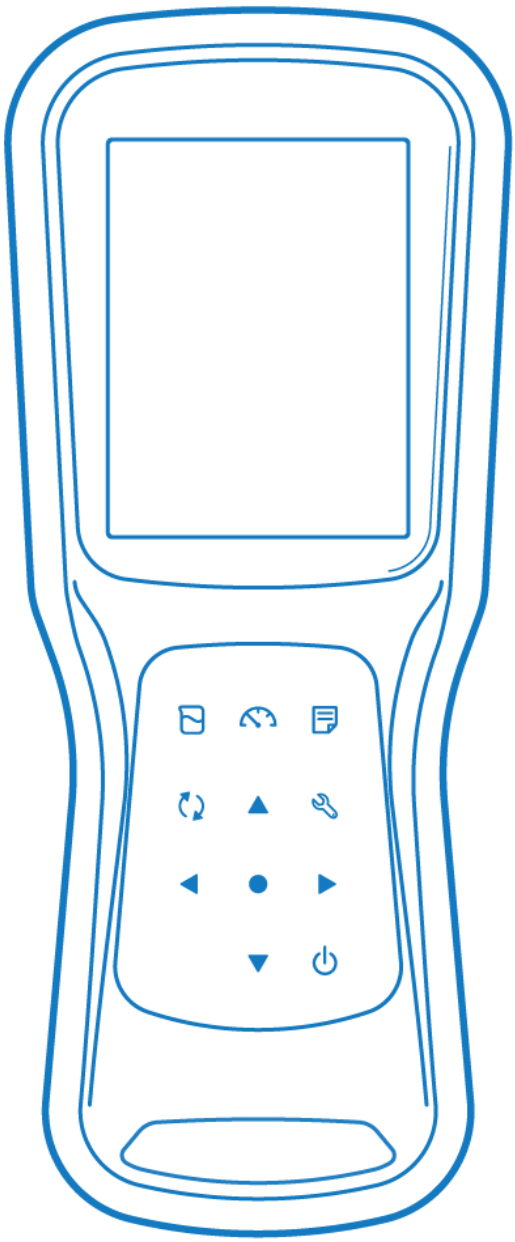
HORIBA

Instruction Manual

Handheld Water Quality Meters
LAQUA WQ-300 series



LAQUA
Portable pH・Water Quality Meter

■ Preface

This manual describes the operation of the following instrument.

Brand:	LAQUA
Series name:	LAQUA WQ-300series Handheld Water Quality Meter
Model:	WQ-310, WQ-320, WQ-330

Be sure to read this manual before using the product to ensure proper and safe operation of the product. Also, safely store the manual so it is readily available whenever necessary.
Product specifications and appearance, as well as the contents of this manual are subject to change without notice.

● Warranty and Responsibility

HORIBA Advanced Techno Co., Ltd. warrants that the product shall be free from defects in material and workmanship and agrees to repair or replace free of charge, at option of HORIBA Advanced Techno Co., Ltd., any malfunctioned or damaged product attributable to responsibility of HORIBA Advanced Techno Co., Ltd. for a period of Three (3) years from the delivery unless otherwise agreed in a written statement. In any one of the following cases, none of the warranties set forth herein shall be extended:

- Any malfunction or damage attributable to improper operation
- Any malfunction attributable to repair or modification by any person not authorized by HORIBA Advanced Techno Co., Ltd.
- Any malfunction or damage attributable to the use in an environment not specified in this manual
- Any malfunction or damage attributable to violation of the instructions in this manual or operations in the manner not specified in this manual
- Any malfunction or damage attributable to any cause or causes beyond the reasonable control of HORIBA Advanced Techno Co., Ltd. such as natural disasters
- Any deterioration in appearance attributable to corrosion, rust, and so on
- Replacement of consumables

HORIBA Advanced Techno Co., Ltd. SHALL NOT BE LIABLE FOR ANY DAMAGES RESULTING FROM ANY MALFUNCTIONS OF THE PRODUCT, ANY ERASURE OF DATA, OR ANY OTHER USES OF THE PRODUCT.

● Trademarks

Microsoft, Windows are registered trademarks or trademarks of Microsoft Corporation in the United States and other countries.
Other company names and brand names are either registered trademarks or trademarks of the respective companies. (R), (TM) symbols may be omitted in this manual.

CODE:GZ0000574030D

■Regulations

●EU and UK regulations

●Conformable Directive

This equipment conforms to the following directives and standards:

CE

EMC:	EN61326-1 Class B, Basic electromagnetic environment
RoHS:	EN IEC 63000 9. Monitoring and control instruments including industrial monitoring and control instruments

UKCA

EMC:	BS EN 61326-1 Class B, Basic electromagnetic environment
RoHS:	BS EN IEC 63000 9. Monitoring and control instruments including industrial monitoring and control instruments

Warning: This product is not intended for use in industrial environments. In an industrial environment, electromagnetic environment effects may cause the incorrect performance of the product in which case the user may be required to take adequate measures.

●Information on Disposal of Electrical and Electronic Equipment and Disposal of Batteries and Accumulators

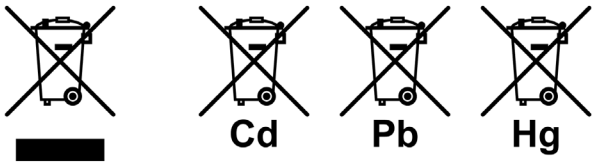
The crossed out wheeled bin symbol with underbar shown on the product or accompanying documents indicates the product requires appropriate treatment, collection and recycle for waste electrical and electronic equipment (WEEE) under the Directive 2002/96/EC, and/or waste batteries and accumulators under the Directive 2006/66/EC in the European Union.

The symbol might be put with one of the chemical symbols below. In this case, it satisfies the requirements of the Directive 2006/66/EC for the object chemical.

This product should not be disposed of as unsorted household waste.

Your correct disposal of WEEE, waste batteries and accumulators will contribute to reducing wasteful consumption of natural resources, and protecting human health and the environment from potential negative effects caused by hazardous substance in products.

Contact your supplier for information on applicable disposal methods.



●Authorised representative in EU and UK

- HORIBA Europe GmbH
  Hans-Mess-Str.6, D-61440 Oberursel, Germany
- HORIBA UK Limited
  Kyoto Close, Moulton Park, Northampton, NN3 6FL, UK

●FCC rules

●FCC Compliance Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. 47 CFR 15 subpart B. This product is considered an exempt device per clause §15.103/§2.1202.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Responsible Party for FCC matter

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●Korea certification

●B급 기기 (가정용 방송통신기자재)

이 기기는 가정용(B 급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

●Taiwan battery recycling mark

廢電池請回收

●China regulation

标记的意义

Meaning of Marking

本标记适用在中华人民共和国销售电器电子产品，标记中央的数字表示环境保护使用期限的年数。(不是表示产品质量保证期间。)只要遵守这个产品有关的安全和使用注意事项，从制造日开始算起在这个年限内，不会给环境污染、人体和财产带来严重的影响。请不要随意废弃本电器电子产品。

This marking is applied to electric and electronic products sold in the People's Republic of China. The figure at the center of the marking indicates the environmental protection use period in years. (It does not indicate a product guarantee period.) It guarantees that the product will not cause environment pollution nor serious influence on human body and property within the period of the indicated years which is counted from the date of manufacture as far as the safety and usage precautions for the product are observed. Do not throw away this product without any good reason.

产品中有害物质的名称及含量

Name and amount of hazardous substance used in a product

部件名称 Unit name	有害物质 Hazardous substance					
	铅 Lead (Pb)	汞 Mer- cury (Hg)	镉 Cad- mium (Cd)	六价铬 Hexa- valent chrom- ium (Cr (VI))	多溴联苯 Poly bromo- biphenyl (PBB)	多溴二苯醚 Poly bromo- diphenyl ether (PBDE)
本体 Main unit	×	○	○	○	○	○
电池 Battery	×	○	○	○	○	○
AC适配器 AC adapter*1, *2	×	○	○	○	○	○
电缆 Cable*2	×	○	○	○	○	○
支架 Stand*2	○	○	○	○	○	○
打印机 Printer*2	×	○	○	○	○	○
电极 Electrode*2	×	○	×	○	○	○

本表格依据 SJ/T 11364 的规定编制。
This form is prepared in accordance with SJ/T 11364.

○: 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。
Denotes that the amount of the hazardous substance contained in all of the homogeneous materials used in the component is below the limit on the acceptable amount stipulated in the GB/T 26572.

×: 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。
Denotes that the amount of the hazardous substance contained in any of the homogeneous materials used in the component is above the limit on the acceptable amount stipulated in the GB/T 26572.

*1: 本部件的环保使用期限为10年。 The environmental protection use period of this product is 10 years.

*2: 选配件 Optional products

■For Your Safety

●Hazard classification and warning symbols

Warning messages are described in the following manner. Read the messages and follow the instructions carefully.

●Hazard classification

⚠DANGER	This indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This is to be limited to the most extreme situations.
⚠WARNING	This indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠CAUTION	This indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. Without safety alert indication of hazardous situation which, if not avoided, could result in property damage.

●Warning symbols

	Description of what should be done, or what should be followed
	Description of what should never be done, or what is prohibited

●Safety precautions

This section provides precautions for using the product safely and correctly and to prevent injury and damage. The terms of DANGER, WARNING, and CAUTION indicate the degree of imminency and hazardous situation. Read the precautions carefully as it contains important safety messages.

●Instrument and Sensor

⚠ WARNING
Do not disassemble or modify the instrument. Otherwise, it may heat up or be ignited resulting in a fire or an accident.

⚠ CAUTION
Harmful chemicals Some electrodes are used with hazardous standard solutions. Handle them with care. The internal solution of pH electrode is highly concentrated potassium chloride (3.33 mol/L KCl). If the internal solution comes in contact with the skin, wash it off immediately. If it gets into the eyes, flush with plenty of water and then consult a doctor.
Broken glass Broken glass may cause injury. The outer tube and tip of an electrode are made of glass. Handle them with care.
Do not use the photo jack under wet or humid conditions. Otherwise, it may cause a fire, electric shock, or breakage.

●Battery

⚠ WARNING
Keep batteries out of reach of children. If someone accidentally swallows a battery, consult a doctor immediately.
If alkaline fluid from a battery gets into the eyes, do not rub the eyes, rinse with clean water immediately and then consult a doctor. Contact with alkaline fluid could cause blindness.
Do not put batteries in a fire, expose to heat, disassemble or remodel. Doing so could case fluid leakage, overheating or explosion.

■Product Handling Information

●Operational precautions (instrument)

- Only use the product including accessories for their intended purpose.
- Do not drop or physically impact on the instrument.
- The instrument is made of solvent-resistant materials but that does not mean it is resistant to all chemicals. Do not expose the instrument in strong acid or alkali solution, or wipe with such solution.
- If the instrument is dropped into water or gets wet, wipe it using soft cloth. Do not heat to dry it.
- The instrument has a dust-proof and waterproof structure i.e., the instrument does not malfunction even when immersed in water of 1 m depth for 30 minutes. This does guarantee non-destructive, trouble-free, dust-proof, and waterproof performance in all situations.
- When replacing the batteries or when a serial cable connected, the instrument does not have the dust-proof and waterproof performance. The dust-proof and waterproof performance is maintained only when the covers are attached correctly.
- After replacing the batteries or removing the serial cable connected, make sure that the waterproof gasket attached to the cover is not deformed or discolored, or has foreign matter adhering to it. If the waterproof gasket is deformed, discolored or has foreign matter adhering to it, dust could get inside, water leaks could occur that could lead to instrument malfunction.
- To disconnect an electrode or serial cable, hold the connector and pull it off. If you pull at the cable, it may cause breakage.
- The phono jack communication between the instrument and a personal computer (referred to as PC in the rest of this document) may fail because of environmental conditions, such as electromagnetic noise.
- Do not replace the batteries in a dusty place or with wet hands. Dust or moisture could get inside the instrument, possibly causing instrument malfunction.
- Do not use an object with a sharp end to press the keys.
- If the power supply is interrupted while measurement data is being saved in the instrument, the data could be corrupted.
- A Ni-MH rechargeable battery can be used in this instrument.

● Operational precautions (battery)

- Do not short circuit a battery.
- Position the + and – side of the battery correctly.
- When the battery has depleted or the instrument will not be used for a long time, remove the batteries.
- Of the specified battery types, make sure to use two batteries of the same type.
- Do not use a new battery together with a used battery.
- Do not use a fully charged nickel-metal hydride battery together with a partially charged battery.
- Do not attempt to charge a non-rechargeable battery.

● Environmental conditions for use and storage

- Temperature: 0°C to 45°C
- Humidity: under 80% relative humidity and free from condensation

Avoid the following conditions.

- Strong vibration
- Direct sunlight
- Corrosive gas environment
- Locations close to an air-conditioner
- Direct wind

● Transportation

When transporting the instrument, repackage it in the original package box. Otherwise, it may cause instrument breakage.

● Disposal

When disposing of the product, battery and standard solutions used for the calibration follow the related laws and regulations of your country for disposal of the product.

