HORIBA

Instruction Manual

COMPACT ORP meter
LAQUAtwin-ORP-11

LAQUAtwin
COMPACT WATER QUALITY METER

Preface

This manual describes things to be known before using the COMPACT WATER QUALITY METER, LAQUAtwin series.
Be sure to read this manual before using the product to ensure proper and safe operation of the instrument. Also safely store the manual so it is readily available for reference 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 malfunctioning or damaged Product attributable to responsibility of HORIBA Advanced Techno Co., Ltd. for a period of two (2) years from the delivery. However, the warranty period of sensor is 6 months.
In addition, the warranty applies only when the sensor repeatedly fails even after cleaning and conditioning. In the following cases, none of the warranties is valid;

- Any malfunction or damage attributable to improper operation
- Any malfunction attributable to attempted repair or modification by any person not authorized by HORIBA Advanced Techno Co., Ltd.
- Any malfunction or damage attributable to violation of the instructions in this manual or operations in an environment and 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 such as the standard solutions
- Replacement of consumables such as the sensor and standard solutions

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

Company names and brand names are either registered trademarks or trademarks of the respective companies. (R), (TM) symbols may be omitted in this manual.

Patent marking

This product is protected under one or more of the patents found at the following address:
http://www.horiba.com/patent

Regulations

EU and UK regulations

● Conformable standards
This equipment conforms to the following standards:

C E
EMC: EN 61326-1
Class B, Portable test and measurement equipment
RoHS: EN IEC 63000
9. Monitoring and control instruments including industrial monitoring and control instruments

UKCA
EMC: BS EN 61326-1
Class B, Portable test and measurement equipment
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 environmental 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 2012/19/EU, 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.
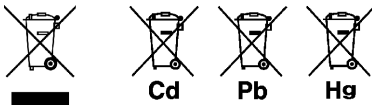
- Authorised representative in EU and UK
  HORIBA Europe GmbH
  Hans-Mess-Str.6, D-61440 Oberursel,
  Germany
  HORIBA UK Limited
  Kyoto Close, Moulton Park, Northampton, NN3 6FL, UK

FCC rules

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

● Warning

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.

Korea certification

● B 급 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 regurlation

标记的意义

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。

产品中有害物质的名称及含量

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
本体	×	○	○	○	○	○
电池	×	○	○	○	○	○
传感器	×	○	×	○	○	○

本表格依据 SJ/T 11364 的规定编制。
○: 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。
×: 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。

California regulations

CR Coin Lithium Battery contains Perchlorate Material - special handling may apply.
See http://www.dtsc.ca.gov/hazardouswaste/perchlorate

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.

● 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

⚠️	**WARNING**

❗	THIS PRODUCT CONTAINS A BUTTON BATTERY If swallowed, a lithium button battery can cause severe or fatal injuries within 2 hours. Keep batteries out of reach of children. If you think batteries may have been swallowed or placed inside any part of the body, seek immediate medical attention.	
🚫	Do not put batteries in a fire, expose to heat, disassemble or remodel. Doing so could case fluid leakage, overheating or explosion.	
❗	Before disposing of batteries, wrap the terminals with tape to insulate. If a battery is allowed to come in contact with other metal or batteries, it may cause heating, destruction, and fire.	
❗	Wash off any calibration fluid that comes into contact with hands or other exposed skin. If fluid gets in eyes, rinse them immediately and see a doctor.	

⚠	**CAUTION**

🛈	Incorrect use of batteries may cause leakage or bursting of the butteries and result in product damage or burn injury.

- Connect the positive and negative terminals of the battery correctly.
- Do not mix different battery types in the same device.
- Replace all of the batteries in the same device at the same time.
- Do not attempt to recharge batteries.
- Do not solder a battery.
- Store in a location away from direct sunlight, high temperature, and high humidity.

Handling precautions

Meter and sensor

- The sensor is a consumable part. If it becomes damaged or its performance deteriorates, replace it with a new one (the sensor cannot be repaired).
- Do not swing the meter and sensor using a strap.
- Do not drop the meter or apply excessive force to it.
- Do not leave the meter in areas of direct sunlight or high temperature/humidity.
- Do not clean the meter with organic solvents.
- Neither the meter nor sensor is waterproof by itself. The sensor must be securely mounted on the meter before use.
- To ensure the waterproof performance, confirm the followings when attaching the sensor.
  - The waterproofing gasket is clean and undamaged.
  - The waterproofing gasket is seated properly in the groove with no twisting or warping.
  - he meter and sensor are not deformed.
- The flat sensor is made of thin material. Take care not to break it.
  If the sensor is damaged, remove it from the meter avoiding injury and dispose of it in a plastic bag.
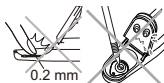
0.2 mm

