RBR*duraturo*^{4}
INSTRUMENT GUIDE

rbr-global.com

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1 General overview

The RBR*duraturo*^{4} (Fig. 1) is a flexible dual-channel instrument that can integrate temperature (T) and/or pressure (D). It supports the following features:

- High accuracy
- Extended deployment
- Large memory
- Flexible schedules
- Twist activation
- USB-C download

RBR instruments facilitate optimal measurement schedules, whether moored, towed, or profiling.

The RBR*duraturo*^{4} comes with twist activation, large storage capacity, and reliable battery power, which facilitates long deployments with higher sampling rates. Downloads are quick with USB-C, and a dedicated holder makes it simple to replace the desiccant before each deployment. The calibration coefficients are stored on the instrument, and only one software tool, Ruskin, is required to operate it. Datasets can be read directly in Matlab, or exported to Excel, OceanDataView®, or text files.

Fig. 1. The RBRduraturo^4.

For a detailed description of using the Ruskin software, see Ruskin User Guide: Standard Instruments^4.

> RBR*duraturo*^{4} T.D | tide32 and RBR*duraturo*^{4} T.D | wave32 take averages of pressure readings over extended periods of time, providing accurate tide level data and obtaining wave characteristics. They are also capable of detecting infrequent phenomena, like boat wakes.

2 Physical specifications

Specification	Description
Max number of readings	> 2.4 billion samples
Power	6 D cells
Communications	USB-C
Clock drift	±60 seconds/year
Housing	Plastic
Diameter	100mm
Depth rating	20 / 100 / 300dbar
Sampling rate	24hr to 1s; 2, 4, 8, 16, and 32Hz
Length	246mm
Weight	2.4kg
Operating temperature	-5 to 35°C
Storage temperature	-20 to 50°C

Clock

The instrument clock is maintained during brief disconnections. This time is usually sufficient to change batteries. If the clock is lost, the time will revert to January 2000. In this case, check the power supply and synchronise with the computer again.

USB-C power

The USB-C cable provides power sufficient for configuration or data download. However, the instrument requires an internal power supply to perform sampling.

For deployment estimates specific for your instrument configuration and sampling options:

- Go to Ruskin and click the **Instruments** tab
- Select **Simulate…**, find your instrument under **Gen 4** > **Standard instruments**, and click **OK**
- Adjust variable parameters under **Deployment** to match your needs
- Ruskin autonomy engine will calculate the end date and indicate when your deployment is likely to stop

3 Sensor specifications

3.1 Pressure

Parameter	Value
Range[1]	20 / 100 / 300dbar
Initial accuracy	±0.01% full scale
Resolution	<0.001% full scale
Typical stability	±0.01% full scale / year
Time constant	<10ms

[1] Recommended pressure ranges for wave measurements are 20 and 100dbar.

Overview

The sensor is protected by a clear plastic guard. During deployments, always orient the sensor downwards to reduce debris collecting on the housing.

Pressure

$$P_{meas} = C_0 + C_1 \cdot P_{cal} + C_2 \cdot {P_{cal}}^2 + C_3 \cdot {P_{cal}}^3$$

where:

C_0-C_3 are unit-specific calibration coefficients determined in the laboratory.

P_{cal} is a temperature-compensated pressure measurement

3.2 Temperature

Parameter	Value
Range[1]	-5 to 35°C
Initial accuracy	±0.002°C
Resolution	<0.00005°C
Typical stability	±0.002°C / year
Time constant	<0.1s | fast, <1s standard, <60s | slow

[1] A wider temperature range is available upon request. Contact RBR for more information.