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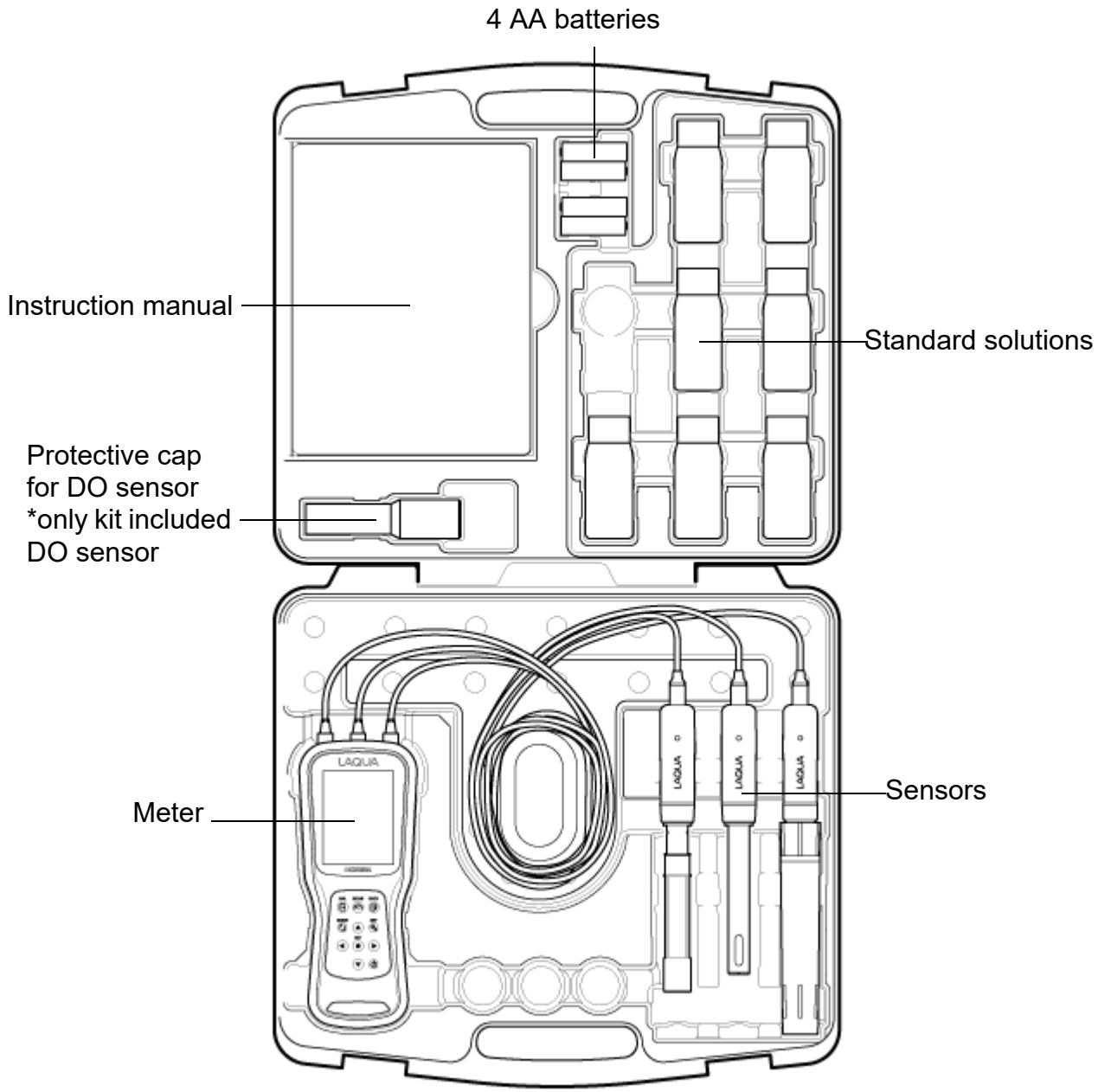
Product Overview

This section describes the package content, Key features and product components of LAQUA WQ-300 series Handheld Water Quality meters.

■ Package Content

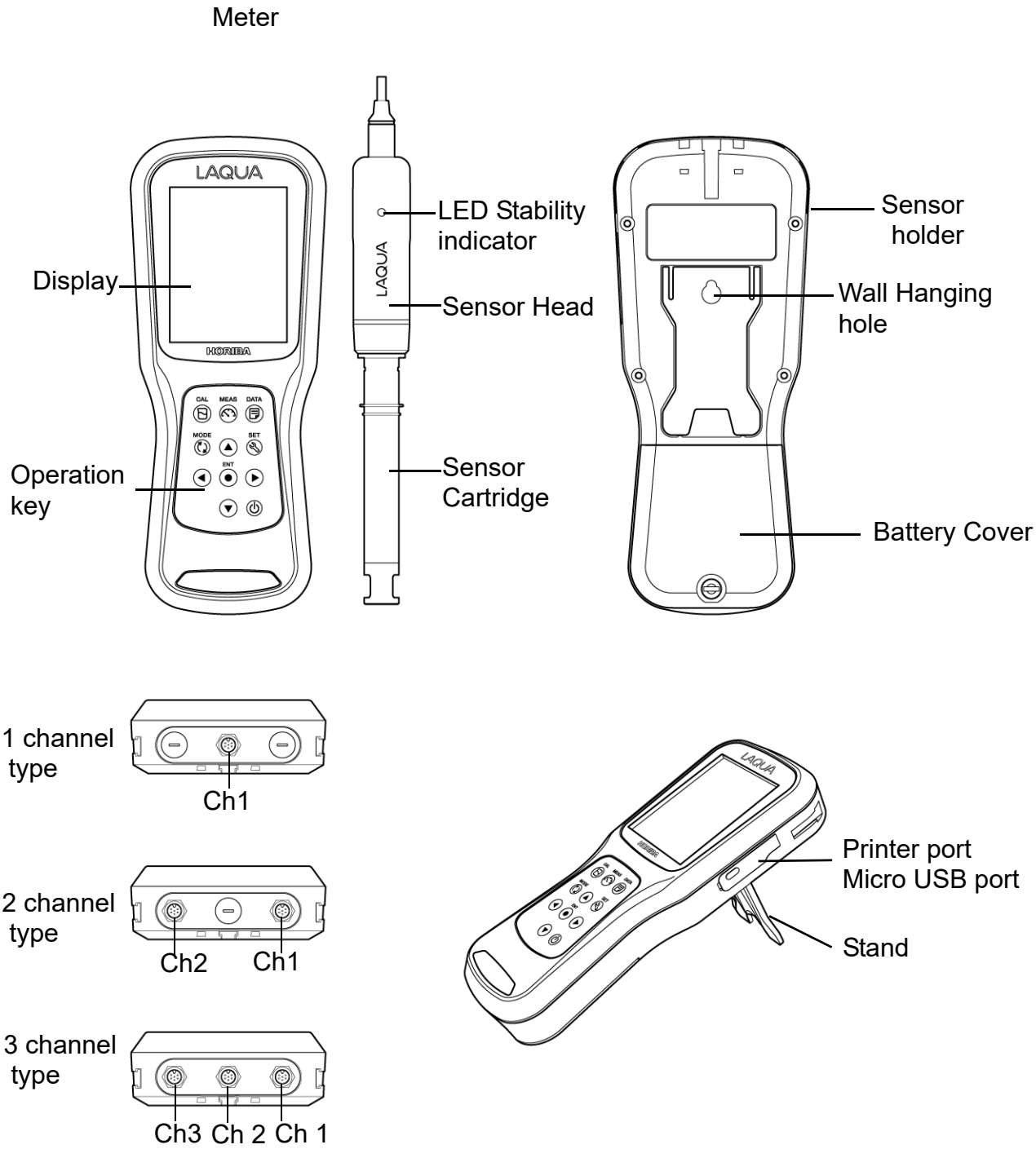
After opening the carry case, remove the meter and check for damage on the instrument and the standard accessories all exist. If damage or defects are found on the product, contact your dealer.
LAQUA WQ-300 Series Hand-held meter and meter kit include the following items:



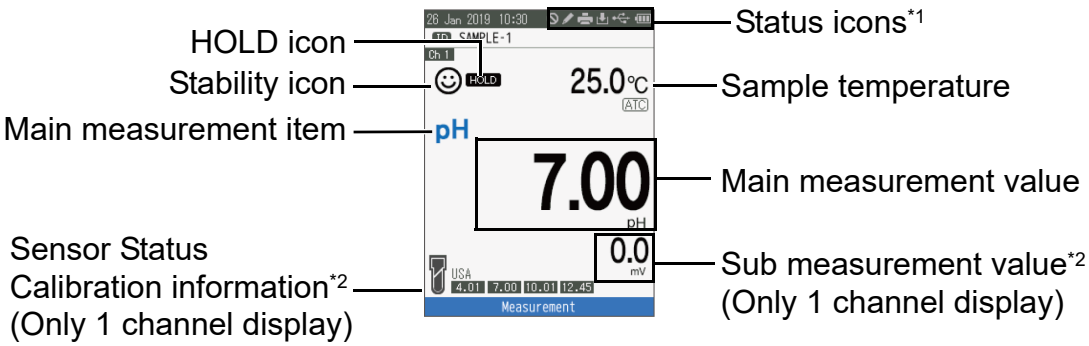
■ Key Features

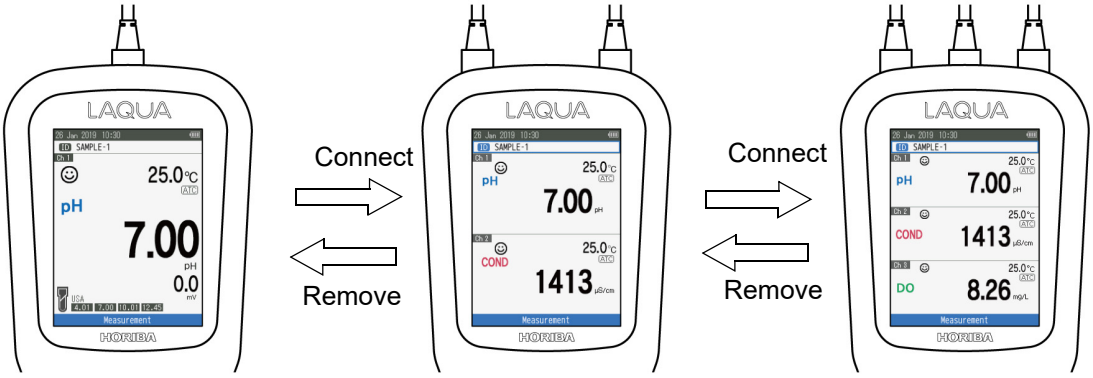
- IP67 water ingress, dust-proof, shock-resistant, anti-slip meter housing.
- Large Color Graphic Display (70 x 55 mm)
- Built-in sensor holder (up to 3 sensors)
- Simple user interface and multi parameter display.
- 10,000 data memory.
- Automatic Temperature Compensation (ATC) with temperature sensor
- Auto-hold / Auto stable with stability indicator and Real-time measurement modes.
- Data transfer without a special software from the meter to a computer via USB connection

■ Product components



■ Display





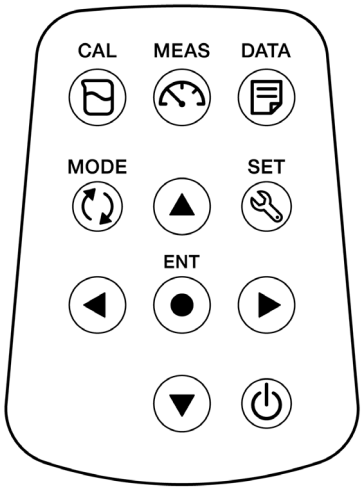
*1 Overview of Status icon area

Icon	Function
	Appears when a key operation is invalid.
	Appears when Printer communication is set ON.
	Appears when Data logging is set ON.
	Appears when data is storaged to the meter.
	Displays the battery level.  : Battery level 50 - 100% : Battery level 20 - 50%  : Battery level less than 20% Prepare the batteries or use Power supply. : Battery has run out. Replace the batteries or use Power supply.  : Displays USB power supply in use. Batteries power is not used.

*2 Sub Item：In the measurement display, the Sub measurement value is displayed according to the displayed main measurement item.

Sensor type	Main measurement item	Sub measurement item
pH Sensor Head	pH	mV (pH)
	mV (pH)	pH
EC Sensor Head	COND	-
	Res	-
	Sal	COND
	TDS	COND
DO Sensor	DO	DO (%)
	DO (%)	DO
ION Sensor Head	ION	mV (ION)
	mV (ION)	ION
ORP Sensor Head	mV (ORP)	-

■ Keypad operation



Keypad	Name	Function
	CAL key	Switches from the measurement mode to the calibration mode.
	MEAS key	Switches the operation mode to the measurement mode.
	DATA key	Switches from the measurement mode to the data mode.
	MODE key	In the measurement mode, changes measurement parameters.
	SET key	Switches to the setup mode of the meter and the connected sensor.
●	ENT key	Determines the selection or set up. Saves data in measurement mode and confirm calibration value in calibration mode.
▲	UP key	Moves the focus area and switches the screen.
▼	DOWN key	
◀	LEFT key	
▶	RIGHT key	
	POWER key	Powers ON/OFF the instrument.

Basic operations

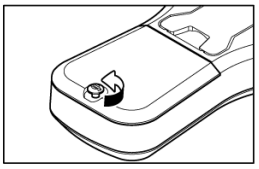
This section describes function and basic operation method of each part of LAQUA WQ-300 series handheld Water Quality meter.

