HORIBA Scientific LAQUAtwin COND

Instruction Manual (Operation)

COMPACT WATER QUALITY METER
LAQUAtwin-EC-11, LAQUAtwin-EC-22,
LAQUAtwin-EC-33

Specifications

Model	LAQUAtwin-EC-	11	22	33
Minimum sample volume	0.12 mL	√	√	√
Range and resolution (valid digits)				
Conductivity				
0 to 199 µS/cm: 1 µS/cm 200 to 1999 µS/cm: 1 µS/cm 2.00 to 19.99 mS/cm: 0.01 mS/cm		√	√	√
20.0 to 199.9 mS/cm: 0.1 mS/cm			√	√
TDS	0.0 to 99.9 ppm: 0.1 ppm 100 to 999 ppm: 1 ppm 1000 to 9990 ppm: 10 ppm			√
Calibration	Up to 2 points	√		
	Up to 3 points		√	√
Accuracy*1				
±2% full scale (for each range)		√		
±2% full scale (0 to 19.99 mS/cm) ±5% full scale (20.0 to 199.9 mS/cm)			√	√
Temperature display	0 to 50.0°C		√	√
Target	Electrical conductivity			
Measurement principle	2 electrode bipolar AC Titanium coated with Platinum black			
Display	Custom (monochrome) digital LCD with backlight			
Operating environment	5 to 40°C, 85% or less relative humidity (no condensation)			
Power	CR2032 batteries (×2)			
Battery life	Approx. 400 h continuous operation*2			
Outer dimensions/mass	164 × 29 × 20 mm (excluding projections), Approx. 45 g (excluding batteries)			
Main function	Temperature compensation (2%/°C fixed), waterproof*3, auto stable/auto hold, automatic power OFF			

*1 Accuracy is the closeness of agreement between the measured value and actual value of the standard solution in the measurement of the same standard solution as the one used for the calibration. Temperature during the calibration and measurement is the same. The error of standard solutions and rounding error (±1 digit) are not included.

*2 The life period if the meter is used in the backlight off mode. If the backlight is used, battery life will shorten.

*3 IP67: no failure when immersed in water at a depth or 1 meter for 30 minutes.
Please note that the meter can not be used underwater

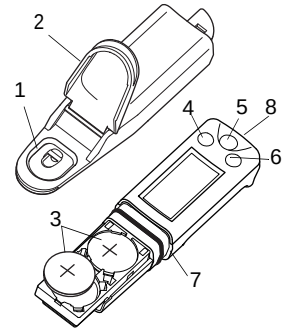
■ Items in package

Items		Quantity
Sensor	S070	1
Meter		1
Storage case		1
Batteries	CR2032	2
Standard solution	1413 µS/cm	1
	12.88 mS/cm	1
Pipette		1
Conditioning solution		1
Instruction manual (Operation)		1
Instruction manual (Before use)		1

■ Consumable parts sold separately

Items	Specifications	Part No.
Sensor	S070, COND	3200459672
Standard solution	514-22, 1413 µS/cm	3999960110
	514-23, 12.88 mS/cm	3999960111
Conditioning solution	514-20	3999960114

Part Names



1 Measurement cell
2 Protection cover
3 Lithium batteries
4 MEAS switch
5 ON/OFF switch
6 CAL switch
7 Waterproof gasket
8 Strap eyelet

Note

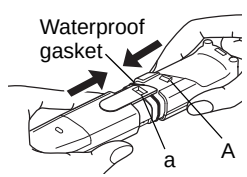
Press the switches 0.5 seconds or more unless otherwise specified.

Initial Setup

■ Attaching/detaching the sensor

● **Attaching the sensor**

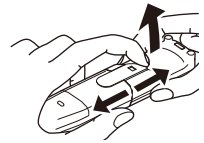
1. **Power OFF the meter.**
2. **Confirm that the waterproofing gasket is clean and undamaged.**
3. **Slide the sensor onto the meter so that catch "A" on the back of the meter fits into hole "a" on the sensor tongue as shown.**



Note

Be careful not to twist the waterproof gasket.

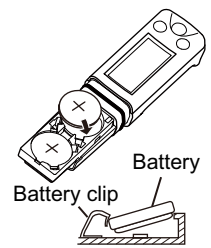
● **Detaching the sensor**



1. **Power OFF the meter.**
2. **Lift the sensor tongue tip and slide the sensor a little away from the meter.**
3. **Pull out the sensor all the way from the meter.**

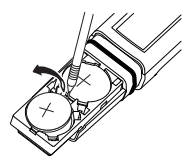
■ Inserting/removing batteries

● **Inserting the batteries**



1. **Power OFF the meter.**
2. **Slide both batteries into the battery case as shown.**
   Be sure to use two CR2032 batteries, and put them with the plus sides (+) upwards.

