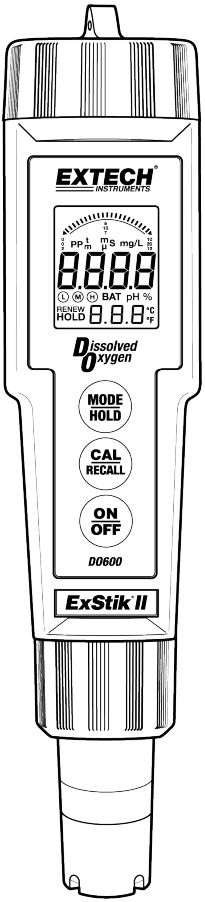
EXTECH®

USER MANUAL

ExStik® II DO600

Dissolved Oxygen Meter



Additional User Manual Translations available from www.extech.com

Introduction

Congratulations on your purchase of the Extech DO600. This instrument measures and displays dissolved oxygen and temperature. The units of measure are % saturation, mg/L or ppm for dissolved oxygen, and °C or °F for temperature.

Features include data hold, reading storage, auto power off (APO), automatic temperature compensation, and compensation for salinity and altitude.

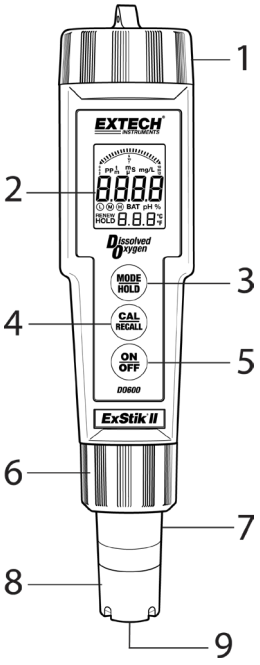
This meter is shipped fully tested and calibrated and, with proper use, will provide years of reliable service. Visit Extech website for the latest version of this manual and customer support.

Product Description

Front Panel

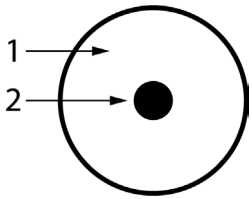
1. Battery compartment cover
2. Display
3. MODE-HOLD button
4. CAL-RECALL button
5. ON-OFF button
6. Electrode retaining collar
7. Dissolved oxygen sensor
8. Bonded membrane cap assembly
9. Electrode membrane and cathode

The electrode storage cap is not pictured.



Electrode Bottom View

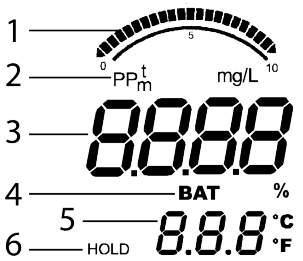
1. Membrane
2. Cathode



Display

The most common display indicators are pictured here. Others are explained in dedicated sections of this user manual.

1. Bar graph
2. Measurement units
3. Primary display
4. Low battery indicator
5. Temperature display
6. Data hold indicator



Operation

Preparing the Electrode

The electrode is shipped 'dry' and requires filling before use, using the supplied electrolyte solution. The DO600 is shipped with the membrane in place. Refer to the *DO Bonded Membrane Cap Replacement* section for filling the bonded cap.

NOTE: Ensure no air bubbles in the electrode before use.

Powering the DO600

The DO600 is powered by four CR2032 lithium batteries. Press the **ON/OFF** button to switch ON or OFF. If the batteries are weak, the 'BAT' indicator appears. Replace the batteries per the *Maintenance* section.

Automatic Power OFF (APO)

APO switches OFF the meter after approximately 10 minutes of inactivity. APO can be temporarily disabled when polarizing, as explained below.

To disable APO, switch ON the meter, short press the **CAL/RECALL** button, and then quickly press and hold both the **MODE/HOLD** and **ON/OFF** buttons until 'off' is displayed.

To enable APO, cycle meter power.

Startup Polarization Period

When the DO600 is powered for the first time, wait three minutes for the electrode to polarize before use.

When the meter is powered with APO disabled, a small biasing current is supplied to the electrode on a seven-day timer. This allows measurements to be made immediately, with no waiting, during the seven days.

Each time the DO600 is switched OFF and ON, the seven-day polarization timer is reset. An asterisk at the bottom right corner of the display indicates that the polarization timer circuit is active (the timer remains active when the meter is OFF).

Power Up Diagnostics

When switched ON, the display shows 'SELF' and 'CAL' while the meter loads user calibration data and runs a diagnostic routine. The meter then returns to the normal measurement mode. The DO600 should be calibrated daily for best accuracy.