- Do not measure samples such as the following, since they may damage the sensor or shorten its life.
  - Organic solvents • Oils • Adhesives • Cement • Alcohols • Surfactants
  - Concentrated acid (0 pH to 2 pH) • Concentrated alkaline (12 pH to 14 pH)

- If the sensor is damaged physically or chemically, stop using the sensor.
- For some samples (such as pure water), the measured value may be unstable. This is natural.
- A small amount of liquid or white powder may appear on the liquid junction of the flat sensor. The appearance of this powder or solution is normal. Simply rinse it off with water before use.

▶ Battery

- The batteries provided have been used for performance testing. Therefore, their service life may be short.
- The battery alarm icon lights up when the battery voltage is low. Replace the batteries when the battery alarm icon (BATT) lights up. The meter power may not be switched ON/OFF when the battery voltage is low.

▶ Identification of manufacturing date

Manufacturing date can be identified from MFG No. described in the ID label on the backside of the instrument.
The number from the middle in the MFG No. indicates manufacturing year and next alphabet indicates manufacturing month. The alphabet is assigned to month according to the table below.
Ex.: ID: XX23M000 means the device manufactured in 2023 December.

JAN	FEB	MAR	APR	MAY	JUN
A	B	C	D	E	F
JUL	AUG	SEP	OCT	NOV	DEC
G	H	J	K	L	M

Table of Contents

1 Product Overview

The COMPACT ORP METER, LAQUAtwin-ORP-11 incorporates HORIBA original flat sensor and enables accurate measurement of ORP (Oxidation-Reduction Potential) from a single drop of a sample.

1.1 Components

Parts name		Quantity	Parts name		Quantity
Sensor	S080-ORP	1	Sampling sheet	5 sheets	1
Meter		1	Polishing set (1 pc Cotton swab with abrasive)		1
Battery	CR2032	2	ORP standard solution (Zobell's solution 225 mV)		1
Storage case		1	Instruction manual		1
Pipette		1			

1.2 Consumable parts sold separately

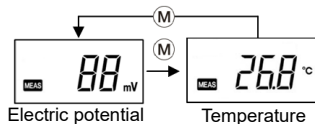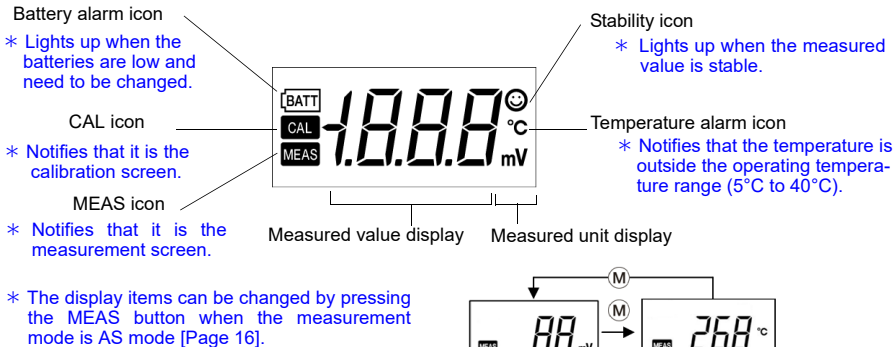| Specifications	Model	Part No.	Specifications	Model	Part No.
Sensor	S080-ORP	3200997083	Sampling sheet B (100 sheets)	Y046	3200053858
ORP standard solution (6 bottles)	514-ORP-225	3200997084			

2 Part Names and Functions

∗ It will not respond to the press if the button is pressed for a short time.
  Press buttons seconds or more unless otherwise specified.
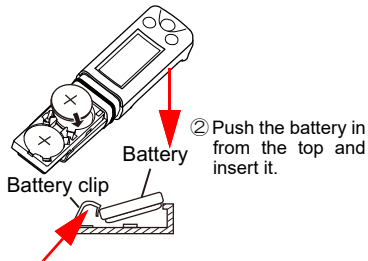∗ ( ) are listed for reference at time of disposal.

Sensor

Light shield cover
(EVA, ABS)

Measurement
part

Liquid junction
(Reference
electrode)

Platinum electrode

Sensor case
(ABS)

Meter

ON/OFF button

MEAS button

Strap eyelet

CAL button

Display

Lithium battery

Gasket for waterproof
(Silicone rubber)

Meter case
(ABS, PC, Elastomer)

Battery alarm icon
* Lights up when the batteries are low and need to be changed.

