In-Situ
YOUR EYES IN THE FIELD

Operator's Manual

Table of Contents

Stripped-And-Tinned Option

Use the stripped-and-tinned RDO Blue in PLC-controlled monitoring systems.

1 **Stripped-And-Tinned Wires**

Stripped-and-tinned wire allow you to connect the RDO Blue to a PLC or data logger.

2 **Probe Body**

3 **Nose Guard/RDO Cap**

The removable nose guard protects the RDO cap during deployment. The RDO cap is replaceable.

Twist-Lock Option

The twist-lock RDO Blue works with any Bluetooth-enabled mobile device and the VuSitu mobile app.

1 Twist-Lock Connector

The Twist-lock connector allows your RDO Blue to communicate with the VuSitu mobile. Just plug the connector into a Wireless TROLL Com and launch VuSitu.

2 Probe Body

3 RDO Nose Guard and Cap

The removable nose guard protects the RDO cap during deployment. The RDO cap is replaceable.

Applications

✓ The RDO Blue is ideal for dissolved oxygen measuremnet in a variety of situations.

General Aquaculture

Inland Pond Aquaculture

Recirculating Aquaculture Systems

Probe

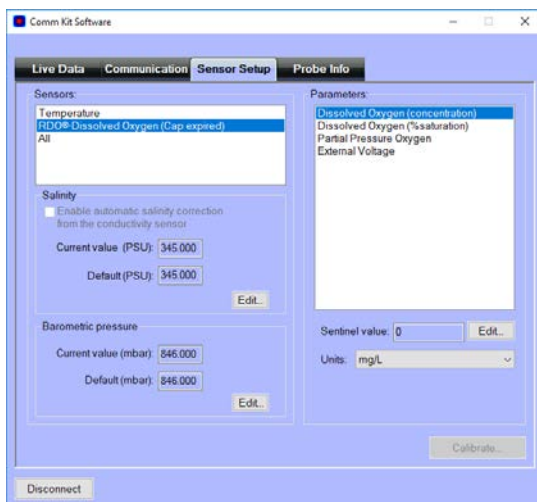Stripped-and-tinned wires are ideal for integration with a PLC and monitoring network.

PLC

The RDO Blue communicates via the Modbus and SDI-12 protocols.

Comm Kit

Connect your RDO Blue to Comm Kit for calibration and programming. Attach the probe's stripped-and-tinned wires to the Comm Kit. Plug the Comm Kit into your PC's USB port.

Laptop with Comm Kit Software

Calibrate the RDO Blue and view live readings with Comm Kit software.

Required Components (Twist-Lock Option)

⚠️ You will need these components to configure and deploy the RDO Blue.

RDO Blue

The RDO Blue's twist-lock connector attaches to a Wireless TROLL Com for communication with a Bluetooth-enabled mobile device.

Wireless TROLL Com

The Wireless TROLL Com enables communication between the instrument and your mobile device.

Bluetooth-Enabled Mobile Device with Vusitu

Install the VuSitu app on any Bluetooth-enabled mobile device. Calibrate, configure, and deploy the RDO Blue on Android or iOS.
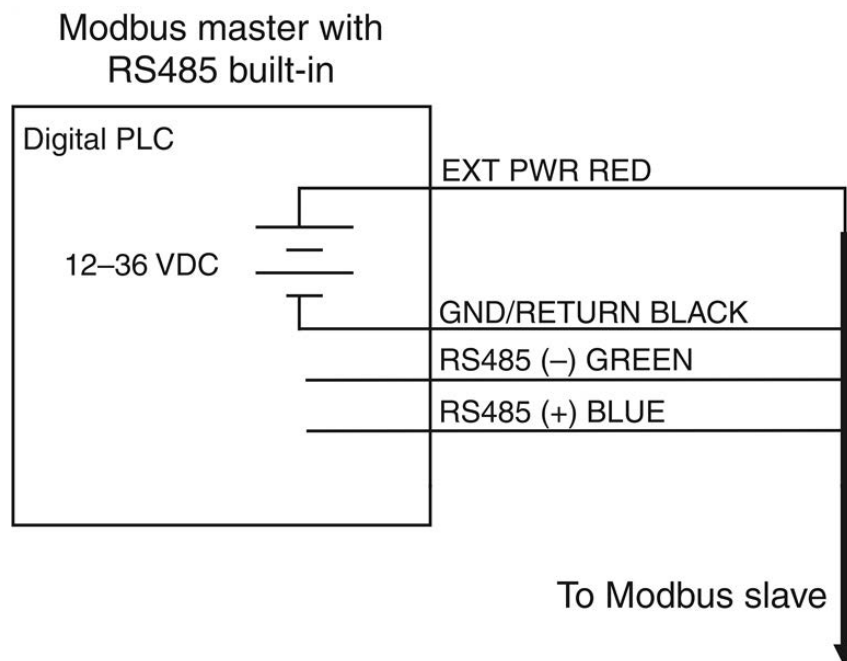
Controller Requirements and Connection

Wiring Overview

Signal	Color
Ground/Return	Black
External Power	Red
RS485 (-)	Green
RS485 (+)	Blue

⚠️ The inside of the controller must be kept free of moisture and humidity. Condensed moisture can migrate through the wiring and cause the probe to fail. Therefore, desiccant should be installed in the controller and be replaced on a regular basis.

Modbus master with
RS485 built-in

Digital PLC

12–36 VDC

EXT PWR RED

GND/RETURN BLACK

RS485 (–) GREEN

RS485 (+) BLUE

To Modbus slave

Stripped-and-Tinned Instruments: First Steps

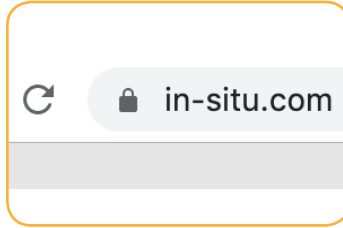✓ You can calibrate the RDO Blue and see live readings with In-Situ's Comm Kit software, available from www.-in-situ.com.

