

RBR *quartz*³ Q INSTRUMENT GUIDE



rbr-global.com

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2 Introduction

This document introduces you to your RBR instrument and will provide the information to deploy and maintain it. It is written specifically for the RBR*quartz*³ Q. You can access the RBR instrument guide on the USB data stick provided when you purchase a logger, from the Help menu in Ruskin, and on the RBR web site, at www.rbr-global.com.

3 Revision history

Revision No.	Release Date	Notes
A	04-May-2020	Original



4 Warranty statement

All data loggers manufactured by RBR Ltd. are warranted against defects in workmanship or original parts and materials for one year. Third party sensors (not manufactured by RBR) are limited to the warranty provided by the original manufacturer.

Units suffering from such defects will be repaired or replaced at the discretion of RBR Ltd., provided that the problem has appeared during normal use of the instrument for the purpose intended by us. The liability of RBR Ltd. extends only to the replacement cost of the instrument. The customer will bear all costs of shipment to us for repair; all other costs, including return shipment, will be borne by RBR Ltd.

This warranty does not cover consumables or normal wear and tear, nor does it cover damage caused by negligent use or mishandling. Attempted modification or repair of any unit without the prior consent of RBR Ltd. will immediately void any warranty in force.

Users are expected to maintain a regular program of calibration.

We reserve the right to grant or refuse warranty repairs at our discretion if we consider that there are reasonable grounds for doing so.

5 RBRquartz Q

5.1 Overview

5.1.1 Description

The RBR*quartz*³ Q tide and wave recorder uses an integrated Paroscientific Digiquartz® pressure sensor for the best-in-class initial accuracy and low drift performance. The RBR*quartz*³ Q is intended for long-term autonomous or real-time observations of water level, tides, and waves. The stable pressure sensor is able to resolve small changes in water level over long deployments. Flexible measurement schedules and burst sampling permit applications for tide, wave, and sea level measurements. The RBR*quartz*³ Q has a large memory capacity and USB-C or optional Wi-Fi download for large data files.

The RBR*quartz*³ Q can record instantaneous pressure measurements, average pressure samples to remove wave action, and burst-sample pressure at up to 16Hz for wave height and period calculations. Wave measurements are made by burst sampling, with programmable sample rate, number of samples, and burst interval. High accuracy marine temperature data are recorded with each measurement. Wave, tide, and temperature measurements are standard with every RBR*quartz*³ Q.



5.1.2 Included in Shipment



Item No.	Description
1	RBRquartz ³ Q*
2	8xAA batteries
3	RBR quick start guide
4	O-ring removal tool
5	Replacement O-rings
6	Spare desiccant
7	Silicone grease (3g)

8	USB-C to USB-A cable
9	Memory stick with software and user guide
10	Shipping case (IP-67)
N/A	Maintenance kit (Not shown)

*Battery end cap defined in the order and may not be as shown

5.2 Specifications

Physical	
Weight (in air):	2300g
Size:	~510mm x Ø100mm
Displaced Volume:	2395cm ³
Housing:	Plastic
Depth rating:	750m
Operational temperature:	-20°C to 50°C*
Storage temperature:	-20°C to 50°C
Power:	8 AA cells**
External power:	4.5-30VDC
Communication:	USB-C or RS-232/485

Other

Storage:	240M readings
Clock drift:	±60 seconds/year

*Calibrated temperature range is -5°C to 35°C

**Lithium iron supplied (MSDS: https://data.energizer.com/PDFs/lithiumirondisulfide_pds.pdf), can also support NiMH, Alkaline, and Lithium ion

Marine temperature (standard)

Range:	-5 to 35°C
Accuracy:	±0.002°C
Time constant:	30s (embedded)
Typical stability:	±0.002°C/year

Depth

Range:	10 / 20 / 55 / 125 / 190 / 260 / 330 dbar
Initial accuracy:	±0.01% FS (full scale)
Resolution:	100ppb (at 16Hz sampling rate)

The full mechanical drawing is available in [Appendix A - Product drawing](#)

6 Instrument Hardware

6.1 Opening and closing the logger

Instruments have both a "sensor end cap" and a "battery end cap". Only the battery end cap needs to be opened, the data connector and battery door are inside. It may be unscrewed by hand or by using a rod inserted into the mooring line hole for leverage. The end cap does not unscrew completely until the O-ring is clear of its mating surface in the body. This ensures that it will not eject at high speed should the interior of the logger become pressurized.



Closing the logger is exactly the reverse of opening it. Remember to keep the O-rings clean and avoid scratching the O-ring mating surfaces. Carefully inspect the O-rings, as described in the [Inspecting the O-rings section](#), before deploying the logger. Do not use excessive force when tightening the end cap; hand-tight is quite sufficient, as the seal depends upon the O-rings, not the end cap tightness.



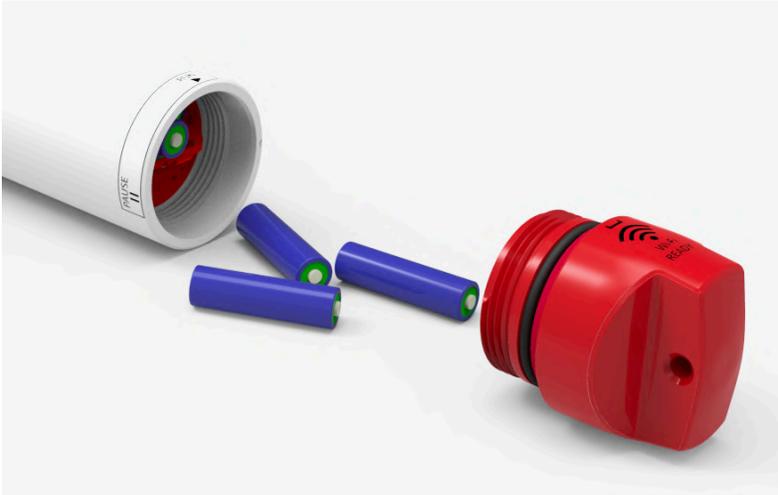
6.2 Changing the batteries

Permalink:<https://docs.rbr-global.com/display/RSKDOC/Changing+the+batteries>

Loggers are powered by eight AA size cells. These can be almost any chemistry with only a few restrictions depending on the sensors ordered. Check your logger's compatibility in Ruskin to see if your instrument has a restriction.

