In-Situ Inc.

Innovations in
Water Monitoring

Operator's Manual

SMARTROLL™ MP Handheld Instrument

FC CE

The presence of the Waste Electrical and Electronic Equipment (WEEE) marking on the product indicates that the device is not to be disposed via the municipal waste collection system of any member state of the European Union.

For products under the requirement of WEEE directive, please contact your distributor or local In-Situ Inc. office for the proper decontamination information and take back program, which will facilitate the proper collection, treatment, recovery, recycling, and safe disposal of the device.

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Introduction

This manual is intended to describe the characteristics, operation, calibration, and maintenance of the SmarTROLL™ MP Instrument.

Scope

This manual covers the following information.

Serial Number Location

The probe serial number is on the product label affixed to the probe body.

The battery pack serial number is on a sticker affixed to the battery pack casing.

Safety

- Do not submerge the battery pack or the mobile display device in liquid.
- Ensure that the pH/ORP sensor is completely inserted into the port, so that no liquid can enter the instrument. The storage plug is not intended to be used when the instrument is deployed in water.
- Ensure that the RDO Sensor Cap is pressed firmly over the sensor lens and is flush with the instrument before submerging in liquid.
- Replace the cable if insulation or connectors are damaged.
- Make sure the probe and sensor O-rings are clean and free of damage.

General Specifications

Operating temperature	-5 to 50° C (23 to 122° F)
Storage temperature	-40 to 65° C (-40 to 149° F)
Dimensions	4.7 cm (1.85 in.) OD x 26.9 cm (10.6 in.) with restrictor installed (does not include connector)
Weight	694 g (1.53 lbs)
Wetted materials	PVC, 316 stainless steel, titanium, Acetal, Viton®, PC/PMMA
Environmental rating	IP68 with all sensors and cable attached. IP67 with sensors removed and cable detached.
Reading rate	1 reading every 10 seconds; data logged to smartphone.
Power	6 VDC from battery pack
Interface	iPhone® 4S, iPod touch® 5, or iPad® 3, 4, mini or later; iOS 6.0 or later. Bluetooth® Low Energy (BLE) radio. Purchase the iSitu™ App at the Apple® App Store.
Cable	Black polyurethane. Standard lengths available: 1.5 m, 4.6 m, 9.1 m, 30.5 m (5 ft, 15 ft, 30 ft, 100 ft)
Warranty	2-years
Notes	Specifications are subject to change without notice. Apple, iPhone, iPod touch, and iPad are trademarks of Apple Inc. registered in U.S. and other countries. Bluetooth is a registered trademark of Bluetooth SIG, Inc. Viton is a registered trademark of DuPont Performance Elastomers L.L.C.

Sensor Specifications

Level, Depth, Pressure Sensor Specifications

Accuracy	Typical ±0.1% FS @ 15° C; ±0.3% FS max. from 0 to 50° C
Range	76 m (250 ft); absolute (non-vented)
Resolution	±0.01% FS or better
Sensor Type	Fixed
Response Time	Instantaneous in thermal equilibrium
Units of Measure	Pressure: psi, kPa, bar, mbar, mmHg, inHg Level: mm, cm, m, in, ft
Methodology	Piezoresistive; ceramic

Barometric Pressure Sensor Specifications (Battery Pack)

Accuracy	±3 mbar max.
Range	300 to 1100 mbar
Resolution	0.01 mbar
Sensor Type	Fixed
Response Time	Instantaneous in thermal equilibrium
Units of Measure	psi, kPa, bar, mbar, mmHg, inHg, Torr, atm
Methodology	Piezoresistive pressure sensor

Conductivity Sensor Specifications

Accuracy	Typical ±0.5% + 1 µS/cm; ±1% max.
Range	5 to 100,000 µS/cm
Resolution	0.1 µS/cm
Sensor Type	Fixed
Response Time	Instantaneous in thermal equilibrium
Units of Measure	Actual conductivity (µS/cm, mS/cm) Specific conductivity (µS/cm, mS/cm) Salinity (PSU) Total dissolved solids (ppt, ppm) Resistivity (Ohms-cm) Density (g/cm3)
Methodology	Std. Methods 2510 EPA 120.1

Dissolved Oxygen RDO Fast Cap (Optical Sensor) Specifications

Accuracy	±0.1 mg/L; ±0.2 mg/L; ±10% of reading
Range	0 to 8 mg/L; 8 to 20 mg/L; 20 to 50 mg/L; Full operating range: 0 to 50 mg/L
Resolution	0.01 mg/L
Sensor Type	Fixed with replaceable RDO Fast Cap (life: 1 year typical)
Response Time	T90: <30 sec. T95: <45 sec.
Units of Measure	mg/L, % saturation, ppm
Methodology	EPA-approved In-Situ Methods 1002-8-2009 1003-8-2009 1004-8-2009

ORP Sensor Specifications

Accuracy	±5.0 mV
Range	±1400 mV
Resolution	0.1 mV
Sensor Type	Replaceable pH/ORP combo sensor
Response Time	<15 sec.
Units of Measure	mV
Methodology	Std. Methods 2580

pH Sensor Specifications

Accuracy	±0.1 pH unit from 0 to 12 pH units
Range	0 to 14 pH units
Resolution	0.01 pH unit
Sensor Type	Replaceable pH/ORP combo sensor
Response Time	<15 sec., pH 7 to pH 4
Units of Measure	pH units
Methodology	Std. Methods 4500-H+ EPA 150.2

Air Temperature Sensor Specifications (Battery Pack)

Accuracy	±2° C
Range	-20 to 70° C (-4 to 158° F)
Resolution	0.1° C
Sensor Type	Fixed
Response Time	<30 sec.
Units of Measure	Celsius, Fahrenheit
Methodology	EPA 170.1

Sample Temperature Sensor Specifications (Probe)

Accuracy	±0.1° C
Range	-5 to 50° C (23 to 122° F)
Resolution	0.01° C or better
Sensor Type	Fixed
Response Time	<30 sec.
Units of Measure	Celsius, Fahrenheit
Methodology	EPA 170.1

Battery Pack Specifications

Battery Type	Four 1.5V AA lithium or alkaline batteries
Operating temperature	-5 to 50° C (23 to 122° F); 95% relative humidity, non-condensing
Storage temperature	-40 to 65° C (-40 to 149° F); 95% relative humidity, non-condensing
Dimensions & weight	9.5 x 7.6 x 5.7 cm (3.75 x 3 x 2.25 in.) (H x D x W). Weight: 165 g (5.8 oz)
Materials	PC/ABS
Environmental rating	IP67 with battery cover closed
Output options	BLE radio
Battery type	4 AA Lithium or Alkaline
Warranty on battery pack	1-year
Warranty on cable	1-year

Instrument Overview

Instrument Description

The smarTROLL™ MP Handheld Instrument is comprised of a mobile display, battery pack, cable, and multiparameter water quality probe. The optical Rugged Dissolved Oxygen (RDO®), conductivity, pressure, and temperature sensors are integrated into the probe. The pH/ORP and the RDO Sensor Cap are replaceable.

System Components

The system includes the following components.

- Integrated sensors: RDO, conductivity, pressure, and temperature
- Plug-in pH/ORP sensor
- RDO Fast Sensor Cap
- Stainless steel restrictor
- Calibration cup
- Battery pack and cable

Accessories Purchased Separately

- Replacement RDO Fast Sensor Cap
- Replacement pH/ORP sensor
- Calibration Kit (includes calibration cup, 3 sponge wafers, vented cap, and storage cap)
- Cable 1.5 m (5 ft), 4.6 m (15 ft), 9.1 m (30 ft) and 30.5 m (100 ft).
- Maintenance kit
- Replacement battery pack
- Storage/Calibration cup
- Low-Flow kit
- iPod® Touch (for instrument control and data display)
- iTunes® account for transferring data files as an alternate to email

Probe Dimensions with Restrictor On
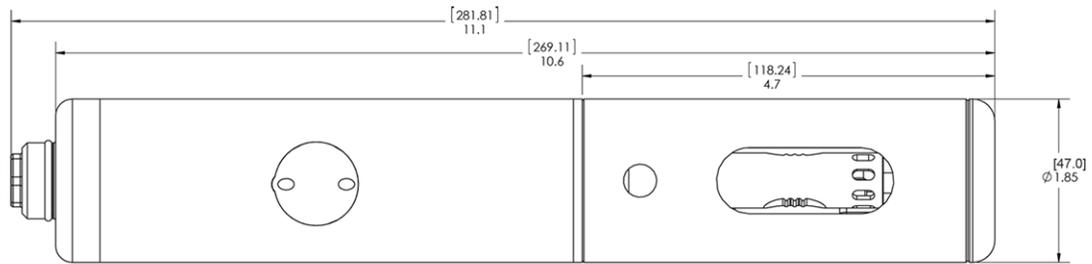
Total length with connector	281.81 mm (11.1 in.)
Total length without connector	269.11 mm (10.6 in.)
Restrictor length	118.24 mm (4.7 in.)
Diameter	47 mm (1.85 in.)