With a PLC

in-situ.com

Connect the RDO Blue to your PLC.
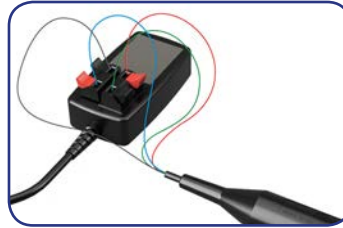
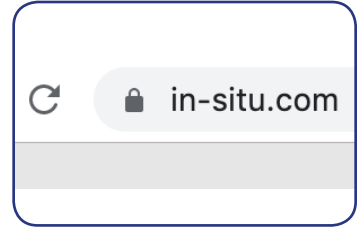Download the RDO Blue Interface Spec from www.in-situ.com.
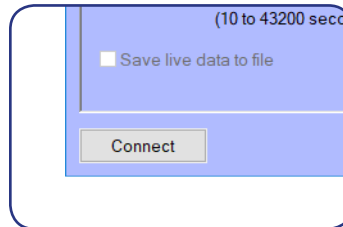

Refer to the Interface Spec for further instructions.

With Comm Kit

in-situ.com

Connect the RDO Blue to the comm box.

Download and install Comm Kit software from www.in-situ.com.
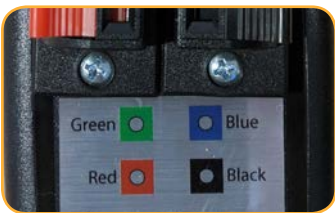

(10 to 43200 seco
☐ Save live data to file

Connect

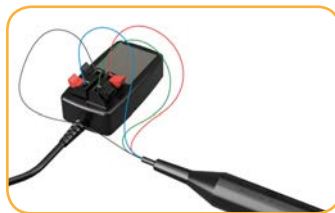Launch the software and click **Calibration**.

1 *Install the software.*
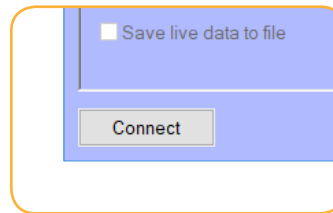
2 *Connect the instrument to a computer.*

✓ The communication device connects a stripped-and-tinned RDO or Aqua TROLL 400 to a computer via a USB port.
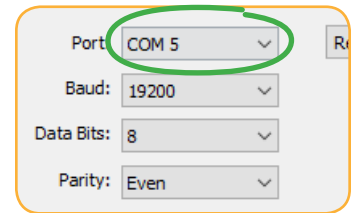

The communication device includes an electrical connection diagram label.

To attach the sensor to the communication device, depress a lever and insert the appropriate wire in the location specified by the diagram.
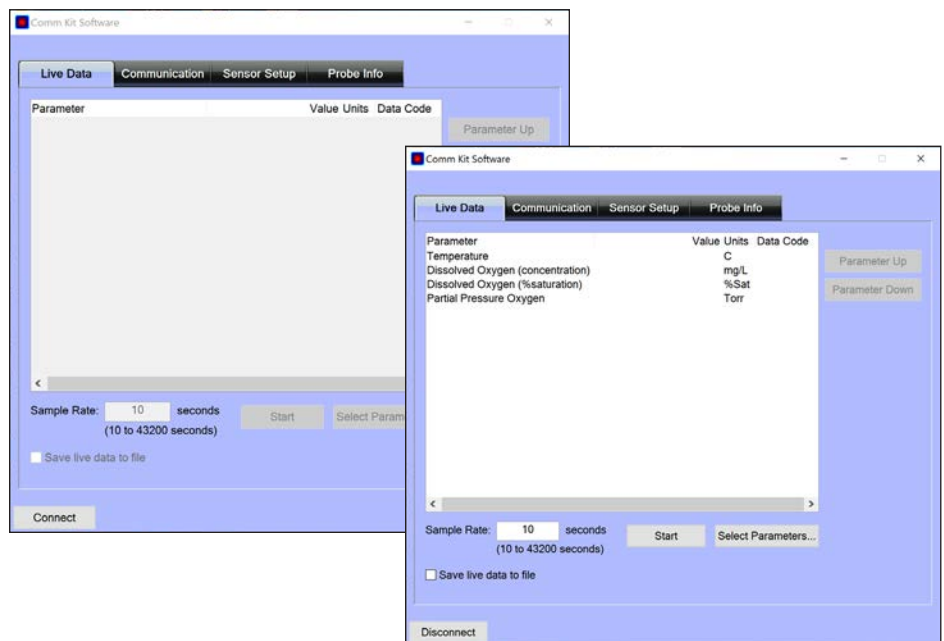
Wait for the computer to recognize the USB device, and then click the Connect button.
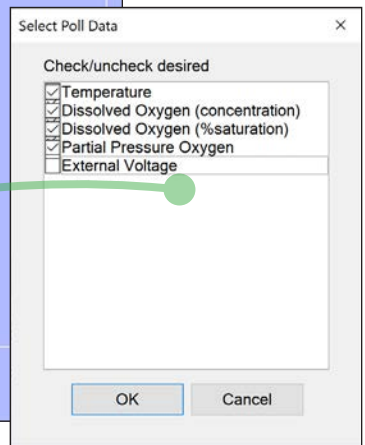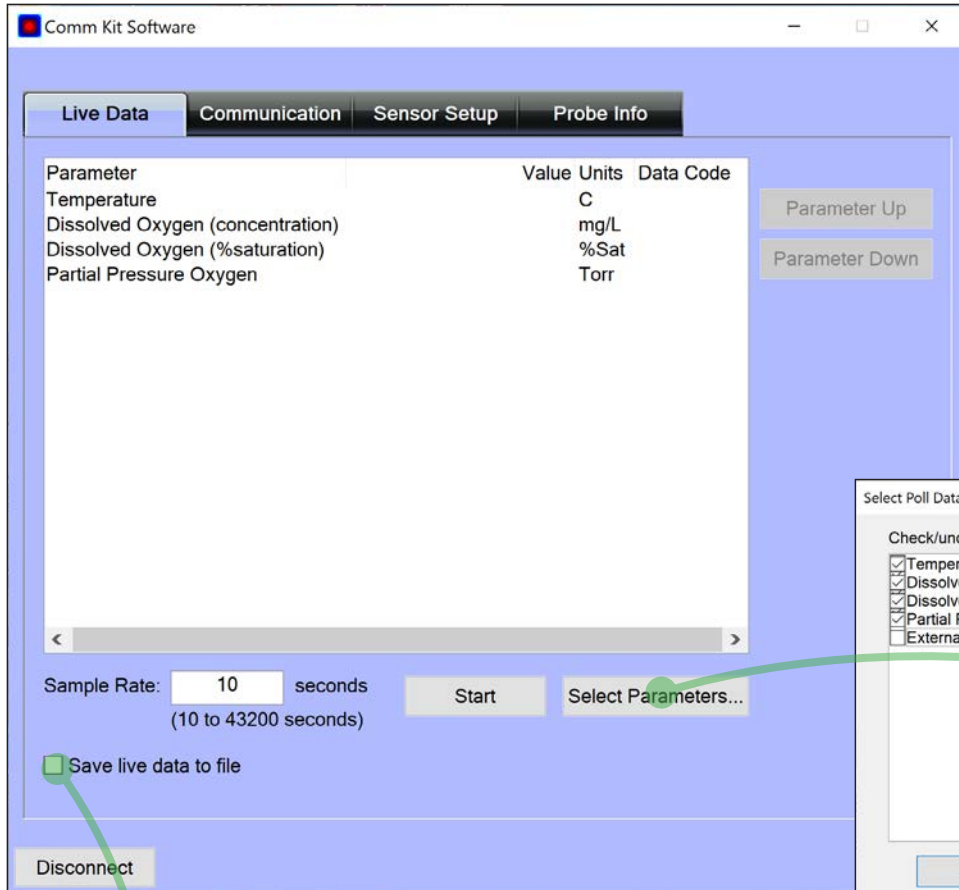
If the software does not connect to the software, you can find the COM port your computer has assigned in Windows Device Manager > Ports.

