

Enter



2.3 Press the ▼ key to view the calibration point and mV value.

MR | ▼

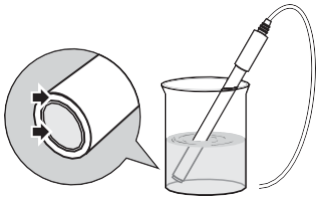
2.4 Press the ▼ key to view the next data set.

2.5 To exit the calibration log, press the **Meas** key.

If the meter is not calibrated, the display will show----- only.

Water Hardness Measurement

1. Rinse the water hardness electrode with distilled water. Place the electrode (and temperature probe) into the sample solution and stir gently. Note, the ion sensitive membrane and liquid junction must be completely immersed into the solution.



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

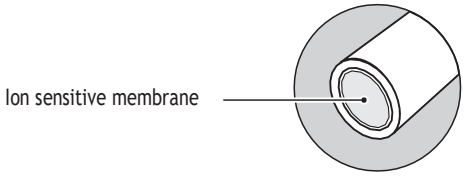
3. Wait for the measurement to stabilize and record the readings.

4. When all of the samples have been measured, rinse the electrode with distilled water.

- During the measurement, never wipe the ion sensitive membrane, blot dry with a lint-free tissue to remove waterdrops on electrode.
- If the meter is not calibrated, the display will always show 0.000.
- If the meter shows ----indicating the measurement exceeds the range, remove the electrode from the sample immediately.

Electrode Maintenance

- Rinse the water hardness electrode with distilled 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 Water Hardness Standard Solution (100mmol/L)

1. To half fill a 1 liter volumetric flask with distilled water and add 14.7 grams of analytical grade calcium chloride ($CaCl_2 \cdot 2H_2O$) reagent.
2. Swirl the volumetric flask gently to dissolve the reagent and fill to the mark with distilled water.
3. Cap the volumetric flask and upend several times to mix the solution.

Optional Accessories

Sensors

Order Code	Description
WH-UK	Water hardness electrode, range: 0.05 to 200mmol/L
TP-10K	Temperature probe, 3.5mm jack plug, 1 meter cable

Solutions

Order Code	Description
ION-WH	100mmol/L standard solution, 480ml
ISA-WH	Ionic strength adjuster, 480ml

Communication and Power Supply

Order Code	Description
USB-A	USB connector, 1 meter cable
DCPA-5V	DC5V power adapter, european standard plug

Conductivity/ TDS/Salinity/ Resistivity

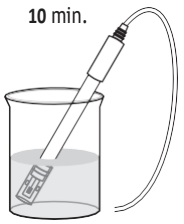
Calibration and Measurement

This section is applicable to models

- YR01818 +
- YR01835 +

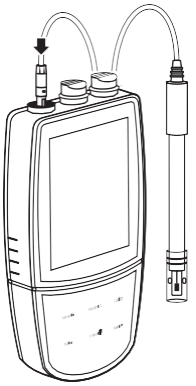
Prior to Use

1. Take out the conductivity electrode from the carrying case.
2. Soak the electrode for a few minutes in tap water to remove dirt and oil stains on the electrode.



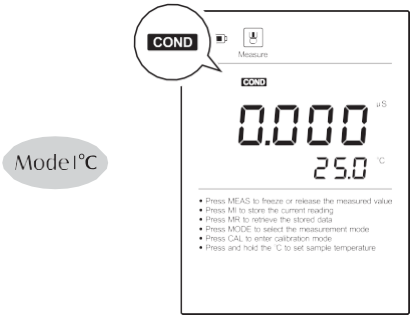
Connecting the Electrode

Insert the 6-pin connector into the connector socket on meter, ensure the connector is fully seated.



Selecting the Measurement Mode

Press the **Mode** key, the meter will show the conductivity (COND), TDS, salinity (SAL) and resistivity (RES) icons. Select a desired mode.