Probe Dimensions with Restrictor Off

Sensor length	81.09 mm (3.2 in.)

Sensors

Sensors include optical RDO (Rugged Dissolved Oxygen), pH/ORP, conductivity, pressure, and temperature.
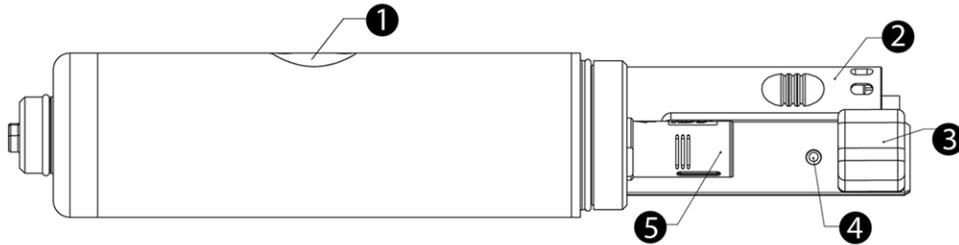
1	Pressure sensor 76 m (250 ft)
2	pH/ORP sensor
3	Conductivity sensor
4	Temperature sensor
5	RDO Sensor

Probe Setup

The probe is shipped with a storage plug and protective dust caps in place.

| 1 | Dust cap protector on the RDO Sensor. (Install the RDO Cap before deploying the instrument.) |
| 2 | pH/ORP storage plug. (Remove the storage plug and install the pH/ORP sensor before deploying the instrument.) |

Install the Batteries

The 4 AA batteries that are shipped with the battery pack are likely to last for 80 hours of continuous use.
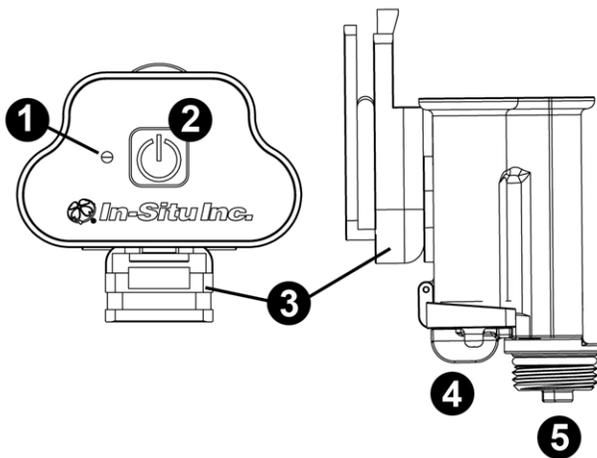
1	Power indicator
2	On/Off button
3	Belt clip
4	Battery compartment latch
5	Cable connection

1. Twist the cable connector counterclockwise to remove the cable from the battery pack.

2. Slide the lever on the battery compartment to release the cover.

3. Install the 4 AA batteries according to the +/- indicators engraved on the outside cover.

4. Close the cover and slide the lever to lock the compartment.

Installing the Sensors
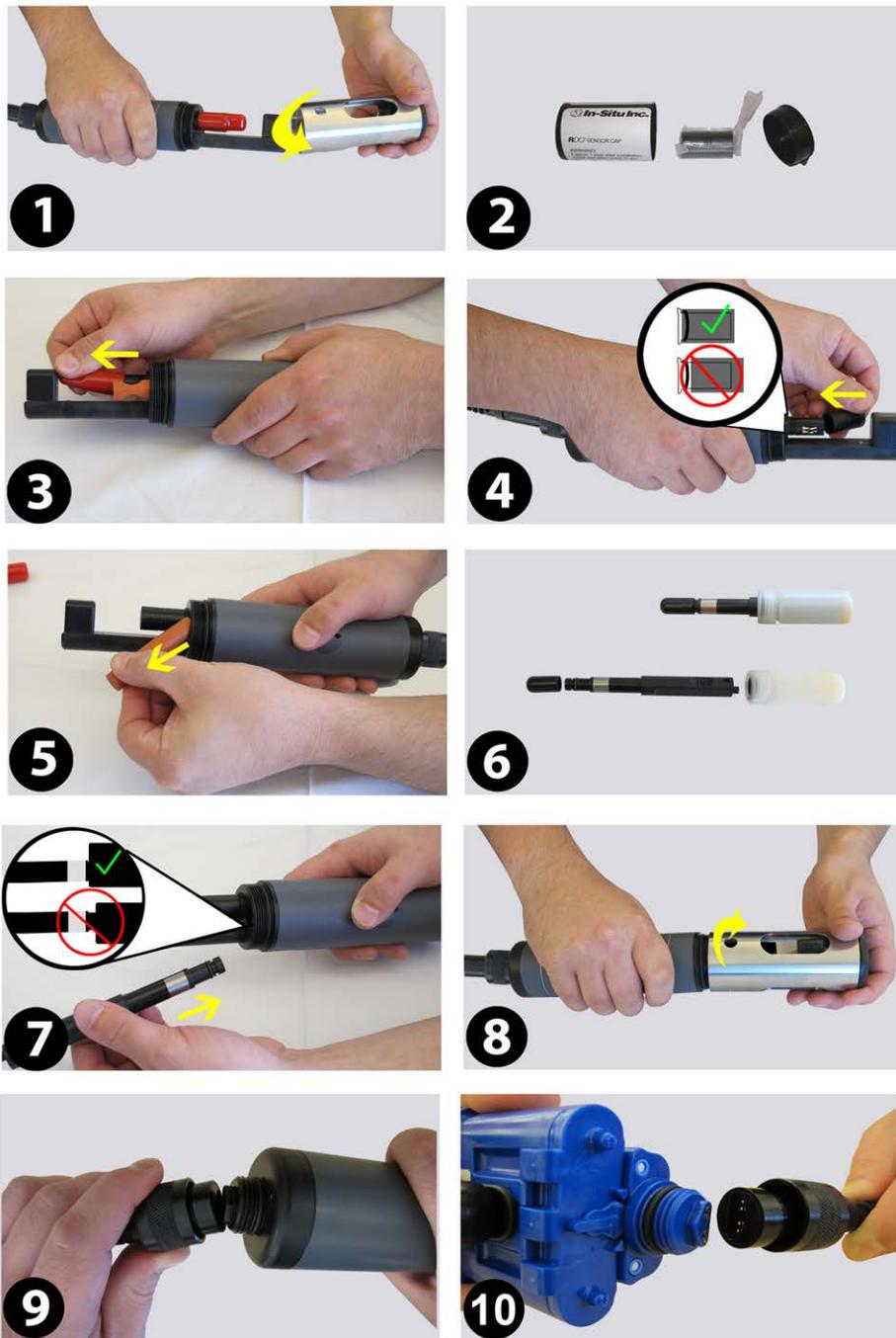
1. Twist the restrictor off the probe.

2. Locate the RDO Sensor Cap container and remove the cap.

3. Remove the dust cap from the RDO Sensor.

4. Align the flat edge of the RDO Sensor with the slotted edge of the RDO Cap and press the cap into position. Push until the cap is firmly in place.

> ⚠️ Important: Avoid touching the sensor lens and the sensing material on the top of the cap.

5. Remove the orange plug from the pH/ORP port.

6. Remove the pH/ORP sensor from the storage bottle. Keep the bottle for future sensor storage.

7. Use the alignment marks to properly align the pH/ORP sensor with the port connection, and press firmly into place. Push until the sensor is completely inserted into the port.

8. Twist the restrictor onto the probe.

9. Align the pins on the cable with the pins on the probe, then twist the outer portion of the connector until the connection is secure.

10. Align the pins on the cable with the pins on the battery pack, then twist the outer portion of the connector until the connection is secure.

> ⚠️ Important: The RDO Sensor Cap and pH/ORP sensor must be installed firmly in place to prevent water from entering the instrument.

iSitu Overview

About the iSitu App

The iSitu App is the user interface and control application for In-Situ Inc. handheld water quality instruments. You can use iSitu on the Apple iPod Touch, and iPhone for up to five devices per purchased license.

iSitu allows you to accomplish the following tasks.

- View live readings that update every 10 seconds.
- Change parameters and units.
- Record data.
- Email data in spreadsheet format.
- Transfer data from mobile device to a computer.
- Organize data by Site location.
- Calibrate Sensors and View Reports
- Conduct Low-Flow Pump Testing (Additional purchase is required.)

Estimated iPod Battery Life

The table below shows the estimated battery life for the iPod. The values are dependent on the number of readings taken and the brightness setting on the display. To change brightness settings, see **Settings > Brightness & Wallpaper** on the iPod.

