![In-Situ Inc. logo]

Innovations in
Water Monitoring

Operator's Manual

Con TROLL® PRO

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Getting Started

Probe Installation Requirements

Before making any wiring connections between the probes and the module, make sure that the probes are set to their factory-default communication settings.

If you are using brand new probes, you do not need to do anything. If you are using pre-configured probes, use Win-Situ 5 Software to reset the default communication settings.

1. Open Win-Situ Software and connect to the probe.

2. Change communication settings for the device by selecting Preferences, then Comm Settings. Click the Reset All Devices button.

This returns the device communication settings to their serial communication defaults (19200, 8, Even, 1, RTU, and Device Address 1).

Navigating Through the Menus

After the Con TROLL PRO is installed by a qualified professional using the Installation Manual, you can begin operating the keypad. The DC model display turns on after you push any button. The AC model display is always on when the unit is connected to power.
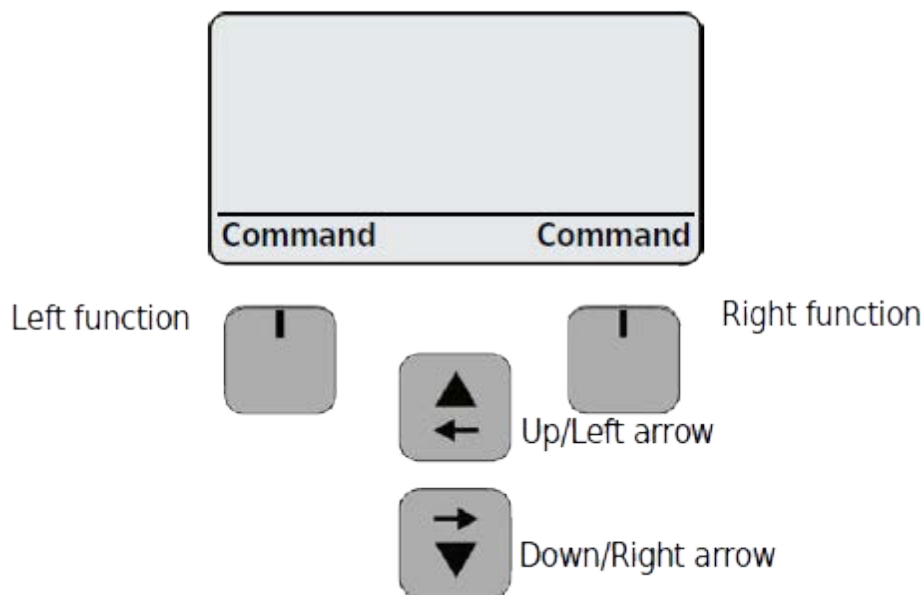
Figure 1.1 Keypad and display window

