

IOP 011D.1
Effective Date: 1/09/2017
Replaces IOP 011D.0
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U.S. Fish and Wildlife Service
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and

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Ludington Biological Station
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Ludington, Michigan 49431

and

Fisheries and Oceans Canada
Sea Lamprey Control Centre
1219 Queen Street East
Sault Ste. Marie, Ontario P6A 2E5
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INSTRUMENT OPERATING PROCEDURE

INSTRUMENT:

Dissolved oxygen meter

MODEL:

Orion Star A223

MANUFACTURER:

Thermo Fisher Scientific Inc.

PRECAUTIONS:

POTENTIAL INTERFERENCES

Alcohols greater than 5% hydrogen peroxide, commercial bleach, gaseous chlorine, and gaseous sulfur dioxide can affect readings. Static electricity may affect reading.

Excessive water in calibration/storage sleeve.

Note: The RDO cap is only good for 365 days. The countdown begins with first reading taken. Err 881 will appear when the RCO cap has expired.

SAFETY

No Special precautions

PROCEDURES:

I. Meter preparation

A. Battery installation or replacement of four alkaline AA-size batteries.

1. Use a screwdriver to remove the 2 screws on the back cover of the meter.
2. Remove the battery-chamber cover.
3. Install the batteries according to the inscribed battery symbols on the inside of the battery chamber. Make sure batteries are in correct polarity.
4. Close the battery chamber cover and secure cover with the 2 screws.
5. Press and release the **POWER** button on the front of the instrument. The LCD will come on; if not, the replacement batteries may be bad.
6. A battery life indicator will appear in the upper, left corner of the display showing the remaining battery power.
7. To turn off the unit, press and hold the **POWER** button for three seconds.

B. Initial Sensor/Probe preparation

1. **NOTE:**

- 1) Do not touch the bottom of the RDO cap, optical window or spring contacts on the RDO sensor.
 - 2) The silicone grease that is supplied with the RDO sensor should only be used to lubricate the two O-rings on the RDO sensor. Do not fill the RDO cap with the grease.
 - 3) The RDO cap has an internal clock that counts down the 365 day lifespan of a new cap. This countdown begins with the first measurement taken.
2. Remove the protective shipping cap from the end of the RDO sensor.
 3. Lubricate the two O-rings on the RDO sensor with a thin film of the silicone grease provided.
 4. Align the arrow on the RDO cap with the arrow on the RDO sensor.
 5. Slide and press the RDO cap onto the RDO sensor until the cap is flush with the sensor body. (**Do not twist the RDO cap.** Once the cap is installed, it should not be removed until a new cap is needed or troubleshooting needs to be performed).
 6. Connect the RDO sensor to the 9 pin input on the meter. An Err 880 message will appear if the sensor is not fully connected to the meter, and/or an Err 882

message will appear if the RDO cap is missing or not properly installed.

II. Calibration

- A. Remove the end cap from the calibration sleeve and remove the sponge from the sleeve. Saturate the sponge with distilled water and squeeze the excess water out of the sponge.
- B. Replace the sponge and the end cap.
- C. Turn power ON.
- D. Meter should now be in the measurement mode, press **f1 to select cal**.
- E. Use the up or down arrows to highlight **Air** and **press f3 to select**.
- F. Rinse probe with distilled water, blot dry with lint-free tissue, and attach the calibration sleeve.
- G. Wait about **5 minutes** for the RDO sensor to equilibrate.
- H. Press **f3 (start)**.
- I. Wait for the DO reading on the meter to stabilize and stop flashing. Once the reading is stable, the meter will display "Reading is stable. Accept auto calibration value".
- J. Press **f2 (cal done)**.
- K. Press **f1 (meas)** to get into measurement mode.

III. Measurements

- A. Make sure the meter is reading in **mg/l**. This can be changed with the **Mode** button.
- B. Rinse probe with distilled water and blot dry.
- C. If measurements are to be taken directly from stream or lake, attach the stainless steel protective guard, which also serves as a weight.
- D. Insert probe into sample or lower probe to desired depth and press **Measure** to start the measurement.
- E. When the **AR icon** stops flashing, record the dissolved oxygen and temperature. Press **Measure** again to start next measurement.
- F. When finished with final measurement, rinse probe with distilled water and return probe to the calibration sleeve. And turn off meter.

IV. Storage

- A. For short and long term storage, leave the RDO cap on the sensor, keep it in the calibration sleeve, making sure to wet the sponge with distilled water, and keep the sensor out of direct sunlight.

MAINTENANCE:

See instrument manual.

REFERENCE:

User Manual Thermo Scientific Orion Star A223 Portable RDO/DO Meter Instruction Sheet and User Guide.

This procedure has been reviewed and approved by the undersigned representatives of the U.S. Fish and Wildlife Service and Fisheries and Oceans Canada.

REVIEWED/APPROVED _____ DATE _____
Field Supervisor (U.S.)

REVIEWED/APPROVED *Duke Shivers* DATE 05 MAR 2020
Program Manager (Canada)