■ Turnig on the instrument

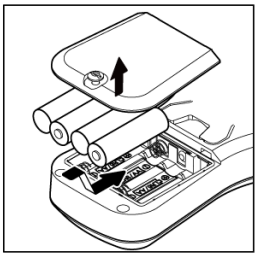
• Inserting the batteries

This instrument is operated by batteries. You can use AA alkaline batteries or AA Ni-MH chargeable batteries. Perform the following procedure to insert batteries in the instrument.

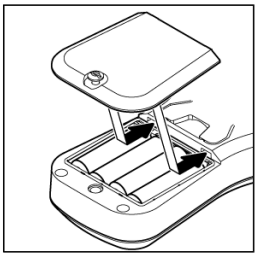
1. Unscrew the battery cover on the back of the instrument counter-clock wise to unlock the battery cover.



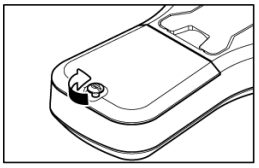
2. Remove the battery cover and set the batteries inside.



3. Replace battery cover.



4. Screw the battery cover on the back of the instrument clockwise to lock the battery cover.



Note

- Do not replace the batteries in a dusty place or with wet hands. Dust or moisture could get inside the instrument and possibly cause an instrument malfunction.
- Do not short-circuit a battery.
- Note polarity as shown in the battery compartment.
- When the battery has depleted or the instrument is not used for a long time, remove the batteries.
- Of the specified battery types, make sure to use two batteries of the same type.
- Do not use a new battery together with an used battery.
- When using the Ni-MH batteries, do not use a fully charged battery together with an insufficiently-charged battery.
- The SD memory is mounted below the battery box. When replacing it, remove the battery and replace it.

■ Using the External Power Supply

The Micro-USB interface can be used for external power supply. It is not possible to charge the batteries. The instrument is not supplied with an external 5V USB battery. Alternatively, the instrument can be supplied by an external power supply unit (not included in the scope of delivery) via the Micro-USB socket. Use an external battery that is suitable for 5V USB battery. For connection, a suitable USB cable with a Micro-USB plug is required. The power saving mode is canceled only when using external power.

*Power saving mode: When the power supply is only the battery, the screen brightness will automatically shift to 1 if there is no button operation for more than 1 minute. Return to the set screen brightness by key operation.

While the instrument is powered by the external power supply, the batteries are not being used. The icon  is shown the screen.

Attention

Take care that the AC adapter does not come into contact with liquids.

■ Connecting sensors

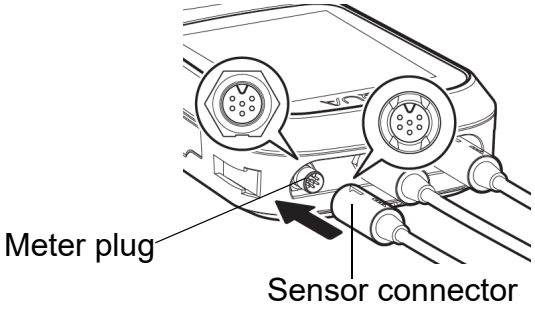
To perform calibration/ measurement, it is necessary to use the appropriate sensors for measurement parameter. Recommended sensors for various sample are listed below. Use the following procedure to correctly connect the sensor to the instrument

Measurement item	Sensor head or Sensor	Sensor Cartridge or Electrode
pH	pH Sensor head (300PH-2, -5)	pH Sensor Cartridge (300-P-C)
Conductivity	EC Sensor head (300-C-2, -5)	4-Cell or 2-Cell EC Sensor Cartridge* (300-4C-C, 300-2C-C)
ION	ION Sensor head (300-I-2, -5)	Ion Sensor Catridge (300-XX-C series), Ion Selective Electrode** (65XX-10C series, 5002S-10C)
ORP	ORP Sensor head (300-O-2, -5)	ORP Sensor Cartridge (300-O-C), ORP Electrode** (9300-10D)
DO	DO Sensor (300-D-2, -5)	

Align the arrow on the sensor connector with the groove of the meter plug and insert it. It does not matter if you plug the connector of any measurement item into the meter plug.

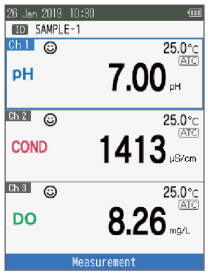
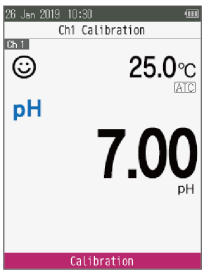
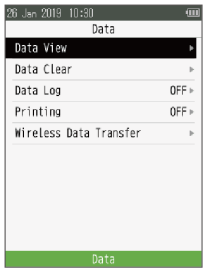
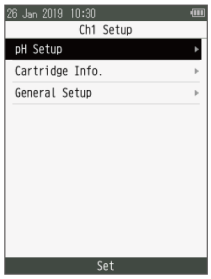
*Set the nominal cell constant value of the EC sensor cartridge when the EC sensor cartridge was changed: refer “Cell Constant” on page 38.

**It is necessary to use the BNC conversion connector (300-BNC) separately.



■ Operation mode

You can change the operation mode to four available modes depending on the purpose of use.

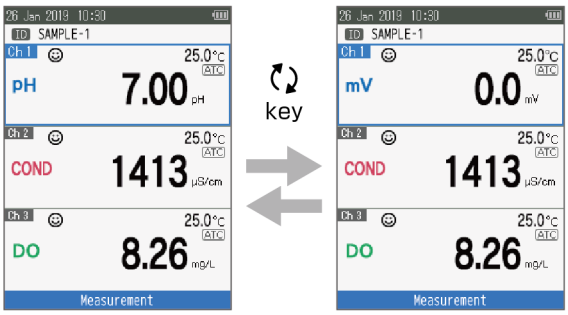
Display	Name	Function
	Measurement mode	Displays the measurement value. Checks the calibration data and the sensor status.
	Calibration mode	Performs calibration.
	Data mode	Performs data set up, data clear, data acquisition and printing set up.
	Setup mode	Performs various set up functions and confirms set up information.

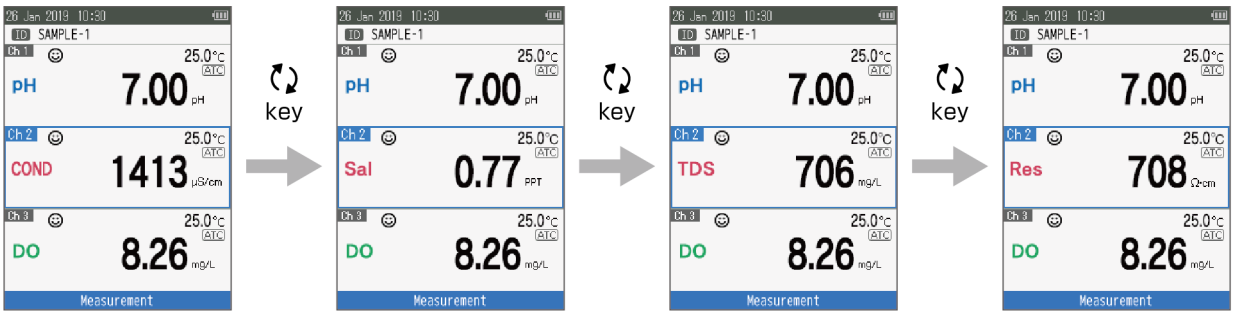
Note

- If the measured value is below the display range, “Under” appears in the pH, mV, ORP, Res and temperature measurement modes.
- If the measured value is above the display range, “Over” appears in all measurement modes.

■ Changing the measurement parameter

The measurement parameter of focused channel can be changed by pressing the ↻ key.

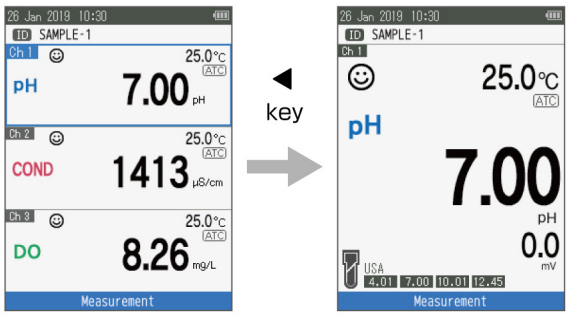




Sensor head or Sensor	pH Sensor head 300PH-2, -5	EC Sensor head 300-C-2, -5	DO Sensor 300-D-2, -5	ION Sensor head 300-I-2, -5	ORP Sensor head 300-O-2, -5
Measurement parameter	pH mV	Conductivity Salinity TDS Resistivity	DO (mg/L) DO (%) O_2 (%)	ION mV	ORP

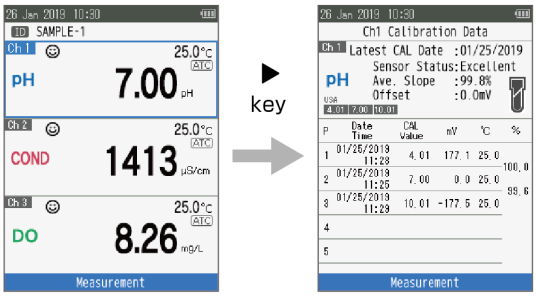
■ Changing the magnifing measurement display

In the measurement mode, measurement display of the focused channel can be magnified by pressing the ◀ key. (The function does not work when only one channel is used.)

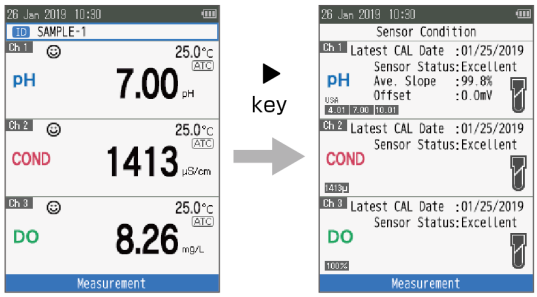


■ Viewing Calibration data

In the focused channel of the measurement mode, the calibration data of each sensors can be viewed by pressing the ▶ key.



In the focused ID of the measurement mode, the sensor condition of each sensors can be viewed by pressing the ▶ key.



Sensor status icon	pH Sensor head 300PH	EC Sensor head 300-C	DO Sensor 300-D	ION Sensor Head 300-I
	Average Slope*	Average Cell constant*	Offset** (Membrane Condition)	Average Slope*
Excellent	95.0 ～ 105.0%	Within ±10%	Within ±14.9	> 80.0%
Very good	85.0 ～ 94.9%	Within ±20%	Within ±19.9	70.0 ～ 79.9%
Good	80.0 ～ 84.9%	Within ±30%	Within ±25.0	50.0 ～ 69.9%

* It is the average of each sensitivity or cell constant between each calibration point. Unlike the mathematical average, it is displayed on the sensor status icon as a sensor status indicator.

** Shows the change from the default value of the membrane condition. This change does not affect the measurement accuracy. It is displayed on the sensor status icon as a guide for the membrane replacement time.

Calibration

This section describes the basic calibration method of each measurement parameter using LAQUA WQ-300 series and sensors (sensor head and sensor cartridge connected) or electrodes (ion selective electrode and BNC conversion connector connected).

■ pH Calibration

Calibration is necessary for accurate pH measurement. To perform pH calibration, follow the procedure detailed below.

● Prerequisites

- Clean the pH sensor with pure water (or deionized water) and wipe it with tissue paper.
- Switch on the meter and plug in the pH sensor.
- Prepare buffer solution required for calibration.
- Set the Focus area in pH measurement mode.
- Place the pH sensor at least 3 cm in the buffer solution.

Note

- Perform two-point calibration using:
  pH 7.00 and 4.01 for acidic sample
  pH 7.00 and 10.01 for alkaline sample
- Perform three-point calibration using pH7.00, 4.01 and 10.01 if you are unsure of the expected sample pH value. It is recommended to calibrate with pH7.00 first.
- Default buffer Group set up is USA. If you like to change to NIST, DIN, Custom refer to “Buffer Group” on page 37.

Tip

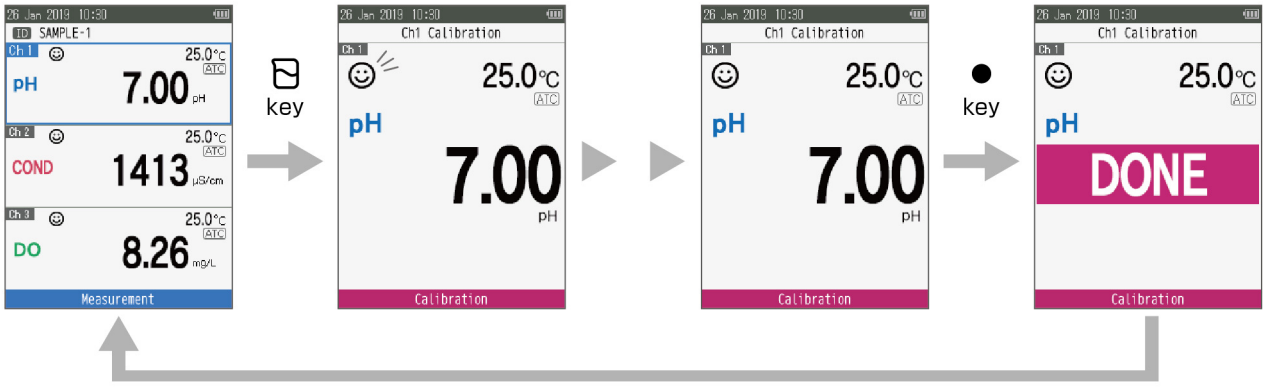
- To abort an ongoing calibration process at any point of time, press the ⏲ key.
- It is recommended to delete the former calibration data (refer to “CAL Data Clear” on page 37).