● **Removing the batteries**



1. **Power OFF the meter.**
2. **Use a ball-point pen or other tool to pry the batteries out from the clips as shown.**

■ Electrode conditioning

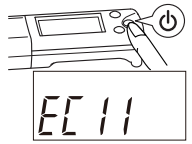
Note

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

1. **Place some drops of the conditioning solution into the measurement cell.**
2. **Wait 10 min before use.**
   There is no need to switch the meter ON.
3. **Clean the flat sensor with running water.**

Basic Operation

■ Power ON



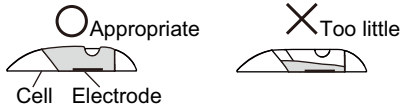
1. **Press and hold the ON/OFF switch.**
The power is switched ON, and the meter model number is displayed on the LCD.

■ Power OFF

1. **Press and hold the ON/OFF switch.**
The power is switched OFF.

■ Precaution on sample setting

Place an appropriate amount of a sample or standard solution into the measurement cell without trapping bubbles inside. If not, the measurement may be inaccurate.



Cross-section of the measurement cell

Calibration

Calibration is required before measurement.
Use standard solution within the measurement range in the specifications.

Tip

- **Calibration values are saved even if the meter is switched OFF.**
- **Calibration value is rewritten if calibration is repeated using the same standard solution.**

■ Calibration points

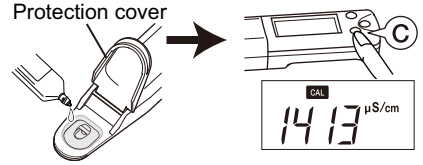
The number of calibration points is dependent on the meter model.

- LAQUAtwin-EC-11:
  Up to two-point calibration at 1413 µS/cm and 12.88 mS/cm
- LAQUAtwin-EC-22 and LAQUAtwin-EC-33:
  Up to three-point calibration at 1413 µS/cm, 12.88 mS/cm, and 111.8 mS/cm

■ Multi-point calibration

1. **Open the protection cover and place some drops of the standard solution into the measurement cell.**
Rinsing the sensor with the standard solution beforehand will provide a more accurate calibration as it will reduce sample crossover contamination.

2. **Close the protection cover and press the CAL switch.**
CAL and ☺ blink, and the calibration value is displayed.

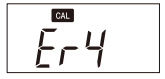


After the calibration is complete, CAL and ☺ stop blinking and the measured value is displayed.
The calibration value at 25°C is displayed for 1 s and the display returns to the measurement mode automatically.

3. **Open the protection cover and remove the standard solution. Then remove moisture on the sensor by gently dabbing with a soft tissue.**
This completes the 1st point calibration.

4. **To perform 2nd point calibration, repeat steps 1. to 3.**

● Calibration error



If CAL blinks and Er4 (error display) appears, the calibration has failed.
Perform electrode conditioning.
Check that the correct standard solution is used, and repeat calibration after cleaning the sensor.
If the calibration repeatedly fails when using the correct standard solution(s), the sensor may have deteriorated. Replace the sensor with new one.

Measurement

■ Sample setting

1. **Open the protection cover and put some drops of sample into the measurement cell.**

2. **Close the protection cover.**

■ Measurement mode

The auto stable (AS) mode and the auto hold (AH) mode can be selected. Refer to " ● Measurement mode change" (page 4) for the operation to set the measurement mode.

● Auto stable (AS) mode

This is the default setting. ☺ appears when the measured value meets the stability criteria. If the value changes, ☺ disappears.

1. **Confirm that the meter is in the measurement mode, and place a sample on the sensor.**

When the read value meets the stability criteria, ☺ appears and the reading is locked.

2. **Document the displayed value when ☺ appears.**
If the read value does not meet the stability criteria, ☺ disappears and the reading changes with time.

● Auto hold (AH) mode

☺ appears when the measured value meets the stability criteria. The reading then locks and will not change until the MEAS switch is pressed for the next measurement.

1. **Confirm that the meter is in the measurement mode, and place a sample on the sensor.**

2. **Press the MEAS switch.**

The auto hold function is activated.
MEAS blinks until the measured value has stabilized.

When the measured value is stable, MEAS stops blinking and the displayed value is locked with MEAS and ☺ displayed simultaneously.