BRIGHTNESS					NUMBER OF READINGS	BATTERY TIME (HOURS)
MIN	1/4	1/2**	3/4	FULL		
X					2,500	6.9
	X				1,950	5.4
		X			1,700	4.7
			X		1,500	4.2
				X	1,050	3.3

*Values provided assume location services and WiFi enabled. Disabling these features can provide an additional 0.5 to 1 hour of life.

**Default

Connect the Instrument to the iSitu App

1. Make sure that the cable is connected to the instrument and the battery pack.
2. Press the power button on the battery pack.
3. On the mobile device, tap **Settings**.

4. Turn Bluetooth on.

5. Press the Home button (round button on the mobile device frame) to show all apps.

6. Tap the iSitu icon to open the iSitu App.

7. If you are prompted to allow iSitu to use your current locations, tap **OK**.

✔	If you allow iSitu to use your current locations it will enable the mapping feature for site setup. If you select **Don't Allow**, you can change the setting later. **See Settings > Privacy Settings > Location Services**.

8. Live readings appear on screen.

Live Readings Screen

The Live Readings screen is also referred to as the Home screen. If you touch the **Home** icon within the app you will return here.

> ✓ Live readings update every 10 seconds.

1	Sites button - setup sites, select another site
2	Site photo (optional)
3	Record/Stop button - records sensor readings every 10 seconds
4	Sensor readings - updated every 10 seconds
5	Data files - access files stored on the mobile device
6	Sensor calibration
7	View or email data
8	Access Low-Flow (additional purchase required)
9	Help

Change Parameters and Units

1. From the **Home** screen, tap any parameter field.

2. Swipe the left side of the parameter pick wheel to find the appropriate parameter.
3. Swipe the right side of the parameter pick wheel to select the appropriate unit.
4. Tap the **Set** button to set the parameter and unit selection.

iSitu Sites

About Sites

A site represents the physical location at which the instrument collects data. For example, you can create a site to represent a lake, gauging station, well, tank, number, or nearby landmark.

If you do not set up a site, your data will be associated with **Default Site**. The site name is displayed at the top of the **Live Readings** screen.

Tap the **Sites** button to select or edit an existing site, or to create a new site.

Create a New Site

1. From the **Live Readings** screen, tap the **Sites** button.

2. A list of existing sites appears.

3. Tap the **New Site** button. The **Site Details** screen appears.
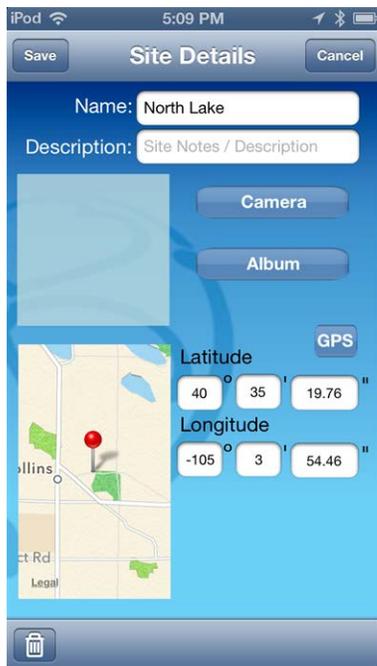
4. Tap the **Name** field. Type the name for the new site and tap **Return**.

5. To add a description, tap the **Description** field. Type a description and tap **Return**. A description is optional.

6. To take a site photo, tap the **Camera** button, tap the camera icon to take a new photo, tap the **Use** button. A site photo is optional.

7. To select an existing photo, tap the **Album** button, tap **Cameral Roll**, tap an existing photo.

8. To locate your site with Maps or GPS, tap the **GPS** button and your current location is automatically associated with the site. You can also enter GPS coordinates, or tap and hold on the map to select a location.

> ✓ Location Services must be turned on for an accurate location to display on the map. See **Settings > Location and Security**.

9. Tap the **Save** button.

10. Tap the **Set** button next to the site you created. Now you are ready to record data associated with the selected site.

Select a Site

After a site has been created, you can select it to record data that will be associated with that site.

1. From the Live Readings screen, tap the **Sites** button.

2. Locate the site with which you want to associate your data.
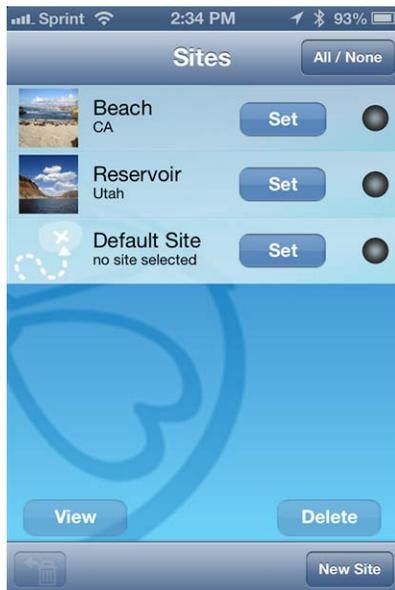
3. Tap the **Set** button. The site will appear on the Live Readings screen and recorded data will be associated with the selected site.

Edit a Site

1. Tap the **Sites** button.

2. Locate the site you intend to edit.

3. Tap the **circle** next to the **Select** button for the site.

4. Tap the **View** button, and make changes to the site information.

5. Tap the **Save** button.

Delete a Site

1. Tap the **Sites** button.

2. Locate the site you intend to delete.

3. Tap the **circle** associated with the site.

4. Tap the **Delete** button.

> ✔ This procedure sends the site to the trash where you can choose to completely delete it, or restore the site. You cannot delete the default site.

Restore a Site

1. It is possible to restore a deleted site.

2. From the **Home** screen, tap the **Sites** button.

3. Tap the **Restore From Garbage Can** icon.

4. Tap the site you intend to restore.

5. Tap the **Restore** button.

iSitu Data

About Data

iSitu allows you to view real-time readings, record readings in ten-second intervals, email data, store data to the mobile device, and transfer data from the mobile device to a PC.

Record Data

1. Tap the **Record** button on the **Live Readings** screen to record data. The number on the stopwatch icon represents how many 10-second data intervals have transpired.

2. To stop recording, tap **Stop**.
3. Now you can email the data or download it to a computer.

View an Individual Reading

Recorded data is stored on the Apple device in a comma-separated value (CSV) file and can be viewed in a spreadsheet format after the file has been emailed from the mobile device, or transferred to a computer via iTunes.

1. To view an individual reading, tap the **Action** icon.

2. Tap **View Last Reading**.

3. The most recent data in the last ten-second interval appears. Tap the **Home** icon to return to the **Live Readings** screen or tap the **Envelope** icon to email the data.

View and Email Data from the Selected Site

After you have recorded data, you can email the data as a CSV file that can be opened with common spreadsheet software. Make sure the email feature is enabled on the mobile device.

> ✓ See **Settings > Mail, Contacts, Calendars > Add Account**. You must also have connection to WiFi or cell phone service if you are using an iPhone®. See **Settings > Wi-Fi**.

1. Tap the **Action** icon.

2. Tap **View Log List**. This shows a list for only the selected site.

3. To select all logs in the list, tap the **All/None** button, or to select individual logs, tap them separately.
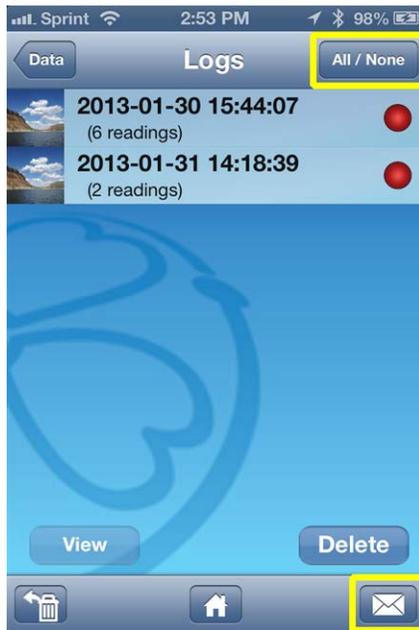
4. Tap the **Envelope** icon.

5. An email form appears with the logs that were selected attached.
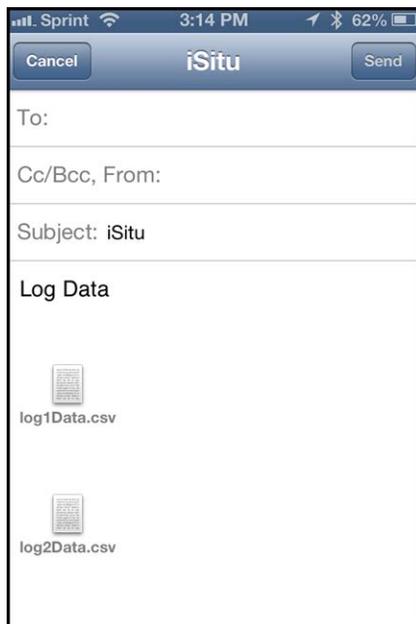
6. Enter an email address in the **To:** field.