Steps

1. Remove the battery end cap from the logger, see [Opening and closing the logger](#).



2. Using both thumbs, press down on the "+" symbols on the battery cover and slide in the direction of the arrow. The battery cover can then be folded up.



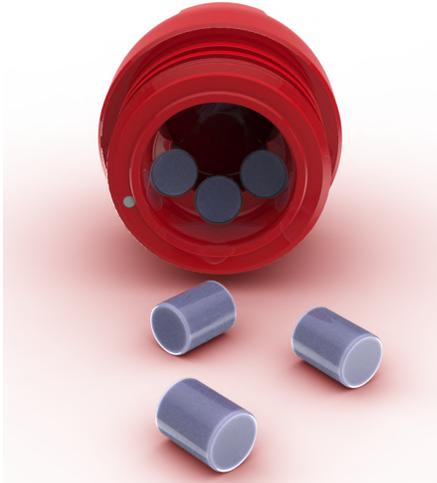
3. Invert the logger to allow the batteries to slide out of the battery carriage.
4. Insert fresh batteries into the battery carriage with the negative terminals pointing inwards, four (4) batteries per channel.
5. Close the battery cover by folding down and then pressing with both thumbs on the "+" symbols and sliding in the opposite direction of the arrow.
6. Replace the battery end cap.

6.3 Installing desiccant

The logger has a dedicated location for placement of desiccant in the battery end cap, which will accommodate three (3) Dricap desiccant capsules (part # 0003240 (qty9), or 0005668 (qty100)).

Steps

1. Remove the battery end cap from the logger - see [Opening and closing the logger](#).
2. Inside the battery end cap, there are 3 recessed sockets. Insert a desiccant capsule into each socket, ensuring that each is securely placed.



3. Replace battery end cap.

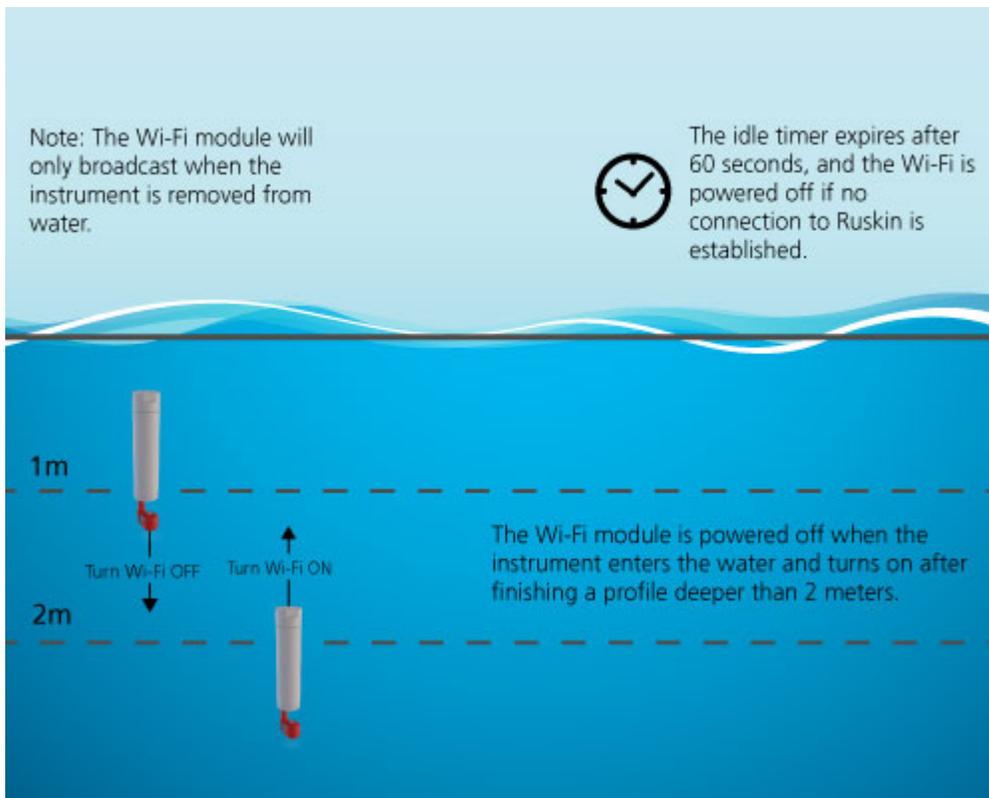
6.4 Twist activation

All loggers are shipped with this feature enabled. This allows the instrument to be enabled without a schedule. To activate or deactivate the twist feature see Twist Activation under the Gate Condition section of the Ruskin user guide. You must first enable this mode and enable the logger. Closing the battery end cap enables the logger. When enabled by twist activation the logger will vibrate for a few seconds. To stop the logger, open the battery end cap one quarter turn. When the logger is stopped it will vibrate for three short pulses to provide positive feedback.



6.5 Wi-Fi feature

The Wi-Fi card will be powered for 60 seconds whenever the battery end cap is turned to the on or off position regardless of whether logging has been enabled or not, allowing for connection to Ruskin, downloading data, and programming the deployment. See image below for an example use case:



If you have enabled the Wi-Fi feature on your logger and a mobile device, you can connect and view data from the logger on the mobile device. Your logger will be shipped from the factory with the Wi-Fi on and set to record data in the

mobile format. Enabling and disabling the Wi-Fi card and changing the data format is described in the Ruskin User Guide.