Calibration

1. Switch ON the meter.
2. Long press the **MODE/HOLD** button until '%' is displayed.
3. If the meter has not been powered for seven days, allow 3 minutes for the electrode to fully polarize.
4. Affix the electrode cap to the electrode. The sponge in the cap should be moist, but not soaked, with distilled or clean tap water. Ensure that the electrode membrane is clean and dry and that there is an air gap between the membrane and sponge. Never touch the membrane, as oils can affect the electrode response.
5. Wait for the reading to stabilize and then long press the **CAL/RECALL** button until 'CAL' appears. The display will then flash '101.7' and 'SA' will appear. If 'SA' does not appear, the calibration was unsuccessful. If unsuccessful, recalibrate or contact customer support.
6. When calibration is complete, 'End' will appear, and the meter will return to the normal measurement mode.
7. Switch OFF the meter.

Zero Oxygen Calibration (Optional)

The zero-oxygen calibration improves accuracy for very low or high DO measurements.

Place the electrode in a zero-oxygen calibration solution (5% sodium sulfite), wait for stability, and then long press the **CAL/RECALL** button until 'CAL' appears. Stability in a zero solution may take some time, depending on electrode history.

Note: Clean sodium sulfite deposits from the electrode and the 'coined' surface of the electrode retaining collar, otherwise measurement accuracy will degrade.

Electronic Zero Calibration (Optional)

1. Perform this calibration when readings are unstable or when replacing the electrode.
2. Switch OFF the meter and remove the electrode by unscrewing the retaining ring and pulling off the electrode.
3. Switch ON the meter and wait for the self-calibration to complete.
4. Set the mode to %.
5. Long press the **CAL** button until 'CAL' appears. When the calibration cycle completes, the display should read 0.0%.
6. Switch OFF the meter.
7. Re-attach the electrode and repeat the first calibration procedure provided at the beginning of this Calibration section.

Taking Measurements

1. Cover the electrode with the electrode cap. The sponge in the cap should be moistened (not soaked) with distilled or clean tap water.
2. Use the **ON/OFF** button to switch ON or OFF. When switched ON, the self-calibration and diagnostic utilities are performed.
3. When switched ON for the first time, wait three minutes for the probe to polarize. For more information, refer to the *Startup Polarization Period* section, above.
4. Disable APO as explained in the APO section earlier in this manual.
5. Long press the **MODE/HOLD** button until the desired units of measure are displayed.
6. Remove the cap and place the electrode in the sample. Stir to remove trapped air bubbles in the membrane surface. Do not allow liquid to reach the electrode collar.
7. Allow time for the reading to stabilize, this time can vary from thirty seconds to five minutes, depending on the electrode-solution temperature differential.

Measurement Considerations

- The DO600 uses a polarographic sensor, which consumes oxygen at the sensing surface. This necessitates a constant movement of the sample across the membrane to maintain a constant DO level. Stir the probe, manually, in the sample or use a stir plate.
- When measuring DO in a small container, the probe will consume oxygen quickly, lowering the displayed reading over time.
- If the DO600 becomes unresponsive, the **MODE/HOLD** button may have been inadvertently pressed, putting the meter in the data hold mode. Press the **MODE/HOLD** button or cycle meter power to reset. If the meter is still unresponsive, remove and replace the batteries and restart.
- For best accuracy, allow sufficient time for the temperature of the probe to reach the temperature of the sample. A stable temperature reading will indicate that the meter is ready for use.

Change Units of Measure (Dissolved Oxygen)

The available units are % saturation, mg/l, or parts per million (ppm). To change the units:

1. Long press the **MODE/HOLD** button, the units of measure (%, mg/l, ppm) will scroll.
2. Release the button when the desired units are displayed, the meter will return to the normal operating mode.

Note: The units of measure cannot be changed while in the data hold mode.

Change Units of Measure (Temperature)

1. Switch OFF the meter and long press the **CAL/RECALL** button.
2. With the **CAL/RECALL** button depressed, short press the **ON/OFF** button.
3. Release the **CAL/RECALL** button when 'Self-Cal' appears.
4. The temperature units (°C and °F) toggle each time this procedure is followed.

Compensation Adjustments

Salinity Compensation

1. Switch ON the meter, and short press the **CAL/RECALL** button twice in quick succession, 'SAL' will appear.
2. Short press the **MODE/HOLD** button to increase the compensation by 1 ppt (part per thousand); the range is 0 to 50ppt.
3. Short press the **CAL/RECALL** button to save the new setting, the meter will then return to the normal measurement mode.