CAL icon
* Notifies that it is the calibration screen.

MEAS icon
* Notifies that it is the measurement screen.

* The display items can be changed by pressing the MEAS button when the measurement mode is AS mode [Page 16].

Stability icon
* Lights up when the measured value is stable.

Temperature alarm icon
* Notifies that the temperature is outside the operating temperature range (5°C to 40°C).

Measured value display   Measured unit display

Electric potential

Temperature

3 Basic Handling

3.1   Inserting batteries / sensor

▶ Inserting the batteries

② Push the battery in from the top and insert it.

Battery

Battery clip

① Slip the end of the battery into the Battery clip.

▶ Inserting the sensor

Gasket for waterproof
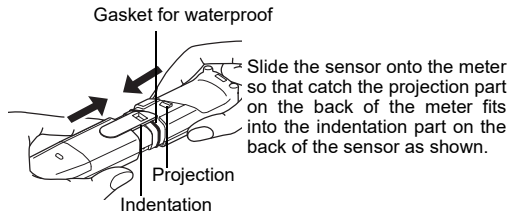
Slide the sensor onto the meter so that catch the projection part on the back of the meter fits into the indentation part on the back of the sensor as shown.

Projection

Indentation

Note

Be careful not to twist the waterproof gasket.

3.2 Power ON / OFF

▶ Power ON

▶ Power OFF

Press the ON/OFF button. The power is turned ON, and the meter type is displayed on the LCD.

Press the ON/OFF button. The power is turned OFF.
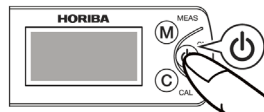
3.3 Sensor conditioning

> **Note**
> - Befor using the sensor for the first time or after several days of disuse, perform sensor conditioning.
> - Perform calibration after sensor conditioning.

1. **Place some drops of ORP standard solution to the measurement part of sensor.**

2. **Wait 5 minutes before use.**

   There is no need to switch the meter ON.

3. **Clean the measurement part of sensor with pure water.**

3.4   Removing sensor / batteries

Turn off the meter and remove sensor / batteries.

Removing sensor

① Lift the indentation part on the back of the sensor and the sensor a little away from the meter.

② Pull out the sensor all the way from the meter.
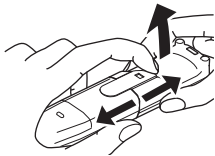
Removing batteries

Use a thin non-metallic stick or other tool to pry the batteries out from the battery clip as shown.
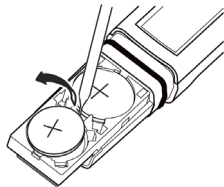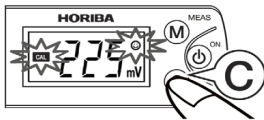
4 Calibration

Calibration is required before measurement. Flow these steps to calibrate.
The sensor is calibrated with the Oxidation-Reduction Potential at the temperature of the standard solution using the temperature sensor built into the sensor.

① **Drop the standard solution to cover the entire measurement part.**

More accurate calibration is possible by co-washing the sensor with the standard solution in advance.

② **Close the light shield cover.**

③ **Press CAL button to calibrate.**

Automatically switches to the measurement screen after calibration.

In the case of the calibration error indicator lights up

Er 4

Not calibrated (Not updated since last calibration data).
Condition the sensor and re-calibrate [Page 7]. If there is no improvement, perform polishing of the platinum electrode on the next page. If still not calibrated, the sensor has deteriorated and replace the sensor.

④ Open the light shield cover, wash the sensor with pure water, and gently remove water droplets with a tissue, etc.

Polishing of the platinum electrode

Polish the platinum electrode if the response or repeatability of measurement is poor.

1. **Add a small amount of tap water th the abrasive tip of the provided abrasive cotton swab.**

2. **Polish the platinum electrode surface gently about 5 times in a circular motion.**

If the abrasive on the cotton swab become black, it is polished.
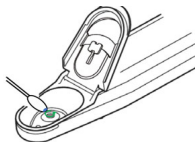
3. **Wash the sensor with pure water, and gently remove water droplets with a tissue, etc.**

5 **Measurement**

Drop
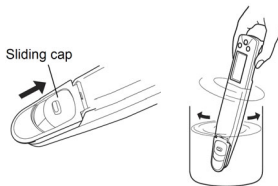
Suitable for measurements with small sample volume.

① **Drop the sample to cover the entire measurement part.**

More accurate calibration is possible by co-washing the sensor with the standard solution in advance.