Conductivity/TDS/Salinity Settings

The meter contains seven measurement settings and general settings in the setup menu.

Menu	Options and Description	
CELL	**Cell Constant** Set the cell constant to match connected conductivity electrode.	
	0.1	K=0.1
	1	K=1 (default)
	10	K=10
	USEr	Custom
TMF	**Temperature Coefficient** Set the temperature coefficient for linear temperature compensation.	
	2.10	0.00 to 10.00%/°C (default 2.10)
CAL	**Calibration Points** Set the number of calibration points.	
	5	1 to 5 points (default 1 point)
PurE	**Pure Water Compensation** If enabled, the pure water compensation coefficient will be applied automatically for ultra-pure water measurements.	
	YES	Enable (default)
	no	Disable
StAd	**Reference Temperature** Set the normalization temperature for measurement, the readings will automatically compensate to the selected temperature during measurement.	
	25°C	25°C (default)
	20°C	20°C
tdS	**TDS Factor** Set the default TDS conversion factor.	
	0.50	0.40 to 1.00%/°C (default 0.50)
UNIt	**Measurement Unit** Set the default temperature unit.	
	°C	Degrees Celsius (default)
	°F	Degrees Fahrenheit

If you want to change the current settings, press and hold the key to enter the setup menu. Press the ▲/▼ key to select an option and press the **Enter** key to confirm.

Refer to the ***Setting a Default Option*** section for detailed instructions on page 8.

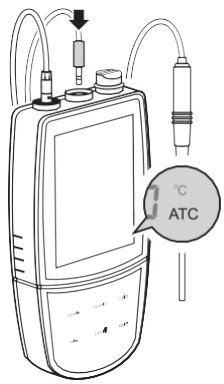
Temperature Compensation

The temperature compensation function has a large effect on conductivity measurements. If enabled, the meter will use the measured conductivity and temperature readings to calculate the result and automatically compensate to the selected reference temperature.

If the temperature coefficient is set to 0, the temperature compensation function will be disabled, the meter only show the actual conductivity at the measured temperature.

Automatic Temperature Compensation

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



Manual Temperature Compensation

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

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

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

Selecting a Conductivity Electrode

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

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

Conductivity Calibration

Automatic Calibration

The meter allows 1 to 5 point calibration with standard solutions. Before calibration, make sure that selected cell constant (K = 0.1, 1, 10) matchs connected electrode. If you have selected the manual calibration (CAL), the meter will wait to enter a cell constant.

For better accuracy, we recommend that you perform 3 points calibration or select a standard solution closest to the sample conductivity you are measuring. The meter will automatically detect the standard solution and prompt the user to perform the calibration.

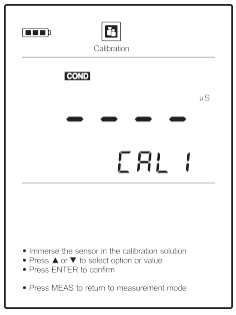
If you change the conductivity electrode, the meter must be recalibrated because every electrode has a different cell constant.

Single Point Calibration

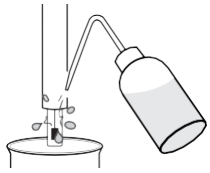
1.1 Press the **Mode** key to enter the conductivity mode and selecte the 1 point calibration in the setup menu.

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

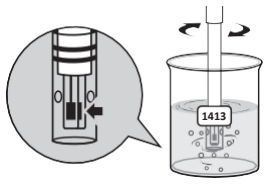
Cal |



1.3 Rinse the conductivity electrode with distilled wate,r then rinse with a small amount of standard solution.



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



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

1.5 If necessary, press the ▲ / ▼ key to modify the calibration value.

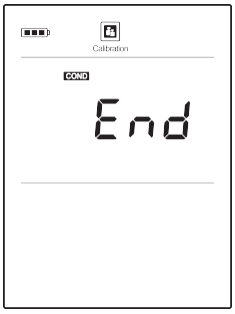
1.6 Press the **Enter** key, the Calibration icon begins flashing.