3. **Document the displayed value.**

4. **Press the MEAS switch.**
The auto hold function is deactivated and ☺ disappears.
Be sure to perform this step before starting the next measurement. Or, you may mistake the displayed hold value for the next measured value.

Note

- **If a measured value is out of the specified measurement range, "Or" is displayed for upper range and "Ur" is displayed for under range.**
- **Ambient air may cause the measured values to fluctuate. To reduce environmental interference, close the protection cover.**
- **When you have a problem with the calibration or measurement, refer to frequently asked questions.**

■ Measurement display change

Measurement display change is available on LAQUAtwin-EC-22 and LAQUAtwin-EC-33.
The display mode switches as follows by pressing the MEAS switch in the AS mode.

- LAQUAtwin-EC-22:
  Between conductivity and temperature alternately
- LAQUAtwin-pH-33:
  Among conductivity, TDS, and temperature

Maintenance

■ Storage

1. **Clean the sensor with tap water.**
2. **Dab gently with soft tissue or cloth to remove moisture on the sensor and meter.**

Note

Especially be sure to treat the sensor gently to prevent damaging it.

3. **Close the protection cover before storing the meter.**

■ Temperature sensor adjustment

Temperature sensor adjustment is available on LAQUAtwin-EC-22 and LAQUAtwin-EC-33.
To perform accurate measurement with correction for temperature effects, follow the steps below. Normally this is not necessary.

1. **Ready a reference thermometer, and allow the meter and reference thermometer to reach to room temperature.**
2. **Set the display mode to temperature referring to " ■ Measurement display change" (page 2).**
3. **Press the CAL switch.**
   The meter displays the setting screen for target temperature.
4. **Press the MEAS switch to adjust the displayed temperature on the meter to match the temperature indicated by the reference thermometer.**
   Pressing the MEAS switch increases the displayed temperature. After the displayed temperature reaches 40°C, it returns to 5°C.
5. **Press the CAL switch again to apply the displayed value to the adjustment.**
   The adjustment starts. The adjusted value blinks with CAL and ℃ displayed.
   After the adjustment is complete, the adjusted value stops blinking with MEAS and ℃ displayed.
   If Er4 (error display) appears, the adjustment has failed. Retry the above steps increasing the time spent on the step 1.
   If the adjustment repeatedly fails, the sensor may have deteriorated. Replace the sensor with new one.

■ Initializing calibration data

Initialize calibration in the following cases.

- To delete the calibration data
- If the number of points for the last calibration is uncertain.
- After the sensor is replaced.

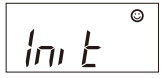
1. **Press and hold the CAL and ON/OFF switches for over 3 seconds when the meter is switched OFF to Initialize calibration.**
   After a moment of all segment indication, the software version is displayed.
   And then, the display changes as shown right.

2. **Press the CAL switch.**
   All calibration data is reset.
   When the initialization of calibration data is complete, End appears.
   The meter automatically switches OFF.

■ Initializing the settings

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

1. **Press and hold the MEAS, CAL and ON/OFF switches for over 3 seconds when the meter is switched OFF to enter the initialization.**
   After a moment of all segment indication, the software version is displayed.
   And then, the display changes as shown right.



2. **Press the CAL switch.**
   All calibration data is reset.
   When the initialization of settings is complete, End appears.
   The meter automatically switches OFF.

Appendix

■ Frequently asked questions

Question	Answer
How can I check the sensor's condition?	Perform 2-point calibration. If calibration error occurs, the sensor has deteriorated. Replace the sensor.
Can I measure high or low temperature samples?	This meter cannot measure a sample with temperatures outside the meter's operating temperature range (5°C to 40°C). The difference between the sample temperature and ambient temperature increases the measurement error. Perform measurement after the sample reaches the ambient temperature.
The measured value does not change after changing the sample.	If ☺ lights steadily in AH mode, the measured value is locked. Press the MEAS switch to unlock the value. If the value does not change after unlocking, the sensor may be damaged. Replace the sensor.
"Or" or "Ur" blinks in value measurement.	The measured value may be out of the specified measurement range. Measure a standard solution to check, and if "Or" or "Ur" still blinks, replace the sensor.
℃ blinks during measurement.	The measured temperature is not within the specified operating temperature (5°C to 40°C). If the ambient temperature is within the specified range and ℃ blinks, replace the sensor.
The meter does not power ON.	Check that the batteries are inserted properly. If the battery voltage is low, replace them both with new ones at the same time.
Er4 is displayed during the calibration	Please note that if you press the CAL switch in mV or temperature display mode, Er4 is displayed. This is because there is no calibration facility available for these modes.
Er1 is displayed soon power ON.	The internal IC in the meter may be defective. Perform meter initialization. If Er1 is still displayed after the initialization, the internal IC in the meter is defective. Replace the meter with a new one (the meter cannot be repaired).
Er2 is displayed right after power ON.	The internal IC in the meter is defective. Replace the meter with a new one (the meter cannot be repaired).
Er3 is displayed right after power ON.	The internal IC in the meter is defective. Replace the meter with a new one (the meter cannot be repaired).