Menu Diagram
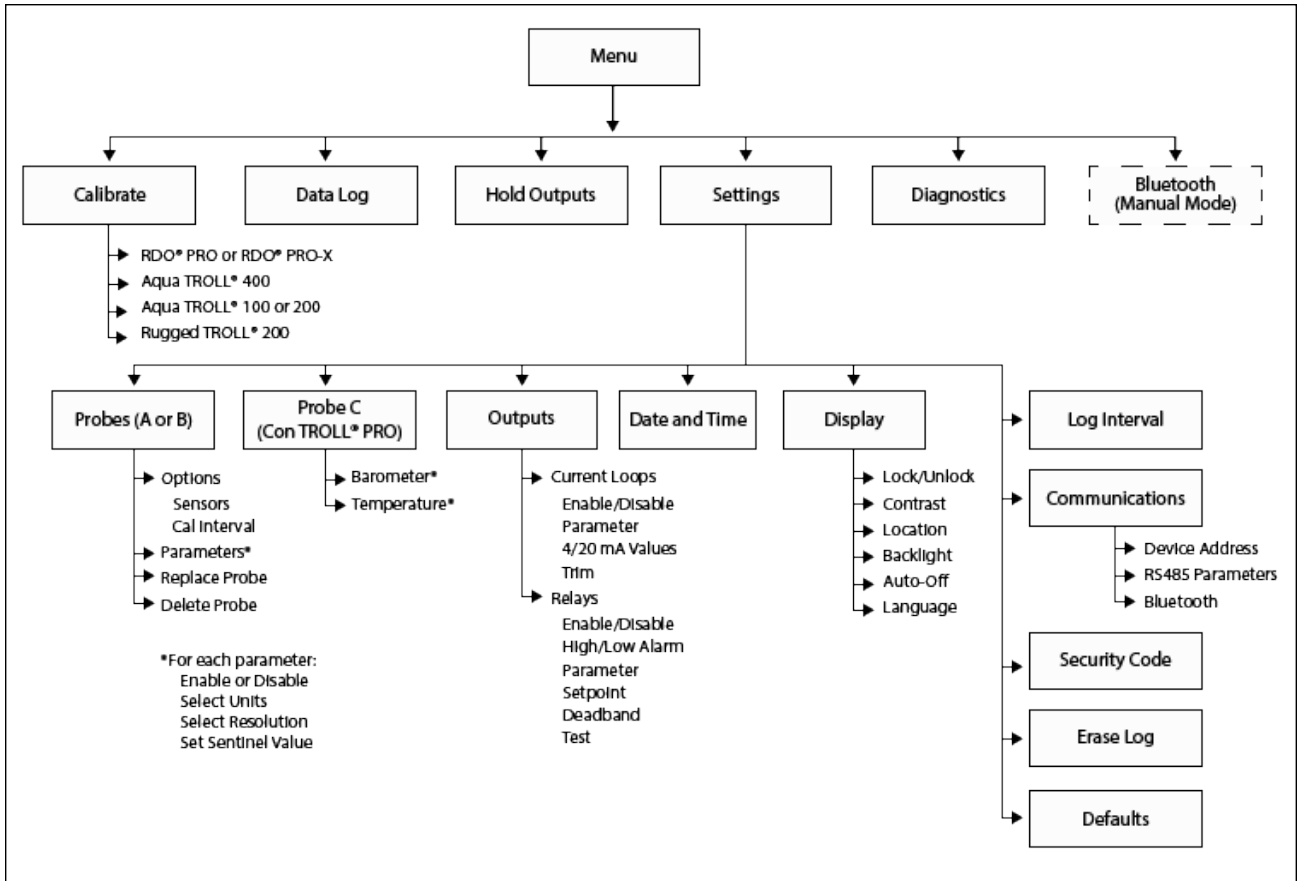
Figure 1.2 ConTROLL PRO Menu Diagram

Initial Configuration

Enter the following information upon first use or anytime after you have restored the default settings on the controller.

1. Use the arrow keys to move up or down to the appropriate language. Select Enter to accept the language.

2. Use the arrow keys to adjust the Contrast level. Select Enter to accept the contrast.

3. Refer to Table 1 to determine your UTC value (Universal Coordinated Time, formerly GMT).

    a. Choose the appropriate time zone as shown in the table.

    b. Find the corresponding time zone number.

    c. Use the Up/Left arrow key to enter a positive or negative value.

    d. Press the Down/Right arrow key to move the appropriate numeric position.

    e. Use the Up/Left arrow key to enter the correct numeric value. Repeat for additional digits as needed.

    f. Press Enter to accept the time.

