RBR*fermata*

UNDERWATER BATTERY CANISTER GUIDE

rbr-global.com

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1 Overview

RBR offers optional battery canisters which can extend deployment of any underwater instrument, including these options:

- quick-release or low-profile handles
- 750m or 4000m, and 8000m depth rating

Fig. 1 shows an RBR*fermata* suitable for deep deployment with quick-release handles. Fig. 2 shows a shallow variant with low-profile handles, which allow for flexible integration where space is restricted e.g., with the Wirewalker (DMO).

Fig. 1. RBRfermata | deep with quick-release handles

Fig. 2. RBRfermata with low-profile handles

The RBR*fermata* automatically configures the internal arrangement of batteries, regardless of cell voltage or chemistry, to provide the nominal output. It extends deployments by supplying up to 2.8kWh of energy to any underwater instrument. This is about forty times greater than our standard battery carriage capacity. The instrument incorporates the in-the-housing detection, overcurrent protection with retries, 8V low voltage shutoff with retries, soft start, and 5A current limit per MCBH port. The end-cap features three mounted MCBH connectors and the battery pack design accommodates 48 individual D-cells. An innovative battery carrousel facilitates simple, tool-free battery replacement with status indicator LEDs communicating correct battery loading, as shown in Fig. 3.

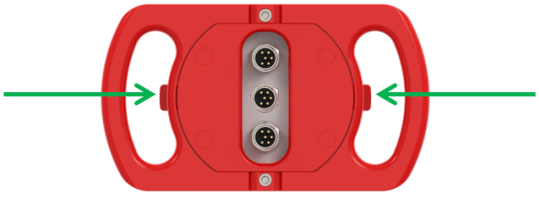
Fig. 3. View of the RBRfermata battery canister and carrousel. (a) Status indicator LEDs. (b) End-cap with three mounted MCBH connectors.

2 Quick start

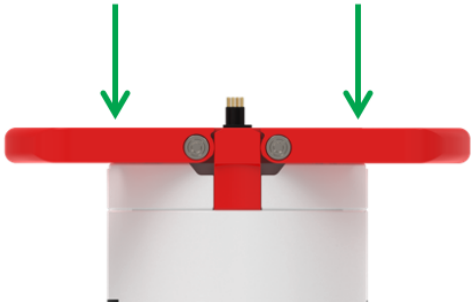
2.1 Open the RBRfermata

Models with quick-release handles

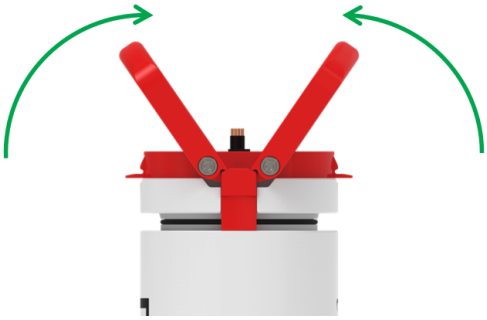
1. Locate two release tabs on the opposite sides of the battery end-cap.



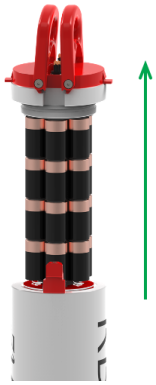
2. Push at the tabs from the top to release the end-cap handles.



3. Move the handles up from both sides.

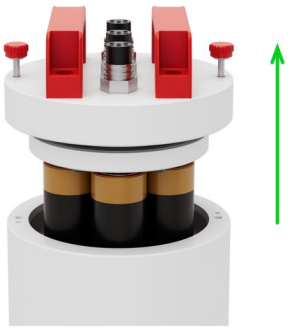


4. Firmly grip both battery end-cap handles and pull them up to remove the battery carrousel.



Models with low-profile handles

1. Loosen the two thumb screws in the battery end-cap until the carrousel can be separated from the housing.
2. Firmly grip both battery end-cap handles and pull them up to remove the battery carrousel from the housing.