Enter |

1.7 When the reading has stabilized, the meter will show End and return to the measurement mode.

Multipoint Calibration

2.1 Ensure that you have selected 2 to 5 points calibration in the setup menu.
2.2 When the first calibration point is completed, the display will show "---/CAL2". The meter prompts you to continue with second point calibration.
2.3 Repeat steps 1.3 through 1.6 above until the meter shows End. Calibration is completed.

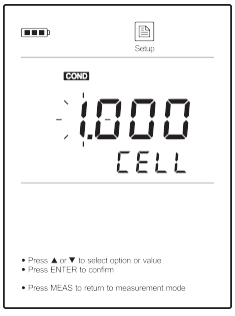


- To exit the calibration without saving changes, press the **Meas** key.
- Performing the conductivity calibration will simultaneously calibrate the corresponding TDS, salinity and resistivity values.

Manual Calibration

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

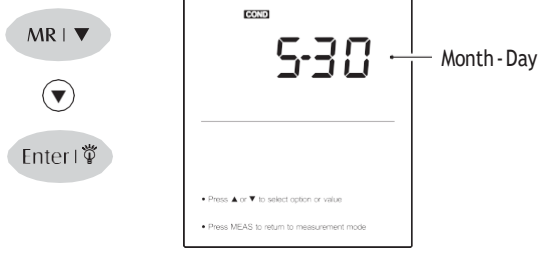
3.1 Press and hold the ⎘ key to enter the setup menu.
3.2 Press the **Enter** key, the display shows 1/CAL1.
3.3 Press the ▲ / ▼ key to select USER CAL1.
3.4 Press the **Enter** key, the first digit begins flashing.



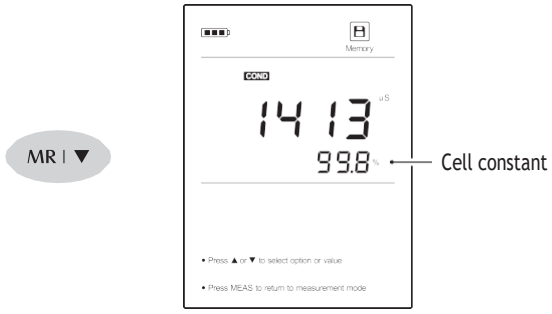
3.5 Press the ▲ / ▼ key to set the cell constant, press the **Enter** key to save until the meter returns to the measurement mode.

Viewing the Calibration Log

4.1 Press the **MR** key in the measurement mode and press the ▼ key until the meter shows FILE/P-02.
4.2 Press the **Enter** key, the meter shows the last calibration date.



4.3 Press the ▼ key to view the calibration point and cell constant (e.g., 0.998).



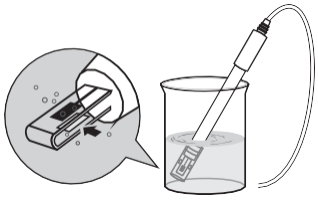
4.4 Press the ▼ key to view the next data set.
4.5 To exit the calibration log, press the **Meas** key.

If the meter is not calibrated with standard solution, the display will show---- only.

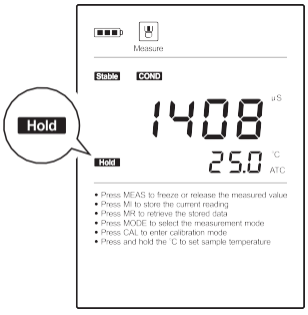
Measurements

1. Press the **Mode** key to select the measurement mode.
   - In the total dissolved solids mode TDS, ensure that you have seta correct conductivity-to-TDS conversion factor in the setup menu (default 0.50).
   - In the salinity mode SAL, the meter provides two measurement units. When the **PSU** appears on the right of the measurement value indicating the meter is in the practical salinity measurement mode. When the **ppt** appears on the display indicating the meter is in the natural seawater measurement mode.