Table 1. Selected regions and their time in UTC

Region	UTC Value (± numeric value)
Australia Northern Territory	+9.5
Australia Lord Howe Island	+10.5 (Daylight saving time +11)
Australia New South Wales	+10 (Daylight saving time +11)
Australia Queensland	+10
Australia Victoria	+10 (Daylight saving time +11)

Region	UTC Value (± numeric value)
Australia Australian Capital Territory	+10 (Daylight saving time +11)
Australia South	+9.5 (Daylight saving time +10.5)
Australia Tasmania	+10 (Daylight saving time +11)
Australia Western	+8
Canada Central	-6 (Daylight saving time -5)
Canada Eastern	-5 (Daylight saving time -4)
Canada Mountain	-7 (Daylight saving time -6)
Canada Yukon & Pacific	-8 (Daylight saving time -7)
Canada Atlantic	-4 (Daylight saving time -3)
Canada Newfoundland	-3.5 (Daylight saving time -2.5)
England	0 hours (Daylight saving time +1)
USA Puerto Rico	-4
USA Central	-6 (Daylight saving time -5)
USA Eastern	-5 (Daylight saving time -4)
USA Mountain	-7 (Daylight saving time -6)
USA Arizona	-7
USA Indiana East	-5
USA Pacific	-8 (Daylight saving time -7)
USA Alaska	-9 (Daylight saving time -8)
USA Aleutian	-10
USA Hawaii	-10

4. Enter the date using the Up/Left arrow key. Select Enter to accept.

5. Enter the time using the Up/Left arrow key. Select Enter to accept.

6. It is optional to enter the installed location of the Con TROLL PRO. The location name can contain up to 10 characters.

7. The Add Probe A screen appears. The name of the probe that is wired in this position also appears. Select Enter to configure this probe.

8. The Add Probe B screen appears. The name of the probe that is wired in this position also appears. If there is no Probe B, the display will tell you that no probe is connected. Select Enter to configure this probe if it exists, or to proceed to the next screen if it does not.
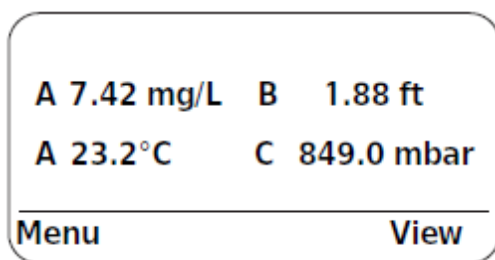
Figure 1.3 Probe and parameters view

9. Parameters are labeled A, B, and C. References to Probe C refer to the Con TROLL PRO itself.

Using the View Function

1. Select the View option. An arrow will point to the first parameter.

2. Select View again to move the arrow to the next parameter.

3. With the arrow pointing to a parameter, use the Up and Down arrow keys to cycle through all the available parameters on both sensors and the control module.

```
┌─────────────────────────────┐
│  A  7.42 mg/L  B    1.88 ft │
│  ▸                          │
│  A  23.2°C      C  849.0 mbar│
│                             │
│  ─────────────────────────── │
│  Menu          ⬍       View │
└─────────────────────────────┘
```
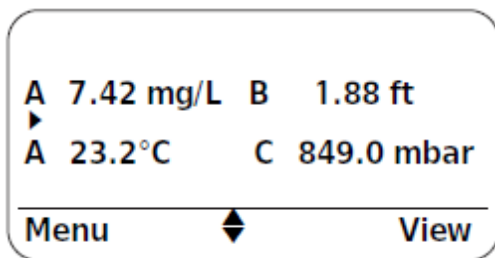
Figure 1.4 Probe A, probe B and probe C

✓ Probe A parameters are labeled with A. Probe B parameters are labeled with B, and Con TROLL PRO parameters are labeled with C.

Changing the Date and Time

1. From the main screen, select Menu, Settings, Date & Time.
2. Three menu items will appear.

   - Date shown as: YYYY-MM-DD
   - Time shown as: HH:MM:SS
   - UTC shown as: ±HH:MM

3. Use Select to choose the menu item.
4. Use the arrow keys to choose the new setting.
5. Select Enter.

Display (Screen) Appearance

Locking the Display

When the display is locked, users will not be able to scroll through the parameters using the View menu option.

1. From the main screen, select Menu, Settings, Display.
2. Choose Lock View.
3. Press Select to toggle between the locked view and the unlocked view.