6.6 Maintenance and repairs

6.6.1 Instrument calibration

We recommend that you verify the calibration of your data logger before any critical deployment, periodically once a year, or if you suspect the calibration to be out of specifications. Discuss your calibration needs with RBR. In some cases, you will be recommended to return the instrument to RBR to have it checked and re-calibrated. Please contact us for our current calibration fees.

6.6.2 O-rings

The single most important item of maintenance on any RBR submersible data logger is the care of the O-rings. Any kind of water leak can damage the circuitry beyond repair and cause complete data loss. Every logger's seal depends upon its O-rings, not the end cap tightness. Therefore, proper O-ring maintenance is crucial.

⚠ O-rings may lose elasticity over time due to pressure, even when the logger is not deployed. We strongly suggest that the O-rings be replaced regularly, for example, before every deployment, or after a change of batteries, or at least once a year.



Inspecting O-rings

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 inner surfaces of the groove in the end-cap where the O-ring sits

Any dirt present should be removed by wiping thoroughly with a soft, lint-free cloth. When cleaning, never use any material or tool which could scratch the O-ring or any of its mating surfaces. If any dirt is present in the O-ring groove, then the O-ring should be removed as described below to allow thorough cleaning of the groove. If an O-ring needs to be removed for any reason, it should be replaced.

If the O-ring is scratched, cut, distorted, perished or defective in any other way it must be replaced. If any of the surfaces of the O-ring groove are scratched, pitted or otherwise damaged, the logger may need to be returned to RBR for refurbishment: please contact us for advice.

Replacing an O-ring

1. Lever the O-ring from its groove. Use a soft plastic or wood tool; do not use a metal screwdriver or any other tool which may scratch the surfaces of the O-ring groove, doing so will probably render the end cap useless. Slide the O-ring out of its groove and off the logger. 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. Thoroughly clean the O-ring groove, taking great care not to scratch or damage it in any way. Inspect it carefully, and contact us for advice if it appears damaged. Apply a light film of silicone grease to all three inside surfaces of the groove, being careful not to trap any dirt, hairs or lint.
3. Select the proper O-ring, see part numbers below, and make sure it is not damaged. Lubricate it with a very light film of silicone grease to ease its installation.
4. Install the new O-ring by pushing it into place and popping it into its groove.
5. When the new O-ring is in place, inspect it once more for scratches and dirt, and wipe away any silicone grease deposited on the end cap.

Most experienced users of oceanographic equipment replace all O-rings before every deployment as a matter of routine. The cost of an O-ring is negligible compared with the cost of the instrument and its deployment. Therefore, routine replacement of O-rings is cheap insurance.

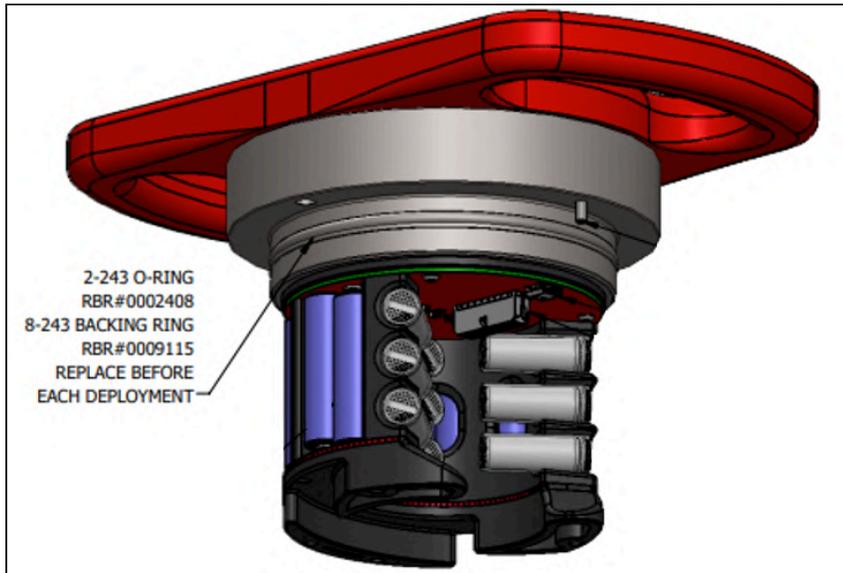
Plastic bodies: #2-225 N70 O-ring

Titanium bodies: #2-225 N70 O-ring, #8-225 N90 backup ring

6.6.3 O-rings - RBRquartz BPR|zero

The single most important item of maintenance on any RBR submersible data logger is the care of the O-rings. Any kind of water leak can damage the circuitry beyond repair and cause complete data loss. Every logger's seal depends upon its O-rings, not the end cap tightness. Therefore, proper O-ring maintenance is crucial.

 O-rings may lose elasticity over time due to pressure, even when the logger is not deployed. We strongly suggest that the O-rings be replaced regularly, for example, before every deployment, or after a change of batteries, or at least once a year.



Inspecting O-rings

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 inner surfaces of the groove in the end cap where the O-ring sits

Any dirt present should be removed by wiping thoroughly with a soft, lint-free cloth. When cleaning, never use any material or tool which could scratch the O-ring or any of its mating surfaces. If any dirt is present in the O-ring groove, then the O-ring should be removed as described below to allow thorough cleaning of the groove. If an O-ring needs to be removed for any reason, it should be replaced.