About Comm Kit

Comm Kit software allows you to configure and calibrate your dissolved oxygen probe on a

Data Tab

Choose the parameters Comm Kit saves to a data file with the **Select Parameters** button.
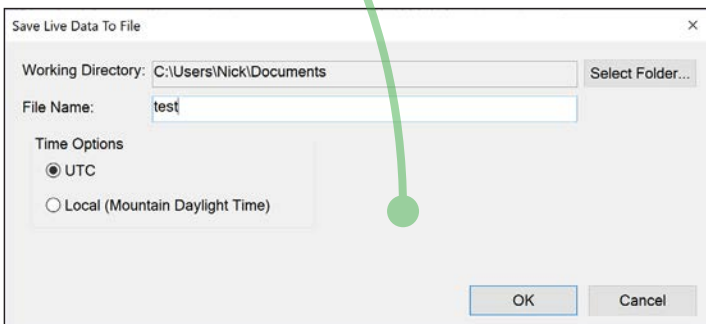
1   To save live readings to a spreadsheet, click the **Save live data to file** checkbox.

2   Click **Select Folder** and choose a destination for the file.

3   Name the file and press **OK**.

4   Enter a sample rate between 10 and 43200 seconds.

5   When you're ready to begin recording data, press the **Start** button.
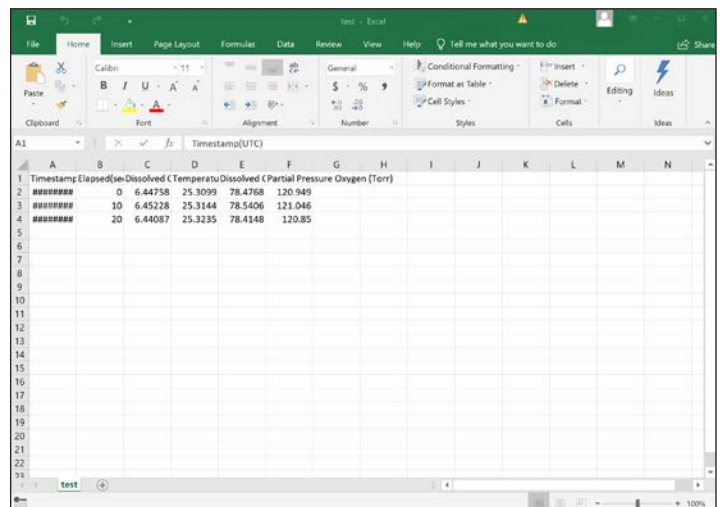
Comm Kit creates a spreadsheet file with one row for each reading.

Communication Tab

✓ Visit the Communication tab to change Modbus or 4-20 mA settings.