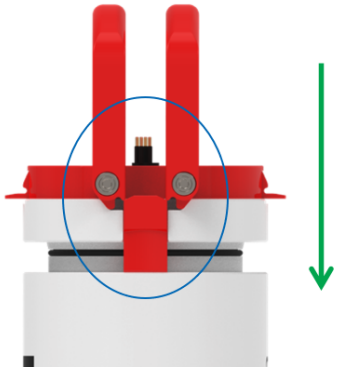


2.2 Close the RBRfermata

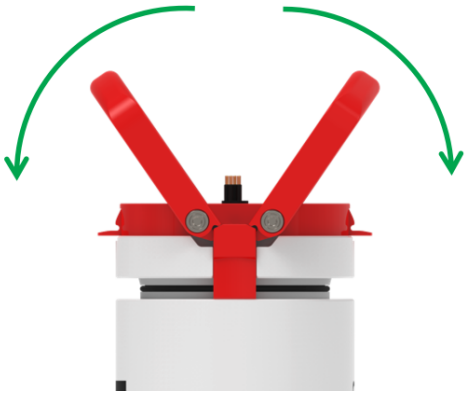
Models with quick-release handles

> There is only one way to insert the battery end-cap. If it does not latch, rotate the battery carrousel 180 degrees and try again.

1. Align the battery end-cap with the slots on the housing and gently push down to ensure it fits in place.

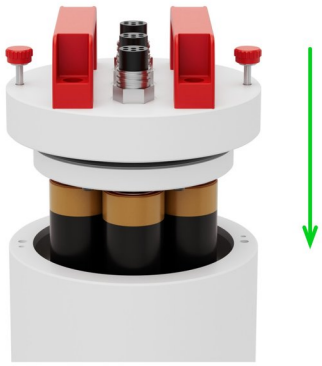


2. Place both hands on the top of the end-cap handles and gently push them out, towards the opposite sides, until they click.



Models with low-profile handles

1. Insert the carrousel into the housing, ensuring the screw holes in the battery end-cap align with the screw holes in the housing.
2. Gently push down to ensure the carrousel fits in place.
3. Hand-tighten the two thumb screws until the battery end-cap is secured in the housing.



2.3 Install the batteries

The RBR*fermata* battery canisters ship with no batteries, unless requested at the time of order.

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

The RBR*fermata* is powered using 48 alkaline, nickel metal hydride (Ni-MH) or Li-$SOCl_2$ (LTC) D-cell batteries.

Alkaline and Ni-MH batteries

When using alkaline or nickel metal hydride batteries, simply put them in the carrousel. These batteries are magnetic and hold in place with no additional steps required, as shown in See Fig. 4.

(LTC) Lithium batteries

Lithium batteries do not have enough magnetic material to hold them together in assembly. Use the red retention bands provided with your RBR*fermata*, as shown in Fig. 5.

Fig. 4. A view of alkaline batteries held in to the carrousel magnetically.

Fig. 5. A view of lithium batteries held in to the carrousel using a red retention band.

LEDs on the middle separator between the top and bottom carrousel indicate correct voltage and battery installation. All LEDs will illuminate when at least one column of batteries is correctly installed. See LED status table for more details.

Batteries should be placed in the carrousel with the positive terminals facing the battery end-cap, as shown in Fig. 6.

Valid column

A column refers to the *four* batteries stacked terminal to terminal in *either* the top or bottom battery carrousel as highlighted in Fig. 6. A column is valid if it meets two criteria:

- The column voltage is between 4V and 18V.
- The column voltage is within 0.8V of the highest column voltage of the existing valid columns.

When the RBR*fermata* determines a column is valid, the column LED will switch from solid red to solid green, see Fig. 6.