Changing the Display Contrast

1. From the main screen, select Menu, Settings, Display, Contrast.
2. Use the arrow keys to brighten or darken the screen's appearance.
3. Select Enter to save the setting.

Changing the Displayed Location

1. From the main screen, select Menu, Settings, Display, Location.
2. Use the arrow keys to enter a location.
3. Select Enter to save the new location.

Changing the Back-light Time

1. From the main screen, select Menu, Settings, Display, Backlight.
2. Select the desired option and press Enter.

- ON—The back-light stays on continuously.
- Interval—The back-light stays on for the specified interval after the last keyboard activity and then turns off. Press any key to turn the back-light on again.

Changing the Auto-Off Time (DC-L Model Only)

To conserve power, you can set the display to turn off after the keypad has not been used for a certain length of time.

1. From the main screen, select Menu, Settings, Display, Auto-off.
2. Select the desired option and press Enter.

   - OFF—The Auto-Off feature is disabled. The display is continuously on.
   - Interval—The display stays on for the specified interval after the last keyboard activity and then turns off. Press any key to turn the display on again.

> ✔ Measurement and control continue at the programmed log interval even while the display is off.

Changing the Language

1. From the main screen, select Menu, Settings, Display, Language.
2. Use the arrow keys to display a language.
3. Select Enter to save the setting.

On-Screen Icon Descriptions

Table 2. Icons and their descriptions

Icon	Description
!	Error with parameter or RDO PRO (RDO Classic Sensor Cap) has expired.
	Error with parameter
	Calibration nominally stable
▸	View
*	*Bluetooth* wireless technology turned on
⇆	Communication ongoing
🔒	View locked
🔓	View is not locked
	Level or Aqua TROLL: Factory calibration has expired. RDO PRO-X: RDO-X Sensor Cap has exceeded its recommended service period, or the cap has sustained significant abrasion and should be replaced.
	User calibration has expired, based on the "Calibrate Interval"
	Depth of water
	Level—Depth to water
	Level—Surface elevation
A	Probe A not communicating
B	Probe B not communicating
1	Relay 1 active
2	Relay 2 active

Setting the Log Interval

The log interval specifies how often the Con TROLL PRO logs data from the probes. On the DC-L model, the log interval also sets the interval that the controller checks the probes and updates the configured outputs when the display is off.

1. From the main screen, select Menu, Settings, Log Interval.
2. Select the desired interval and select Enter.

> ✔ IMPORTANT: Any change to the configuration of the parameters (add probe, delete probe, enable/disable parameters, change units, etc.) will cause the data log to be erased and restarted.

Setting the Communications Preferences

Setting the Device Address for the Controller (RS485 Instruments Only)

1. From the main screen, select Menu, Settings, Communication.
2. Select Address.
3. Enter a value between 1 and 245.

> ✔ The address of Probe A is the controller address plus 1. The address of Probe B is the controller address plus 2.

Setting the RS485 Settings for the Controller

1. From the main screen, select Menu, Settings, Communication.
2. Select RS485. You can choose from the following options:

   - Mode (Choose RTU or ASCII)
   - Baud Rate (Choose 9600, 19200, 38400, or 57600)
   - Data Bits (Choose 8)
   - Parity (Choose Even, Odd, or None)
   - Stop Bits (Choose 1 or 2)
   - Defaults (Restore RS485 default settings, yes or no)

Enabling *Bluetooth* Communications on the Controller

1. From the main screen, select Menu, Settings, Communication, *Bluetooth*, Mode.
2. You can choose from the following options:

   - Disabled—*Bluetooth* is always off.
   - Manual—When this setting is selected, a *Bluetooth* On/*Bluetooth* Off toggle setting will be added to the list of Main Menu items. Note that when *Bluetooth* communications are turned on the *Bluetooth* symbol appears on the main display. In Manual Mode, *Bluetooth* automatically turns off after one minute of inactivity.
   - Always On—Recommended for use with AC and AC-L versions only.