Calibration equations

Temperature

$$T_m = \ln\left(\left(\frac{1}{V}\right) - 1\right)$$

$$T_c = \frac{1}{(C_0 + C_1 T_m + C_2 T_m^2 + C_3 T_m^3)} - 273.15$$

where:

T_m = Intermediate variables

V = Raw temperature channel voltage ratio output (unique with each individual measurement)

C_0 = Cubic function regression calibration coefficient

C_1 = Cubic function regression calibration coefficient

C_2 = Cubic function regression calibration coefficient

C_3 = Cubic function regression calibration coefficient

T_c = Temperature in celsius

4 Derived parameters

4.1 Sea pressure

Sea pressure is the difference between the pressure measured underwater by your RBR instrument and atmospheric pressure. The units of measurement are **dbar** (decibars).

$$\text{Sea pressure} = \text{absolute pressure} - \text{atmospheric pressure}$$

where pressure (in dbar) is the value measured directly by your RBR instrument.

Enter atmospheric pressure (in dbar) manually in the table under **Calibration** > **Parameter** in Ruskin. See Ruskin User Guide: Standard Instruments[4]. If not entered, a default value of 10.1325dbar will be used.

5 Hardware

5.1 Open and close the instrument

Remember to keep the O-ring clean and avoid scratching the O-ring mating surfaces. Carefully inspect the O-ring before deploying the instrument.

Opening the RBR*duraturo*^{4}

1. Twist the battery end-cap counterclockwise.
2. Once fully unscrewed, pull the end-cap away from the housing.

Closing the RBR*duraturo*^{4}

1. Place the end-cap back on the instrument until almost fully closed.
2. Twist the end-cap clockwise until aligned with the pause icon.

*Fig. 2. The RBR*duraturo*^{4} with end-cap removed.*

5.2 Twist activation

The RBR*duraturo*^{4} is equipped with twist activation. Twist activation allows you to start or pause the instrument without the need to connect to a computer.

To use Twist activation, in Ruskin, go to the **Deployment** tab and from the **Start** menu select **Twist activation**. The instrument will now sample based on the twist position (pause or run) rather than a schedule. To enable sampling, first click **Enable** in Ruskin to enable logging. The status will then become **Paused**. Turn the battery end-cap to the run position (Fig. 3). The instrument will vibrate with one long pulse and start sampling. To pause it, turn the battery end-cap to the pause position (Fig. 4). The instrument will vibrate with three short pulses to indicate it has paused logging.

Fig. 3. The battery end-cap in the run position.

Fig. 4. The battery end-cap in the pause position.

5.3 Instrument interface

Refer to Open and close the instrument for details on accessing connection ports.

USB-C connection

Remove the battery end-cap to access the USB-C port located inside the instrument body.

A USB-C desktop cable is supplied in the instrument support kit. Use this cable to download data from the instrument to your computer.

Mini-HDMI port

The mini-HDMI port is located next to the USB-C port. This is the port to use for the umbilical cable from a connectorised end-cap.

Fig. 5. Inside the instrument body. (a) USB-C port. (b) Mini-HDMI port.

6 Maintenance

6.1 Support kits

RBR provides one support kit per every three instruments ordered. If you need more units, contact RBR.

The RBR support kits contain an assortment of basic accessories and spare parts, as presented below.

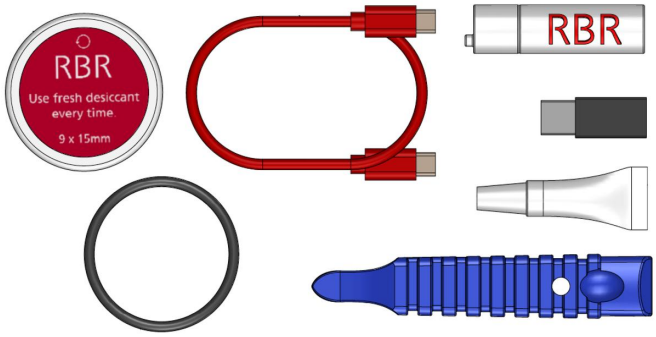


Fig. 6. The contents of the support kit for the RBRduraturo[4], clockwise from top left: Replacement desiccant, USB-C to USB-C cable, USB memory stick, USB-C to USB-A adaptor, silicone compound, O-ring removal tool, replacement O-rings.

6.2 Replace the O-rings

> Refer to Open and close the instrument for details on accessing the O-rings.
>
> The O-ring removal tool and silicone compound are available in the support kits.