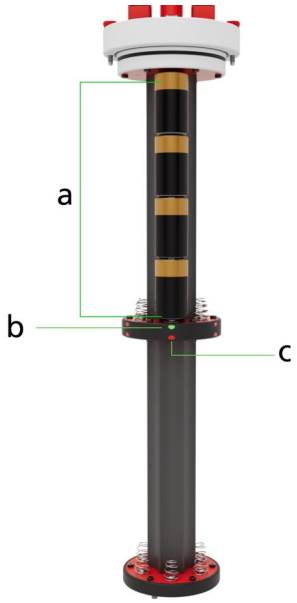


Fig. 6. A partially loaded RBRfermata carrousel. (a) One complete column of batteries. Note the orientation of the batteries: positive terminals facing the battery end-cap. (b) Green LED indicating completed column of batteries with valid voltage. (c) Remaining LEDs illuminate red, indicating an invalid column.

To install new batteries:

1. Open the RBRfermata.
2. Load the batteries into the carrousel ensuring correct polarity.
3. When all batteries are installed and the RBR*fermata* has verified all the columns are valid, the LEDs will blink green **six** times indicating a valid canister.
4. The RBR*fermata* determines the chemistry and configures accordingly. See Battery voltage chemistry determination table for details.
5. All LEDs will now turn off and channels will be enabled to the 3x MCBH connectors mounted on the top of the battery end-cap.
6. Place the carrousel into the housing and Close the RBRfermata.

Note: When a valid carrousel is removed from the housing, the LEDs will blink green **six** times. Output channels will continue to be enabled until the canister enters an invalid state. See Invalid canister for more information.

Invalid canister

A canister enters an invalid state if:

- At least one column does not meet the Valid column criteria.
- The RBR*fermata* detects low voltage. See Low voltage shutoff for more information.
- The RBR*fermata* detects a short circuit. See Short circuit protection for more information.

LED sleep mode

When an invalid canister is out of its housing and no activity is detected for 1 minute, the LEDs will go into sleep mode. To exit sleep mode either remove or insert a battery, or place the carrousel into the housing.

2.4 Low voltage and short circuit

Low voltage shutoff

When the internal canister voltage drops below 8V, the output channels will turn off.

After a 2 minute timeout, the voltages will be measured and output channels will restart if they exceed the low voltage threshold.

The output channels will attempt to restart **two** times. After the maximum retries, the channels will remain off until the canister is reset. See Battery canister reset/restart for more information.

To confirm if the canister is in a low voltage shutoff state, remove it from the housing. If a low voltage shutoff has been initiated, the LEDs will slowly flash red (1s/10s on-off).

Short circuit protection

If the output current of any one channel exceeds 5A, the output voltage to that channel will turn off.

After a 2 minute timeout the output channels will restart with the output current being monitored.

The output channel will attempt to restart **two** times. After the maximum retries, the channel will remain off until the canister is reset. See Battery canister reset/restart for more information.

To confirm if the canister is in a short circuit state, remove it from the housing. If the short circuit condition is still present, or the battery has exhausted the maximum number retries to re-enable the affected channel, the LEDs will flash red fast (3x every 2s).

Battery canister reset/restart

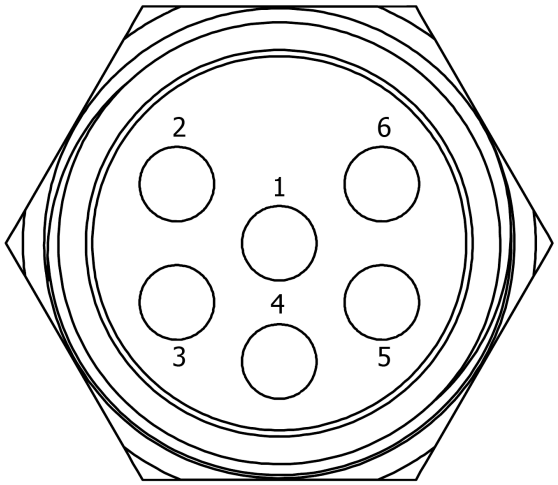
To reset/restart the RBR*fermata,* remove battery power from the canister by taking out at least one battery from each column for at least 5 seconds.