7. Tap the **Send** button.

> ✓ You can also transfer data to a computer using iTunes.

View, Email, or Delete Data from Any Site

After you have recorded data, you can email the data as a CSV file that can be opened with common spreadsheet software. Make sure the email feature is enabled on the mobile device. See **Settings > Mail, Contacts, Calendars > Add Account**. You must also have connection to WiFi. See **Settings > Wi-Fi**.

1. Tap the **Data** icon.

2. The Data screen displays a list of sites and the number of data logs within each site. Tap the site that contains the data you want to view, email or delete. The selection circle turns red and the **View**, and **Delete**, buttons become active.

3. Tap the **View** button.

4. The list of logs associated with that site appears. Tap the log you want to view. The selection circle turns red and the **View** and **Delete** buttons become active. The **Envelope** icon also becomes active. You can select any of these options.

5. Tap the **View** button.

6. The list of readings within the log appears. Tap the reading you want to view. The selection circle turns red and the **View** button becomes active.

7. Tap the **View** button. The data for an individual reading appears.

Emailing Data From Different Screens in iSitu

Emailing from the Data screen

Select one or more sites and email all logs associated with the selected sites.

Emailing from the Logs screen

Select one or more logs (from a single site) and email the selected logs.

Emailing from the Readings screen

Select one or more readings (from a single log) and email them as one file. The file name will be appended with the word "reading."

Emailing from the Data Details screen

Emailing from the Data Details view will email all readings in that log

Transfer Data to a Computer

1. Connect the mobile device to a computer with iTunes installed.
2. Click on the Apple device icon next to the eject button.

3. Click the word **Apps** near the top of the screen.
4. Scroll to the bottom of the screen and click on **iSitu**.
5. Click on a file and drag it to your desktop.

> ✓   You can also email data to your computer.

Delete all Logs by Site

1. Tap the **Data** icon.

2. Tap the **All/None** button, or tap an individual site. The selection circle turns red when a site is selected.
3. Tap the **Delete** button. All logs associated with the site will be deleted.

> ✔ This procedure sends the logs to the trash where you can choose to completely delete them or restore the logs.

Restore Data

It is possible to restore deleted logs.

1. Tap the **Data** icon.

2. Tap the **Restore from Garbage Can** icon.

3. The contents of the Trash Can are displayed.

4. Tap the**All/None** button, or tap the individual logs you want to restore.

5. Tap the **Restore** button.

> ✔ If you want to permanently delete data from the Trash Can, tap the **Delete** button.

iSitu Sensor Calibration

About Calibration

Tap the **Calibration** icon in the iSitu App to access a list of sensors that are available for calibration.
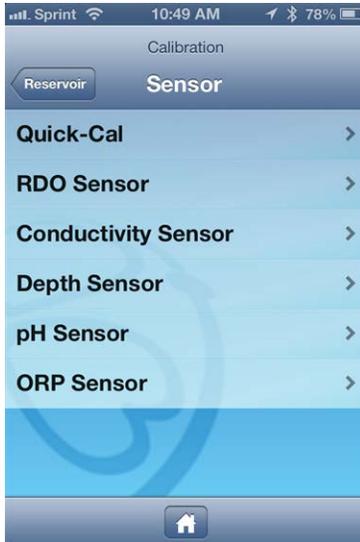
Calibrate Multiple Sensors with Quick-Cal Solution

1. Tap the **Calibration** icon to access a list of sensors that are available for calibration.

2. Tap **Quick-Cal**.
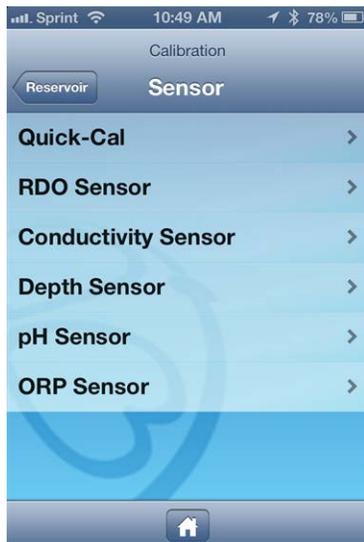
3. The conductivity, pH, and ORP sensors are automatically selected. Tap the green check mark next to a sensor if you want to exclude it from the quick calibration.

> ✓ The dissolved oxygen sensor cannot be calibrated using the Quick-Cal procedure.

4. Tap **OK**.

5. Fill the calibration cup to the fill line with Quick-Cal solution.

6. Place the instrument into the calibration cup, and tap **Start**.

7. When the calibration is stable, tap the **Accept** button.

8. Rinse the sensors with DI water.

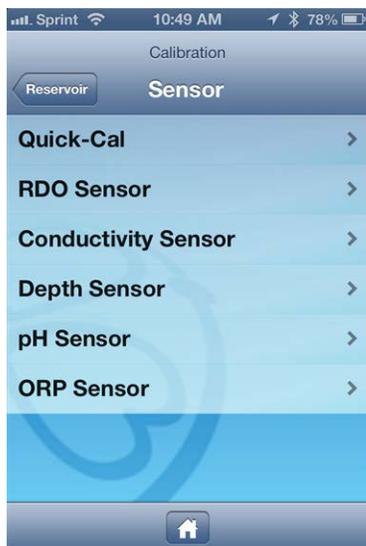## Calibrate the Rugged Dissolved Oxygen Sensor

The RDO sensor requires very little maintenance. The zero oxygen calibration is optional.

1. Tap the **Calibration** icon .

2. Tap **RDO Sensor**.

3. Select the method by which you intend to calibrate the sensor. This example demonstrates a two-point calibration. Tap **100% and 0% Saturation**.
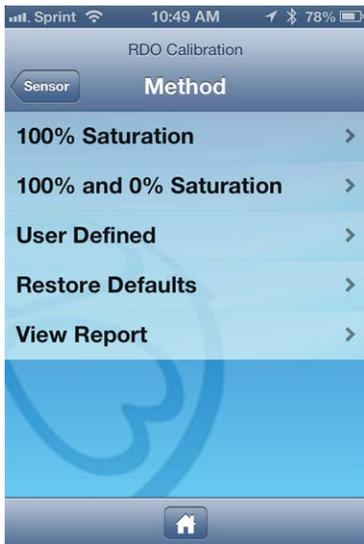
4. Place a water-saturated sponge in the bottom of the calibration cup. Place the instrument into the calibration cup, and tap **Start**.

> ✓ The calibration cup must be vented to barometric pressure. If you are using the calibration cup pictured below, make sure the vented cap is installed. If you are using the twist-on storage cup, set the instrument in the cup, but do not twist it into place.

5. When the calibration is stable, tap the **Accept** button.

6. Remove the sponge and add fresh sodium sulfite solution to the fill line. Place the instrument into the calibration cup, and tap **Start**.

7. When the calibration is stable, tap the **Accept** button.

8. To view the calibration report, tap **View Report**.

9. Rinse the sensors thoroughly with DI water.

Calibrate the Conductivity Sensor

1. Tap the **Calibration** icon to access a list of sensors that are available for calibration.

2. Tap **Conductivity Sensor**.

3. Tap 1-Point Calibration

4. Make sure the vented cap is installed on the calibration cup. Fill the cup to the fill line with calibration standard. Place the instrument into the calibration cup, and tap **Start**.

5. iSitu automatically detects the calibration standard.

> ✔ If your calibration standard references 20° C, tap the
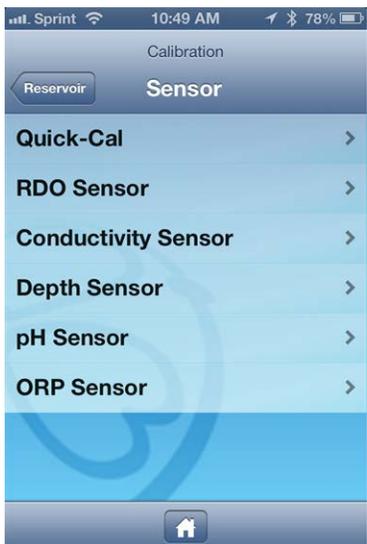> **Thermometer** icon and change the reference temperature.