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Replacing an O-ring

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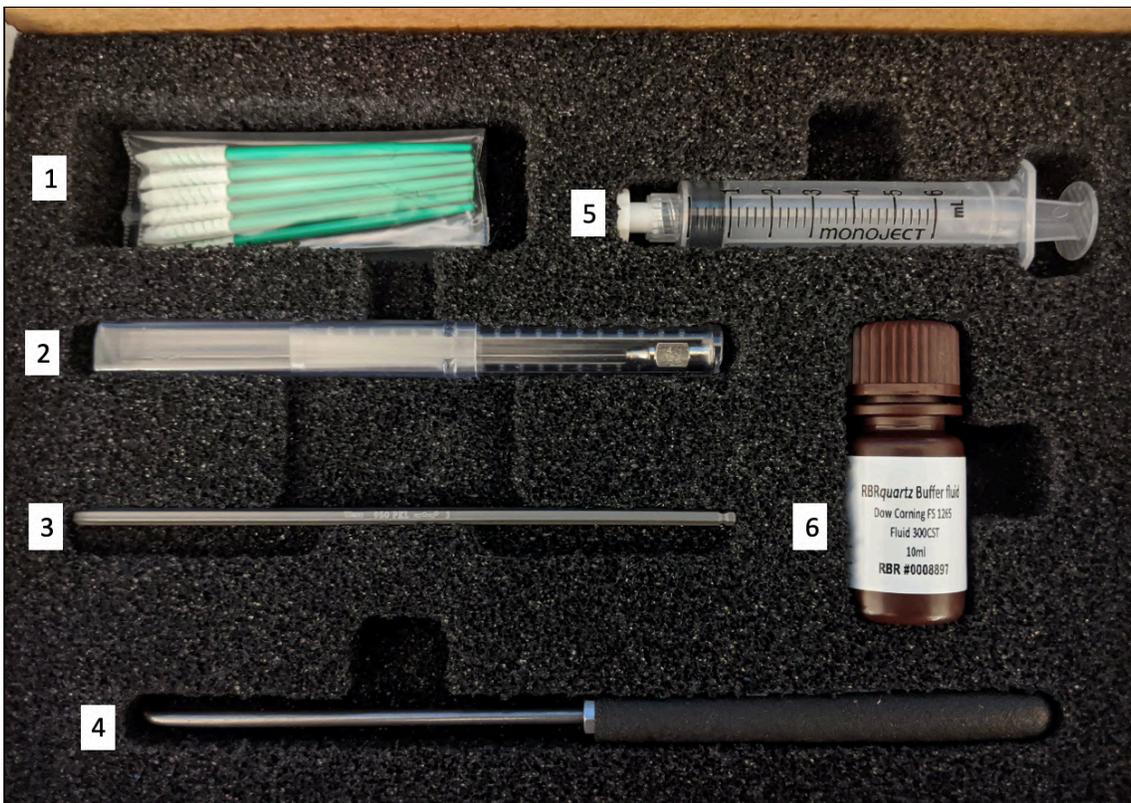
O-rings: #2-225 N70 O-ring (RBR#0002408), #8-225 N90 backup ring (RBR#0009115)

6.6.4 Corrective maintenance

Overview:

The Paroscientific Digiquartz® sensor is filled with a buffer, which is connected to the environment via a tube. The mounting of the Paroscientific Digiquartz® sensor and the connection to the sensor end cap are described in [Appendix B - Paros interface drawing](#). Should any of the buffer leak from the instrument this will need to be refilled, likewise if the buffer tube were to have debris fall into it the material would need to be purged. The instructions in this section describe how to remove the anti-biofouling assembly to allow access to the buffer tube for the oil to be refilled or for debris to be flushed out.

RBRquartz Maintenance kit (0008879)



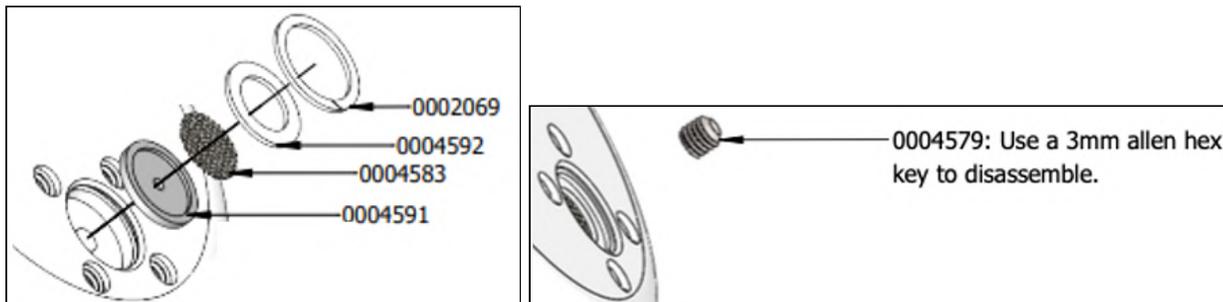
Item No.	Description
1	Lint-free swabs

Item No.	Description
2	24 gauge needle ~10cm long
3	3mm hex key
4	Pick
5	Syringe with stopper
6	Dow Corning FS 1265 Fluid 300 cst

Accessing the buffer tube:

1. Remove the retaining ring (0002069) using the pick by hooking the split in the ring at the opening and pulling it out of the recess in the sensor end-cap (SEC).
2. Once the split ring has been removed the Upper Mesh Insulator Disk (0004592), Mesh (0004583), and the Lower Mesh Insulator Disk (0004591) will then come out easily.
3. Using the 3mm hex key remove the set screw (0004579)

The full anti-biofouling assembly drawing is available in [Appendix C - Anti biofouling mesh assembly](#)



Filling / purging debris from the buffer tube:

1. While holding the instrument vertical with the SEC up, push the needle in approximately 5cm.
 - a. Before installing the needle into the buffer tube ensure any air bubbles have been purged. To purge the syringe needle, hold the syringe with the needle pointing up and discharge a small amount of buffer oil.
 - b. The buffer tube interface assembly drawing (Figure 2) shows that there are several features in the buffer tube assembly where the needle can get stuck, moving the needle side to side will allow you to clear these features and fully insert the needle.