Pairing *Bluetooth* Devices

In order for a *Bluetooth* device (such as a RuggedReader or a computer) to communicate with the controller, it must be "paired." For security purposes, the following procedure must be used to pair a device with the controller before communication is possible.

1. From the main screen, select Menu, Settings, Communication, *Bluetooth*, Enable Pairing.
2. Configure the *Bluetooth* settings on the handheld device or computer.

3. When pairing between the controller and the ***Bluetooth*** device is successful the controller screen will show "Pairing Successful."

4. Select OK.

After a device is paired with the Con TROLL PRO, it can connect to the Con TROLL PRO any time ***Bluetooth*** is turned on.

Administrator and Password Access

You may set up the controller with passwords for an administrator and a single user.

The User can access the Calibrate, Log Data, Hold Outputs, and Diagnostics menus. The Administrator can access all functions, most notably, the Settings menu. If there is no administrator code set, the User becomes the default Administrator and can access all functions. To remove pass code-protected access, enter "0000" for all codes.

1. From the main screen, select Menu, Settings, Security Code, Administrator.

2. Set a 4-digit code for the Administrator using the arrow keys. Select Enter.

3. Select User. Set a 4-digit code for the User using the arrow keys. Select Enter.

Configuring Probes

Adding a Probe After Initial Configuration or Deletion

1. From the main screen, select Menu, Settings, Probes.

2. Select Probe A or B, then Add Probe.

3. The Add Probe screen appears with the name of the sensor that is wired in this position. If there is no probe detected, the display will tell you that no probe is connected. Select Enter to add and configure the probe.

Deleting a Probe

If you plan to permanently remove a probe or remove the probe and replace it with a different type of probe, follow the steps below.

1. From the main screen, select Menu, Settings, Probes.

2. Highlight the probe that you want to remove and press Select.

3. Use the arrow keys to scroll down to Delete Probe.

4. Press Select, then Enter to confirm.

5. The probe has been deleted from the configuration. Refer to the Con TROLL PRO Installation Manual to physically remove the probe from the controller and add a different probe.

Replacing a Probe

If you want to replace a probe with the same model and type of probe (i.e., Level TROLL 300 with a Level TROLL 300 or Aqua TROLL 100 with an Aqua TROLL 100), you can replace a probe directly and retain the existing settings.

1. Refer to the Con TROLL PRO Installation Manual, Input/Output Connection for directions on safely disconnecting the existing probe and replacing it with the same model of probe.

2. From the main screen, select Menu, Settings, Probes, the probe type, Replace Probe, Enter. The controller will configure the probe.

3. Press and hold the Back option to return to the display screen.

Enabling and Disabling Parameters

In most situations, you will only need to monitor or log specific parameters rather than every possible parameter. For example, each probe and the controller are capable of measuring/logging temperature, but you may only want to measure temperature from one probe. Thus, you will want to disable some parameters while leaving others enabled.

1. Select Menu, Settings, Probes.

2. Select a probe, then select parameters.

3. Select a parameter from the list and select Disable to stop logging or viewing that parameter.

> ✓ Any change to the configuration of the parameters (add probe, delete probe, enable/disable parameters, change units, etc.) will cause the data log to be erased and restarted.

Setting Parameter Units

1. From the main screen, select Menu, Settings, Probes.
2. Select a probe.
3. Select parameters.
4. Use the arrow keys to scroll to the selected parameter. Select Enter.
5. Select Units.
6. Use the arrow keys to scroll to the correct unit of measure. Select Enter.

Settings Parameter Resolution (Setting Significant Units)

1. From the main screen, select Menu, Settings, Probes.
2. Select a probe. (Remember that Probe C is the controller.)
3. Select Parameters.
4. Use the arrow keys to scroll to the selected parameter. Select Enter.
5. Select Resolution.
6. Continue to press Select in order to move the decimal point. When you achieve the desired resolution, press Back.