6. Once the calibration is stable, tap the **Accept** button.

7. To view the calibration report, tap **View Report**.

8. Rinse the sensors with DI water.

Calibrate the Depth Sensor

Zero in Air

1. Tap the **Calibration** icon 🧪 to access a list of sensors that are available for calibration.

2. Tap **Depth Sensor**.
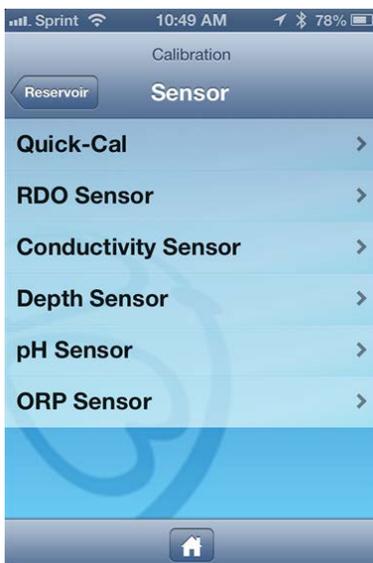
3. Tap **Zero in Air**.

> ✓ Do not perform a "Zero in Air" calibration if a Depth reference is already set because it will result in a faulty calibration. To clear a Depth reference, tap **Restore Defaults**.

4. Ensure that the pressure sensor is exposed to air and is not submerged in liquid.

5. Tap the **Start** button.

6. When the calibration is stable, tap the **Accept** button.

Setting the Depth Reference

1. Tap the **Calibration** icon to access a list of sensors that are available for calibration.

2. Tap **Depth Sensor**.
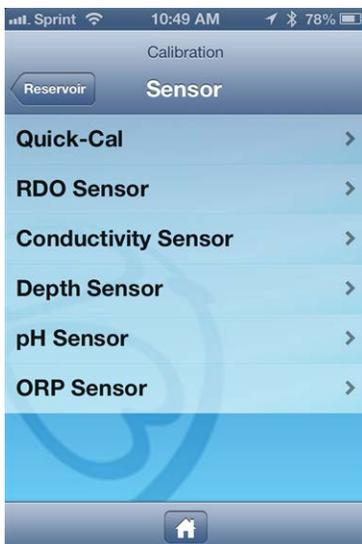
3. Tap **Depth Reference**.

4. Place the instrument in the water at a known depth, and tap the **Start** button.
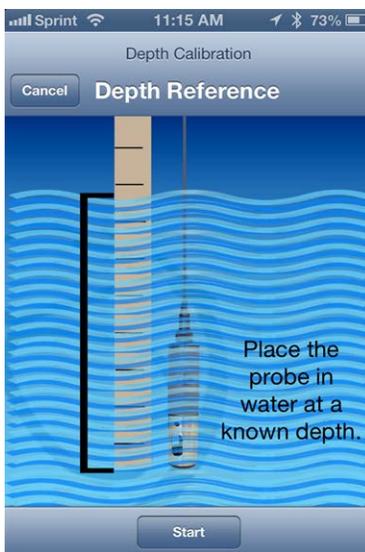
5. Tap the **Reference Value** field and enter the value of the known depth reference.
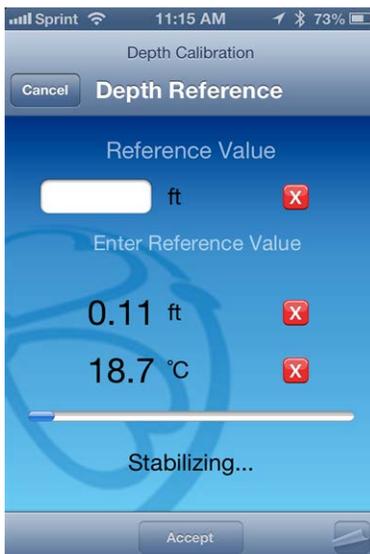
<table>
<tr><td>✓</td><td>A depth reference applies an offset equal to the distance from the pressure sensor to a desired location, such as the bottom of the probe, so that the depth reading is reported from the desired location, rather than from the location of the pressure sensor.</td></tr>
</table>
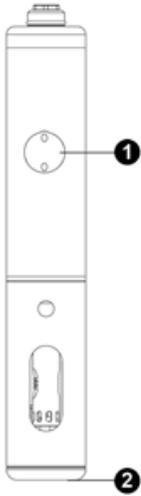
1	Pressure sensor
2	Example of a Depth reference setting

6. When the calibration is stable, tap the **Accept** button.

Calibrate the pH Sensor

1. Tap the **Calibration** icon to access a list of sensors that are available for calibration.

2. Tap **pH Sensor**.

3. Select the method by which to calibrate the sensor. This example demonstrates a two-point calibration. Tap **2-Point Calibration**.
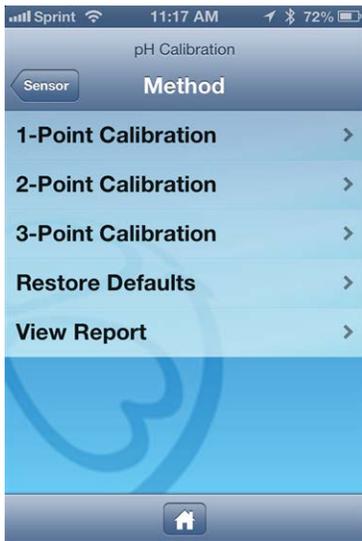
4. Make sure the vented cap is installed on the calibration cup. Fill the cup to the fill line with the first calibration buffer. Place the instrument into the calibration cup, and tap **Start**.

5. When the calibration is stable, tap the **Accept** button.

6. Fill the cup to the fill line with the second calibration buffer. Place the instrument into the calibration cup, and tap **Start**.

7. When the calibration is stable, tap the **Accept** button.

8. To view the calibration report, tap **View Report**.

Calibrate the ORP Sensor

1. Tap the **Calibration** icon [icon] to access a list of sensors that are available for calibration.

2. Tap **ORP Sensor**.

3. Tap 1-Point Calibration
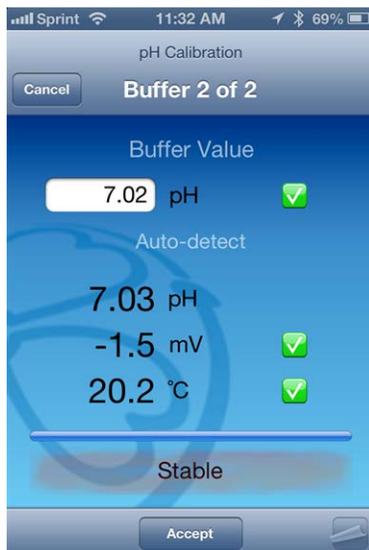

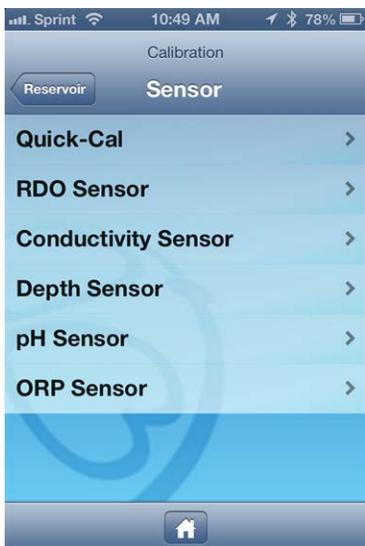4. Make sure the vented cap is installed on the calibration cup. Fill the cup to the fill line with calibration standard. Place the instrument into the calibration cup, and tap **Start**.

Add standard to the fill line.

5. When the calibration is stable, tap the **Accept** button.

6. To view the calibration report, tap **View Report**.

Low-Flow Pump Testing

Low-Flow Sampling with SMARTROLL™ MP Instrument

Low-Flow sampling allows you to automate the collection of well and pumping information, monitor and record the stabilization of key water quality parameters, and automatically generate sample reports that conform to federal and regional regulations.

You can set up a template in the office and email it to a technician, or the setup can be done entirely in the field.

You need the following equipment.

- Pump and tubing
- Flow cell, fittings, and base plate or stake
- SMARTROLL MP Instrument, battery pack, and cable
- iPod® or iPhone® loaded with the iSitu App
- Optional turbidity meter

Purchase the Low-Flow App

1. Tap the **Gear** icon ⚙.
2. Tap the **Store** button.
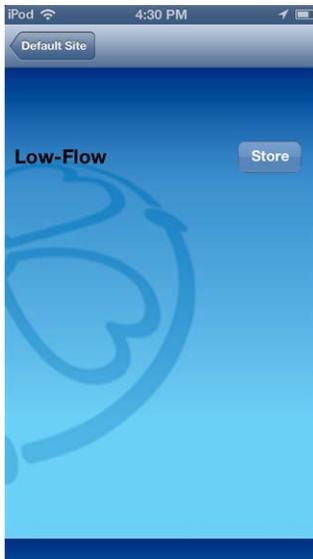
3. Tap the **Buy** button. You are asked to confirm your purchase. Tap the **Buy** button again.
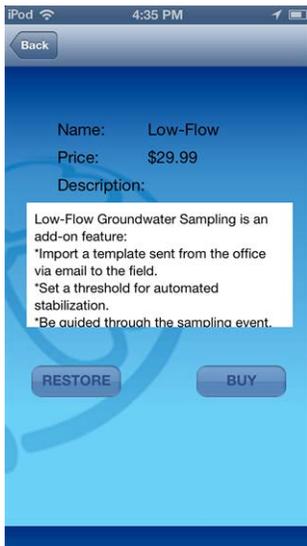
4. You are prompted to enter your iTunes information. The Low-Flow App will be accessible the next time you tap the **Gear** icon.