2. Tip the instrument onto its side and flush with ~2mL of oil.
 - a. The purpose of having the instrument on its side is to remove debris and contaminated oil.
3. Return the instrument to the vertical position, leaving the needle inserted into the buffer tube.
4. Continue to push more oil into the buffer tube, while slowly removing the needle.
5. Ensure you have filled the cavity with oil to the top of the threaded hole.
6. Clean the M6 set screw with 0.7mm
 - a. The 0.7mm hole is the smallest opening in the assembly, and if there is debris it may block this area. You may need to clear this hole with a pick, or compressed air if available.
7. Reassemble, as per Figure 1 and instructions below:
 - a. Install the set screw with the 0.7mm hole (0004579) using the 3mm hex key. When installing the set screw, the oil will be displaced and spill into the mating surface for the lower mesh insulator disk.
 - b. Remove excess oil with a tissue or swab.
 - c. Once cleaned, install the Lower Mesh Insulator Disk (0004591) with the recess facing up.
 - d. The nickel-copper mesh (0004583) will rest in the recess of the lower mesh insulator disk, see Figure 1.
 - e. The upper mesh insulator disk (00044592) is then placed on top of the lower mesh insulator disk and nickel-copper mesh assembly.
 - f. Lastly, the retaining ring (0002069) is re-inserted by opening the split ring and feeding the ring into the recession of the SEC, holding it in place with one finger while continuing to feed the remainder of the ring into the recess.