Comm Kit Software

Live Data | **Communication** | Sensor Setup | Probe Info

Modbus setup... | SDI-12 setup... | Analog 4-20 mA setup...
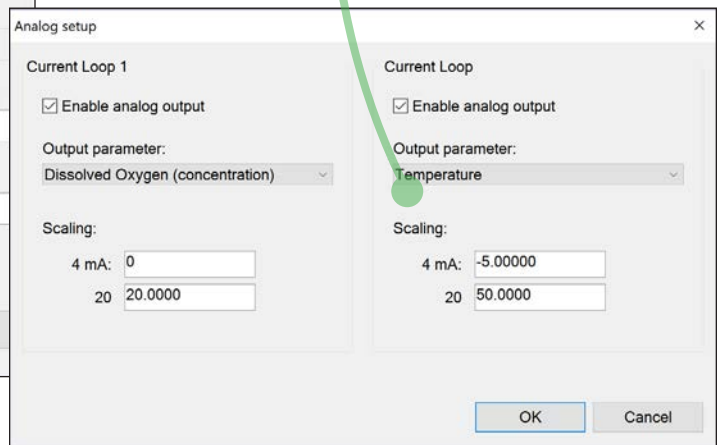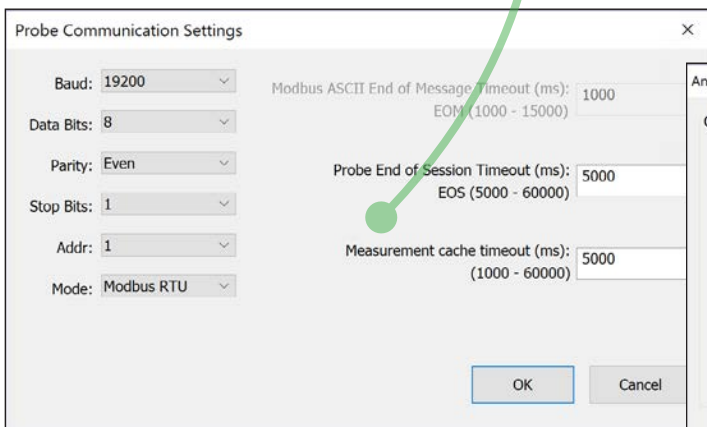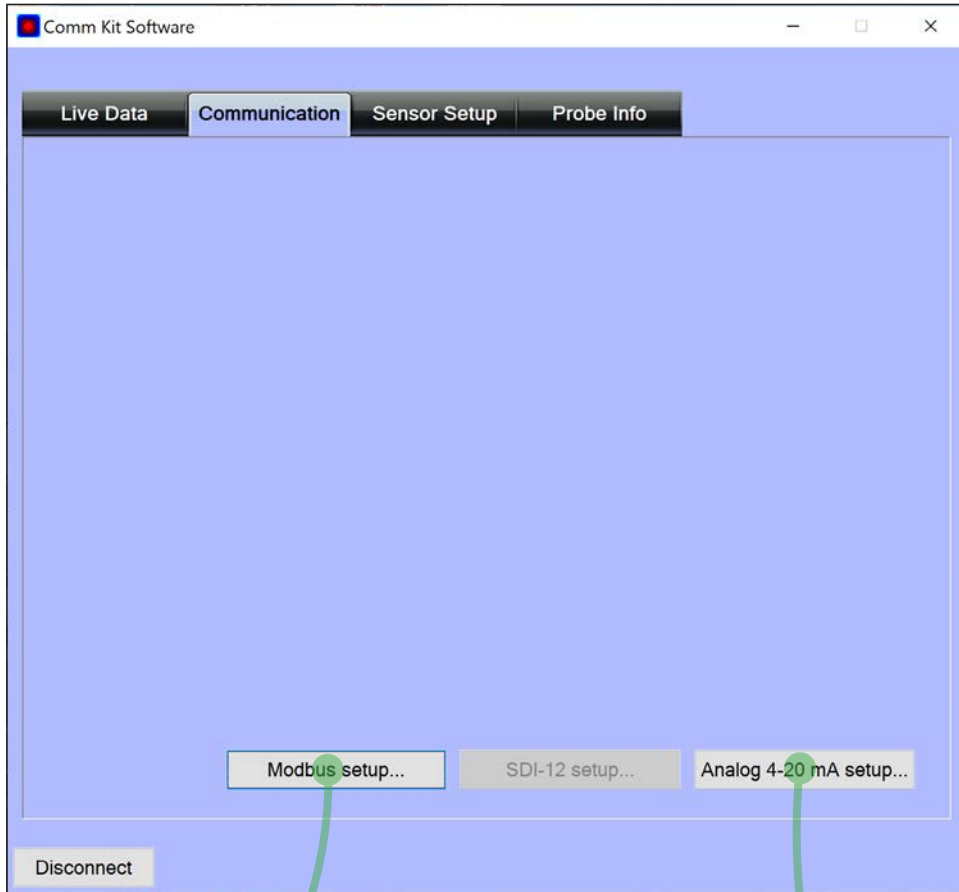
Disconnect

Probe Communication Settings

Baud:	19200	
Data Bits:	8	
Parity:	Even	
Stop Bits:	1	
Addr:	1	
Mode:	Modbus RTU	

Modbus ASCII End of Message Timeout (ms): 1000
EOM (1000 - 15000)

Probe End of Session Timeout (ms): 5000
EOS (5000 - 60000)

Measurement cache timeout (ms): 5000
(1000 - 60000)

OK | Cancel

Analog setup

Current Loop 1

☑ Enable analog output

Output parameter:
Dissolved Oxygen (concentration)