② **Close the light shield cover.**

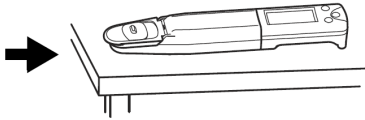## Immersion

Suitable for measurements with large sample volume.

Sliding cap

Open the sliding cap on the light shield cover and immerse the sensor into the sample and stir gently 2 or 3 times.

✳ It is possible to measure even with the light shield cover removed from the sensor.
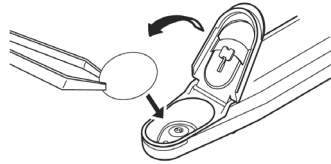
11

Scooping

Suitable for measurements that scoop out a sample such as in the field.

Open the sliding cap on the light shield cover and immerse the sensor into the sample and stir gently 2 or 3 times as like immersion. Close the light shield cover and measure the sample on a desk, etc.

Sampling sheet

Suitable for measurements of a minute samples as small as 50 µL.

Absorb the sample on a sampling sheet. Measure with the light shield cover closed to minimize concentration changes due to sample evaporation.

Cleaning the sensor promptly after measurement will prevent deterioration of the sensor.

6.1 Maintenance

Open the light shield cover, wash the sensor with pure water, and gently remove water droplets with a tissue, etc.

- Neither the meter nor sensor is waterproof by itself. The sensor must be securely mounted on the meter before use.

- Do not measure samples such as the following, since they may damage the sensor or shorten its life.
  - Organic solvents, Oils, Adhesives, Cement, Alcohols, Surfactants, Concentrated acid (pH 0 to 2), Concentrated alkaline (pH 12 to 14)
  If the sensor is used with these samples, it should be cleaned with pure water as soon as possible.

- A small amount of liquid or white powder may appear on the liquid junction of the measurement part. The appearance of this powder or solution is normal. Simply rinse it off with pure water before use.
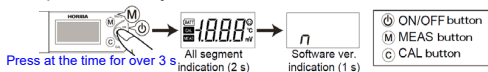
6.2 Storage

● Store the meter and sensor in the case with the meter and sensor connected.

● Store in a non-condensing location with 5°C to 40°C and a relative humidity 85% or less.

● Do not leave the meter in areas of direct sunlight.

● Do not store the meter and sensor immersed in water.

● Befor using the sensor after several days of disuse, perform sensor conditioning [Page 7].

7 Setup • Initialization

The setup mode allows the operator to customize the meter to specific needs. To enter the setup mode, press and hold the MEAS and ON/OFF buttons for over 3 seconds when the meter is switched OFF.

7.1 Setup

- Setup mode entry

Press at the time for over 3 s | All segment indication (2 s) | Software ver. indication (1 s)

| ⏻ ON/OFF button |
| Ⓜ MEAS button |
| Ⓒ CAL button |

The setting is saved and the next item is selected when the CAL button is pressed on the item being set.

If the ON/OFF button is pressed before the CAL button is pressed, it is changed.
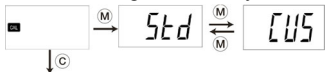(It is changed until the item is changed in the previous item.)

- ORP display value setting: selected.
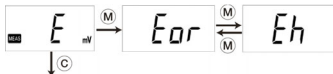
Eor (ORP for the reference electrode on the sensor)

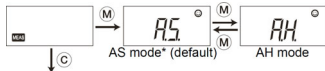Eh (ORP for standard hydrogen electrode [converted value])

- Calibration setting: To use any standard solution, set to CUS (Custom).

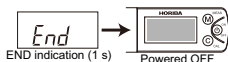- (Displayed only for CUS setting) Calibration value setting: Set to any value (-500 mV to 500 mV).

15

● Measurement mode setting

AS mode* (default)   AH mode

● Back light setting

Backlight ON   Backlight OFF
(default)

● Setup completion

END indication (1 s)   Powered OFF

AS (Auto Stable)
The measurement value is fixed when it is stable. The fixed measurement value is released and the instantaneous value is displayed.
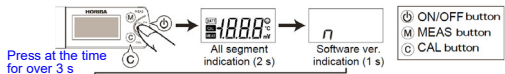
AH (Auto Hold)
The measurement value is always displayed as instantaneous value. Pressing the MEAS button starts stability determination. The measurement value is fixed when it is stable. To unfreeze, press the MEAS button.
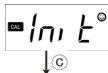
7.2　Initialization of calibration data

Calibration data is erased. The meter is reset to the factory default calibration setting value.