Setting the Sentinel Value (Offline/Error Value)

To set a value to display when the probe returns an error condition for a parameter.

1. Select Menu, Settings, Probes.
2. Select a probe. (Remember that Probe C is the controller.)
3. Select Parameters.
4. Use the arrow keys to scroll to the selected parameter. Select Enter.
5. Select Sentinel.
6. Use the arrow keys to set the sentinel (error) value. Select Enter.

RDO PRO or RDO PRO-X Probe

Configuring RDO PRO or RDO PRO-X Options

The RDO PRO and the RDO PRO-X probes are both compatible with the Con TROLL PRO.

Barometer

1. From the main screen, select Menu, Settings, Probes.

2. Select the RDO PRO or RDO PRO-X Probe.

3. Select Options, then Barometer.

4. Choose between Fixed or Automatic compensation.

   - If you select "Fixed," you must then enter a barometric value.

   - If you select "Automatic," the Con TROLL PRO will provide a barometric value to the probe.

Salinity

You can enter a fixed salinity correction value under all circumstances. You can enter an automatic/dynamic value for salinity correction if you also have an Aqua TROLL 100, 200, or 400 installed.

1. From the main screen, select Menu, Settings, Probes.

2. Select the RDO PRO or RDO PRO-X Probe.

3. Select Options, then Salinity.

4. Choose Fixed or Automatic.

   - If you select "Fixed," you must then enter a salinity value.

   - If you select "Automatic," the probe will pull a salinity value from the Aqua TROLL if installed.

Calibration Interval

This function will warn you when you are overdue for a calibration by displaying the graph symbol on the screen.

1. From the main screen, select Menu, Settings, Probes.

2. Select the RDO PRO or RDO PRO-X Probe.

3. Select Options, then Calibrate Interval.

4. Select the preferred interval (ranging from one week to 12 months) from the on-screen options.

Calibrating the RDO PRO or RDO PRO-X Probe

Calibration Options

From the Con TROLL PRO Main menu, select Calibrate, then select the RDO PRO or RDO PRO-X Probe. You will have the following options.

- Saturation—Choose this option if you want to perform a one-or two-point percent saturation calibration.

- Concentration—Choose this option if you want to calibrate the concentration values to a concentration obtained using another method.
- Defaults—Choose this option if you want to restore the default calibration values.

1-Point Calibration

Water-Saturated Air

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

1	Storage cap
2	Vented calibration cap

Figure 3.1 Storage cap and vented calibration cap shown together

2. Place the sponge wafer in the bottom of the calibration chamber and saturate with approximately 10 mL water.

3. Gently dry the instrument and sensing material with a paper towel, making sure there is no water or debris on the instrument or on the sensing surface.

4. Place the instrument into the calibration chamber about 2.5 cm (1 in.) above the water-saturated sponge.

Figure 3.2 Calibration chamber with water-saturated sponge

5. Allow 5 to 10 minutes for temperature stabilization prior to starting the calibration procedure. Do not leave the instrument in the calibration chamber for more than 30 minutes. This can allow condensation to form on the sensing material, which will produce false low readings after calibration. If condensation does occur, remove the instrument, dry the sensing material, place the instrument in the chamber, and calibrate.

Controller 1-Point Calibration

1. From the Con TROLL PRO Main screen, select Menu, Calibrate, then RDO PRO.

2. Select Saturation, then select 1-point cal.

3. Press OK to start the calibration.

4. You will see the Calibration Beginning icon next to the mg/L reading. When the calibration is complete, choose Stable to accept the calibration or Cancel to return to the pre-existing calibration.