Scaling:
4 mA: 0
20: 20.0000

Current Loop

☑ Enable analog output

Output parameter:
Temperature

Scaling:
4 mA: -5.00000
20: 50.0000

OK | Cancel

Sensor Setup Tab

1 Use the tabs to navigate between functions.

2 Scroll through the parameters in the Live Data tab with the **Up** and **Down** buttons.

Probe Info Tab

Comm Kit will ask for confirmation before resetting.
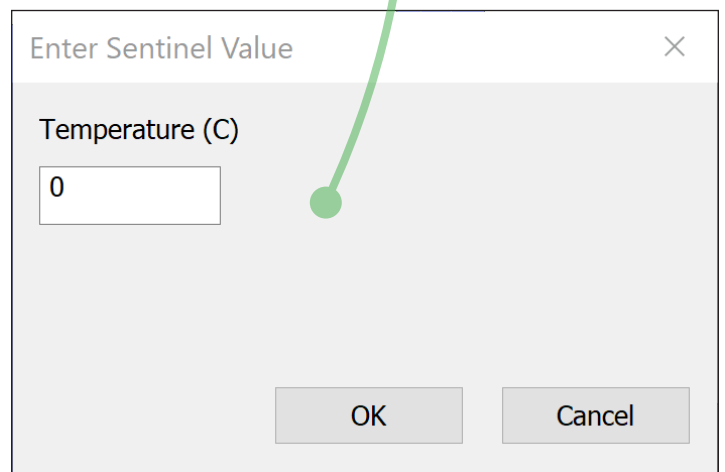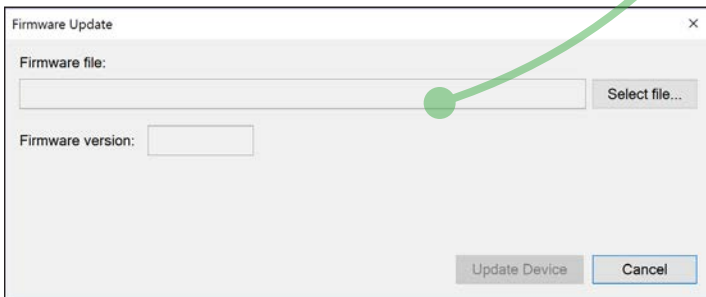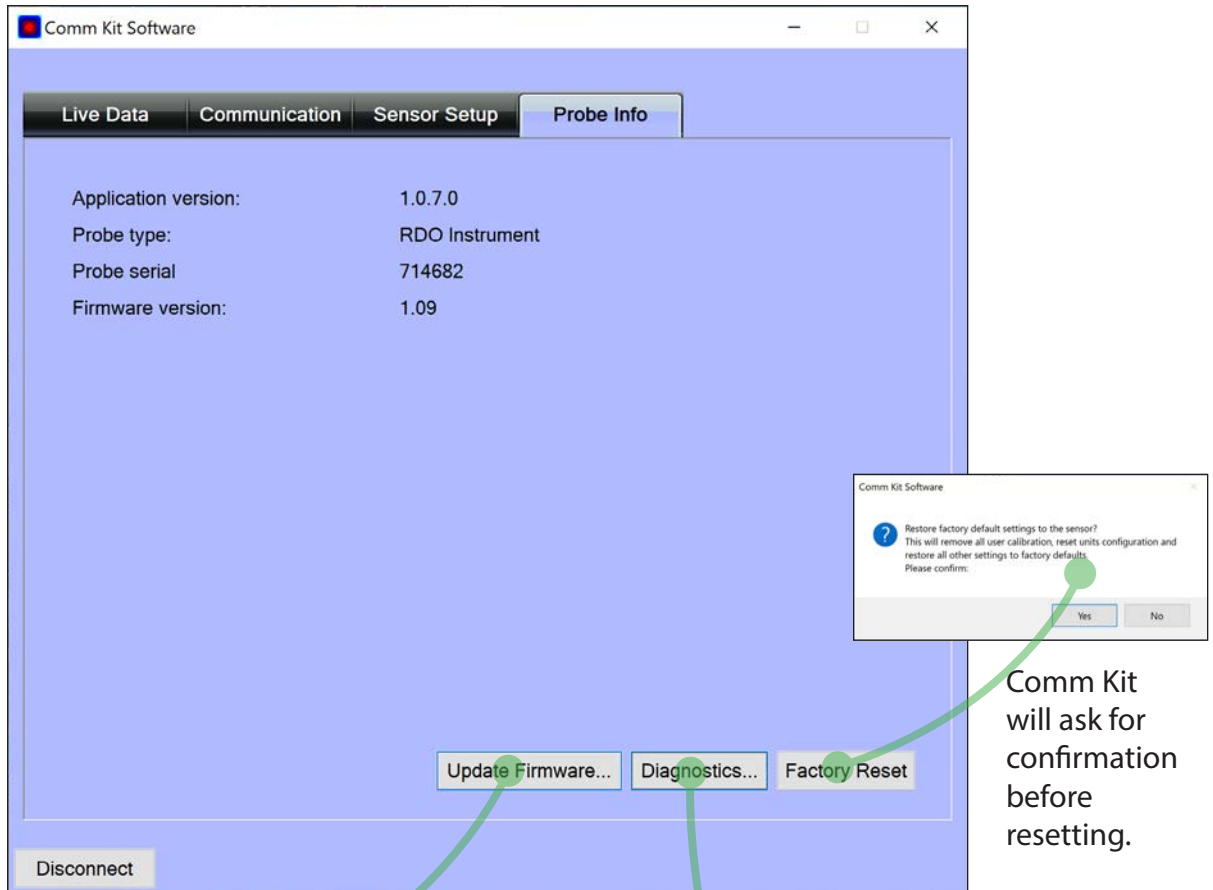
1   Click **Update Firmware** to install the latest firmware.
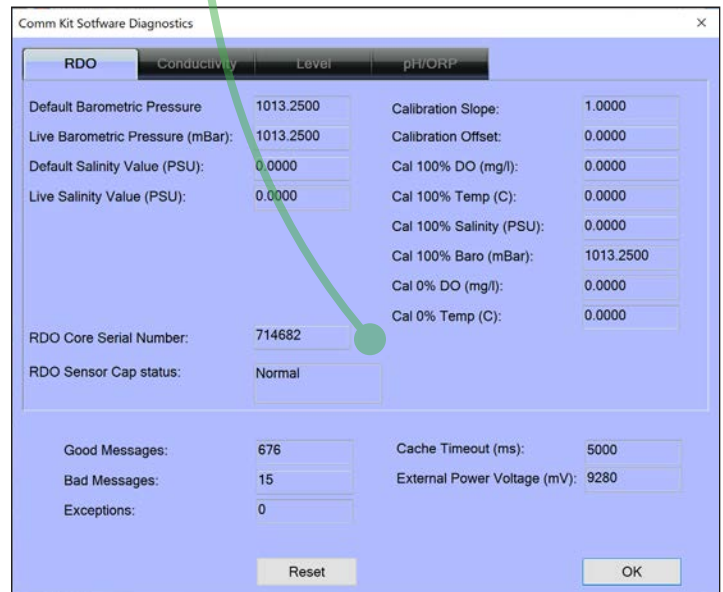
2   Then click **Select file** and choose your firmware.

3   The version number will appear in the Firmware version box.

The diagnostics tabs display critical sensor, sensor cap, calibration, and power supply info.

Handheld Operation

✓ To configure and deploy the RDO Blue, you will need a Wireless TROLL Com and a Bluetooth-enabled mobile device with the VuSitu app.