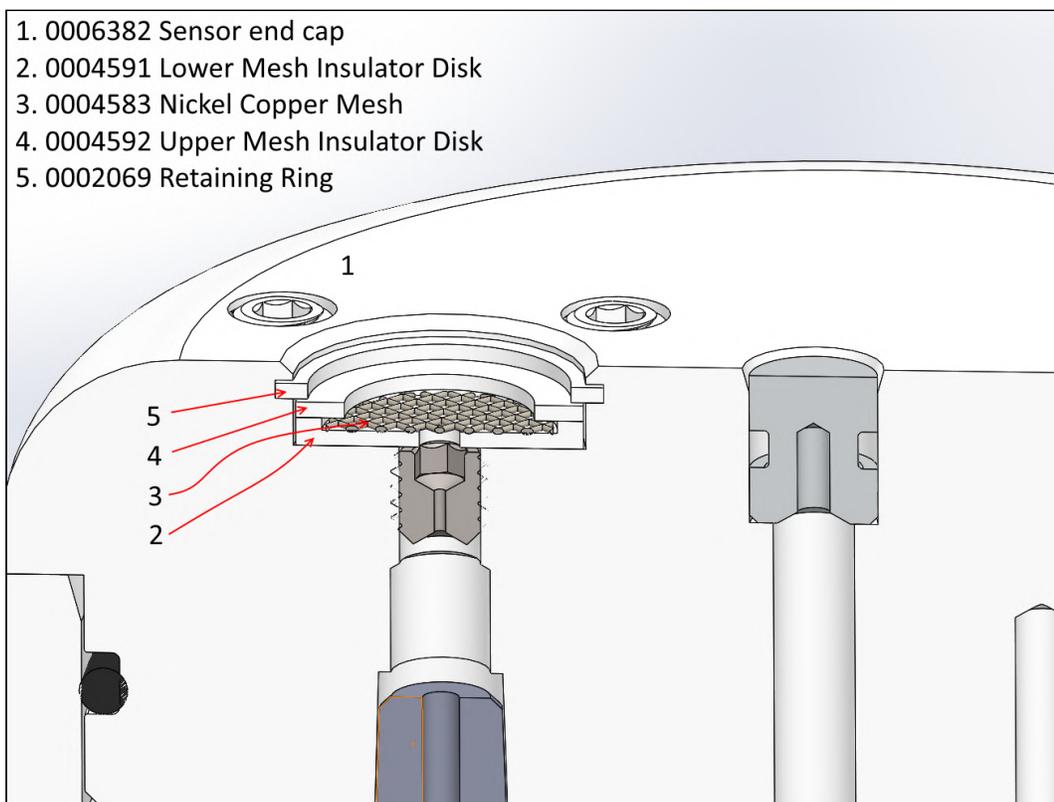


Figure 1 - Anit biofouling mesh assembly

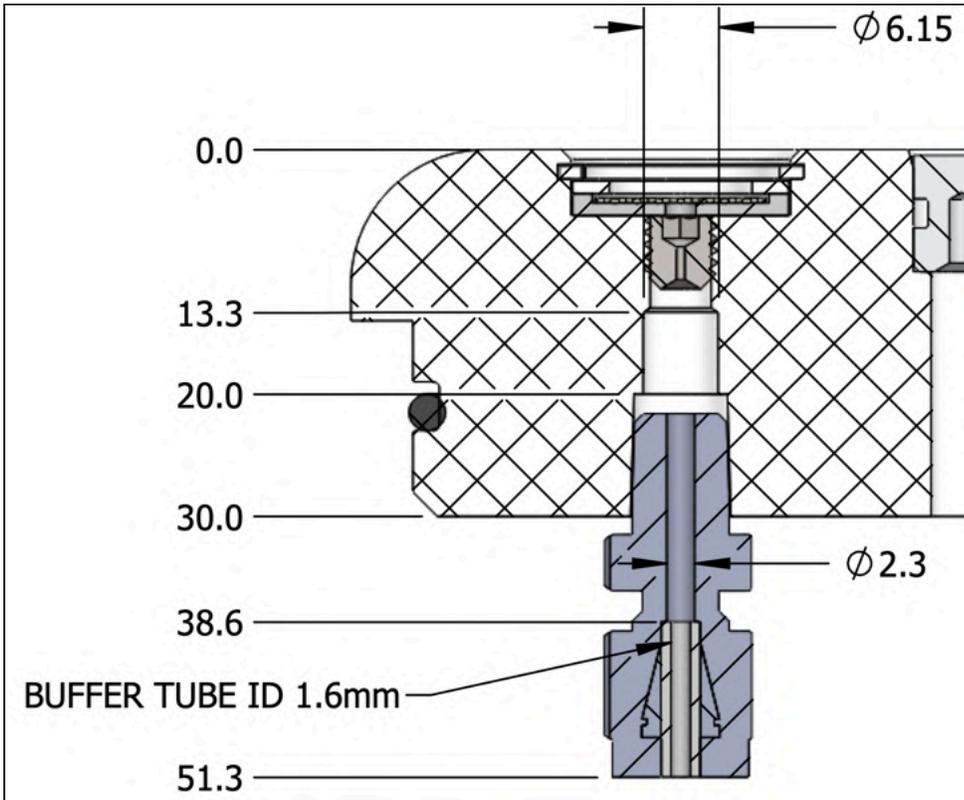


Figure 2 - Buffer tube interface assembly

RBR replacement hardware:

Part Number	Description
0008765	Anti-biofouling Mesh hardware kit for BPR (Includes the items below)
• 0004583	14mm Dia. Nickel Copper Anti-biofouling Mesh
• 0004592	Upper Mesh Insulator Disk
• 0004591	Lower Mesh Insulator Disk
• 0002069	Retaining Ring, 19mm
• 0004579	Set screw with 0.7mm hole

6.6.5 Installation of calibration adapter

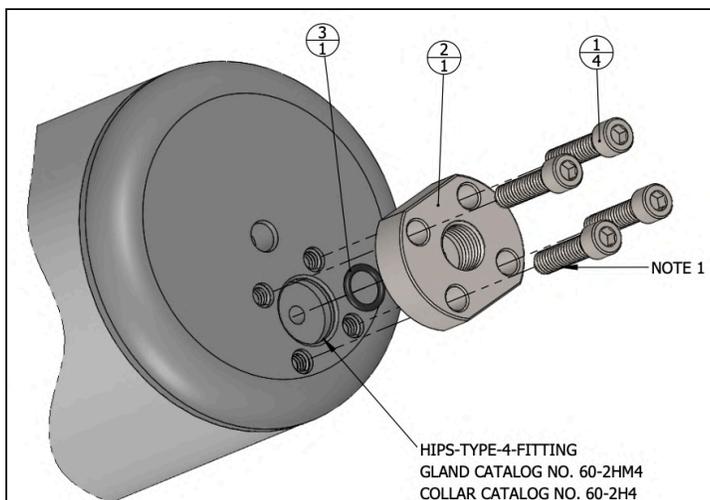
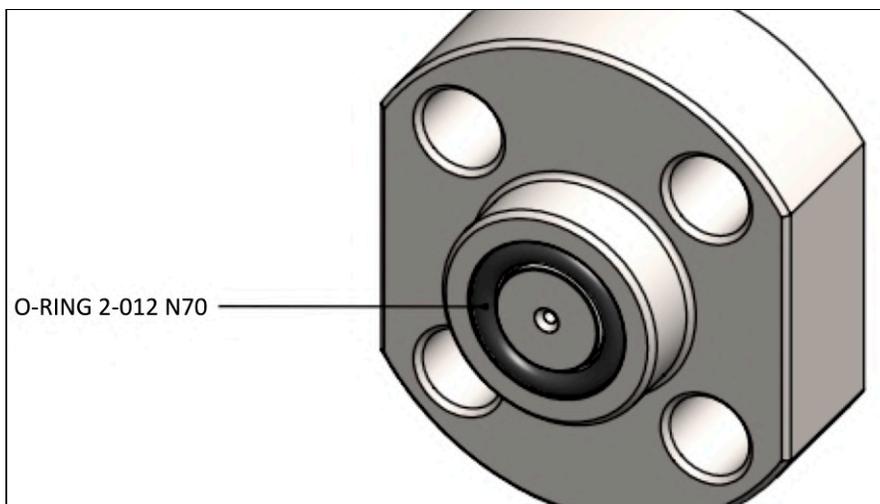
A calibration adapter is available from RBR. This section below will describe how to install this adapter. The full drawing of the assembly can be found in [Appendix D -Calibration adapter installation](#).

Remove anti-biofouling mesh

1. Follow the instructions for accessing the buffer tube as described in: [Corrective maintenance](#)

Installation of the calibration adapter

1. Apply a thin layer of grease to the O-ring, see: [O-rings](#)
2. Install O-ring into the O-ring groove of the pressure adapter as shown below
3. Position the calibration adapter over the exposed pressure port of the instrument as shown below
4. Install the 4 screws and tighten to 1/4 turn past snug. Max 100.00 Nm.



Item No.	Part No.	Description	Qty.
1	0002430	SCHS 1/4-20x1 SS MCMaster 92196A542	4
2	0007865	RBR external pressure adapter	1
3	0001798	O-RING 2-012 N70	1

6.6.6 Repairs

We support all instruments and software that we manufacture. First line support is always available by phone or e-mail. Please contact us immediately if you are experiencing problems with your RBR product. It is very important to contact us before returning your instrument, as some difficulties can be easily solved on-site by the user. Please have the model and serial number of the unit handy when you contact us at support@rbr-global.com.

There are no user-repairable parts of the logger. Any attempt at repair, whether successful or not, without prior authorization from RBR Ltd., will void the warranty. If it is necessary to return the product to RBR for an upgrade, repair, or calibration; please review the detailed shipping information on our website www.rbr-global.com before returning the unit.