Create a Low-Flow Template from the Desktop

You can create a Low-Flow template from a desktop or laptop computer and email it to technicians in the field.

> ✓ This Windows® software application is designed to work in conjunction with the iSitu mobile App and the SMARTROLL MP Instrument.
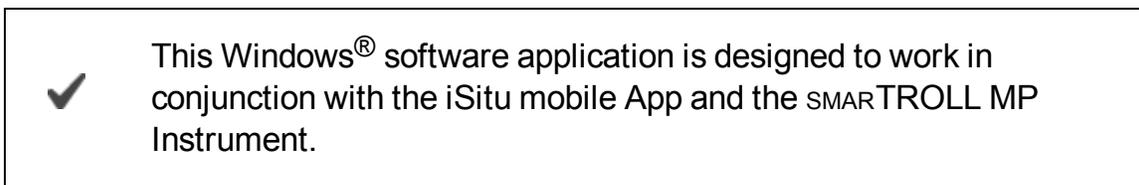
1. Open the Low-Flow software from within Win-Situ 5. When you are asked if you would like to connect to the device, click **No**.

2. Click the **Tools** menu and select **LowFlow Setup**.
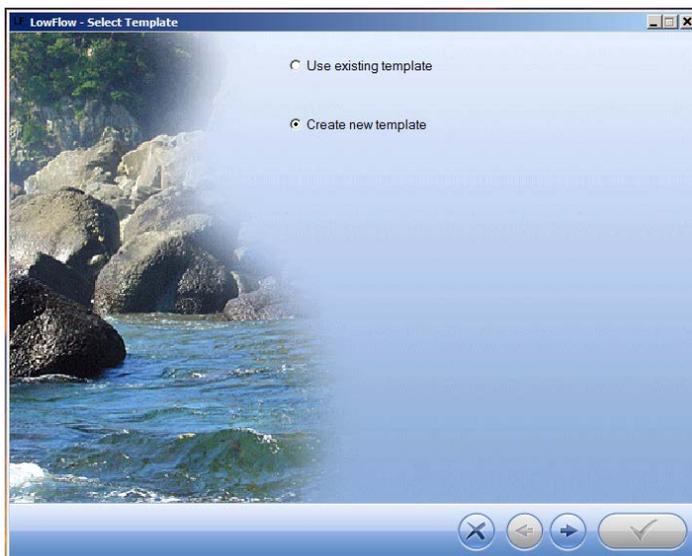
3. Click **Create New Template**, and click the **right arrow** button. The **Project** screen appears.

4. Enter project information and click the **right arrow** button. The **Units** screen appears.
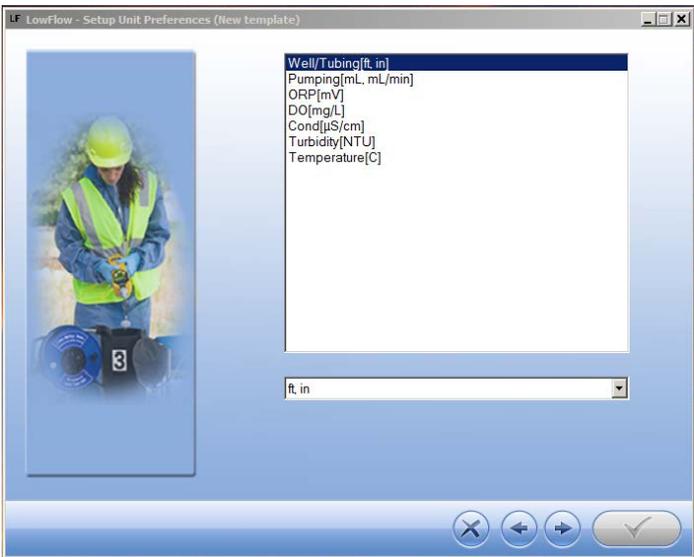
5. If necessary, select a parameter and then click the drop-down box to select units.

6. Click the **right arrow** button. The **Well Information** screen appears.
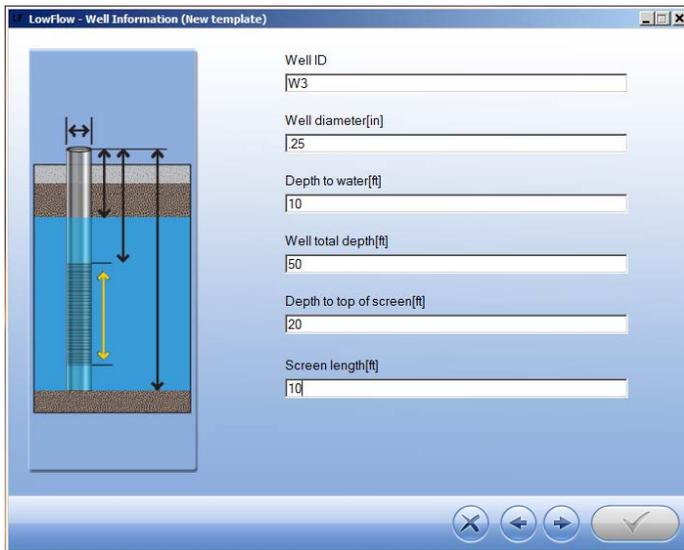
7. When you click on a field, the corresponding area of the well diagram is highlighted. Enter the well information.

8. Click the **right arrow** button. The **Stabilization Parameters** screen appears.
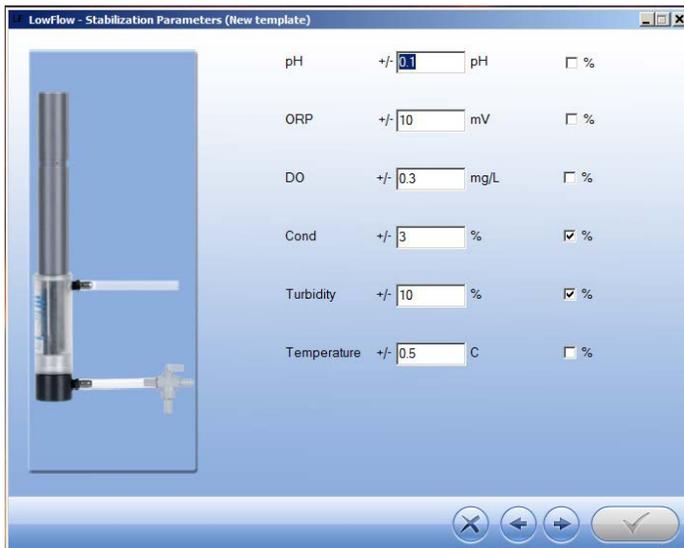
9. The default stabilization criteria is shown. A selected percentage checkbox indicates that the stabilization criterion for the parameter is based on percentage rather than an absolute value.

10. Edit the information if necessary, and click the **right arrow** button.
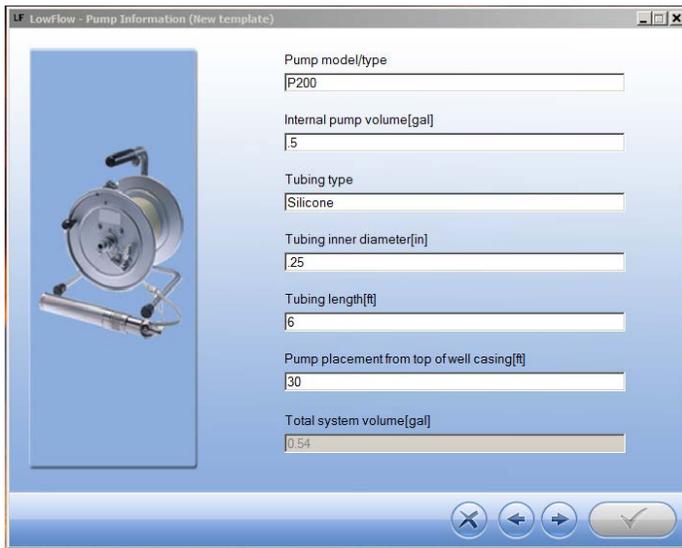
11. Enter the pump information. The total system volume is calculated using the internal pump volume, the tubing inner diameter, and the tubing length.