1. Wireless TROLL Com
2. Integrated Twist-Lock cable
3. RDO Blue
4. Bluetooth-enabled mobile device

✓ Set up and deploy your RDO instrument in four simple steps. Read the overview below, and then see the following pages for detailed instructions.
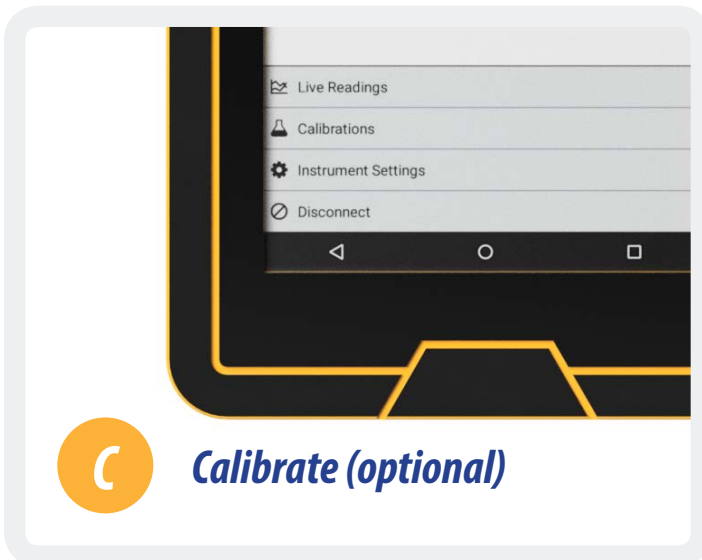

A   Connect

Install the RDO cap and attach the instrument to a Wireless Rugged TROLL Com.

B   Pair

Use the VuSitu mobile app to pair your Wireless TROLL Com with your mobile device.

C   Calibrate (optional)

The RDO Blue is factory calibrated, but you can perform a calibration at any time with VuSitu. Select **Calibrations** from VuSitu's menu. Follow the on-screen instructions.

D   Deploy

Select **Live Readings** to view real-time readings from the instrument.

Part Numbers

Kit #0103190

1. RDO Blue with **10 meter** cable
2. Wireless TROLL Com
3. Lanyard for Wireless TROLL Com

Kit #0103210

1. RDO Blue with **3 meter** cable
2. Wireless TROLL Com
3. Lanyard for Wireless TROLL Com

#0038640

- RDO Blue with **10 meter** cable

#0103200

- RDO Blue with **3 meter** cable

⚠️ The Wireless TROLL Com's lanyard is not a weight-bearing part.

1 Install the RDO cap.

Align the RDO cap so the flat edge on the inside matches up with the flat edge on the sensor. Slide the RDO cap into place.
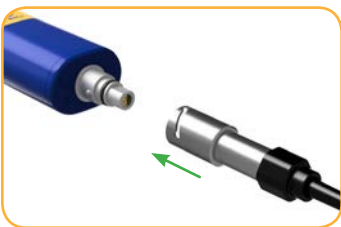
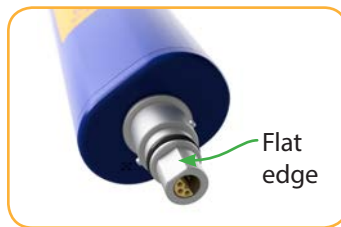Slide the nose guard into place and thread it clockwise to install.

✓ **For part numbers 0103190 and 0103210**: The Wireless TROLL Com is connected to the RDO Blue at the factory.

2 Connect the instrument to a Wireless TROLL Com.

Flat edge

click

Attach the RDO Blue's twist-lock connector to the end of the Wireless TROLL Com.

Make sure the flat edges of the connectors align, and then push and twist.

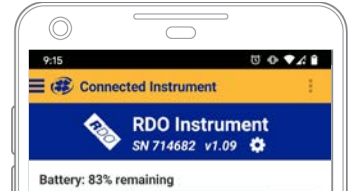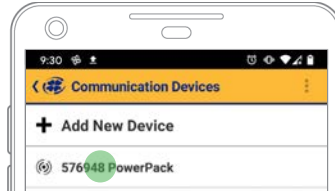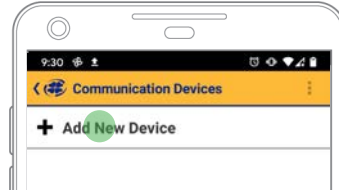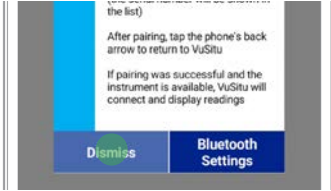You will hear a click when the cable is connected properly.

Press the power button on the Wireless TROLL Com.

3 Pair the Wireless TROLL Com with your mobile device.

⚠️ You must have the VuSitu mobile app to use the RDO Blue with a mobile device. Download VuSitu from the Google Play Store or the Apple App Store.

Make sure your mobile device's Bluetooth is turned on. Launch VuSitu and tap **Dismiss**.

Tap **Add New Device** and select the Wireless TROLL Com from the list of available devices.

Tap your mobile device's back button. In VuSitu, tap the serial number of your Wireless TROLL Com.

VuSitu displays the Connected Instrument screen when pairing is complete.

4 Configure and deploy the RDO Blue.

✓ VuSitu will guide you through configuration, calibration, and other tasks. Choose an option from the menu to get started.
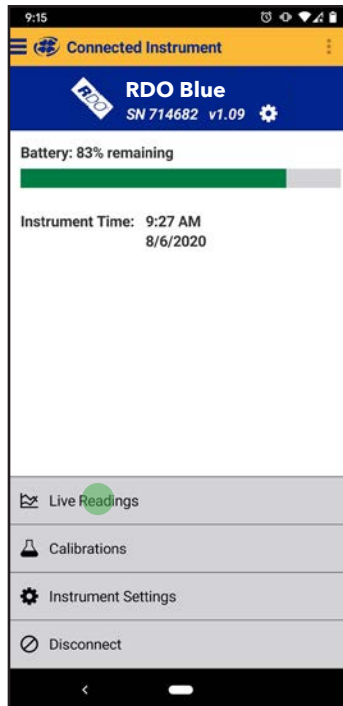
Navigating VuSitu

After pairing a Wireless TROLL Com with VuSitu, the app will always display the Connected Instrument screen at launch. You can access all features of the app from this screen.

Connected instrument screen

Access menu.

Access help information.

Take single readings or continuously record at two-second intervals.

Calibrate sensors.

Disconnect app from instrument.

Access instrument clock and telemetry settings.