● Calibration

1. After placing the pH sensor in the buffer solution, press the key.
2. Meter starts checking various calibration values with a blinking ☺ on screen.

* In the buffer setting for CUSTOM calibration, press key and then adjust the calibration value.

3. Wait for the ☺ to stabilize (stable calibration reading).
4. Press the ● key to confirm calibration data.
5. Meter displays **DONE** indicating end of the pH calibration procedure.
6. Switch to the measurement screen. For the second calibration, repeat the same calibration procedure from 1.



Tip

If you want to know current calibration data, refer to “Viewing Calibration data” on page 11.

■ EC Calibration

Calibration is necessary for accurate electrical conductivity measurement. To perform conductivity calibration, follow the procedure detailed below:

● Prerequisites

- Set the Cell type according to the EC sensor cartridge to be used: refer to “Cell Type” on page 39.
- Set the nominal cell constant value of the EC sensor cartridge: refer to “Cell Constant” on page 38.
- Clean the EC sensor with pure water (or deionized water) and wipe it with tissue paper.
- Switch on the meter and plug in the EC sensor.
- Prepare standard solution required for calibration.
- Set the Focus area in EC measurement mode.
- Place the EC sensor at least 3 cm in the standard solution.

Note

- Salinity, TDS, and resistivity of a sample solution are calculated from the measured value of conductivity.
- If you like to use manual calibration method, refer to “CAL Mode” on page 38.

Tip

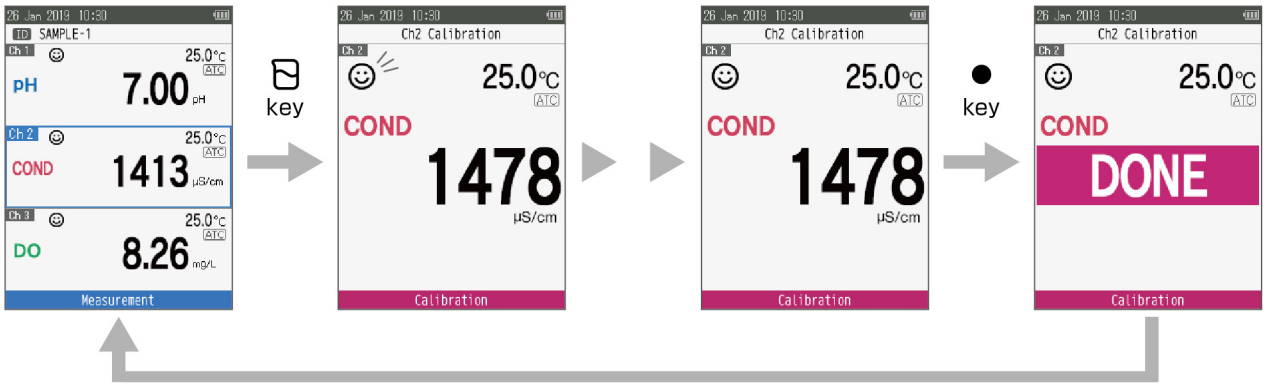
- For second or multiple point calibration, clean the EC sensor with pure water (or deionized water) and follow the same procedure.
- If you are performing multiple point calibration, calibrate to the lowest conductivity first and then move to increasing conductivity values. This minimizes cross contamination.
- To abort an ongoing calibration process at any point of time, press the ⏲ key.
- It is recommended to delete the former calibration data (refer to “CAL Data Clear” on page 38).

● Calibration

1. After placing the EC sensor in the standard solution, press the ⇆ key.
2. Meter starts checking various calibration values with a blinking ☺ on screen.

* In the buffer setting for CUSTOM calibration, press 🔧 key and then adjust the calibration value.

3. Wait for the ☺ to stabilize (stable calibration reading).
   Change the supplementary unit by pressing the 🔧 key on the calibration value input screen.
4. Press the ● key to confirm calibration data.
5. Meter displays **DONE** indicating end of the conductivity calibration procedure.
6. Switch to the measurement screen. For the second calibration, repeat the same calibration procedure from 1.



■ Salinity Calibration

Calibration is necessary for accurate Salinity measurement. To perform salinity calibration, follow the procedure detailed below.
Use the standard solution made by NaCl when you calibrate in Sal mode. Salinity can be also measured after calibration in EC mode. In that case, Salinity is calculated from conductivity.

● Prerequisites

- Clean the EC sensor with pure water (or deionized water) and wipe it with tissue paper.
- Switch on the meter and plug in the EC sensor.
- Prepare standard solution required for calibration.
- Set the Focus area in EC measurement mode.
- Press the ↻ key to keep the meter in Sal mode.
- Place the EC sensor at least 3 cm in the standard solution.

Note

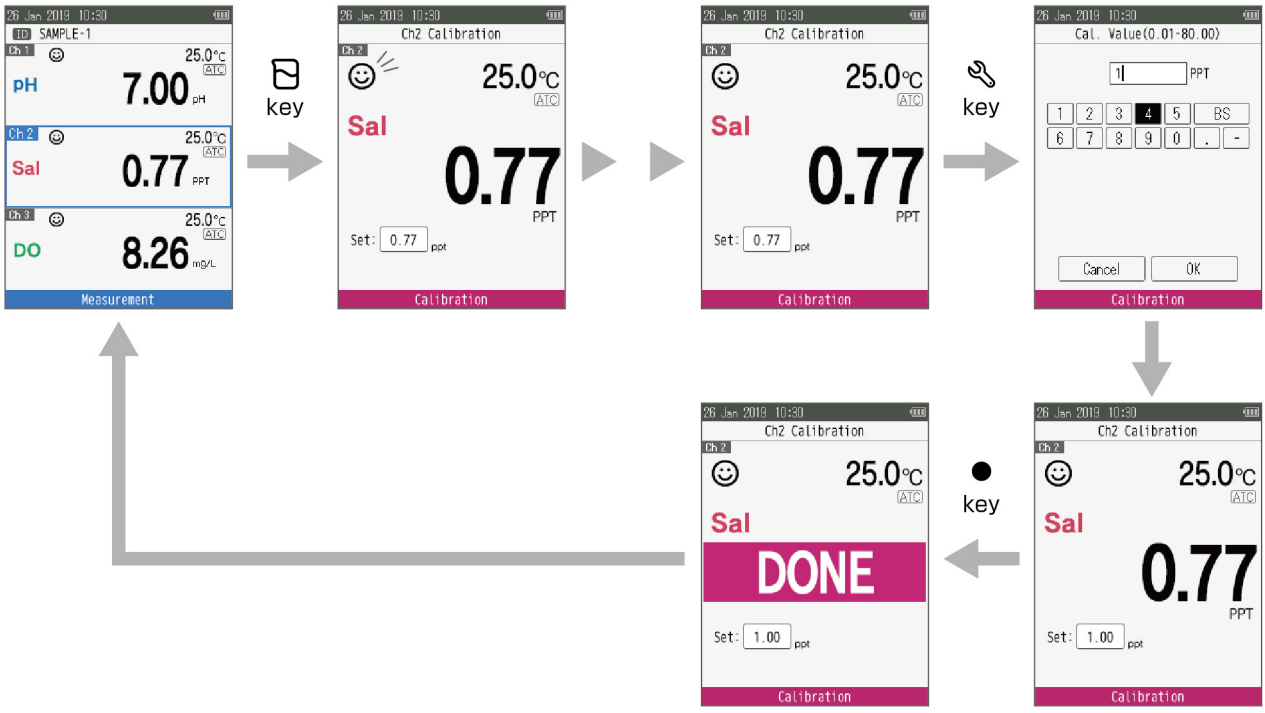
- Before salinity calibration, set the required Salinity method. In LAQUA WQ-300 series handheld Water Quality meter, available salinity methods are;
  NaCl (non-linear salinity curve)
  Seawater (Practical Salinity Scale 1978 UNESCO)
- To set a desired Salinity method, refer to “Sal Type” on page 39.

Tip

- To abort an ongoing calibration process at any point of time, press the ⏲ key.
- It is recommended to delete the former calibration data (refer to “CAL Data Clear” on page 39).

● Calibration

1. After placing the EC sensor in the standard solution, press the key.
2. Meter starts checking the stability of calibration value with a blinking ☺ on screen.
3. Wait for the ☺ to stabilize (stable calibration reading).
4. Press the key and then adjust the Salinity calibration value.
5. Press the ● key to confirm calibration data.
6. Meter displays **DONE** indicating end of the calibration procedure.
7. Switch to the measurement screen.



■ DO Calibration

Calibration is necessary for accurate DO measurement. Two calibration modes are available in DO meter for calibration,

- DO concentration mode (mg/L)
- DO saturation mode (%)

To perform DO calibration, follow the procedure detailed below:

● Prerequisites

- Clean the membrane at the tip of the DO sensor with pure water (or deionized water) and wipe it with tissue paper.
- Switch on the meter and plug in the DO sensor.
- Set the Focus area in DO measurement mode.
- Press the key to keep the meter in DO concentration (mg/L) or DO saturation (%) mode.

Note

<Air calibration>
Span: Moisten the sponge inside the supplied calibration bottle with pure water (or deionized water), place the sensor in the bottle and calibrate at [100%].
<Standard solution calibration>
Span: Immerse the sensor into the solution for span calibration*1 and calibrate at [100%].
*1: Pure water (or deionized water) is thoroughly bubbled with an air pump to saturate it with oxygen.
Zero: Immerse the sensor into the solution for zero calibration*2 and calibrate at [0%].
*2: Prepare the solution for zero calibration by adding 2 g of sodium sulfite (Na_2SO_3) to 1000 mL of pure water (or deionized water) and stirring the mixture to completely dissolve it.

Tip

- To abort an ongoing calibration process at any point of time, press the key.
- It is recommended to delete the former calibration data (refer to “CAL Data Clear” on page 40).

● Calibration

1. Press the ⧉ key. Meter starts checking various calibration values with a blinking ☺ on screen.

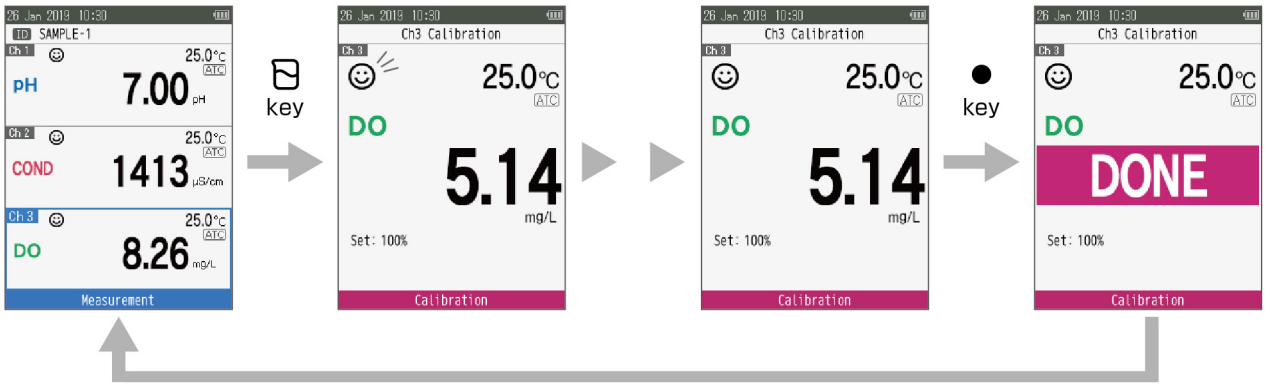
   *Switch to [100%] and [0%] calibration mode by pressing the ⧉ key in DO calibration mode.

2. Wait for the ☺ to stabilize (stable calibration reading).

3. Press the ● key to confirm calibration data.

4. Meter displays **DONE** indicating end of the DO calibration procedure.

5. Switch to the measurement screen. For the second calibration, repeat the same calibration procedure from 1.



■ ION Calibration

Calibration is necessary for accurate ION measurement. To perform ION calibration, follow the procedure detailed below:

● Prerequisites

- Set MTC when ion sensor cartridges are used without temperature compensation: refer to “Temp. Type” on page 42.
  *To use temperature compensation with an electrode without a temperature sensor, an optional temperature compensation electrode must be connected and set to ATC.
- Clean the senor with pure water (or deionized water) and wipe it with tissue paper.
- Switch on the meter and plug in the sensor.
- Prepare standard solution required for calibration.
- Press the ▲ ▼ key to keep the Focus area in ION measurement mode.
- Place the sensor at least 3 cm in the standard solution.

Note

- Before ION calibration, set the required ION species. In LAQUA WQ-300 series handheld Water Quality meter, available ion species are;
  Na^+, K^+, NH_4^+, Ca^{2+}, F^-, NO_3^-, Cl^-, NH_3 and Custom (Ion valency:+1, +2, -1, -2)
- To set ION species, refer “ION Setup” on page 42.
- The ionic strength adjuster (ISA) should be added to the standard solution to achieve the following volume ratios.
  Na^+, K^+, NH_4^+, Ca^{2+}, NO_3^-, Cl^-, NH_3
  the standard solution:the ISA=50:1
  F^-
  the standard solution:TISAB=1:1

Note

Conditioning of the electrode
In the following cases, perform conditioning of the electrode before calibration.