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



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



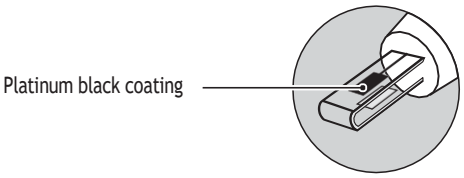
Meas

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

- If the meter shows ----indicating the measurement exceeds the range, please replace a conductivity electrode that is appropriate for the conductivity range of the sample solution you are measuring.
- To record the measurement at the predefined time intervals, refer to the ***Interval Readings*** section on page 40.

Electrode Maintenance

- Rinse the conductivity electrode thoroughly with distilled 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 electrode.



- If you do not use the conductivity electrode for long periods, wipe clean with a lint-free tissue and store the electrode in a dry and cool area.
- If your electrode is model CON-10, store the electrode with tap water. The sensor need to be kept wet always.

Appendix

Preparation of Conductivity Standard Solutions

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

Conductivity Standard	Reagent	Weight
84µS/cm	KCl	42.35mg
1413µS/cm	KCl	745.9mg
12.88mS/cm	KCl	7.45g
111.8mS/cm	KCl	74.5g

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

Calculating the Cell Constant

1. Refer to the ***Manual Calibration*** section to set the cell constant to 1.000.
2. Place the electrode into a standard solution and record the reading.
3. Calculate the cell constant using the following formula.

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

Where:

K = Cell constant

C_{std} = Value of conductivity standard solution

C_{meas} = Measured value

G = Raw cell constant (0.1, 1 or 10)

Calculating the Temperature Coefficient

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

Calculating the TDS Conversion Factor

To determine the TDS factor of sample use the following formula.

Factor = Actual TDS ÷ Actual Conductivity @25°C

For example, dissolve 64 grams of KCl reagent in 1 litre distilled water. If measured conductivity value is 100mS/cm, then TDS factor is 0.64.

Conductivity to TDS Conversion Factors

Conductivity at 25°C	TDS (KCl)		TDS (NaCl)	
	ppm	Factor	ppm	Factor
84µS/cm	40.38	0.5048	38.04	0.4755
1413µS/cm	744.7	0.527	702.1	0.4969
12.88mS/cm	7447	0.5782	7230	0.5613

Optional Accessories

Conductivity Electrodes

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

Temperature Probe

Order Code	Description
TP-10K	3.5mm jack plug, 1 meter cable

Solutions

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

Communication and Power Supply

Order Code	Description
USB-A	USB connector, 1 meter cable
DCPA-5V	DC5V power adapter, european standard plug

Dissolved Oxygen

Calibration and Measurement

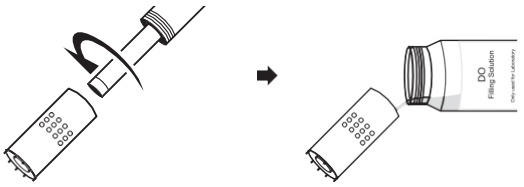
This section is applicable to models

- YR01819 (only)
- YR01835 +

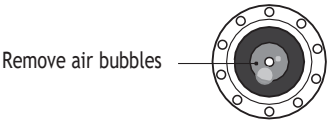
Prior to Use

Filling the Electrolyte Solution

1. Take out the dissolved oxygen electrode and electrolyte solution from the carrying case. Unscrew the membrane cap from the buttom of the electrode. Rinse the inside and outside of the cap with distilled water and blot dry.
2. Fill the membrane cap halfway with electrolyte solution.

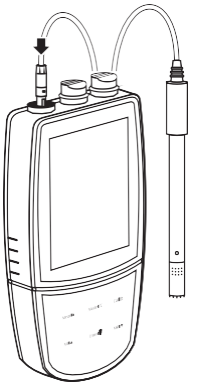


3. Screw the membrane cap back onto the electrode. Some electrolyte solution will overflow during this process.
4. Check the electrode, make sure that no air bubbles are trapped in the electrolyte solution and the membrane is not creased or damaged.