Selecting with Long-press and Swipe

Long-press
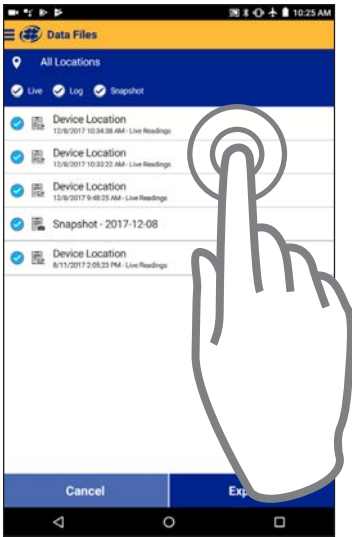
Press and hold any of the items in a list of files.

You can now select two or more items.

Swipe left
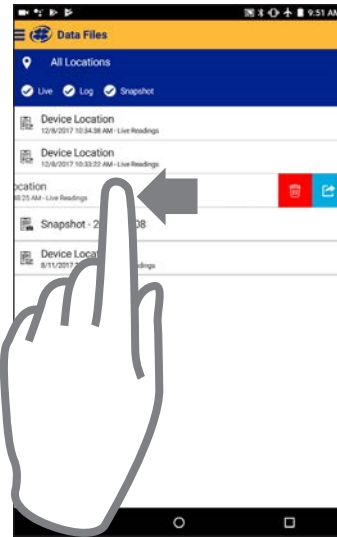
Press an item and swipe left to reveal the delete and sharing icons.

Swipe right
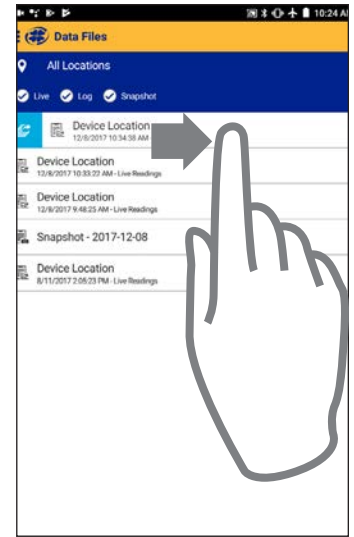
Press any item in a list and swipe right to reveal the sharing icon.

Calibrating Your RDO Instrument

⚠️ Calibrate your RDO probe using VuSitu software on a PC. You can download the application from www.in-situ.com/software.

One-Point Calibration

Water-saturated air calibration

Vented cap

Remove the storage cap from the top of the calibration chamber and replace it with the vented calibration cap.

Saturate the sponge wafer (use approximately 10 mL of water) and place it in the bottom of the calibration chamber.
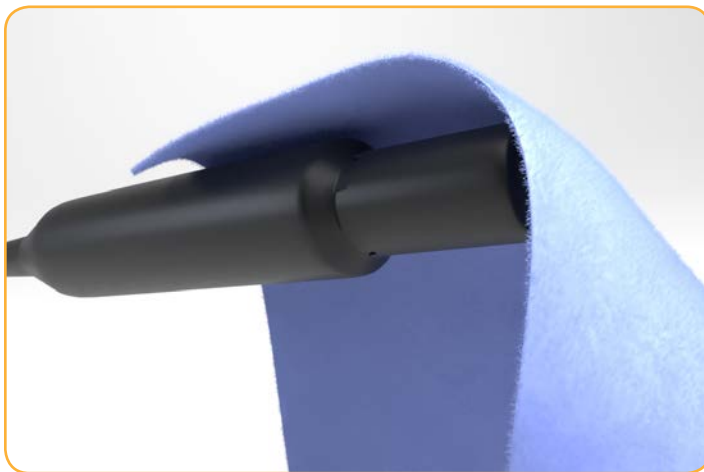
Gently dry the probe and sensing element with a paper towel.

Place the probe in the calibration chamber so that the sensing element is about 2.5 cm (1 inch) above the water-saturated sponge.

⚠️ Be sure the sensor surface is dry when you place the probe into the calibration chamber.

Two-Point Calibration

Remove the water-saturated sponge from the calibration chamber and fill the chamber to the fill line with approximately 60 mL of fresh sodium sulfite solution.

Place the probe into the solution. Leave at least 13 mm (0.5") between the surface of the sensing element and the bottom of the chamber.

1 **Carabiner**

The carabiner allows a VuLink to attach to the top of a well via a well dock.

2 **VuLink telemetry device**

VuLink powers the RDO Blue and transmits data to HydroVu or another FTP server.

3 **RDO Blue**

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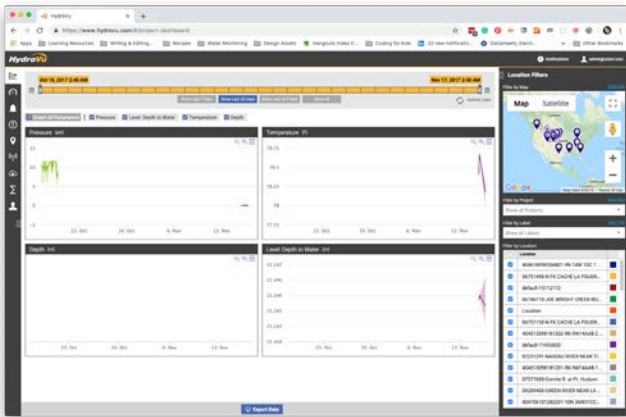
1 **Create a HydroVu account.**

Visit hydrovu.com and create an account.
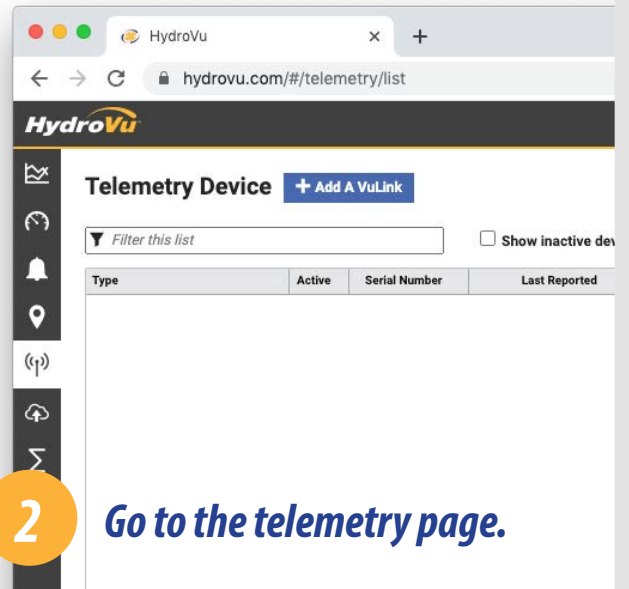
2 **Go to the telemetry page.**

Click the telemetry page link in the menu on the left side of the page. Then click **Add a VuLink**.

or

3 **Scan the QR code on your VuLink.**

Open your web camera and scan the QR code on your device, or type the registration code into the provided field.