① Initialization of calibration data mode entry

Press at the time for over 3 s

All segment indication (2 s)

Software ver. indication (1 s)

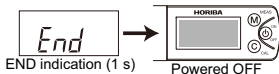| ON/OFF button |
| MEAS button |
| CAL button |

To enter the Initialization of calibration data mode, press and hold the CAL and ON/OFF buttons for over 3 seconds when the meter is switched OFF.

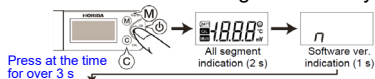② Perform initialization of calibration data

③ Initialization of calibration data completion

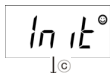END indication (1 s)　　Powered OFF

7.3 Initialization of the settings

All setup choices are erased. The meter is reset to the factory default values.

① Initialization of the settings mode entry

Press at the time for over 3 s

All segment indication (2 s)

Software ver. indication (1 s)
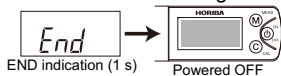
ⓞ ON/OFF button
Ⓜ MEAS button
ⓒ CAL button

To enter the initialization of the settings mode, press and hold the MEAS, CAL and ON/OFF buttons for over 3 seconds when the meter is switched OFF.

② Perform initialization of the settings

③ Initialization of the settings completion

END indication (1 s)   Powered OFF

8 What to do if...

Issue	Cause	Recommended action
No display on screen. (Power is not turned on.) Display disappears midway.	Dead batteries.	Replace 2 batteries both with new ones at the same time. [Page 8, Page 5]
	Batteries not in contact with metal fittings of battery case.	Remove batteries [Page 8] and gently press the metal fittings form above, then re-install batteries [Page 5].
°C is blinking on the display.	The temperature of measurement environment is outside 5°C to 40°C.	It is outside the operating temperature range. Measure in a multifaceted environment within the operating temperature range to reduce measurement error.
	Sensor is not connected.	Connect the sensor to the meter [Page 5] and confirm that the blinking display disappears.
Or or Ur is displayed.	Measurement range is exceeded.	If Or or Ur is displayed even after measuring the standard solution, the sensor may be deteriorated. Replace the sensor with a new one.
	Sensor is not connected.	Re-connect the sensor to the meter [Page 5]. If Or or Ur is displayed even after measuring the standard solution, the sensor may be deteriorated. Replace the sensor with a new one.

Issue	Cause	Recommended action
Er1, Er2 or Er3 is displayed.	The internal IC in the meter may be defective.	Initialize the meter [Page 18]. If initialization does not improve the issue, replace the meter with a new one (The meter cannot be repaired).
Temperature readings are off.	Since the temperature sensor is installed inside the sensor, temperature error occurs when measuring a small amount of sample, depending on the temperature of the measurement environment.	Normally temperature sensor adjustment is not necessary, but temperature value can be adjusted. After changing to the temperature measurement screen [Page 4], press the CAL button, the temperature display will blink, and press the MEAS button to set the temperature to be adjusted. Each press of the MEAS button increases the displayed temperature, which can be set within ±2°C of the displayed temperature. After setting, press the CAL button to complete the adjustment. If Er4 is displayed, the temperature sensor is faulty and should be replaced with a new sensor.
Measurement value remains the same on display.	Measurement value remains fixed in AH measurement mode.	Press MEAS button and release the hold.
Response or repeatability of measurement is poor	Less oxidation-reduction material in the sample or the sensor surface is dirty or oxidized.	Polish the platinum electrode [Page 10]. If the sample is low in oxidation-reduction material, the response will be slow and not repeatability, but may be improved.

9 Specifications

Model	LAQUAtwin-ORP-11
Target	ORP (Oxidation-Reduction Potential)
Minimum sample volume	0.3 mL or more (0.05 mL or more if sampling sheet is used.)
Measurement range	-1000 mV to 1000 mV
Resolution	1 mV
Calibration point	1 point
Accuracy	±2 mV [Repeatability]
Waterproof	IP67 [No failure when immersed the product in water, but it cannot be used underwater.]
Display	Custom (monochrome) digital LCD with back light
Operating environment	Temperature: 5°C to 40°C, Relative humidity: Less than 85% (No condensation)
Power	3 V battery (CR2032) x 2
Battery life	Approx. 400 h (Back light off mode) [Battery life will shorten when the back light is used.]
Dimensions	164 mm × 29 mm × 20 mm (excluding projections)
Mass	Approx. 50 g (excluding batteries)

10 Reference information

Polishing of platinum electrode

Instead of the supplied polishing set, a commercially available polishing compound for precious metals (more than 8000 grit) can be used.
Apply a small amount of polish to the tip of a commercially available cotton swab and polish [Page 10].

Disposal

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

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