Polarizing the Electrode

1. Insert the 6-pin connector into the connector socket on meter, ensure the connector is fully seated.
2. Switch on the meter and wait 20 minutes for the electrode to polarize.



⚠

The dissolved oxygen electrode must be polarized before use.

Selecting the Measurement Mode

Press the **Mode** key until the DO ion and measurement unit **mg/L** (or ppm) appears on the display, the meter enters the dissolved oxygen concentration mode.

Press the key again, the measurement unit will switch to **%**, the meter enters the percentage saturation mode.

Mode/°C

Dissolved Oxygen Settings

The meter contains five measurement settings and seven general settings in the setup menu.

Menu	Options and Description	
CAL	**Calibration Points** Set the number of calibration points.	
	1	1 point
	2	2 points (default)
PrES	**Pressure Coefficient** Set the barometric pressure coefficient according to the local altitude.	
	760.0	450.0 to 850.0mmHg or 60.0 to 113.3kPa (default 760.0mmHg/101.3kPa)
SAL	**Salinity Coefficient** Set the salinity compensation coefficient of sample.	
	0.0	0.0 to 50.0ppt (default 0.0)
rESO	**Resolution** Set the resolution of the measurement value.	
		0.01mg/L, 0.1% (default)
	0.0 1 0.1	0.1mg/L, 1%
UNIt	**Measurement Units** Set the default dissolved oxygen, barometric pressure and temperature units.	
	mg/L	Milligrams per liter (default)
	ppm	Parts per million
	mmHg	Millimeter of mercury (default)
	kPa	Kilopascal
	°C	Degrees Celsius (default)
	°F	Degrees Fahrenheit

If you want to change the current settings, press and hold the ⎚ key to enter the setup menu. Press the ▲/▼ key to select an option and press the **Enter** key to confirm.
Refer to the ***Setting a Default Option*** section for detailed instructions on page 8.

During the barometric pressure and salinity settings, press and hold the ▲ / ▼ key will make the value change faster.

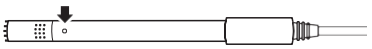
The following table describes the relationship between the altitude and barometric pressure. Make sure to set the compatible parameter before the calibration and measurement.

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 meter allows 1 or 2 points calibration in the dissolved oxygen mode. If you have selected the single 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.

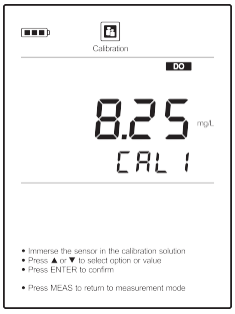
During the calibration and measurement, make sure that the temperature sensor on electrode is immersed in solution completely and the solution keeps 0.3m/s of minimum flow rate to avoid oxygen starvation at the membrane.



DO Calibration in mg/L or ppm Mode

1.1 Press the **Mode** key to enter the dissolved oxygen concentration mode and select the 1 point calibration in the setup menu.

1.2 Press the **Cal** key, the display shows "8.25mg/L / CAL 1" (@25°C).



1.3 Place the dissolved oxygen electrode into the air-saturated water for 10 minutes and stir gently. Press the **Enter** key, the meter begins the calibration, the Calibration icon continuously flashing.

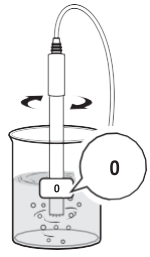
1.4 When the reading has stabilized, the meter will show End and return to the measurement mode.

2 Points Calibration

2.1 Ensure that you have selected 2 point calibration in the setup menu.

2.2 Press the **Cal** key and the ▼ key until the meter shows "0.00mg/L/ CAL 1".

2.3 Place the dissolved oxygen electrode into the zero oxygen solution for 10 minutes and stir gently. Press the **Enter** key to begin the calibration.