- Before the first use
- Before use after storage for two weeks or longer
- If the electrode is less responsive

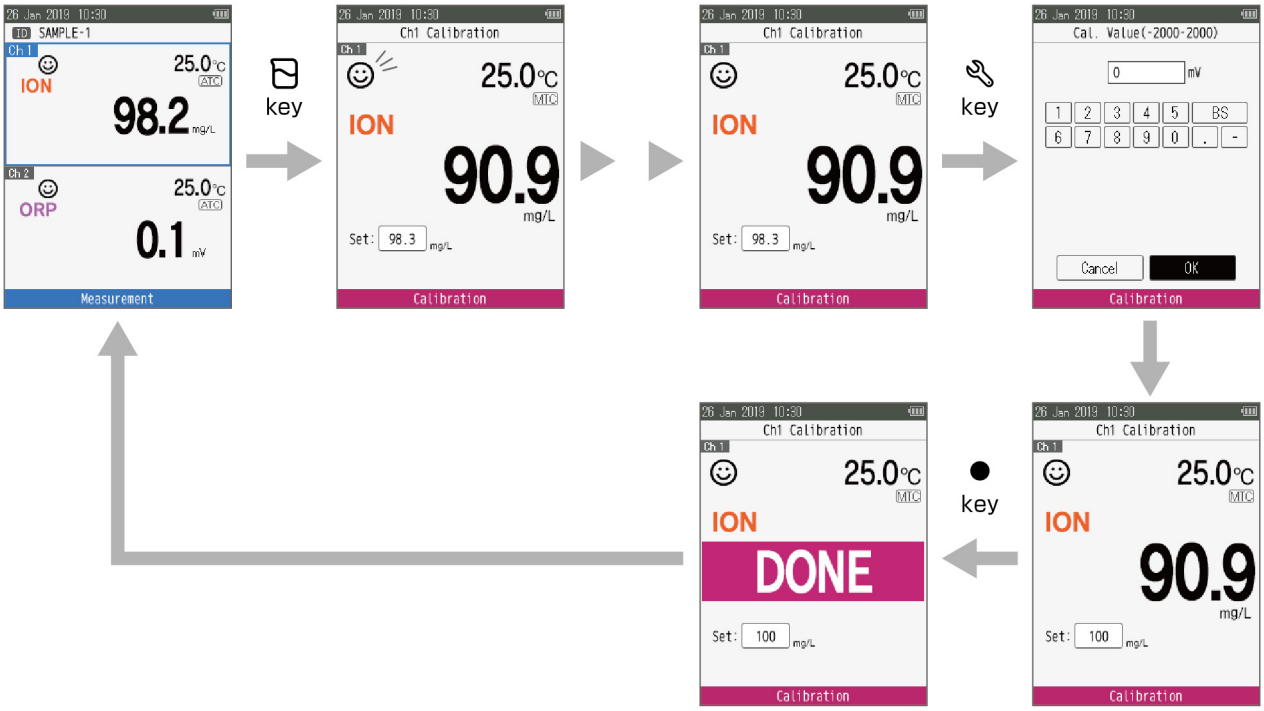
An electrode is conditioned by soaking it in a standard solution for 1 hour or longer.
Use a standard solution whose concentration is 100 mg/L or more.
A standard solution with ISA added can also be used.

Tip

- For second or multiple point calibration, clean the ION sensor with pure water (or deionized water) and follow the same procedure.
- If you are performing multiple point calibration, calibrate to the lowest concentration first and then move to increasing ion values. This minimizes cross contamination.
- To abort an ongoing calibration process at any point of time, press the ↶ key.
- It is recommended to delete the former calibration data (refer to “CAL Data Clear” on page 42).

● Calibration

1. After placing the sensor in the standard solution, press the ⎘ key.
2. Meter starts checking the stability of calibration value with a blinking ☺ on screen.
3. Wait for the ☺ to stabilize (stable calibration reading).
   (Depending on the condition of the ISE, a value that differs significantly from the standard solution may be displayed, but this does not affect calibration.)
4. Press the 🔧 key and then adjust the calibration value.
5. Press the ● key to confirm calibration data.
6. Meter displays **DONE** indicating end of the calibration procedure.
7. Switch to the measurement screen.



■ ORP calibration

Calibration is necessary for accurate ORP measurement. To perform salinity calibration, follow the procedure detailed below:

● Prerequisites

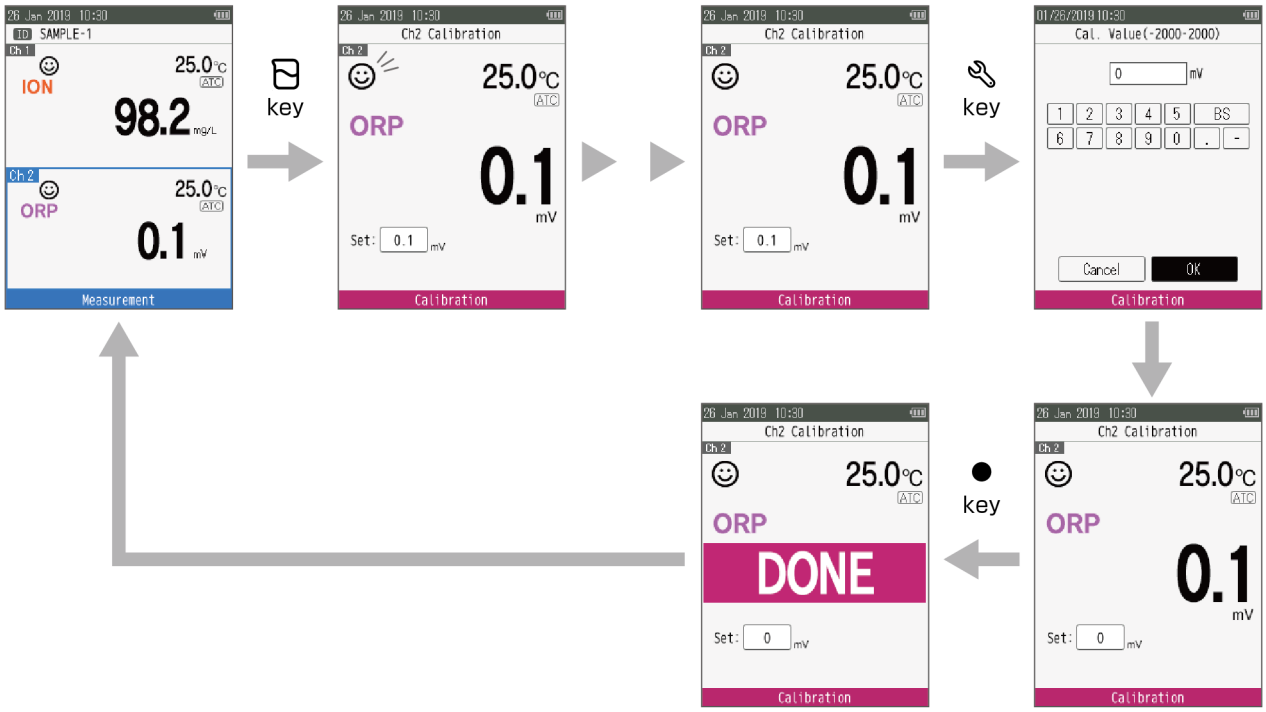
- Clean the sensor with pure water (or deionized water) and wipe it with tissue paper.
- Switch on the meter and plug in the ORP sensor.
- Prepare standard solution required for calibration.
- Set the Focus area in ORP measurement mode.
- Place the sensor at least 3 cm in the standard solution.

Tip

- To abort an ongoing calibration process at any point of time, press the ⏲ key.
- It is recommended to delete the former calibration data (refer to “CAL Data Clear” on page 43).

● Calibration

1. After placing the sensor in the standard solution, press the ⎘ key.
2. Meter starts checking the stability of calibration value with a blinking ☺ on screen.
3. Wait for the ☺ to stabilize (stable calibration reading).
4. Press the 🔧 key and then adjust the ORP calibration value.
5. Press the ● key to confirm calibration data.
6. Meter displays **DONE** indicating end of the calibration procedure.
7. Switch to the measurement screen.



■ Temperature calibration

Temperature calibration is required to accurately match the sensor to the meter. Check the temperature reading and if its acceptable, no temperature calibration is required. If you need to calibrate, please follow the procedure detailed below:

● Prerequisites

- Clean the sensor with pure water (or deionized water) and wipe it with tissue paper.
- Switch on the meter and plug in the sensor.
- Prepare standard solution required for calibration.
- Set the Focus area in the measurement mode that the temperature is needed.
- Place the sensor at least 3 cm in the standard solution.
- Wait for 5 minutes to ensure temperature stability.

Note

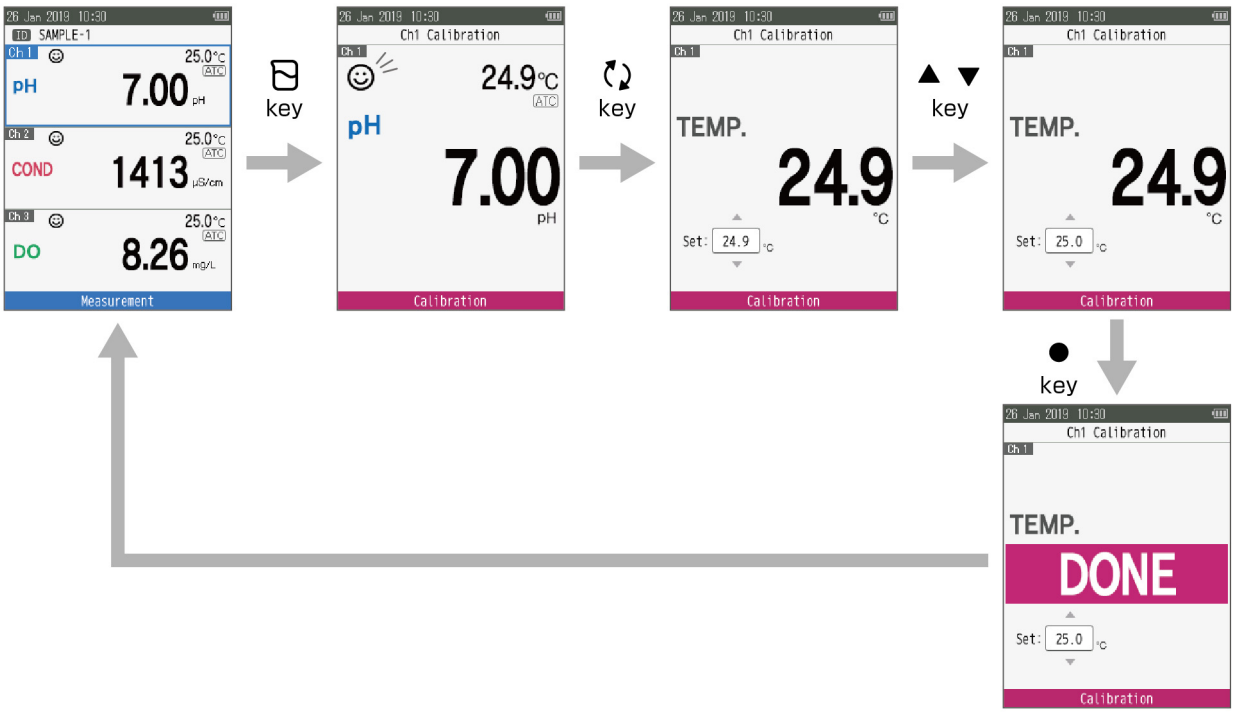
- In the only ATC setting, temperature calibration is available.
- Temperature calibration must be performed using a known temperature solution or against a calibrated thermometer.

Tip

To abort an ongoing calibration process at any point of time, press the ⏲ key.

● Calibration

1. After placing the sensor in the standard solution, press the ⊟ key.
2. Press the ↻ key to switch to temperature calibration mode. Meter displays measured temperature value.
3. Press the ▲ ▼ key to adjust the calibration value.
4. Press the ● key to confirm calibration data.
5. Meter displays **DONE** indicating end of the temperature calibration procedure.
6. Switch to the measurement screen.



■ Multi auto calibration

Multi auto calibration is available with pH, EC and DO sensors in the auto calibration setting. If you need to calibrate, please follow the procedure detailed below:

● Prerequisites

- Clean the sensor with pure water (or deionized water) and wipe it with tissue paper.
- Switch on the meter and plug in sensors.
- Prepare standard solution required for each calibration.
- Set the focus area in the ID.
- Place the sensor at least 3 cm in the standard solution.

