

RBR *legato*³

INSTRUMENT GUIDE



rbr-global.com

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1 RBR*legato*³

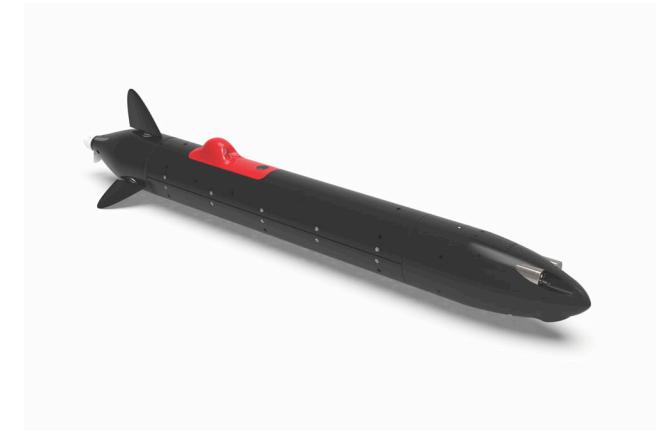
The RBR*legato*³ is a small CTD instrument optimised for gliders and autonomous underwater vehicles. It incorporates conductivity, temperature, and pressure/depth sensors (CTD) and can derive salinity, density, and sound velocity. The instrument ensures totally silent operation for passive acoustic listening and turbulence measurements, and is rated to the depth of 1000m.

The RBR*legato*³ comes in two variants:

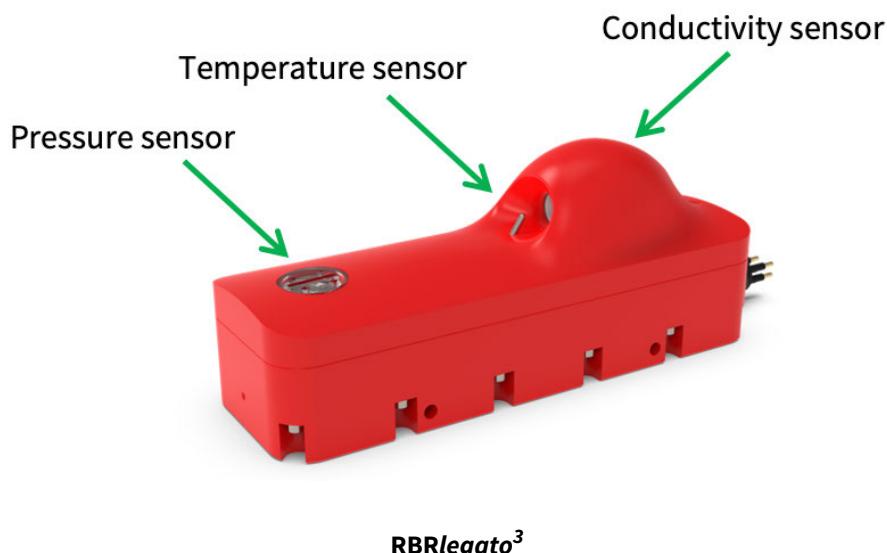
- RBR*legato*³ C.T.D - 2Hz instrument, standard thermistor response, realtime data output
- RBR*legato*³ C.T.D|fast16 - 16Hz instrument, fast thermistor response, realtime data output

Key features of the RBR*legato*³ C.T.D are:

- High accuracy
 - Unaffected by surface contaminants
 - Pre-calibrated to account for static elements*
 - Sampling rate up to 16Hz
- Low power
 - 90% less power than pumped CTD
 - Longer mission and more samples
- Silent operation
 - No pump or moving parts
 - Reduced noise for acoustic measurements
 - Reduced vibration for turbulence studies



*Accuracy of conductivity measurements is affected by objects within 15cm of the sensor, especially if they are conductive. Metal deployment frames are a good example. This proximity effect decreases with distance. Calibration procedure uses the predetermined k-factor to take into account static elements, such as other sensors or glider body.



2 Specifications

Instrument

Parameter	Value
Maximum number of readings*	240 million
External power	4.5V to 30V
Communications	RS-232
Clock drift**	±60 seconds per year
Depth rating	1000m
Housing material	Plastic
Dimensions	195.8mm x 63.8mm x 78.6mm
Top curvature, selectable	Ø220mm or Ø124mm
Weight (in air)	0.8kg
Weight (in water)	0.2kg
Displacement	600cm ³

*Each sample can include multiple readings.