12. Click the **right arrow** button. The **Purging Information** screen appears.
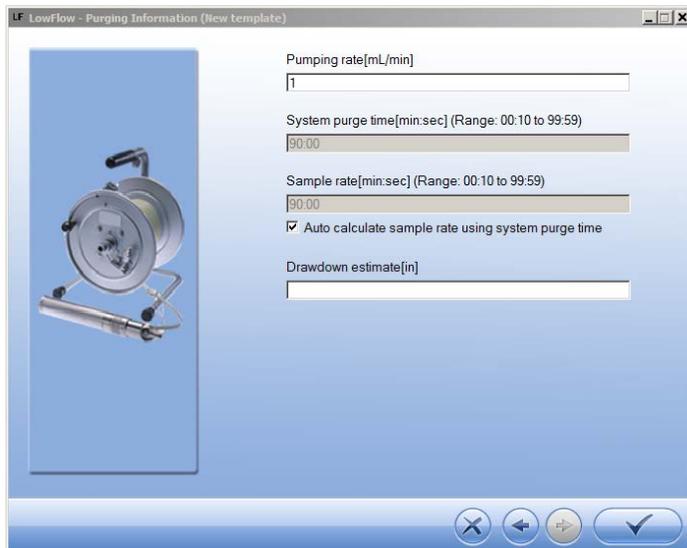
13. Enter the pumping rate you intend to use during the test.

14. Enter the sampling rate you intend to use, or select **Auto calculate sample rate using system purge time** if you want the software to assign a sample rate.

15. Enter an estimate of the drawdown you expect during the testing.

16. Click the **check mark**. You can save the template with the default name or enter a different name.

Email Low-Flow Template to an iPod or iPhone

1. Low-Flow templates are by default saved to your computer in **My Documents/LowFlow Templates**.

2. One way to email a template is to open the **LowFlow Templates** folder and right-click on the template you want to email.

3. Select **Send to** and select **Mail recipient**. A new email will open with the template attached.

4. Send the email to a device that has email enabled.

Load the Template into the iSitu App

1. Open the email on the mobile device.

2. Scroll to the attached template.
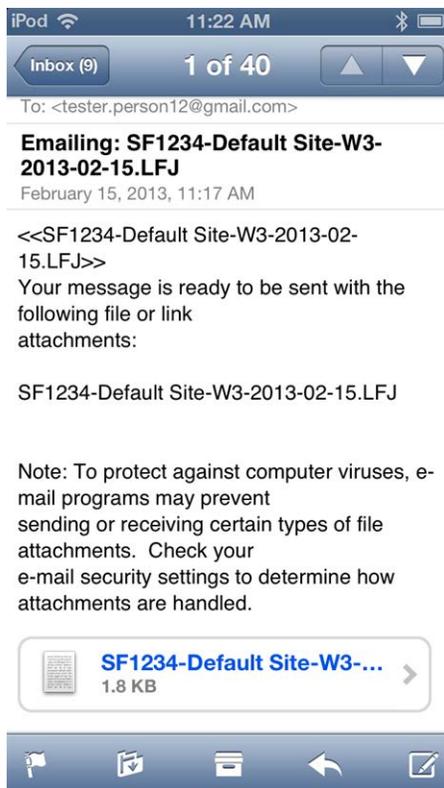
3. Tap and hold the attachment. A pop-up menu appears.

4. Tap the **iSitu icon**. The iSitu app opens with the template loaded. If you would like to save the template to the device, tap the **Save** button.

> ✓ You can swipe through the screens and edit information before you save changes to the template.

Set up a Low Flow Test From a Template

1. Tap the **Gear** icon ⚙ to access the Low-Flow section of the App.

2. The **Project** screen appears.

3. Tap the **Template** button. A list of all saved templates appears.

4. Tap on the template you intend to load, and tap the **Load** button.

Set up a Low-Flow Test without a Template

1. Tap the **Gear** icon to access Low-Flow and tap **Launch**.

2. The **Project** screen appears.

3. Tap a text-entry field to open the keyboard.

4. Enter the project information. Tap the **Return** button on the keyboard to close the keyboard.

5. Tap the **Next** button to continue to the **Units** screen.

6. If you want to change units, tap the units button and select a different value.

7. Tap the **Next** button to continue to the **Well** screen.
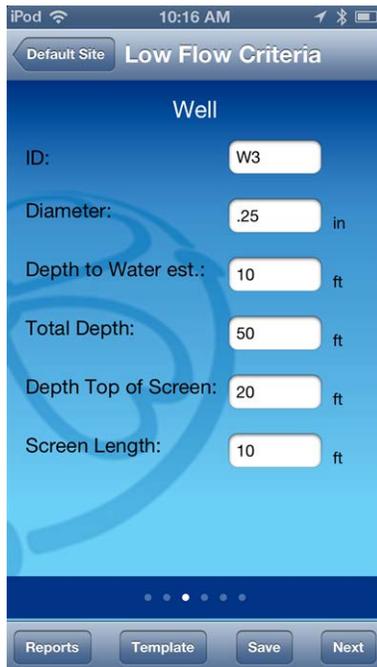
8. Enter the well information.

9. Tap the **Next** button to continue to the **Stabilization** screen.

10. A green checkmark indicates that the stabilization criterion for the parameter is based on percentage rather than an absolute value. Tap a gray box to change from absolute to percentage.

11. Tap the **Next** button to continue to the **Pump** screen.
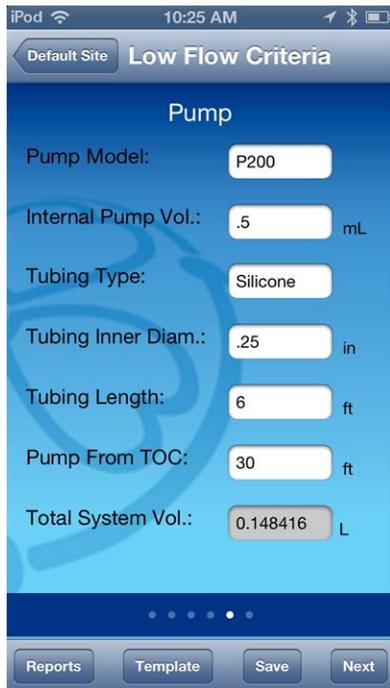
12. Enter the pump information. The total system volume is calculated using the internal pump volume, the tubing inner diameter, and the tubing length.

13. Tap the **Next** button to continue to the **Purge** screen.
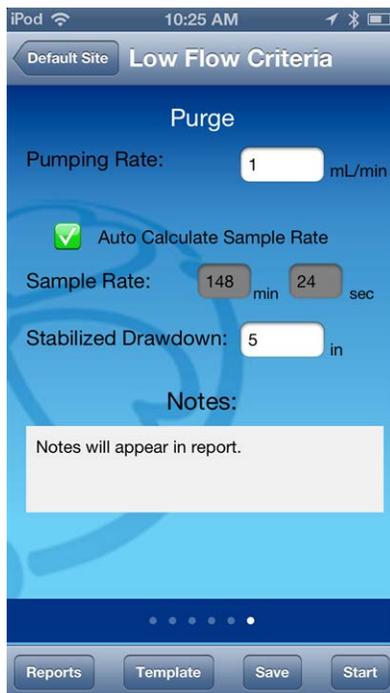
14. Enter the pumping rate you intend to use during the test.

15. Enter the sampling rate you intend to use, or select **Auto Calculate Samle Rate** if you want the software to assign a sample rate.

16. Enter an estimate of the drawdown you expect during the testing. It is optional to enter notes in the **Notes** field.

17. If you would like to save the test set up information as a template to use again later, tap the **Save** button. You can save it using the default name, or tap the field and enter a new name.

Install the Pump

1. Determine the static water level.

2. Install the pump in the well.

3. Start the pump and determine the optimum final pumping rate and final stabilized drawdown from static water level. This can be calculated using a graduated cylinder, stopwatch, and water level tape.

Prepare the Flow Cell

1. Select the barbed NPT fitting that will fit with the tubing size.

2. Tape the threads with plumbing tape.

3. Attach a fitting to the inflow port at base of the cylinder and to the outflow port at the top of the cylinder. Tighten until hand-tight. Do not tighten with a wrench.

> ✓ The 3-way valve and check valve are optional.

4. Attach the tubing.

5. Use the attachment screw to connect the flow cell to the base plate.

6. Insert the calibrated SMARTROLL™ MP Instrument.

Start a Low-Flow Test

1. After you have entered the setup information, installed the pump, and set up the flow cell you are ready to start the Low-Flow test.

2. From the **Purge** screen tap the **Start** button.

3. The test begins and the sample rate countdown is displayed on screen. The parameters appear after the first countdown is complete.