Note

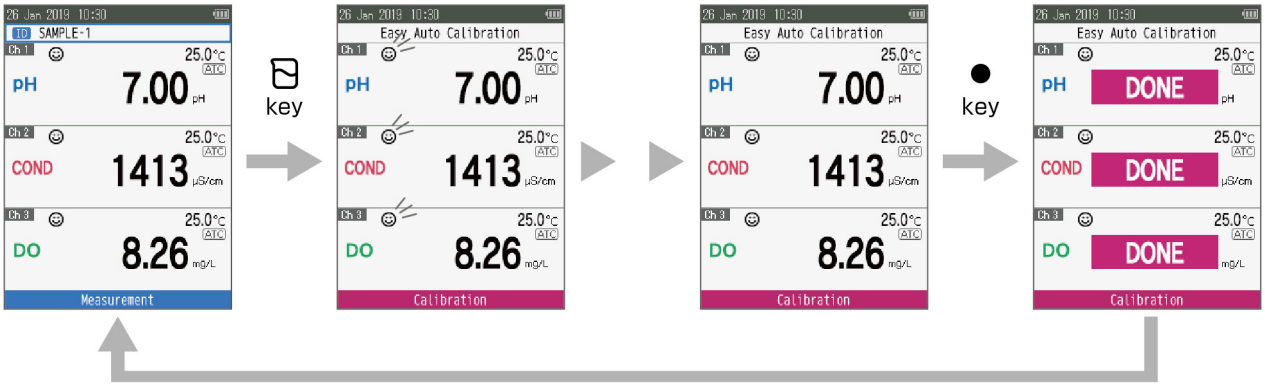
- Multi auto calibration is not available with pH and EC sensors in the Custom calibration setting.
- Multi auto calibration is not available with ION and ORP sensors, because the calibration setting is only custom setting.
- DO calibration is available only High concentration calibration [100%] for the multi auto calibration.

Tip

To abort an ongoing calibration process at any point of time, press the ⏲ key.

● Calibration

1. After placing sensors in the standard solution, press the ⊟ key.
2. Meter starts checking various calibration values with a blinking ☺ on screen.
3. Wait for the ☺ to stabilize (stable calibration reading).
4. Press the ● key to save calibration data.
5. Meter displays **DONE** indicating end of the calibration procedure.
6. Switches to the measurement screen.



Measurement

This section describes the basic measurement method of each measurement parameter using LAQUA WQ-300 series and sensors (sensor head and sensor cartridge connected) or electrodes (pH, ORP or ion selective electrode connected to the corresponding sensor head via a conversion connector (300-BNC)).

■ measurement

In measurement mode, measurement can be performed by immersing the sensor in the sample.

● Prerequisites

- Set the measurement type: auto-stable (Default setting), auto-hold, and real time measurement. refer “Stability Mode” on page 35.
- Set the stability criteria: refer “Stability Criteria*1” on page 35.
- Refer to “Data Log” on page 30 when using the data log function.

● Sample measurement

1. Clean the sensor with pure water (or deionized water) and wipe it with tissue paper.
2. Open the internal liquid replacement port if the electrode has the internal liquid replacement port.
   In order for the internal solution to flow into the standard solution, make sure to open the internal liquid replacement port.
3. Place the sensor or the electrode at least 3 cm in the buffer solution.
   Refer “Calibration” on page 12 before starting sample measurement.

Data

This section describes the basic method of data storing and transferring using LAQUA WQ-300 series handheld Water Quality meters.

■ Data storage

In LAQUA WQ-300 series handheld water quality meters, data measured by the instrument can be stored in the internal memory.

To save the measured data; Press the ● Key to save the displayed data.

Data can be saved automatically at set time intervals. While using this function, the automatic power OFF setting is invalid. If the battery runs out during data logging, the data until the battery runs out is saved. Replace the battery and check the data.

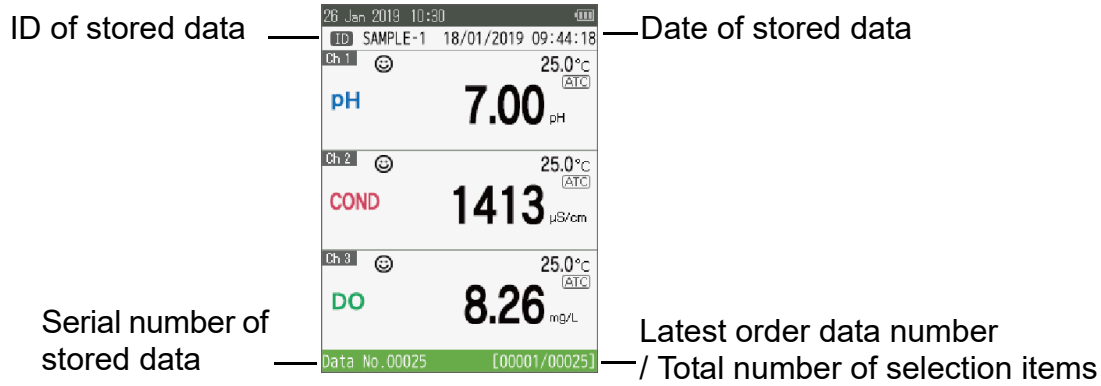
Refer to “Data Log” on page 30 for details on this function

Note

- If the data storage limit reaches 10,000, storage data excess error message is displayed.
- In such case, transfer necessary data to a PC and delete the data from the internal memory of the instrument.

■ Data display

The screen display of saved measurement data is as follows.



Tip

In the data screen, fast-forward the data number by pressing and holding ▲ ▼ key.

■ Data management

To view, erase stored data and set data acquisition, press key.
In the Data mode, move the focus with the ▲ ▼ key, select the Data View or Data Clear, and press the ● key.

Default settings are in **Bold**.

Parameter	Item or settings	Function
Data View	All	Displays all stored data.
	Date	Displays stored data of each date.
	ID	Displays stored data of each ID.
Data Clear	Latest Data	Erase only the stored latest data.
	Date	Erase stored data collectively by date.
	ID	Erase stored data collectively by ID.
	All	Erase all stored data at once.
Data Log	**0 (OFF)**-3600 sec	Save measurement data to the meter according to the entered time of data log interval time.
Printing	· **OFF** · ON	Turn on function to printout the data when the printer is connected to meter.
Wireless Data Transfer		Transfer stored data to PC with the product installed the FlashAir™*1 application software or web browser (http://flashair/). 1. Select this parameter. 2. Select flashair in the Wifi settings of your PC. 3. Enter the address (http://flashair) in your browser. *The default password for wireless LAN connection is “12345678”. The stored data for each channel is saved in CSV data format in User / MEAS / CH. Copy the data to the connected device. **To save battery power, exit this function immediately after data transfer.

*1 ... FlashAir™ is a trademark of Toshiba Corporation

■ Data transfer to PC

Connect the meter to a PC using the micro-USB plug to USB cable to transfer saved data to the PC. If you need to transfer data from meter to PC, please follow the procedure detailed below:

For wireless data transfer, refer “Wireless Data Transfer” on page 30

● Prerequisites

prepare USB-A to micro-USB (B) interface cable

Note

Do not use USB-A to micro-USB (B) cable for only power supply. Use it for data transfer.

● Data transfer to PC

1. Turn off the meter if the meter power is on.
2. Open the cover for the micro USB and printer ports.
3. Connect the USB cable first to the meter and then to the PC.
4. Turn on the power to the meter.
5. Select OK and press ● key when displays Confirmation dialog for MSC (Mass Storage Class) mode connection.
6. Stored data for each channel is stored in CSV format in User / MEAS/ CH on the PC. Copy and paste the data of User folder in the meter to PC.
   *Files in the User folder should only be copied and should not be deleted or edited. Data may be lost.

Tip

During the USB communication, the meter does not have the dust-proof and waterproof performance. The dust-proof and waterproof performance is maintained only when the covers are attached correctly.

● Eject from PC

1. To avoid losing data, remove the USB cable safety refer to safety removing hardware procedure for your PC.
2. Remove the USB cable from the meter.
3. Close the cover for the micro USB and printer ports correctly.

■ Print data

The measure value displayed on the meter, stored data and calibration data can be printed. Pressing the ● key on the screen displaying measurement values and stored data starts printing. Connect the dedicated printer unit and the meter in advance using the dedicated printer cable. While using the data logging, not print in measurement mode.

Tip

When the Stability Mode is auto hold setting and the auto save/print is ON, data is automatically saved after the measurement value is fixed. It also prints automatically when using the printer. Refer “Auto Save/Print” and “Stability Mode” on page 35.

Printer formant - Measurement data and stored data

Item	Data (sample)
Date	2019/01/26
Time	10:30
Sensor	300-X-X
SN	123
ID	Sample01
[Measurement parameter]	[Measurement value][Unit]
[Sub measurement parameter]	[Measurement value][Unit]
Temperature	25.0 [°C/°F][ATC/MTC]
Sal Coef.	0.0 PPT *Only DO
Baro Coef.	101.3 kPa *Only DO
User Name	
Signature	

Printer formant - Calibration data

Item	Data (sample)	
Sensor	300-X-2	
SN	123	
Cartridge *DO: Membrane	300-X-C	
SN	123	
ION Species	ION	*Only ION
ION Valency	+1	*Only ION(ION Species setting : ION)
Coef. Value	1.005	*Only Sal
Sensor Status	Excellent	*Only pH, COND, DO, ION
Hi. Coef.	0.1	*Only DO
Low. Coef.	0.1	*Only DO
Offset	0.5 mV	*Only pH
Slope		*Only pH, ION
Cell		*Only COND
[Cal. Range]	[Cal. Result]	*Only pH, COND, ION
Average Slope	99.7%	*Only pH, ION
Calibration data		
Date	2019/01/26	
Time	10:30	
Cal. value [Cal. value]	[measurement value or cell coef.] (each calibration) 25.0 [°C/°F][ATC/MTC]	
Baro. Coef.	101.3 kPa	*Only DO
Raw value	[measurement value] *Only ORP 25.0 [°C/°F][ATC/MTC]	
User Name		
Signature		

Setup

This section describes all the setup functions for each measurement parameter available in LAQUA WQ-300 series handheld Water Quality meters.

■ ID Setup

Individually created ID can be selected according to the purpose of the measurement.
In measurement mode, set the focus area in the ID and press the ◀ key.

Parameter	Details
Select ID	Select registered ID. Default: blank
Create New ID	Enter an ID using the alphanumeric entry screen (up to 8 characters and up to 100 IDs)
Delete ID	Erase registered ID.

■ General Setup

It is possible to change settings suitable for the meter. In the measurement screen mode, move the focus area in the ID and press the key.

Default settings are in **Bold**.

Parameter	Settings	Details
System Setup	refer to “System Setup” on page 36	Use System Setup to customize settings for the meter.
Stability Mode	· **Auto Stable**	Auto Stable : If the measurement value does not fulfill the stability condition*1, the fixed value is released. When the measured value fulfill the stability condition again, the measured value is fixed.
	· Auto Hold	Auto Hold : Press the key to release the fixed measured value. When the measured value fulfill stability condition*1 again, the measured value is fixed.
	· Real time	Real time : Measure the instantaneous without Hold of the measured value.
Auto Save / Print *Only Auto Hold	· ON · **OFF**	Data is automatically saved after the measurement value is fixed. It also prints automatically when using the printer.
Stability Criteria*1	· Slow · **Medium** · Fast	Measurement value variation for 10 seconds is less than each criteria of the below list*1 and Temperature variation is less than 2.0°C.
System Info.	· Meter · Ch1 Sensor · Ch2 Sensor · Ch3 Sensor	Select this mode to display the Model name and the serial number of the meter or each selected sensor.

*1 ... The criteria of stability judgment in the Auto Stable and Auto Hold measurement are as follows. Measurement value variation for 10 seconds is less than each criteria of the below list and Temperature variation is less than 2.0°C.

Parameter	Slow	Medium	Fast
pH	0.005 pH (0.3 mV)	0.015 pH (1.0 mV)	0.05 pH (3.0 mV)
COND,TDS,Res	Min. Display digit: 1 digit	Min. Display digit: 3 digit	Min. Display digit: 5 digit
Sal	0.3 PPT (0.030%)	1.00 PPT (0.100%)	3.00 PPT (0.300%)
DO	0.05 mg/L (0.5%)	0.1 mg/L (1.0%)	0.2 mg/L (2.0%)
O_2	0.1%	0.2%	0.4%
ION, ORP	0.3 mV	1.0 mV	3.0 mV

● System Setup

Default settings are in **Bold**.

Parameter	Settings	Details
Language	· **English** · Japanese · French · German · Spanish · Portuguese · Chinese	Set the language to be used for the meter.
Date Format	· DDMMYYYY · MMDDYYYY · YYYYMMDD · **DDMMMYYYY**	Use the date setting to select the date format. DD/MM/YYYY: Day/Month/Year MM/DD/YYYY: Month/Day/Year YYYY/MM/DD: Year/Month/Day Day Month (3 characters) Year
Date/Time		Set the date and time to select the year, month, day, hour and minute values.
Temp. Unit	· **°C** · °F	Set the units displayed with the sample temperature value.
Beep	· **ON** · OFF	Turn the audible beep on or off each time a meter key is pressed.
Brightness	1, 2, **3**, 4, 5	Adjust the display contrast higher or lower to improve display viewing in different light conditions.
Sensor LED	· **ON** · OFF	Turn the Sensor LED on to indicate the stability condition on the sensor head side. (When setting the real time, the sensor LED turns off regardless of this setting.)
Auto Power Off	0 (OFF) – 60 min Default: **30** min	Set the function to automatically power off the meter when no keys are pressed for entered time. But this function is not active when the data log setting is selected.
SD Format		Select this mode to initialize the SD card or delete the all saved measurement data. Delete all folders on the SD card after connecting the PC and meter, if initialization is not possible: refer to “Data transfer to PC” on page 31.
Software Update	· Meter · Ch1 Sensor · Ch2 Sensor · Ch3 Sensor	Select this mode to update the software of meter or each connected sensors. * This parameter only indicates with USB power supply and more than 20% meter battery capacity.
Factory Reset	· Meter · Ch1 Sensor · Ch2 Sensor · Ch3 Sensor	Select this mode to reset all meter or each selected sensor setup parameters and erase the meter’s stored data and each selected sensor’s calibration data. Some setup parameters are retained: pH Sensor Cartridge: Buffer Group EC Sensor Cartridge: Cell Constant and Unit

■ pH Setup

When the pH sensor head is connected to the meter, it is possible to change settings suitable for measurement and calibration. In the measurement screen mode, move the focus in the pH measurement item, and press the key.