Altitude Compensation

1. Switch ON the meter, and short press the **CAL/RECALL** button twice in quick succession, 'SAL' will appear.
2. Long press **CAL/RECALL** to enter the altitude compensation mode, 'Ald' will appear.
3. The default setting is for sea level. Each press of the **MODE/HOLD** button increases the compensation by 1000 ft. (20,000 ft maximum).
4. Short press the **CAL/RECALL** button to save the new setting, the meter will then return to the normal measurement mode.

Storing and Recalling Readings

The DO600 can save 25 reading sets. Up to 25 reading sets can be saved, recalled, overwritten, and cleared as explained below.

Storing Readings

1. Press the **MODE/HOLD** button to store a reading set. The memory location numbers are shown on the lower display, and the stored readings are shown on the primary display.
2. When a reading is stored, the meter enters the HOLD mode, freezing the reading on the display, and the 'HOLD' indicator appears.
3. Press the **MODE/HOLD** button again to exit the HOLD mode.
4. Each subsequent press of the **MODE/HOLD** button stores a reading set.
5. Previously stored readings are overwritten when the 25-reading limit is reached.

Recalling Readings

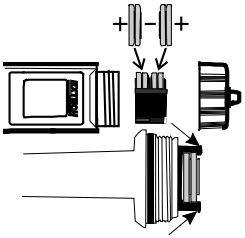
1. Short press the **CAL/RECALL** button and then, within 4 seconds, short press the **MODE/HOLD** button. The last memory location used will be displayed. Each time the **MODE/HOLD** button is pressed the next most recently stored reading will be displayed.
2. After the last stored reading is displayed, pressing the **MODE/HOLD** button returns to the beginning of the list.
3. Pressing the **CAL/RECALL** button exits this mode and returns the meter to its normal operating mode.

Clearing Readings

1. Switch ON the meter and long press the **ON/OFF** button for 4 seconds.
2. When “clr” appears, the 25-reading memory is cleared.

Maintenance

Battery Replacement



1. Twist off the battery compartment cover.
2. Holding the battery housing in place, remove the battery carrier using the two small tabs.
3. Replace the four (4) CR2032 batteries observing proper polarity.
4. Replace the battery carrier, reattach the battery compartment cap, and tighten securely.

Battery Safety

- Remove and immediately recycle or dispose of used batteries according to local regulations, keeping the batteries away from children. Do NOT dispose of batteries in household trash or incinerate.
- Even used batteries can cause severe injury or death.
- Call a local poison control center for treatment information.
- This unit contains four (4) CR2032, 3.0 V, lithium batteries.
- Non-rechargeable batteries are not to be recharged.
- Do not force discharge, recharge, disassemble, heat above 122°F (50°C), or incinerate. Doing so may result in injury due to venting, leakage, or explosion resulting in chemical burns.
- Ensure that the batteries are installed correctly according to correct polarity (+ and -).
- Do not mix old and new batteries, different brands or types of batteries, such as Alkaline, carbon-zinc, or rechargeable batteries.
- Always completely secure the battery compartment. If the battery compartment does not close securely, stop using the product, remove the batteries, keeping the batteries away from children.
- Remove and immediately recycle or dispose of batteries from equipment not used for an extended period of time, according to local regulations.

⚠ WARNING

- **INGESTION HAZARD** : This product contains a button cell or coin battery.
- **DEATH** or serious injury can occur if ingested.
- A swallowed button cell or coin battery can cause **Internal Chemical Burns in as little as 2 hours.**
- **KEEP** new and used batteries **OUT OF REACH of CHILDREN.**
- **Seek immediate medical attention** if a battery is suspected to be swallowed or inserted inside any part of the body.

Membrane Maintenance

On first use, remove the membrane cap and replace it with a new cap filled with refill solution.

Note: The installation of a bonded cap causes the membrane to be tightly streched over the cathode. Once a bonded cap is removed, reinstallation is not possible as the membrane will no longer be properly streched over the cathode.

When storing, lightly moisten the sponge (do not soak) in the protective electrode cap with distilled or clean tap water.