4. When you are satisfied with the stability of the test, tap the **Accept** button.

5. Enter the final values for drawdown, pumping rate, and total volume pumped.

6. You can accept the default file name, or enter a different name. It is optional to enter notes.

7. Click the **Next** button. The report appears. You can pinch and drag the report to resize the view.

> ✔ The test report is saved as a PDF file, which can be emailed or transferred to a computer via iTunes®.

Transfer Low-Flow Report to a Computer

1. Connect the mobile device to a PC with iTunes installed.

2. Click on the Apple device icon next to the eject button.

3. Click the word **Apps** near the top of the screen.

4. Scroll to the bottom of the screen and click on **iSitu**.
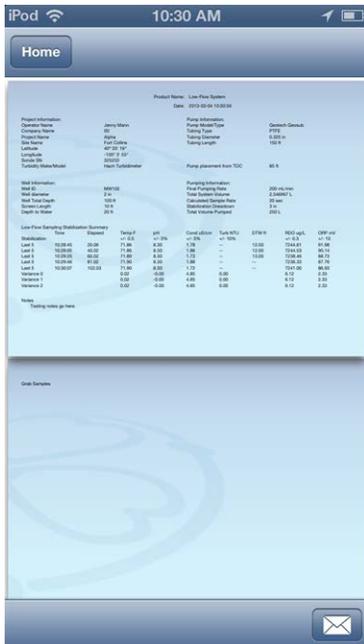
5. Click on a file and drag it to your desktop.

Care and Maintenance

Maintenance Schedule

For best results, send the instrument to the manufacturer for factory calibration every 12 to 18 months.

User-Serviceable Parts

The user-serviceable parts on the instrument include the O-rings, the pH/ORP sensor, and the RDO Sensor Cap.

O-rings

The instrument has several O-rings that can be maintained by the user in order to keep moisture from entering the instrument and damaging the electronics. Apply a very thin layer of vacuum grease to new O-rings upon installation. The O-rings are located in the following areas.

1	Connector
2	Instrument housing
3	pH sensor
4	RDO Sensor

RDO Fast Sensor Cap Replacement

The RDO Fast Sensor Cap has a 1-year typical life (15 months of total usage) after the sensor takes its first reading, or 36 months from the date of manufacture. Follow the instructions included in the RDO Sensor Cap Replacement Kit. Replacement caps are available from In-Situ Inc. or your authorized In-Situ distributor.

pH/ORP Sensor Replacement

To replace the pH/ORP sensor or to refill the reference junction, follow the instructions in the pH/ORP Sensor Instruction Sheet that is included with the replacement sensor.

Instrument Storage

To store the probe for a week or less, place the probe in the calibration cup with a few drops of clean water to maintain a moist storage environment.

To store the probe for more than a week, perform the following procedure.

1. Remove the pH/ORP sensor and place the orange pH port plug into the empty pH/ORP port to prevent any humidity from entering the probe.

2. Locate the sensor storage bottle in which the pH sensor was originally shipped.

3. Open the bottle and remove the O-ring.

4. Moisten the sponge inside the bottle with either a pH storage solution or a pH 4 solution.

5. Slide the O-ring onto the sensor, and then slide the bottle cap over the sensor as shown.

6. Place the sensor tip in the buffer and tighten the cap to prevent the glass bulb from drying.

Cleaning the pH/ORP Sensor

Begin with the gentlest cleaning method and continue to the other methods only if necessary. Do not directly touch or wipe the glass bulb.

To clean the pH sensor, gently rinse with cold water. If further cleaning is required, consider the nature of the debris.

Remove Crystalline Deposits

- Clean the sensor with warm water and mild soap.
- Soak the sensor in 5% HCl solution for 10 to 30 minutes.
- If deposits persist, alternate soaking in 5% HCl and 5% NaOH solutions.

Remove Oily or Greasy Residue

- Clean the sensor with warm water and mild soap.
- Methanol or isopropyl alcohol may be used for short soaking periods, up to 1 hour.
- Do not soak the sensor in strong solvents, such as chlorinated solvents, ethers, or ketones, including acetone.

Remove Protein-Like Material or Slimy Film

- Clean the sensor with warm water and mild soap.

- Soak the sensor in 0.1M HCl solution for 10 minutes and then rinse with deionized water.

> ✓ Note: After performing any of these cleaning methods, rinse the sensor with water and then soak overnight in pH 4 buffer.

Cleaning the RDO Sensor

Clean the Sensor Cap

1. Leave the cap on the sensor.

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

3. Gently wipe with a soft cloth or brush if biofouling is present.

4. If extensive fouling or mineral build-up is present, soak the RDO Cap end (while the cap is still installed on the sensor) in commercially available household vinegar for 15 minutes, then soak in deionized water for 15 minutes.

> ✓ Note: Vinegar is safe for all of the sensors on the probe including the RDO Sensor if the Sensor Cap is on.

5. Do not use organic solvents because they will damage the sensing material. Do not remove the cap from the sensor prior to wiping.

6. After cleaning the sensor cap, perform a 2-point calibration.

Clean the Optical Window

1. Perform this task only once per year when you replace the sensor cap.

2. Pull to remove the sensor cap.

3. Gently wipe the optical window with the supplied lens wipe.

> ⚠ Important: Do not wet the interior lens area with water or any solution.

Cleaning the Conductivity Sensor

1. Before you begin, ensure that the RDO Cap and the pH/ORP sensor are in place. Rinse the conductivity sensor under running water to remove loose material.

2. Follow Cleaning Procedure 1. If debris is still present, progress to the next cleaning procedure. If the debris is removed, skip to the last step.

Cleaning Procedure 1

Avoid damaging the plastic material of the conductivity cell. Gently scrub the conductivity cell with a soft swab and mild soap such as a dilute solution of dish detergent. The probe is shipped with polyurethane foam swabs for this purpose. You can also achieve good results using a gentle back-and-forth motion with a thin cotton pipe cleaner. If debris is still present, continue to Cleaning Procedure 2. If the sensor is clean, skip to the last step.

Cleaning Procedure 2

Avoid damaging the plastic material of the conductivity cell. Gently scrub the conductivity cell with a foam swab and an aggressive soap such as Alconox cleaner. If debris is still present, continue to Cleaning Procedure 3. If the sensor is clean, skip to the last step.

Cleaning Procedure 3

Soak the sensor with dilute acetic acid (10:1 solution) or commercially available household vinegar to pre-soften calcium deposits. Follow this with Cleaning Procedure 1 or Cleaning Procedure 2, depending on the degree of residual contamination. The probe can soak for any length of time in household vinegar. If debris is still present, continue to Cleaning Procedure 4. If the sensor is clean, skip to the last step.

Cleaning Procedure 4

Topically apply dilute phosphoric acid (< 27 %) or the consumer product LIME-A-WAY with a soft swab to remove iron or calcium deposits that remain after using Process 3. Do not allow the cleaner to be in contact with the sensor for more than 10 minutes. Rinse well with clean water and continue to the last step.

Check the sensor calibration before redeployment. Recalibrate the sensor when necessary.

Declaration of Conformity

Manufacturer: In-Situ, Inc.
                            221 East Lincoln Avenue
                            Fort Collins, CO 80524
                            U.S.A.

Declares that the following product:

Product name: smarTROLL™ MP Handheld
Model: smarTROLL MP
Product Description: The smarTROLL MP Handheld is a water quality instrument equipped with sensors for measuring dissolved oxygen, conductivity, temperature, pH, ORP, and depth in natural groundwater and surface water. An iOS mobile device running the iSitu App allows instrument control, data display, and data transfer. A battery pack supplies power to the probe and enables wireless communication between the iOS device and the probe. The battery pack includes a barometric pressure sensor and an additional temperature sensor.

The device meets or exceeds the following international requirements and compliance standards:

Under the EMC Directive 2004/108EC

- IEC 61000-6-1: 2005 - Electromagnetic Compatibility (EMC) - Part 6-1: Generic Standards - Immunity for Residential, Commercial and Light-Industrial Environments

- IEC 61000-6-3: 2006 - Electromagnetic Compatibility (EMC) - Part 6-3: Generic Standards - Emission Standard for Residential, Commercial and Light-Industrial Environments

- Electrostatic Discharge Immunity Test (IEC 61000-4-2:2008)

- Radiated, Radio-Frequency, Electromagnetic Field Immunity Test (IEC 61000-4-3:2006, A1:2007, A2:2010)

- EFT/Burst Immunity Test (IEC 61000-4-4:2004, A1:2010)

- Immunity to conducted disturbances, induced by radio-frequency fields (IEC 61000-4-6:2008)

- Power Frequency Magnetic Field Immunity Test (IEC 61000-4-8-:2009)

- Radiated Electromagnetic Emissions (CISPR 22: 2008)

Jon Firooz
Vice President of R & D
In-Situ, Inc.
April 5, 2013

CE   FC