Care for the O-ring is the single most important item of maintenance on any submersible RBR instrument. A water leak can damage the circuit board beyond repair and cause complete data loss. Every instrument's seal depends upon its O-ring, not the end-cap tightness. Therefore, proper O-ring maintenance is crucial.

> The O-ring may lose elasticity over time, even when the instrument is not deployed. RBR strongly recommends replacing the O-ring regularly.

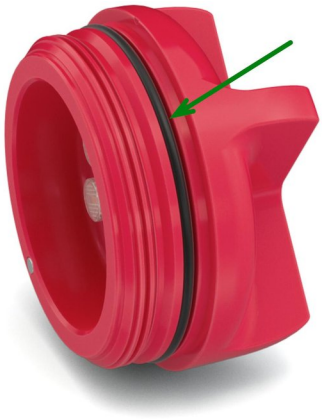


Fig. 7. The instrument end-cap, note the location of the O-ring.

Location of the O-ring

To access the O-ring, open the instrument.

Inspecting the O-ring

Visually inspect the new O-ring for nicks and scratches before installing it. Pay attention to the following areas:

- The surface of the O-ring itself
- The mating surface on the inside of the case between the threads and the open end
- The groove in the end-cap where the O-ring sits

When handling the O-rings:

- Avoid using any object that could scratch the O-ring or any of its mating surfaces.
- If dirt is present in the O-ring groove, remove the O-ring as described below and thoroughly clean the groove.
- Do not return this old O-ring to the instrument. If you remove the O-ring from the instrument for any reason, always replace it with a new one.
- If the surfaces of the O-ring groove are scratched, pitted, or damaged, contact RBR for advice.

Replacing the O-ring

Do not use metal screwdrivers or any other metal tool. They may scratch the O-ring groove and render the end-cap useless.

1. Use the plastic O-ring removal tool (included in the support kit) to remove the old O-ring from its groove. The O-ring may need to stretch quite a bit as it is pushed off. This requires some effort, but can be done by hand.
2. Clean the groove thoroughly with a soft, lint-free cloth and compressed air, if necessary.
3. Select a new O-ring and inspect it for damage.
4. Lubricate with a very light film of silicone compound (included in the support kit).
5. Install the new O-ring by pushing it into place and popping it into its groove.
6. Once in place, inspect it once more for scratches and debris, and wipe away any silicone compound deposited on the end-cap.
7. Close the instrument.

6.3 Replace the batteries

RBR ships new instruments with fresh, highest capacity batteries included. Replace the batteries before each deployment to maximise the operational time and prevent data loss.

Ruskin software estimates the remaining battery life during deployment. When setting up your deployment on Ruskin, check **Fresh** to indicate that new batteries are installed.

If using the same batteries for a subsequent deployment, do not check **Fresh** and continue power tracking from the previously recorded level.

See Ruskin User Guide: Standard Instruments[4] for more information on predicting battery life.

Replacing the batteries

1. Remove the battery end-cap.
2. Press down on the battery cover and slide in the direction of the arrow.
3. Replace the six batteries. Checking for correct battery polarity.
4. Push down the battery cover and slide it back over until it clicks.
5. Put the end-cap back on the instrument and twist clockwise until aligned with the pause icon.

Fig. 8. Location of the battery carriage

Always remove the batteries from your instrument during long-term storage. Doing so will prevent internal damage due to battery leakage and/or corrosion.

6.4 Replace the dessicant capsules

Replace desiccant capsules before each deployment. Fresh desiccant will keep the instrument compartment dry and prevent malfunction. Water damage may occur if condensation forms inside the instrument.

As a preventative measure, RBR recommends servicing the instrument in a cool, dry place (when possible).

Replacing desiccant capsules

1. Remove the battery end-cap.
2. Remove the used desiccant capsules from their sockets.
3. Insert fresh desiccant capsules into their sockets, face out.
4. Once all the capsules are secured, place the battery end-cap back in its place.
5. Put the end-cap back on the instrument and twist clockwise until aligned with the pause icon.