2.4 When the reading has stabilized, the display will show "8.25mg/L / CAL 2" (@25°C). The meter prompts you to continue with second point calibration.

2.5 Repeat the step 1.3 above until the meter shows End. Calibration is completed.

DO Calibration in % Saturation Mode

3.1 Press the **Mode** key to enter the % saturation mode and select the 1 point calibration in the setup menu.

3.2 Press the **Cal** key, the display shows "100.0%/CAL 1".

3.3 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. Press the **Enter** key, the meter begins the calibration.

3.4 When the reading has stabilized, the meter will show End and return to the measurement mode.

2 Points Calibration

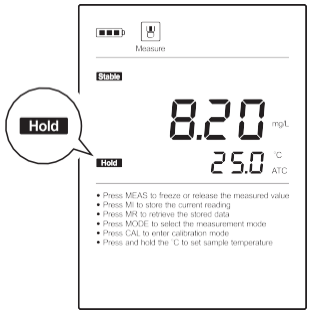
4.1 Ensure that you have selected 2 point calibration in the setup menu.
4.2 Press the **Cal** key and the ▼ key until the meter shows "0%/CAL 1".
4.3 Place the electrode into the zero oxygen solution for 10 minutes and stir gently. Press the **Enter** key to begin the calibration.
4.4 When the reading has stabilized, the display will show "100%/CAL 2". The meter prompts you to continue with second point calibration.
4.5 Place the electrode into the air-saturated water for 10 minutes and stir gently. Press the **Enter** key to begin the calibration.
4.6 When the reading has stabilized, the meter will show *End*. Calibration is completed.

To exit the calibration without saving changes, press the **Meas** key.

Dissolved Oxygen Measurement

The meter is used for measuring 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. Rinse the dissolved oxygen electrode with distilled water. Place the electrode into the sample solution and stir gently.
2. If necessary, set the barometric pressure and salinity coefficient in the setup menu.
3. If the Auto-Hold option in the setup menu is enabled, the meter will automatically sense a stable reading and lock the measurement, the **Hold** icon appears on the display. Press key to resume measuring. If the option is disabled, the meter will continuously measure and update the readings.

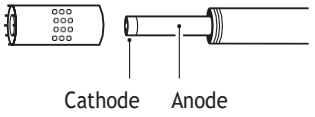


4. Wait for the measurement to stabilize and record the readings.
5. When all of the samples have been measured, rinse the electrode with distilled water.

- If the meter shows ---- indicating the measurement exceeds the range, remove the electrode from the sample immediately.
- To record the measurement at the predefined time intervals, refer to the ***Interval Readings*** section on page 40.

Electrode Maintenance

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



Appendix

Preparation of Zero Oxygen Solution

Dissolve 500mg of sodium sulfate (Na_2SO_3) reagent and a small amount of cobalt (II) chloride hexahydrate ($CoCl_2 \cdot 6H_2O$) in the 250ml distilled water, mix the solution until reagent is completely dissolved.

Preparation of Air-Saturated Water

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

Optional Accessories

Dissolved Oxygen Electrode and Components

Order Code	Description
DO100	Dissolved oxygen electrode, range: 0 to 20mg/L
DO-MEM	Membrane cap, 2 PCS/set
DO-ES	Electrolyte solution, 480ml

Communication and Power Supply

Order Code	Description
USB-A	USB connector, 1 meter cable
DCPA-5V	DC5V power adapter, european standard plug

Data Management

This section is applicable to all models of meters

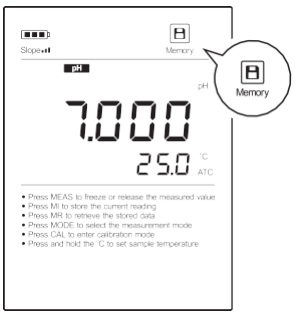
Data Management

The meter is capable of storing and recalling up to 500 data sets.