Electrode Replacement

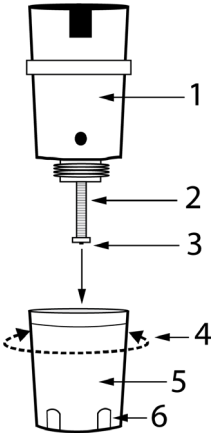
1. To remove the electrode, switch OFF the meter and remove the electrode retaining collar by unscrewing counter-clockwise.
2. Gently rock the electrode from side to side, pulling it away from the meter until it disconnects.
3. To attach an electrode, first align the positioning 'keys' on the electrode with the ones on the meter housing, and then carefully push the electrode into the meter socket until it is fully seated.
4. Tighten the electrode retaining collar sufficiently to seal the electrode with the meter.

DO Bonded Membrane Cap replacement

Important Note : Do not touch the membrane, oils will interfere with the oxygen permeability rate of the membrane.

1. Keep the electrode attached to the meter during this replacement process.
2. To remove the bonded cap from the electrode, unscrew the cap counter-clockwise from the electrode (see diagram below).
3. Discard the used cap.
   Note: The installation of a bonded cap stretches the membrane tightly over the cathode. Once a bonded cap is removed, reinstallation is not possible as the membrane will no longer be properly streched.
4. Rinse the old electrolyte solution from the cathode and anode.
5. Use the supplied polishing paper to clean, polish, and remove scratches from the cathode. Be sure to moisten the cloth before polishing and do not over-polish.
6. Set the replacement bonded cap on a flat surface, and leave it in this position throughout this process.
7. Fill the bonded cap with the electrolyte solution, to the bottom of the threads on the inside of the cap.
8. Tap the side of the bonded cap to remove trapped air bubbles from the solution.
9. Keeping the cap in a fixed position on a flat surface, carefully insert the electrode into the new bonded cap by first dipping and removing the electrode several times from the cap. With each dip, push the electrode progressively further into the bonded cap.
10. Screw the electrode slowly onto the bonded cap (clockwise) until fully tightened. The dipping and removal technique minimizes air bubbles in the electrolyte solution.
11. When tightening the cap, excess solution will leak, this is normal and desireable since it minimizes the introduction of air pockets. Clean the excess electrolyte before use.

1. Electrode
2. Anode
3. Cathode
4. Turn clockwise to tighten; counterclockwise to loosen
5. Bonded cap
6. Air vents



Specifications

Display	2000 count, dual function 3 ½ digit LCD with bar graph, Display size: 1.0 x 0.8 in. (24 x 20 mm)
Sensor	Polarographic type
Membrane	Threaded bonded membrane cap
Operating Temp. Range	32 to 122°F (0 to 50°C)
ATC Range	32 to 122°F (0 to 50°C)
Salinity Compensation	0 to 50 ppt in 1 ppt (part per thousand) increments
Altitude compensation	0 to 20,000 ft (6000 m) in 1000 ft (300 m) increments
Reading memory	25 reading sets
Battery	Four (4) CR2032 lithium batteries
Low Battery Indication	'BAT' appears
Auto Power Off	After 10 minutes of inactivity
Dimensions	1.4 x 6.8 x 1.6 in. (36 x 173 x 41 mm)
Weight	3.8 oz (110 g)

Measurement	**Range**	**Resolution**	**Accuracy (Full scale)**
% Saturation	0 to 200.0%	0.1%	±2.0%
Dissolved Oxygen Concentration	0 to 20.00 mg/l	0.01 mg/l	±2.0%
	0 to 20.00 ppm	0.01 ppm	±2.0%
Temperature	0 to 50 °C	0.1 °C	±1.0 °C
	32 to 122°F	0.1 °F (0 to 99ºF); 1.0 °F (>100°F)	±1.8°F

Appendices

Troubleshooting Guide

Symptom	Possible Causes	Action
No power	Batteries not in place Expired batteries Battery polarity incorrect	Replace batteries Replace batteries Reorient batteries
Unstable readings	Insufficient electrolyte in probe (air bubbles present)	Replace electrolyte and membrane cap assembly
Readings drift downward	Insufficient stirring	Stir sample
Slow Response	Soiled or damaged membrane	Replace electrolyte and membrane cap
Electrode won't calibrate	Depleted electrolyte or soiled/damaged membrane	Replace electrolyte and membrane cap
Electrode won't calibrate after replacing electrolyte and membrane cap	Soiled probe (cathode is not a shiny gold color)	Clean cathode with supplied polishing paper, perform electronic zero calibration
Reading is frozen	Meter in HOLD mode or locked	Release HOLD mode (press Hold button) or remove/replace batteries