**The realtime clock is not maintained when there is no power.

Power consumption

Typical values obtained with V _{in} at 12V	
≤1Hz sampling	22.8mJ per sample
≥2Hz sampling	46mW
Sleep power	180µW
Typical peak inrush current	6.6A (15µs duration)

Startup time

Generally, there is no need to power off RBR instruments. The RBR/legato³ will go to sleep after inactivity, consume virtually no power while on standby, and then wake up instantly when required.

If you turn off the instrument, there will be a delay starting up. Furthermore, you will have to wait for at least two minutes before turning it back on.

- Elapsed startup time from fully discharged state to functional command interpreter: 4s maximum
- Elapsed power downtime to complete discharge: 120s minimum

 Ensure that the instrument is fully discharged before resuming the measurements. Power-cycling the unit for less than 120s may leave the board in an unknown state. In addition, the realtime clock may not be maintained over a power cycle.

Conductivity sensor

Parameter	Value
Range	0 to 85mS/cm
Initial accuracy	$\pm 0.003\text{mS/cm}$
Resolution	0.001mS/cm
Typical stability	0.010mS/cm/year

Temperature sensor

Parameter	Value
Range	-5°C to 42°C
Initial accuracy	$\pm 0.002^\circ\text{C}$ (-5 to +35°C) $\pm 0.004^\circ\text{C}$ (+35 to +42 °C)
Resolution	0.00005°C
Typical stability	$\pm 0.002^\circ\text{C}/\text{year}$
Time constant	<1s (standard) <0.1s (fast16)

Pressure sensor

Parameter	Value
Range	500 / 1000dbar
Initial accuracy	$\pm 0.05\%$ full scale
Resolution	$\pm 0.001\%$ full scale
Typical stability	0.05% full scale
Time constant	<0.01s

External port

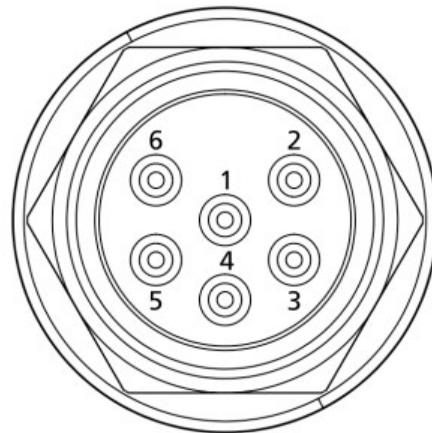
The RBR *legato*³ uses an external MCBH-6-MP connector. It can be used for connecting to an RS-232 underwater extension cable.



RBR/legato³ external port location

External MCBH-6-MP connector pinout

Pin No.	RS-232
1	Ground
2	Power in 4.5V to 30V
3	Data output from the instrument (Tx)
4	Data input into the instrument (Rx)
5	N/C
6	N/C



3 Maintenance

3.1 Cleaning

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

Type	Procedure	Notes
General/biofouling	To clean the exterior, soak in a mild detergent, then scrub the logger with a soft brush.	Avoid scratching the plastic (scratches make future cleaning more difficult).
Calcification	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 chances of a leak.
Encrustation	Ultrasound bath	Do not use ultrasound on pressure transducers <50dbar.

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 flat head 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, contact [RBR](#).



Pressure sensor of the RBRlegato³, with the guard removed

3.2 Cables and connectors

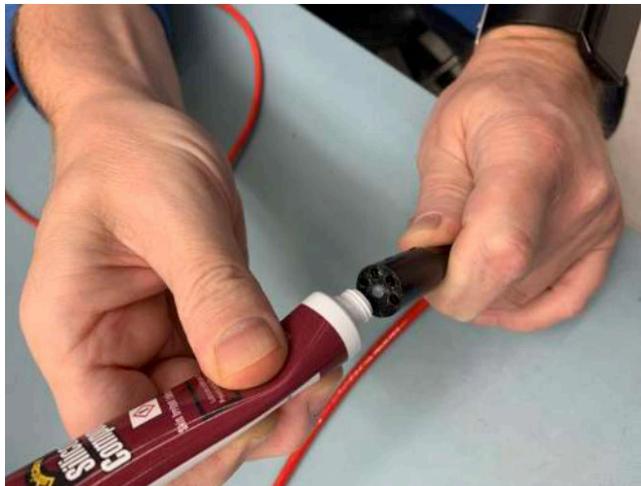
Cable bend radius

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 silicon compound provided with your instrument.

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



Lubricating a connector

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

3.3 Calibration

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. Hard copies are provided with each shipment. RBR can replace lost or misplaced calibration certificates upon request.

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 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 [RBR](#) for our current calibration fees.

3.4 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 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](#).

4 Revision history

Revision No.	Release date	Notes
A	31-August-2021	Original