Press

4 **Connect the instrument to a VuLink.**

Follow the instructions on the next page of this quickstart guide. When your VuLink is connected to an instrument and ready to deploy, press the button on top.

Instrument Specifications

Sensor Ratings

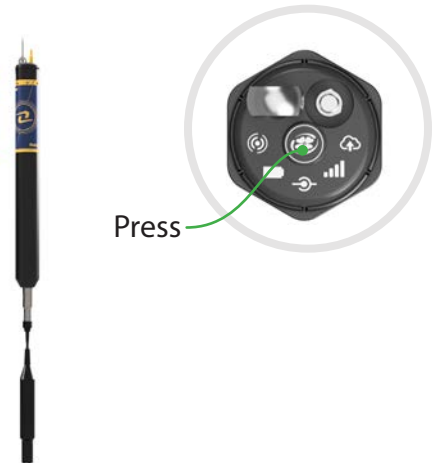|	
Sensor Type	Optical Dissolved Oxygen Sensor
Range, DO	0-60 mg/L; 0-600% Saturation
Accuracy, DO	+/- 0.1 mg/L (0-20 mg/L) +/-2% (20-60 mg/L)
Resolution, DO	0.01 mg/L
Response Time, Cap	T63<5s, T90<45s, T95<60s (RDO-X cap)
Units, DO	mg/L, ppm, % saturation
Range, Temp.	-5°C to 50°C (23°F to 122°F)
Accuracy, Temp.	+/- 0.1°C
Resolution, Temp.	0.01°C
Units, Temp.	Celsius, Fahrenheit
Salinity Comp.	Fixed or real-time capable
Barometric Comp.	Fixed or real-time capable
Methods	EPA-approved In-Situ® RDO methods 1002-8-2009, 1003-8-2009, 1004-8-2009 Standard Methods 4500-O

Environmental Ratings

Pressure	150 psi from 0° to 50°C
Depth	100m (328ft) @ 25°C
Operating Temp. (Non-Freezing)	-5.0°C to + 50.0°C (23°F to 122°F)
Storage Temp.	-40°C to + 65°C (-40°F to 149°F)
Compliance	EMC 2014/30/EU IEC 61000-6-2:2005 EN 55011:2009
Ip Rating	IP-67 with sensor cap off; IP-68 with sensor cap installed

Chemical Ratings

INTERFERENCES	Alcohols >5%; hydrogen peroxide > 3%; sodium hypochlorite (commercial bleach) > 3%; gaseous sulfur dioxide; gaseous chlorine. Do not use in organic solvents (e.g., acetone, chloroform, methylene chloride, etc.), which may swell the sensing element (foil matrix) and destroy it.

General Ratings

Dimensions	L 22.06 cm (8.69 in) x D 2.95 cm (1.16 in)
Weight	205 g (0.5 lb) (without cable)
Wetted Materials	Ryton® (PPS), Cycoloy® (PC/ABS), PC/PMMA
Communication Output	Modbus/RS485
Reading Rate	1 reading every 1 second
Power Requirements	8 to 36 VDC
Power Consumption	Maximum (measurement): 50 mA at 12 VDC Idle (communication only): 2 mA at 12 VDC
Warranty	2 years from date of shipment

NOTES: Ryton is a registered trademark of Solvay SA.; Cycoloy is a registered trademark of SABIC GLOBAL Technologies B.V.

Maintenance & Service

Cleaning the Sensor Cap

Keep the cap on the probe during cleaning.

Rinse the sensor with clean water from a squirt bottle or spray bottle.

Gently wipe with a soft-bristled brush or soft cloth to remove bio-fouling.

To remove extensive mineral build-up, soak the probe cap-down in vinegar for 15 minutes. Then soak in deionized water for 15 minutes.
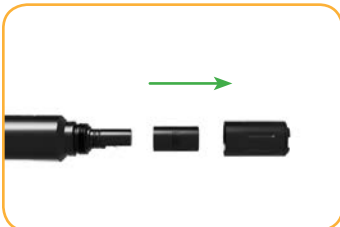
⚠️ Do not use organic solvents to clean the sensor or probe; they will damage the sensing element.

Cleaning the Optical Window

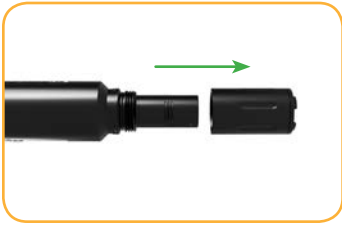✓ Clean the optical window only when you change the cap.

Remove the cap and gently wipe the lens with the supplied lens cloth.

Do not use water or any kind of solution to clean the optical window.

Cleaning the Probe

Remove the nose guard.

Use a lint-free cloth to dry the probe.

Pull the used RDO cap off of the sensor, without twisting.

Remove the existing O-rings from the sensor.

O-ring grooves

Use your finger to apply a light layer of silicone-based lubricant around the O-ring grooves.

Place the O-rings on the sensor. Apply another thin layer of lubricant to the O-rings and grooves.

Align the flat edge inside the RDO cap with the flat edge and metal contacts on the probe. Slide the cap in place.

Thread the nose guard onto the probe.

Warranty Information

In-Situ provides a 2-year, limited warranty on the RDO Blue instrument. To make a return, visit www.in-situ.com and fill out a return material authorization (RMA) form.