Operational Matrix

Function / Resulting Action	Power Status	Mode Setting	Required Button Press Sequence	Comments
On/Off	Any	Any	Short press the ON/OFF button.	
Water Saturated Air Calibration	On	Any	Place Electrode in Calibration Cap Long Press CAL/RECALL button for 2 seconds.	
Zero Calibration	On	Any	Place Electrode in Zero Solution, wait for stability. Long press CAL/RECALL for 2 secs.	Also works with probe removed (Cal at zero current)
Store Reading	On	Any	Short press the MODE/HOLD button.	Stores and holds reading, "HOLD" displayed
Hold Release	On	While In Hold Mode	Short press the MODE/HOLD button.	
Enter Memory Retrieval	On	Any	Short press the CAL button followed by a short press of the MODE/HOLD button (within 4 seconds).	If no data is stored in memory, "End" is displayed briefly, meter returns to previous mode.
Scroll Stored Readings	On	Memory Recall	Short press the MODE/HOLD button.	
Exit Memory Retrieval	On	Memory Recall	Short press the CAL/RECALL button.	
Clear Stored Memory	On	Any Measure-ment Mode	Long press the ON/OFF button for 4 seconds.	"clr" is displayed.
Change Measurement Mode	On	Any	Long press the MODE/HOLD button for at least two seconds (the modes will scroll until the button is released).	
Enter Salinity Compensation	On	Any	Short press the CAL/RECALL button twice. (Display shows SAL).	
Changing Salinity Compensation	On	SAL	Short press the MODE/HOLD button (each button press increases the ratio by 1 ppt, the value cycles from 0 to 50).	
Exit Salinity	On	SAL	Long press the CAL/RECALL button for 2	It is necessary to press the

Compensation			seconds to enter Altitude Compensation. To enter measurement mode, press the Cal button again.	CAL/RECALL button to save changes. If the unit times out, no changes are saved.
Enter Altitude Compensation	On	Any or SAL	Short press CAL/RECALL twice. Unit enters Salinity Mode. Long press CAL/RECALL for 2 seconds to enter Altitude Compensation Mode (Displays Ald).	Unit times out in 5 seconds if no button is pressed, reverts to previous mode.
Changing Altitude Compensation	On	Ald	Short press the MODE/HOLD button (each press increases altitude by 1,000 ft., the value cycles from 0 to 20).	
Exit Altitude Compensation	On	Ald	Short press CAL/RECALL button to exit and save changes.	It is necessary to press the CAL/RECALL button to save changes. If the unit times out, no changes are saved.
Change Temperature Units	Off	n/a (off mode)	Long press the CAL/RECALL button, then short press the ON/OFF button. Release the CAL/RECALL button after "SELF CAL" lights.	
Override APO	On	Any	Short press CAL/RECALL button and then simultaneously long press the MODE/HOLD and ON/OFF buttons for 2 seconds.	

Factory Default Reset

1. Long press the **CAL** and **MODE** buttons and, while holding them down, press the **ON/OFF** button. Release all buttons when the display switches ON.
2. The display will show **dFLt rSt** (default reset).

Re-order and Accessory Information

Part Number	Description
DO600	ExStik II Dissolved Oxygen Meter
DO600-K	ExStik II Dissolved Oxygen Meter Kit – contains DO600, DO603, EX050 cable, probe weight, and CA895 case
DO605	Replacement Probe
DO603	Membrane Kit for DO600. Contains: 6 membrane caps, 15 mL KCL solution, polishing paper
EX010	Extension cable 3 feet (1 m) and probe weight
EX050	Extension cable 16 feet (5 m) and probe weight
DO610	ExStik II DO/pH/Conductivity Meter Kit Contains: EC500 pH/Conductivity/Salinity/TDS ExStik II Meter, DO600 Dissolved Oxygen ExStik II Meter, Single use pH buffer pouches 4, 7, and 10pH, Sample Cups with Cap, Weighted Base for Sample Cups, and Batteries, all packed in a Carrying Case
CA895	Small Soft Vinyl Pouch with Belt Loop for ExStik and ExStik II

Two-year Warranty

Teledyne FLIR warrants this Extech brand instrument *to be free of defects in parts and workmanship for* ***two years*** *from date of shipment. To view the full warranty text please visit:*
https://www.flir.com/support-center/warranty/instruments/extech-product-warranty/

Calibration and Repair Services

Teledyne FLIR offers calibration and repair services for the Extech brand products we sell. We offer NIST traceable calibration for most of our products.

Customer Support

Local Telephone Support List: *https://support.flir.com/contact*

Return Material Authorization (RMA): *https://customer.flir.com/Home*

Customer Service: *https://support.flir.com/ContactService*

Technical Support: *https://support.flir.com*

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