In the unlikely event of an instrument requiring service at RBR, contact us for an RMA number and please use the following shipping address:

RBR Ltd
95 Hines Road Unit 5
Kanata, Ontario
CANADA K2K 2M5
Telephone +1 (613) 599-8900

For those who are shipping from outside of Canada, you will need to clearly mark the waybill and any other customs paperwork with the following:

"Canadian goods being returned to manufacturer for repair. NOT A SALE."

Please state the instrument value on the waybill as closely as possible to the current market value based on the original purchase price less depreciation. Please contact RBR if you have any questions about the instrument value. Send the unit using your own preferred method (prepaid). However, we suggest that you do not use Ground Service since customs brokerage charges will be billed incorrectly.

Units repaired under warranty will be returned prepaid by RBR. Warranty repairs are decided on a case by case basis.

Standard Repair Charges (Non-warranty)

Our minimum repair charge is \$150 CAD. This charge covers a comprehensive initial check, including verification calibration and sensor functionality. Minor repairs are also covered by this basic fee. If further repair work or re-calibration is necessary, a quotation will be issued to the customer. Once we have received authorization to proceed,

the repair shall be completed and the instrument returned as soon as possible. Please note that any units returned with low (or no) batteries will have new batteries installed and the costs will be added to the repair invoice.

6.6.7 Support kits

To simplify maintenance of your data logger, RBR sells support kits with enough O-rings, and silicone grease for 5 deployments. Please contact RBR for more information or to place an order.

6.7 Internal and External Power draw

RBR loggers may be powered by an external source with a voltage range from 4.5-30V.

6.7.1 Order of power draw

When an external power supply is present, the logger will preferentially draw power from this source and not consume the internal batteries. For a logger that is powered by an external source, the internal batteries serve as backup power in the event the external source fails.

The logger is powered by the external power source as long as the voltage is greater than 4.5V. If the external voltage drops below 4.5V, the system switches on the internal batteries.

6.7.2 Paused

Twisting the battery end cap toggles the logger between the "Play" and "Paused" states. When the instrument is in the "Paused" state the power draw is truly 0, so it is not necessary to stop the logger if it will remain in this state for an extended period of time.

6.7.3 USB Power

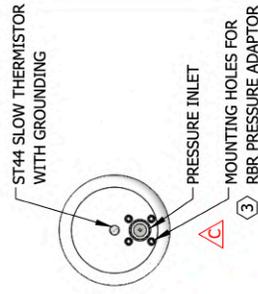
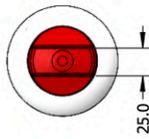
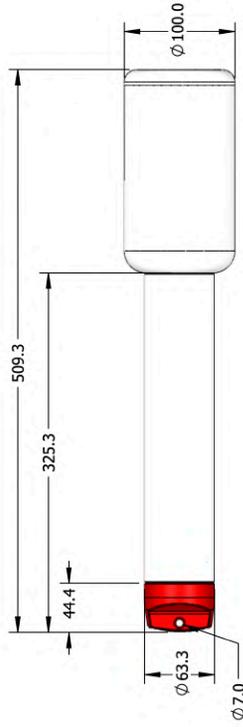
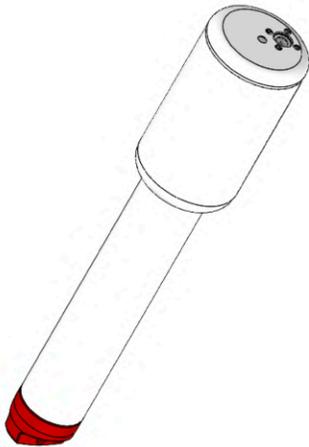
When connected, USB preferentially powers the logger during configuration or data download, however, if sampling occurs while connected via USB the internal batteries are used during the sample.

7 Appendix

7.1 Appendix A - Product drawing

REVISIONS

REV	DESCRIPTION	DATE	REV BY	APP BY
A	INITIAL RELEASE	AUG 24, 2018	MW	WZ
B	ADDED LABEL AND DEPTH RATING	AUG 25, 2018	MW	WZ
C	UPDATE TO SHOW PRESSURE ADAPTOR FEATURES MECH 1/24	NOV 22, 2019	WZ	WZ



NOTES:
 1. DRAWING IS METRIC, DIMENSIONS ARE IN mm.
 UNLESS OTHERWISE SPECIFIED.
 2. THESE DIMENSIONS ARE FOR REFERENCE.
 3. RBR PRESSURE ADAPTOR KIT 0008746

RBR

This drawing is issued in the strictest confidence and is not to be used for the manufacture of any product in whole or in part, without the express written consent of RBR Ltd © 2019