Storing a Measurement Result

In the measurement process, press the **MI** key to store the reading into the memory, the Memory icon appears on the display.

MI | ▲



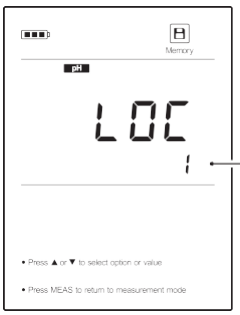
Viewing the Data Logs

1.1 Press the **MR** key in the measurement mode, the meter shows LOC/P-01.

MR | ▼

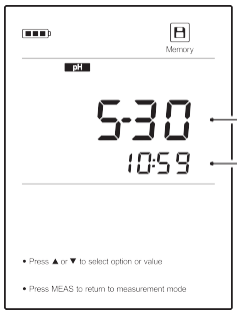
1.2 Press the **Enter** key, the meter shows the serial number of stored data.

Enter |



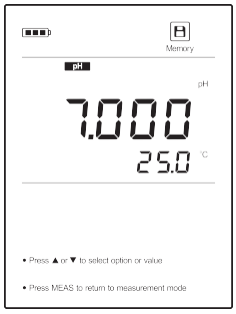
1.3 Press the ▼ key to view the date and time of measurement.

MR | ▼



1.4 Press the ▼ key to view the stored data.

MR | ▼



1.5 Press the ▼ key to view the next data set.
1.6 To exit the data log, press the **Meas** key.

If the meter has not stored any reading, the display will show----- only.

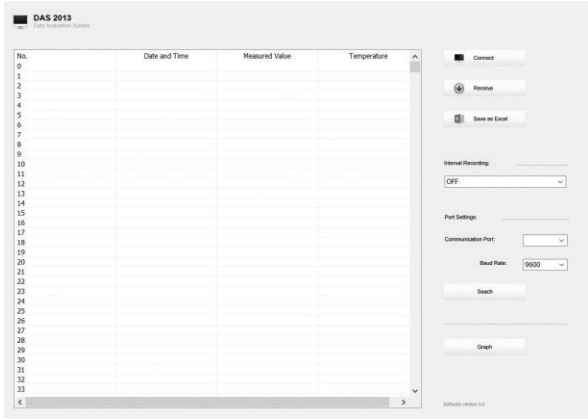
Clearing the Data Logs

If the memory is full, the meter will automatically show FULL when the **MI** key is pressed. To delete data logs, please follow the steps below.

2.1 Press and hold the 🖹 key to enter the setup menu.
2.2 Press the ▼ key until the meter shows CLr.
2.3 Press the **Enter** key, the meter shows NO/rI r.
2.4 Press the ▼ key to select the YES/rI r.
2.5 Press the **Enter** key to confirm.

Communication

The DAS communication software is compatible with our portable series meters and you are able to download it under request. Before installation, ensure that Windows 10 operating system has been installed on your computer.



Receiving Data

- Connect the USB cable to meter and click the **DAS_9_Series** icon, the system automatically scans an available communication port and shows a message box "Found a port on your computer".
- Click the **OK** button, the application starts.
- Click the **Connect** button, the screen shows "Port is connected".
- Click the **OK** button, then click the **Receive** button, the stored data automatically transfer to computer.

Interval Readings

- Click the **Interval Recording** option box and select a time option.
- Click the **Receive** button to begin record the readings.

- The first data will be shown on the screen after 1 minute.
- Do not press any key on meter during the Interval Readings mode, it will cause communication interruption.

Creating an Excel File

When the transfer is completed, click the **Save as Excel** button, the readings in data sheet will automatically convert to Excel file.

Note, once the software is closed, all received data will be lost and can not be recovered.