Fig. 9. Desiccant capsules inserted into the end-cap

Fig. 10. Direction of insertion

All instruments ship with fresh reusable desiccant capsules. They use a cobalt-free colour changing indicator dye. Orange indicates fresh desiccant, while green indicates it is saturated (about 15% water by weight). Once exhausted, the capsules can be replaced with new ones (available from RBR), or refreshed.

Fig. 11. Fresh (orange) and saturated (green) desiccant capsules.

Refreshing the desiccant

Follow the steps below to refresh the desiccant.

1. Remove the saturated silica beads from their capsule.
2. Place them in the oven and heat at 120°C (250°F) for about two hours.
3. Take the refreshed beads out of the oven and return them to the capsule.
4. Wait until the silica beads cool down. Once cool, the desiccant is ready to be reused.

Always remove the beads from their capsule before refreshing. The capsule will deform if heated to 120°C.

Return the refreshed beads to the capsule immediately after reheating. If left outside the capsule, the desiccant will trap moisture and go back to green.

6.5 Clean the instrument

Clean the instrument after each extended deployment to remove deposits that may have accumulated.

Do not use an ultrasonic bath to clean your instruments. Ultrasonic vibrations can break the wire bonding inside the transducers.

Type	Procedure	Notes
General/biofouling	To clean the exterior, soak in a mild detergent, then scrub the instrument with a soft brush.	Avoid scratching the plastic (scratches make future cleaning more difficult).
Calcification, encrustation	Soak in vinegar for six hours, then scrub the surface using a soft brush.	Soaking in vinegar for more than 24 hours may damage the O-ring and increase the risk of a leak.

Cleaning the pressure sensor

Avoid touching the diaphragm when cleaning the sensor. Any deformation will permanently affect performance.

1. Unscrew the sensor guard using a coin or a large flathead screwdriver. Do not apply excessive force, especially when using the screwdriver.
2. Rinse the area under running water. If this fails to remove the deposits, try soaking in vinegar.
3. If unsuccessful, contact RBR.

6.6 Calibrate the instrument

Factory calibration coefficients are calculated for each sensor, and the coefficients are stored on the instrument.

RBR calibration certificates contain calibration equations, coefficients, and residuals for each sensor.

Calibration certificates are available for download:

- If using Ruskin, connect your instrument and go to **Calibration**, then click Calibration certificates **Download**.
- For OEM instruments, go to https://oem-lookup.RBR-global.com, select **OEM lookup by serial number**, and search by the serial number and authorisation key.

RBR recommends calibrating your instrument before any critical deployment, periodically once a year, or if you suspect the readings to be out of specifications.

Discuss your calibration requirements with RBR. In some cases, the instrument will need to be returned to RBR to be checked and recalibrated.

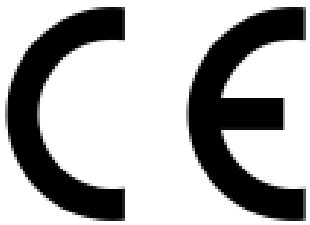
Please contact RBR for our current calibration fees.

6.7 Repair

RBR supports all our products. Contact us immediately at support@rbr-global.com or via the RBR website if there are any issues with your instrument. Please have the model and the serial number of the unit ready. Our support team will work to resolve the issue remotely. In some cases, you may have to return your instrument to RBR for further servicing.

There are no user-repairable parts of the instrument. Any attempt to repair without prior authorisation from RBR will void the warranty. Refer to the RBR warranty statement.

To return a product to RBR for an upgrade, repair, or calibration, please contact our support team to obtain a return merchandise authorisation code (RMA) and review the detailed shipping information on the RBR website.

7 Revision history

Revision No.	Release date	Notes
A	15 January 2026	Initial release
B	19 February 2026	Removed details of mesh guard and pressure adaptor Amended pressure specs
C	27 April 2026	Updated pressure range and accuracy Updated pressure calibration equation.
D	22 September 2026	Migrated. Reformatted and reviewed. Removed the 20dbar sensor accuracy and stability footnote from the pressure specifications. Corrected the pressure typical stability to ±0.01% full scale / year; the previous revision omitted the time basis.