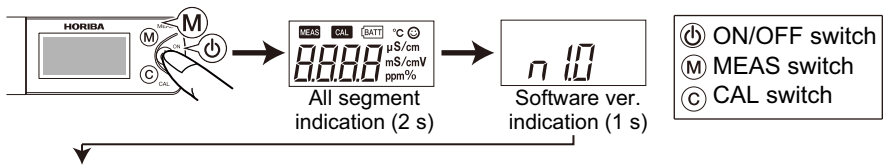
Setup Mode

The setup mode allows the user to customize the meter to his specific needs.
To enter the setup mode, press and hold the MEAS and ON/OFF switches for over 3 seconds when the meter is switched OFF. All the LCD segments appear and then the meter enters the setup mode.

Tip

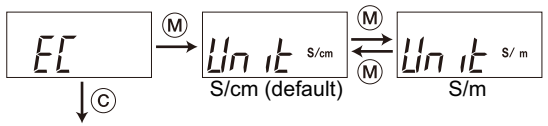
- **To have the changes apply, you need to go through the entire steps from "Setup mode entry" to "Setup completion" shown below. To leave a setting as it is, just press CAL switch in the setting.**
- **To exit the setup mode with no change of settings, press the ON/OFF switch earlier than pressing CAL switch in the last step but one, or the "Backlight setting" step.**

● Setup mode entry



● Unit setting

The display units can be changed.

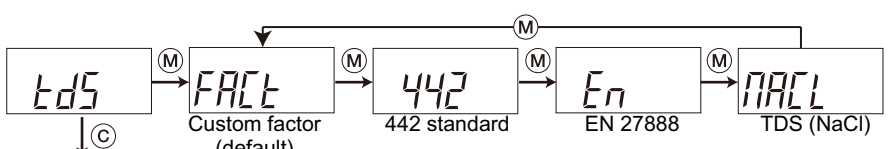


● TDS method setting (Only LAQUAtwin-EC-33)

The TDS method can be selected from the following options only on LAQUAtwin-EC-33.

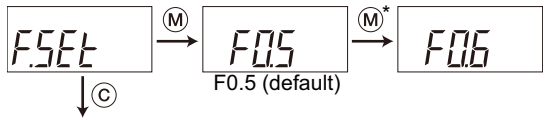
- FACt: KCl with factor adjustable from 0.4 to 1.0 (default 0.5)
- 442: Myron L 442 non-linear standard curve
- En: European environmental standard non-linear curve
- NACL: Non linear salinity curve

This step is bypassed on LAQUAtwin-EC-11 and LAQUAtwin-EC-22.



● Factor setting (Only LAQUAtwin-EC-33 with the TDS method set to FACt)

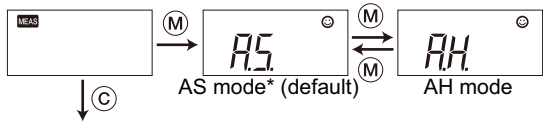
This step is bypassed on LAQUAtwin-EC-11 and LAQUAtwin-EC-22, and when the TDS method is set to 442, En, or NACL on LAQUAtwin-EC-33.



* The setting range is from F0.4 to F1.0.
In this setting, pressing the MEAS switch increases the displayed value. After the displayed value reaches F1.0, it returns to F0.4.

● Measurement mode change

The measurement mode can be switched.



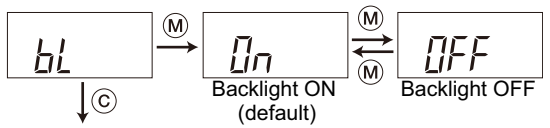
Note

The AH (auto hold) mode is applied only to conductivity measurement.

* Measurement display change is available in the AS mode. Refer to " ■ Measurement display change" (page 2).

● Backlight setting

The backlight can be switched to ON or OFF.



● Setup completion