Meter Specifications & Troubleshooting

This section is applicable to all models of meters

Meter Specifications

pH	
Range	-2.000~20.000pH
Resolution	0.001, 0.01, 0.1pH
Accuracy	±0.002pH
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 (pH1.09/4.65/6.79/9.23/12.75)
Temperature Compensation	0~100°C/32~212°F, manual or automatic

ORP	
Range	±1999.9mV
Resolution	0.1, 1mV
Accuracy	±0.2mV
Calibration Point	1 point (only for relative mV mode)

Ion Concentration	
Range	0.001~19999ppm, mg/L, mol/L, mmol/L
Resolution	0.001, 0.01, 0.1, 1
Accuracy	±0.5% F.S.(monovalent), ±1% F.S.(divalent)
Calibration Points	2 to 5 points
Calibration Solutions	0.001, 0.01, 0.1, 1, 10, 100, 1000, 10000

Water Hardness	
Range	0.05~200mmol/L
Resolution	0.001, 0.01, 0.1, 1
Accuracy	±1% F.S.
Calibration Points	2 to 5 points
Calibration Solutions	0.001, 0.01, 0.1

Conductivity	
Range	0~200.0mS/cm
Resolution	0.001, 0.01, 0.1, 1
Accuracy	±0.5% F.S.
Calibration Points	1 to 5 points
Calibration Solutions	10μS/cm, 84μS/cm, 1413μS/cm,
	12.88mS/cm, 111.8mS/cm
Temperature Compensation	0~100°C/32~212°F, manual or automatic
Temperature Coefficient	Linear (0.0~10.0%/°C), pure water
Reference Temperature	20/25°C
Cell Constant	K=0.1, 1, 10 or custom

TDS

Range	0.00~10.00ppt (max. 200ppt)
Resolution	0.01, 0.1, 1
Accuracy	±1% F.S.
TDS Factor	0.1~1.0 (default 0.5)

Salinity

Range	0.00~80.00ppt, 0.00~42.00psu
Resolution	0.01
Accuracy	±1% F.S.

Resistivity

Range	0.00~20.00MΩ
Resolution	0.01
Accuracy	±1% F.S.

Dissolved Oxygen

Range	0.00~20.00mg/L, 0.0~200.0% saturation
Resolution	0.01, 0.1
Accuracy	±0.2mg/L, ±2.0%
Calibration Points	1 or 2 points
Temperature Compensation	0~50°C/32~122°F, automatic
Pressure Correction	60.0~112.5kPa/450~850mmHg, manual
Salinity Correction	0.0~50.0g/L, manual

Temperature

Range	0~105°C/32~221°F
Resolution	0.1°C/±0.1°F
Accuracy	±0.5°C/±0.9°F
Calibration Point	1 point

General Specifications

Memory	500 data sets
Communication Interface	USB
Display	Custom LCD (80×60mm)
Operating Temperature	0~50°C/32~122°F
Relative Humidity	< 80%
Power Requirements	3×1.5V AA batteries or DC5V power adapter
Dimensions	170 (L) × 85 (W) × 30 (H)mm
Weight	300g

Troubleshooting

LCD Display	Cause and Corrective Action
- - -	Electrode dried out: Soak the pH electrode in 3M KCl solution for about 30 minutes. Soak the ion selective electrode in 100ppm standard solution for about 30 minutes. Soak the conductivity electrode in tap water for about 10 minutes.
	Measurement out of range: Check the electrode whether is clogged, dirty or broken.
Err	Incorrect standard solution: Using the fresh standard solutions for calibration.
	DO electrolyte solution is depleted: Refilling electrolyte solution.
	Zero oxygen solution is contaminated: Replace the calibration solution.
	pH electrode has expired: Replace the pH electrode.
	Keypad is not working properly: Replace the batteries.

Hazardous Substance Statement

Our company 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.

Disposal

This instrument 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 instrument is 2 years from the date of shipment. Above warranty does not cover the sensors and standard solutions. Out of warranty products will be repaired on a charged basis. The warranty on your instrument shall not apply to defects resulting from:

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

For more information, please contact the supplier.

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