Description: RBRquartz³ Q Product Drawing

Material: NATURAL POM ACETAL COPOLYMER

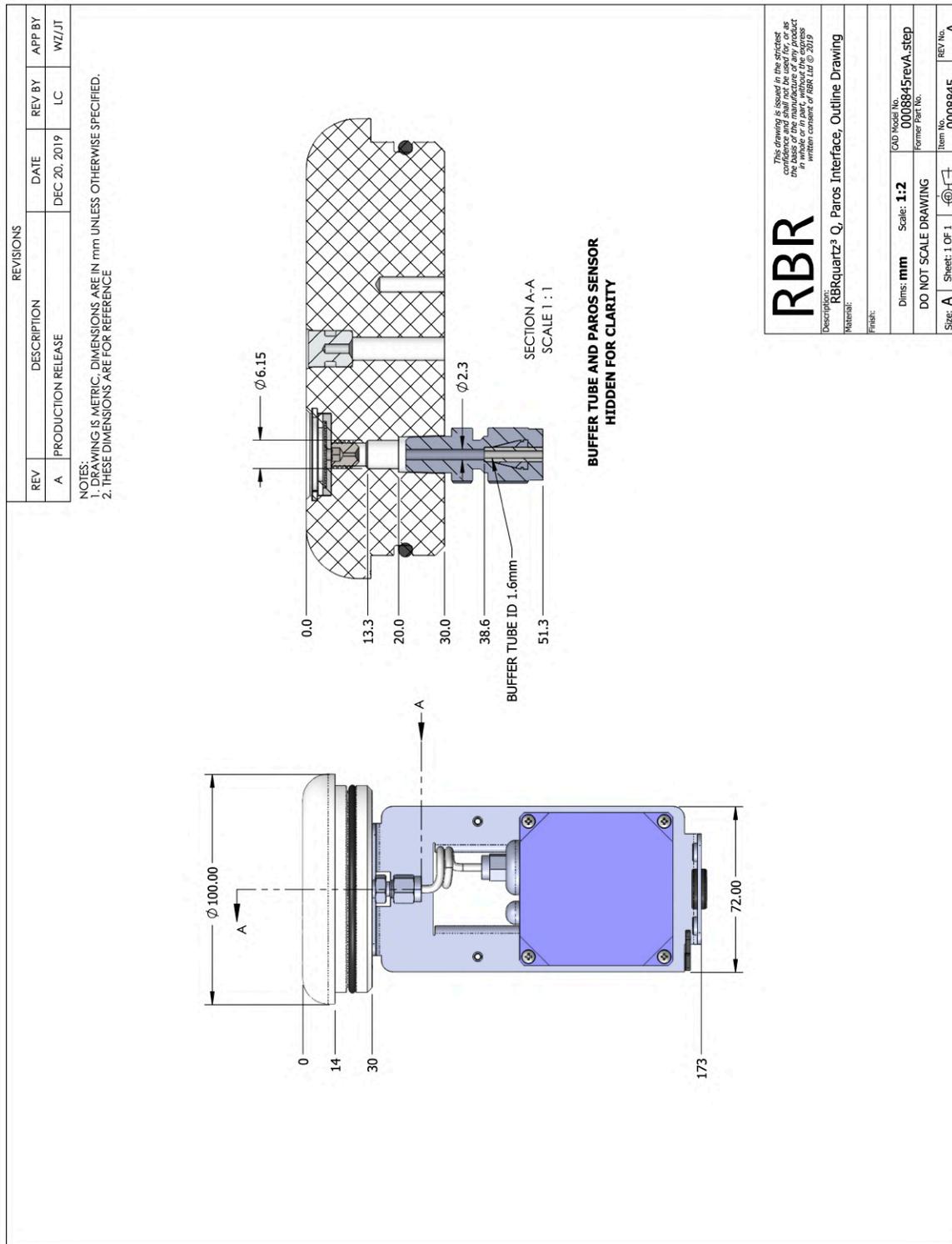
Instrument Depth Rating: 700dbar

Dims: mm Scale: 1:5 CAD Model No: 0006411.rev.C.step

DO NOT SCALE DRAWING Former Part No:

Size: A Sheet: 1 OF 1 Item No: 0006411 REV No: C

7.2 Appendix B - Paros interface drawing



7.3 Appendix C - Anti biofouling mesh assembly

REVISIONS			
REV	DESCRIPTION	DATE	APP BY
A	INITIAL RELEASE	NOV 29, 2019	MG WZ

0002069: Remove using a precision knife or similar tool.

0004592

0004583

0004591

0004579: Use a 3mm allen hex key to disassemble.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	0004583	14mm Dia. Nickel Copper Antibiofouling Mesh	1
2	0004592	Upper Mesh Insulator Disk	1
3	0004591	Lower Mesh Insulator Disk	1
4	0002069	Retaining Ring, 19mm	1

RBR

Description: Anti biofouling mesh disassembly BPR POM SEC
Material: N/A
Finish: CLEAN
Dims: mm Scale: 1:10 CAD Model No: 0008765
DO NOT SCALE DRAWING Former Part No: N/A
Size: A Sheet: 1 OF 1 Item No: 0008765revA Rev No: A

This drawing is issued in the strictest confidence and is not to be used for the manufacture of any product in whole or in part, without the express written consent of RBR Ltd © 2019

7.4 Appendix D -Calibration adapter installation

REVISIONS			
REV	DESCRIPTION	DATE	APP BY
A	INITIAL RELEASE	DEC 1, 2019	MG WZ

HIPS-TYPE-4 FITTING
GLAND CATALOG NO. 60-2HM4
COLLAR CATALOG NO. 60-2H4

NOTE 1

ENSURE UNIFORM AIR GAP

DETAIL A
SCALE 6 : 1

SEE NOTE 2

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	0002430	SCHS 1/4-20x1 SS MCMASTER 92196A542	4
2	0007865	RBR external pressure adapter	1
3	0001798	O-RING 2-012 N70	1

NOTES:
 1. Tighten to 1/4 turn past snug. Max 100.00 Nm.
 2. Apply minimal o-ring grease.

RBR

This drawing is issued in the strictest confidence and is not to be used for the basis of the manufacture of any product in whole or in part, without the express written consent of RBR Ltd © 2019

Description: PRESSURE ADAPTER INSTALLATION ON BPR POM SEC
 Material: N/A
 Finish: CLEAN
 Dimensions: mm Scale: 1:5
 GAD Model No. 0008754
 Former Part No. N/A
 DO NOT SCALE DRAWING
 Size: A Sheet: 1 OF 1
 Item No. 0008754
 Rev No. A

Material: N/A
 Finish: CLEAN
 Dimensions: mm Scale: 1:5
 GAD Model No. 0008754
 Former Part No. N/A
 DO NOT SCALE DRAWING
 Size: A Sheet: 1 OF 1
 Item No. 0008754
 Rev No. A