Default settings are in **Bold**.

Parameter	Settings	Details
pH Setup		Use pH Setup to customize settings for the pH sensor head.
pH Resolution	· **0.01** · 0.001	Set the resolution of the pH measurement value.
Buffer Group		Set the buffer type for automatic buffer recognition during pH calibrations.
	· **USA**	USA:1.68, 4.01, 7.00, 10.01 and 12.45 at 25°C
	· DIN[*1]	DIN:1.09, 3.06, 4.65, 6.79, 9.23 and 12.75 at 25°C
	· NIST	NIST:1.68, 4.01, 6.86, 9.18 and 12.45 at 25°C
	· NIST10	NIST10:1.68, 4.01, 6.86, 10.01 and 12.45 at 25°C
	· CUSTOM	CUSTOM: Use arbitrarily calibration value.
CAL Alarm	**0 (OFF)**- 400 days	Set the interval of calibration in days.
Temp. Type	· **ATC**	ATC (Automatic Temperature Compensation): The instrument detects the solution temperature with the connected temperature sensor.
	· MTC	MTC (Manual Temperature Compensation): The instrument performs temperature compensation using the entered temperature.
Temperature (Only MTC Setup)	0.0 - 100.0°C Default: **25.0**°C	Use arbitrarily temperature value when the temp. Type MTC setting is active.
CAL Data Clear		Erase the calibration data.
Cartridge Info.		Use the Cartridge Information to update meter settings for the model and SN of the pH sensor cartridge.
Model		Enter a model name using the alphanumeric entry screen (up to 10 characters)
SN		Enter a serial number using the alphanumeric entry screen (up to 10 characters)
General Setup	refer to “General Setup” on page 35	Use General Setup to customize settings for the meter.

*1: DIN19267

■ COND, TDS, Sal Setup

When the EC sensor head is connected to the meter, it is possible to change settings suitable for measurement and calibration. In the measurement screen mode, move the focus in the EC measurement item, and press the key.

Default settings are in **Bold**.

Parameter	Settings	Details
COND Setup		Use COND Setup to customize settings for the EC sensor head.
Cell Constant	4-Cell Default: **1.720** × 0.1 cm^{-1} 2-Cell Default: **1.000** × 0.1 cm^{-1}	Enter the nominal cell constant value of the EC sensor cartridge.
Ref. Temp.	15 - 30°C Default: **25**°C	Enter the temperature coefficient used with the linear temperature compensation setting.
Temp. Coeff.	0.00 (OFF) - 10.00%/°C Default: **2.00**%/°C	Set the reference temperature for temperature compensated measurements, reading s are adjusted to the entered reference temperature when the temperature compensation setting is active.
Temp. Type	· **ATC** · MTC	ATC (Automatic Temperature Compensation): The instrument detects the solution temperature with the connected temperature sensor. MTC (Manual Temperature Compensation): The instrument performs temperature compensation using the entered temperature.
Temperature (Only MTC Setup)	0.0 - 100.0°C Default: **25.0**°C	Use arbitrarily temperature value when the temp. Type MTC setting is active.
Unit	· **S/cm** · S/m	Set the unit of the conductivity measurement value.
CAL Mode	· **Auto** · Custom	Auto: Use automatic standard solution recognition. Custom: Use arbitrarily calibration value.
CAL Data Clear		Erase the calibration data.

Default settings are in **Bold**.

Parameter	Settings	Details
TDS Setup		Use TDS Setup to customize settings for the EC sensor head.
Factor Type	· **Linear**	· Linear factor with adjustable factor from 0.40 to 1.00
	· 442	· Myron L 442: refer to Natural water (40% Sodium sulfate, 40% Sodium carbonate, 20% Sodium chloride)
	· EN27888	· European environmental standard
	· NaCl	· NaCl concentration is calculated from the conductivity value of the sample compensated at an arbitrarily set reference temperature.
Factor Value	0.40 - 10.0 Default: **0.50**	Enter the factor value used when the Factor Type Linear setting is active.
Unit	· **mg/L** · ppm	Set the unit of the TDS measurement value.
Sal Setup		Use Sal Setup to customize settings for the EC sensor head.
Unit	· **PPT** · %	Set the unit of the salinity measurement value. *PPT (Parts Per Thousand)
Sal Type		Set the type of salinity measurement.
	· **NaCl**	NaCl: Calculated to the NaCl concentration based on the conductivity value of the sample under the temperature setting conditions without temperature compensation.
	· Seawater	Seawater: Compensation by Practical Salinity Scale (UNESCO 1978)
CAL Data Clear		Erase the calibration data.
Cell Type	· **4-Cell** · 2-Cell	Set the type of EC sensor cartridge as 4-Cell or 2-Cell type.
Cartridge Info.		Use the Cartridge Information to update meter settings for the model and SN of the pH sensor cartridge.
Model		Enter a model name using the alphanumeric entry screen (up to 10 characters)
SN		Enter a serial number using the alphanumeric entry screen (up to 10 characters)
General Setup	refer to “General Setup” on page 35	Use General Setup to customize settings for the meter.

■ DO Setup

When the DO (Dissolved Oxygen) sensor is connected to the meter, it is possible to change settings suitable for measurement and calibration. In the measurement screen mode, move the focus in the DO measurement item, and press the key.

Default settings are in **Bold**.

Parameter	Settings	Details
DO Setup		Use DO Setup to customize settings for the DO sensor head.
Baro. Comp.	· **Auto**	Auto: Use automatic barometric pressure recognition.
	· Manual	Manual: Use arbitrarily barometric pressure value.
Baro. Press.	10.0 - 199.9 kPa Default: **101.3**	Use arbitrarily barometric pressure value when the Baro. Comp. Manual setting is active.
Sal. Comp.	· OFF · **Auto**	Auto: Use automatically conductivity data of EC sensor.
	· Manual	Manual: Use arbitrarily salinity compensation value. * Use automatically the salinity value of Manual setting. When EC sensor isn't connected, Auto setting is OFF. ** Use the salinity value of lower channel number of EC sensors, when two EC sensors are connected.
Salinity	**0.0** - 40.0 PPT	Enter the salinity value used when the Sal. Comp. Manual setting is active.
Temp. Type	· **ATC**	ATC (Automatic Temperature Compensation): The instrument detects the solution temperature with the connected temperature sensor.
	· MTC	MTC (Manual Temperature Compensation): The instrument performs temperature compensation using the entered temperature.
Temperature (Only MTC Setting)	0.0 - 100.0°C Default: **25.0**°C	Use arbitrarily temperature value when the temp. Type MTC setting is active.
CAL Data Clear		Erase the calibration data.
Membrane Coef.	**0** - 9	Set the number of the DO membrane coefficient.
CAL in cap replacement		Initialize Offset (Membrane Condition) by performing [100%] calibration. * Switch to [100%] calibration mode by pressing the settings. ** [100%] calibration are available to calibrate in vapor-saturated water with a calibration bottle or in air-saturated water.
Membrane Info.		Use the membrane information to update meter settings for the model and SN of the DO cap.

Parameter	Settings	Details
Model		Enter a model name using the alphanumeric entry screen (up to 10 characters)
SN		Enter a serial number using the alphanumeric entry screen (up to 10 characters)
General Setup	refer to “General Setup” on page 35	Use General Setup to customize settings for the meter.

■ ION Setup

When the ION sensor head is connected to the meter, it is possible to change settings suitable for measurement and calibration. In the measurement screen mode, move the focus in the ION measurement item, and press the key.

Default settings are in **Bold**.

Parameter	Settings	Details
ION Setup		Use ION Setup to customize settings for the ION sensor head.
ION Species	· Na^+, K^+, NH_4^+, Ca^{2+}, NO_3^-, F^-, Cl^-, NH_3, **Custom**	Set the ion species of the connected ion sensor cartridge or ion selective electrode.
ION Valency (Only CUSTOM Setting)	-2, -1, +**1**, +2	Set the ION Valency when ION Species Custom setting is active.
Unit	· **mg/L** · mmol/L	Set the unit of the ION measurement value.
Temp. Type	· **ATC** · MTC	ATC (Automatic Temperature Compensation): The instrument detects the solution temperature with the connected temperature sensor. MTC (Manual Temperature Compensation): The instrument performs temperature compensation using the entered temperature.
Temperature (Only MTC Setting)	0.0 - 100.0°C Default: **25.0**°C	Use arbitrarily temperature value when the temp. Type MTC setting is active.
CAL Data Clear		Erase the calibration data.
Cartridge Info.		Use the Cartridge Information to update meter settings for the model and SN of the ION sensor cartridge or electrode.
Model		Enter a model name using the alphanumeric entry screen (up to 10 characters)
SN		Enter a serial number using the alphanumeric entry screen (up to 10 characters)
General Setup	refer to “General Setup” on page 35	Use General Setup to customize settings for the meter.

■ ORP Setup

When the ORP sensor head is connected to the meter, it is possible to change settings suitable for measurement and calibration. In the measurement screen mode, move the focus in the ORP measurement item, and press the key.

Default settings are in **Bold**.

Parameter	Settings	Details
ORP Setup		Use ORP Setup to customize settings for the ORP sensor head.
Temp. Type	· **ATC** · MTC	ATC (Automatic Temperature Compensation): The instrument detects the solution temperature with the connected temperature sensor. MTC (Manual Temperature Compensation): The instrument performs temperature compensation using the entered temperature.
Temperature (Only MTC Setting)	0.0 - 100.0°C Default: **25.0**°C	Use arbitrarily temperature value when the temp. Type MTC setting is active.
CAL Data Clear		Erase the calibration data.
Cartridge Info.		Use the Cartridge Information to update meter settings for the model and SN of the ORP sensor cartridge or electrode.
Model		Enter a model name using the alphanumeric entry screen (up to 10 characters)
SN		Enter a serial number using the alphanumeric entry screen (up to 10 characters)
General Setup	refer to “General Setup” on page 35	Use General Setup to customize settings for the meter.

Maintenance and storage

This section describes maintenance of LAQUA WQ-300 handheld water quality meters and each sensors used with the meter. To use them for a long period, perform the described maintenance procedures appropriately. For the detailed procedures for maintaining and storing electrodes, refer to the instruction manual for each electrode, too. This section describes an overview of the procedures for maintenance and storage to be performed as part of daily use.

■ Maintenance and storage of the instrument

● How to clean the instrument

- If the instrument is dirty, wipe it gently with a soft dry cloth. If it is difficult to remove the dirt, wipe it gently with a cloth moistened with alcohol.
- The instrument is made of solvent resistant materials but is not resistant to all chemicals.
- Do not dip the instrument with polishing powder or other abrasive compound.

● Environmental conditions for storage

- Temperature: 0°C to 45°C
- Humidity: under 80% relative humidity and free from condensation

Avoid the following conditions:

- Dusty place
- Strong vibration
- Direct sunlight
- Corrosive gas environment
- Close to an air-conditioner
- Direct wind

■ Maintenance and storage of pH and ORP sensors

This section describes an overview of the procedures for maintenance and storage of pH and ORP sensor.

● How to clean the sensors

When the tip of a sensor (responsive membrane and liquid junction) becomes dirty, the response time may slow or an error may occur in the calibration results. To avoid such error, clean the sensor. For dirt that cannot be washed off by pure water (or deionized water), use the cleaning solution indicates below depending on the type of dirt. After cleaning, rinse the sensor with pure water (or deionized water).
However for pH and ORP sensors, different cleaning solutions should be used to clean different types of dart.

<For pH sensor>

Type of dirt	Cleaning solution
General	Diluted neutral cleaning solution (General dish washing liquid works reasonably well.)
Oil	Alcohol, or diluted neutral cleaning solution
Inorganic Substance	1 mol/L HCl or electrode cleaning solution (Model: 220)
Protein	Cleaning solution including protein-removing enzyme (Model: 250)
Alkali	1 mol/L HCl solution

<For OPR sensor>

Type of dirt	Cleaning solution
General	Diluted neutral cleaning solution (General dish washing liquid works reasonably well.)
Oil	
Inorganic substance	Immerse into the dilute nitric acid (1:1 nitric acid)

● Daily storage of the sensors

If the sensor becomes dry, the response will slow. Store in a moist atmosphere. Follow the steps below to properly store the sensor.

1. Wash the sensor well with pure water (or deionized water) to remove sample
2. Wash the inside of the protective cap with pure water (or deionized water), then add enough pure water (or deionized water) to soak the sponge.
3. Attach the protective cap.

Note

When the sensor will not be used for a long period, store it by following the sensor storage procedure detailed above.

■ Maintenance and storage of the EC sensor

This section describes an overview of the procedures for maintenance and storage of the EC sensor.

● How to clean the EC sensor

Always clean the EC sensor with pure water (or deionized water) after every measurement. When the response is slow or residue from the sample adheres to the EC sensor, use the appropriate method below to clean the EC sensor, and then clean again with pure water (or deionized water).