3 Specifications

Physical specifications

	Model with quick-release handles	Model with low-profile handles
Power	48 D-cells	48 D-cells
Connectors	Three MCBH-6-FS	Three MCBH-6-FS
Housing	Plastic or Ti	Plastic or Ti
Length	663mm	686mm
Diameter	Ø140mm	Ø140mm
Handles	250mm x 142mm	Ø140mm
Weight (plastic) With lithium batteries With Ni-MH batteries With alkaline batteries	 ~14kg in air, ~3kg in water ~17kg in air, ~6kg in water ~16kg in air, ~5kg in water	 ~13kg in air, ~3kg in water ~16kg in air, ~6kg in water ~15kg in air, ~5kg in water
Weight (Ti) With lithium batteries With Ni-MH batteries With alkaline batteries	 ~27kg in air, ~16kg in water ~30kg in air, ~19kg in water ~29kg in air, ~18kg in water	 ~29kg in air, ~19kg in water ~32kg in air, ~22kg in water ~31kg in air, ~21kg in water
Depth rating	750m, 4000m, and 8000m	750m, 4000m, and 8000m
Operating temperature	-5°C to 35°C	-5°C to 35°C

External MCBH-6-FS connector pinout



Pin No.	USB
1	Ground
2	Power
3	N/C
4	N/C
5	N/C
6	N/C

Electrical specifications

Battery type	Lithium thionyl chloride (Li-SOCl2)	Nickel metal hydride (Ni-MH)	Alkaline (Zn-MnO2)
Nominal voltage1, 2	14.4V	14.4V	18.0V
Maximum voltage	14.7V	17.4V	19.8V
Maximum current[2]	5A per MCBH port		
Capacity	2.8kWh	0.5kWh	0.9kWh
Self discharge rate	<2%/yr	<4%/yr	<4%/yr

[1]In all cases the RBR*fermata* disables the output when output voltage drops below 8V. It will attempt to restart two times with a 2min interval.

[2]In all cases the RBR*fermata* disables the output to any individual port that exceeds 5A. It will attempt to restart two times with a 2min interval.

RBR offers an option to retrofit legacy RBR*fermata* battery canisters with the new battery carrousel, quick-release handles, and new electronic hardware. To return your RBR*fermata* for retrofitting, please contact RBR support team.

4 General maintenance

The RBR*fermata* underwater battery canisters are shipped with the O-rings replacement kit (O-rings, silicone compound, and O-ring removal tool) and lithium battery retention bands.

4.1 Replacing the O-rings

Care for the O-ring is the single most important item of maintenance. A water leak can damage the RBR*fermata* beyond repair. The battery canister seal depends upon its O-ring, therefore proper O-ring maintenance is crucial.

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

Location of the O-ring

The O-ring is located in the battery-end cap, as shown in Fig. 7. To access the O-ring, Open the RBR*fermata*.

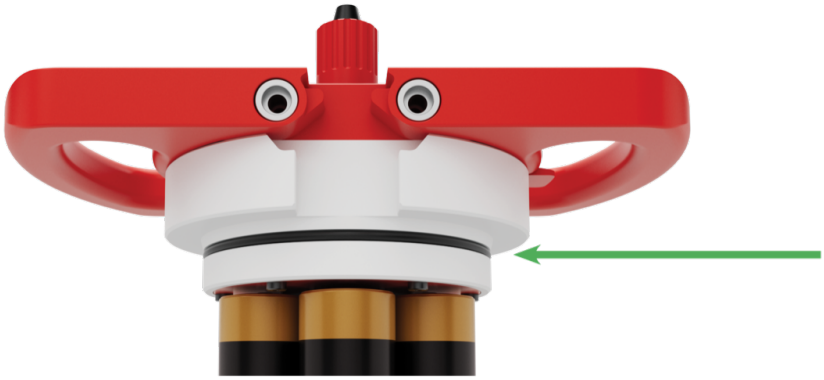


Fig. 7. The location of the O-ring

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

If dirt is present in the O-ring groove, remove the O-ring as described below and thoroughly clean the groove.

> Avoid using any object that could scratch the O-ring or any of its mating surfaces.