Type of dirt	Cleaning solution
General	Diluted neutral cleaning solution (General dish washing liquid works reasonably well.)
Oil	Alcohol, or diluted neutral cleaning solution
Scale that formed during long term storage	A commercially available scale remover (neutral cleansing solution for kitchen use, etc.) diluted by a factor of 100. If this does not remove the scale, use diluted solution that contains oxygen bleach (sodium percarbonate) or chlorine bleach (sodium hypochlorite).

● Daily storage of the EC sensor

EC sensor is stored in air.

■ Maintenance and storage of the DO sensor

This section describes an overview of the procedures for maintenance and storage of the DO sensor to be performed as part of daily use.

● How to clean the DO sensor

When the membrane of a sensor become dirty, the response time may slow or an error may occur in the calibration results. Clean the sensor with pure water (or deionized water) and wipe it with a soft cloth, take care not to damage it.

● Daily storage of the DO sensor

If the membrane of a sensor becomes dry, the response will be slow. Store in a moist atmosphere. Follow the steps below to properly store the sensor:

1. Wash the sensor well with pure water (or deionized water) to remove sample
2. Wash the inside of the calibration bottle with pure water (or deionized water), then add enough pure water (or deionized water) to soak the sponge.
3. Thread the calibration bottle onto the probe.

Note

When the sensor will not be used for a long period, store it in a cool and dark location by following the sensor storage procedure detailed above.

■ Maintenance and storage of the ION sensor

This section describes an overview of the procedures for maintenance and storage of the ION sensor to be performed as part of daily use.

● How to clean the ION sensor

When the membrane of a sensor become dirty, the response time may slow or an error may occur in the calibration results. Clean a sensor with pure water (or deionized water) and wipe it with a soft cloth, take care not to damage it.
For the 500-F-C, 500-CL-C, and 6560S-10C, the response membrane can be polished using the polishing sheet. When the response time is slow or the surface of the membrane is dirty, polish it with the polishing sheet.
See also the following Web site for detailed instructions.
https://www.horiba.com/water_quality_300_ion_c_info_en/

● Daily storage of the ION sensor

Follow the steps below to properly store the sensor correctly.

1. Wash the sensor well with pure water (or deionized water) to remove sample
2. Wipe off the moisture and attach the protective cap: refer to the instruction manual for each ion sensor cartridge or ion selective electrode.

Note

When the sensor will not be used for a long period, store it by following the sensor storage procedure detailed above.

Error messages and trouble shooting

● Error message

This section describes the causes of typical errors and the actions to be taken to resolve respective errors.
If EXXXX displayed while you are using the instrument, check the error, its cause and action to be taken in the error list below.

Error code	Error description	Cause of error	Recommended Action
E1100	Memory error	Data cannot be read form or written to the internal memory.	Remove the batteries, disconnect the AC adapter, and then press the Power key after reset the batteries. Or, contact your dealer for repair.
E1200	SD Memory Over	The saved memory of SD card has exceeded the memory capacity.	Clear stored data, refer to “Data Clear” on page 30 or format the SD card, refer to “SD Format” on page 36.
E1201	SD Memory writing error	Cannot write data to the memory.	Make sure to insert the SD card in SD card slot. Use new SD card if an issue is encountered while using SD card.
E1202	SD Memory reading error	Cannot read data from the memory.	
E1203	Low Battery	Battery power is low.	Replace with new batteries.
E1300	Excess of ID registration	The number of ID registered has exceeded 100 IDs.	Erase stored ID in ID setup, and then create New ID.
E1301	MSC mode switching error	The USB cable is a specification only for supplying power, or the device to be communicated does not support mass storage.	Re-connect using a communication compatible USB cable or communication compatible device.
E1302	SD not inserted error	SD card is not inserted or not connected.	Open the cover for SD card below the battery and insert the SD card again.
E1303	SD unformatted error	SD card is not formatted.	Format the SD card, refer to “SD Format” on page 36.
E1304	Storage data excess error	The number of measurement data stored has exceeded 10,000.	Print or transfer the data, or clear stored data, refer to “Data Clear” on page 30.
E1351	Data format error	The previous software version does not match the measurement data structure in the SD due to the main software update.	After pressing OK in the error dialog, all measurement data in SD will be deleted automatically.

Error code	Error description	Cause of error	Recommended Action
E2100	Sensor ADC error	The ADC system of Sensor has a problem.	Remove the batteries, disconnect the AC power supply, and then press the power key.
E2101	Sensor memory error	The memory system of Sensor has a problem.	
E22XX	Sensor communication error	The communication system of Sensor has a problem.	Disconnect the sensor connector from meter, and then reconnect the sensor connector to the meter. Or, contact your dealer for repair.
E2250	Sensor update request error	Sensor update did not complete successfully.	Execute sensor update again.
E2251	Sensor update error	Error occurred during sensor update.	
E2300	Calibration interval alarm error	Exceeds the calibration interval setup.	Calibrate the meter.
E2301	CAL error: Offset	The offset potential of the pH sensor is out of the range of ±50 mV.	Maintenance the sensor or use the new standard solution.
E2302	CAL error: Slope	The slope of sensor is out of range.	
E2303	CAL error: CAL points	Maximum calibration points exceeded.	Up to maximum calibration points.
E2304	CAL error: Unknown solution	The meter cannot recognize the standard solution.	(1) Make sure to place the sensor in the standard solution. (2) Make sure the buffer group setting. (3) Clean the sensor. (4) Replace the new sensor.
E2305	CAL error: Cell constant	Cell constant is out of range.	(1) Make sure to place the sensor in the standard solution. (2) Make sure the buffer group setting. (3) Clean the sensor. (4) Replace the new sensor.
E2306	CAL error: Temp. CAL	Temperature set for calibration is more than ±2°C.	Make sure to place the sensor in the standard solution.
E2308	CAL error: Membrane	DO membrane has reached the lifetime.	Replace with a new sensor cap.

Appendix

This section describes technical information and option for LAQUA WQ-300 Water Quality Handheld meters.

■ Specification

● Meter Specification

Model	WQ-310	WQ-320	WQ-330
Channel	1 Channel	2 Channel	3 Channel
Memory	10,000		
Auto Data log	●		
Calibration Alarm (1 to 400 days)	●		
Auto Shut-off	●		
Sensor Status	●		
Diagnostic Messages	●		
Stability type	Auto Stable / Auto Hold / Real time		
Outputs	Micro USB for PC connection, Phono jack for printer		
Inputs	Micro USB for PC connection, Push-pull connector, Micro USB		
Display	Color graphic TFT-LCD (3.5 inch)		
Housing	IP67, shock-resistant, non-slip		
Power Requirement	4 x AA batteries		
Dimensions	90 (W) x 220 (D) x 34 (H) mm		
Weight	Approx. 400 g (with batteries) Approx. 320 g (without batteries)		

● pH Sensor Head specification

pH Sensor Head Model	300PH-2 (2 m cable) / 300PH-5 (5 m cable)
	pH/mV/Temp (°C/°F)
pH	
Range	-2.00 pH to 20.00 pH -2.000 pH to 20.000 pH
Resolution	-2.00 to +20.00: 0.01 pH -2.000 to +20.000: 0.001 pH
Accuracy	-2.00 to +20.00: ±0.01 pH -2.000 to +20.000: ±0.005 pH
Calibration Points	Up to 5
pH Buffer Groups	USA, DIN, NIST, NIST (10), Custom
mV	
Range	±1000.0 mV
Resolution	0.1 mV
Accuracy	±0.1 mV
Temperature	
Temperature Range	ºC: -30.0 to +130.0 ºF: -22.0 to +266.0 *Operating Temperature range of pH sensor head: 0ºC to 60ºC
Resolution	0.1°C/°F
Accuracy	ºC: ±0.5 ºF: ±0.9
Calibration points	1

● EC Sensor head specification

EC Sensor Head Model	300-C-2 (2 m cable) / 300-C-5 (5 m cable)	
	EC/Sal/TDS/Res/Temp (°C/°F)	
Conductivity		
Range	[µS/cm] 0.000 ... 0.199 0.200 ... 1.999 2.00 ... 19.99 20.0 ... 199.9 200 ... 1999 [mS/cm] 2.00 ... 19.99 20.0 ... 199.9 200 ... 2000	[µS/m] 0.0 ... 19.9 20.0 ... 199.9 200 ... 1999 [mS/m] 2.00 ... 19.99 20.0 ... 199.9 200 ... 1999 [S/m] 2.00 ... 19.99 20.0 ... 200.0
Resolution	auto ranging, up to 4 significant digits	
Accuracy	± 0.5% F.S. of each range 200 mS/cm (20.0 S/m): 1.5%F.S	
Reference Temperature	15°C to 30°C	
Temperature Coefficient	0.00%/°C to 10.00%/°C	
Calibration Points	Up to 4 (Auto) / Up to 5 (Manual)	
Units	S/cm, S/m	
Salinity		
Range	0.00 PPT to 80.00 PPT 0.000% to 8.000%	
Resolution	0.01 PPT, 0.001%	
Accuracy	±0.5% of reading value or ±0.01 PPT, whichever is greater	
Salinity Curves	NaCl, Sea Water (UNESCO1978)	
Calibration Option	Yes	
Total Dissolved Solids (TDS)		
Range	0.01 mg/L to 200,000 mg/L	
Resolution	0.01 minimum, 4 significant digits	
Accuracy	±0.5% of reading value or ±0.1 mg/L, whichever is greater	
TDS Curves	Linear (0.40 to 1.00), EN27888, 442, NaCl	

Resistivity		
Range	[Ω・cm] 0.1 ... 199.9 200 ... 1999 [kΩ*cm] 2.00 ... 19.99 20.0 ... 199.9 200 ... 1999 [MΩ・cm] 2.00 ... 19.99 20.0 ... 200.0	[Ω・m] 0.001 ... 1.999 2.00 ... 19.99 20.0 ... 199.9 200 ... 1999 [kΩ・m] 2.00 ... 19.99 20.0 ... 199.9 200 ... 2000
Resolution	auto ranging, up to 4 significant digits	
Accuracy	± 0.5% F.S. of each range > 20.0 MΩ・cm (200 kΩ・m) : 1.5%F.S	
Temperature		
Temperature Range	ºC: -30.0 to +130.0 ºF: -22.0 to +266.0 *Operating Temperature range of EC sensor head: 0ºC to 60ºC	
Resolution	0.1°C/°F	
Accuracy	ºC: ±0.5 ºF: ±0.9	
Calibration points	1	

● DO Sensor Specification

DO Sensor Model	300-D-2/300-D-5
	DO/DO(%)/O_2/Temp (°C/°F)
Dissolved Oxygen (DO)	
Range	[mg/L] 0.00 ... 20.00 mg/L [%] 0.0 ... 200.0%
Resolution	0.01 mg/L, 0.1%
Accuracy[*1]	[mg/L] ±0.2 mg/L [%] ±0.2%
Salinity Compensation	automatic using Cond sensor or Manual: 0.0 ppt to 40.0 ppt
Barometric Pressure Compensation	automatic using built-in barometer Manual: 10.0 kPa to 199.9 kPa
Calibration Points	Up to 2
O_2	
Range	0.0 ... 50.0%
Resolution	0.1%
Accuracy	±0.5%
Temperature	
Temperature Range	ºC: -30.0 to +130.0 ºF: -22.0 to +266.0 *Operating Temperature range of DO sensor: 0 to 50ºC
Resolution	0.1°C/°F
Accuracy	ºC: ±0.5 ºF: ±0.9
Calibration points	1

*1 ... Repeatability in measurement of air-saturated water (at 25°C, normal pressure condition).

● ION Sensor Head Specification

ION Sensor Head Model	300-I-2 (2 m cable) / 300-I-5 (5 m cable)
	ION / mV / Temp (°C/°F)
ION	
Range	[mg/L, mmol/L] 0.000 ... 0.999 1.00 ... 9.99 10.0 ... 99.9 100 ... 999 1000 … 9990 10000 … 99900
Resolution	0.001 minimum, 3 significant digits
Accuracy	±0.1 mV
Calibration Points	Up to 5
mV	
Range	±1000.0 mV
Resolution	0.1 mV
Accuracy	±0.1 mV
Temperature	
Temperature Range	ºC: -30.0 to +130.0 ºF: -22.0 to +266.0 *Operating Temperature range of ION sensor head: 0ºC to 60ºC
Resolution	0.1°C/°F
Accuracy	ºC: ±0.5 ºF: ±0.9
Calibration points	1

● ORP Sensor Head Specification

ORP Sensor Head Model	300-O-2 (2 m cable) / 300-IO-5 (5 m cable)
	ORP/Temp (°C/°F)
ORP	
Range	-2000 mV to +2000 mV
Resolution	-999.9 mV to +999.9 mV: ±0.1 mV -2000 to +2000: ±1 mV
Accuracy	-999.9 mV to +999.9 mV: ±0.1 mV -2000 to +2000: ±1 mV
Calibration Points	1
Temperature	
Temperature Range	ºC: -30.0 to +130.0 ºF: -22.0 to +266.0 *Operating Temperature range of ORP sensor head: 0ºC to 60ºC
Resolution	0.1°C/°F
Accuracy	ºC: ±0.5 ºF: ±0.9
Calibration points	1

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For any questions regarding this product, please contact your local agency, or inquire from the following website.
http://global.horiba.com/contact_e/index.htm