Do not return the old O-ring to the battery canister. If you remove the O-ring from the RBR*fermata* 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 tool (included with the RBR*fermata*) to remove the 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 the proper O-ring and inspect it for damage.
4. Lubricate the new O-ring with a very light film of silicone compound (included with the instrument).
5. Install the new O-ring by pushing it into place and popping it into its groove.
6. Once the new O-ring is in place, inspect it once more for scratches and debris, and wipe away any silicone compound deposited on the end-cap.
7. Once the inspection is complete, Close the RBRfermata.

O-rings on | deep variants

The | deep variants of the battery canisters use two O-rings. One is the main O-ring, and the other is the backup. Both are required to protect the RBR*fermata* from flooding.

Orienting the O-rings on | deep variants

Correct placement and orientation of the two O-rings are critical to maintaining depth rating integrity.

The main O-ring has a round profile. It must be installed first.

The backup O-ring is flat on one side, and concave on the other. When installed, the concave side must face the main O-ring as highlighted in Fig. 8.

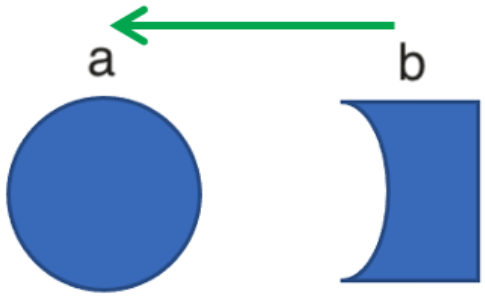


Fig. 8. Orientation of the O-rings. (a) Main O-ring. (b) Backup O-ring.

4.2 Connectors

Cable bend radius

The smallest bend radius for RBR supplied cables is 15cm.

Lubricating the connectors

Lubrication improves watertight sealing, prevents corrosion, and reduces the force required to de-mate the connector. Use the silicone compound provided with your instrument:

- Apply the silicone compound to all female connectors before every mating.
- Ensure each connector hole is filled with approximately 30% lubricant.

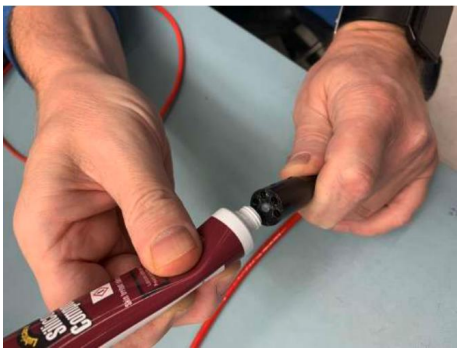


Fig. 9. Applying silicone compound to the female connectors.

Fig. 10. Cross-sectional view of a connector with 30% lubricant fill.

Reducing mechanical stress

- Do not pull on the cable.
- Hold onto the connector to pull out the cable.
- Disconnect by pulling straight out, not at an angle.
- Avoid sharp bends at the point where the cable enters the connector.
- Avoid angular loads on the connector.

4.3 Repairs

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 battery canister. 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 RBR*fermata* to RBR for further servicing.

There are no user-repairable parts of the battery canister. 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.

5 Revision history

Revision No.	Release date	Notes
A	18 September 2025	Original
B	27 September 2026	Migrated. Reformatted and reviewed; no technical changes.

6 Appendix

6.1 Battery voltage chemistry determination table

NOTE: Only applicable for initial determination of the battery chemistry and canister configuration

Battery Mode	**Battery Column Voltage**
Alkaline/NiMH	< 8V
LTC	≥ 8V

6.2 LED status table

LED status	**RBR*fermata* status**
Solid green	Valid column
Solid red	Invalid column
Flashing green	The LEDs will flash **six** times when: • All batteries are loaded correctly and columns are valid. • A valid canister is removed from the housing.

Flashing red
(Indicates a fault)
	• Continuous (1s/1s on-off)
	  ◦ Invalid canister placed into housing
	• Slow (1s/10s on-off)
	  ◦ Low voltage shutoff
	• Fast (3x flashes every 2s)
	  ◦ Short circuit shutoff