100% Saturation	100% Saturation	100% Saturation
7.04 mg/L ⬤	7.04 mg/L ÷	7.04 mg/L
23.1 °C ⬤	23.1 °C ÷	23.1 °C
Cancel	Nominal Cancel	Stable Cancel
Calibration beginning	Accept or cancel	Accept or cancel
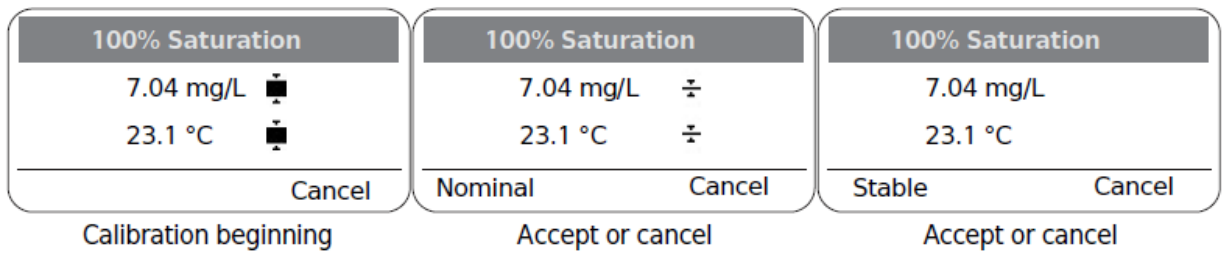
Figure 3.3 Beginning the 1-point calibration; accepting or canceling the calibration.

Controller 2-Point Calibration (100% and 0% Saturation)

100% Calibration Point

1. Set up the calibration equipment. See page 17.

2. From the Con TROLL PRO Main screen, select Menu, Calibrate, RDO PRO or RDO PRO-X.

3. Select Saturation, then select 2-point cal.

4. Press OK to start the 100% saturation calibration.

5. You will see the Calibration Beginning icon next to the % Sat value. When the calibration is complete, choose Stable to accept the 100% calibration point and proceed to the 0% point or Cancel to return to the previous calibration.

0% Calibration Point

1. Remove the sponge from the calibration chamber.

2. Ensure the calibration cap, with the vent hole, is on the top of the calibration chamber.

3. Fill the calibration chamber to the fill line with approximately 60 mL of fresh sodium sulfite solution.

1	Fill line
2	Temperature sensor

Figure 3.4 Calibration chamber fill line and submerged sensors

4. Completely submerge the sensor, making sure that the temperature sensor is also under the surface of the solution. Do not allow the sensor to rest completely on the bottom of the calibration chamber. Leave at least 1.25 cm (0.5 in.) between the surface of the sensing material and the bottom of the chamber.

5. Press OK to start the 0% saturation calibration.

6. You will see the Calibration Beginning icon next to the % Sat value. When the calibration is complete, choose Stable to accept the calibration or Cancel to return to the pre-existing calibration.

0% Saturation	0% Saturation	0% Saturation
0.04 mg/L ▪	0.02 mg/L ÷	0.02 mg/L
23.1°C ▪	23.1°C ÷	23.1°C
Cancel	Nominal Cancel	Stable Cancel
Calibration beginning	Accept or cancel	Accept or cancel

Figure 3.5 Beginning the 2-point calibration; accepting or canceling the calibration

7. Once calibrated, remove the probe, and thoroughly rinse with water to remove any excess sodium sulfite.

Calibration using the Concentration Option

1. From the Con TROLL PRO Main screen, select Menu, Calibrate, RDO PRO or RDO PRO-X.

2. Select Concentration.

3. With the probe in the water, take a measurement using a method of choice.

4. Enter the value from your reference method as the "Standard Value" shown on the Con TROLL PRO screen. Select Enter.

Calibration Hints

Nominal Stability vs. Full Stability

To meet the criteria for a valid calibration point, the change (delta) in probe response is monitored over time. The controller is looking for the calibration solution temperature and the probe readings to settle over a specific time period. The criteria for Full Stability are designed to meet the published specifications. The criteria for Nominal Stability are designed to shorten the calibration time when an approximate calibration is acceptable.

Factory Recalibration

Proper maintenance can improve your results and extend the life of the instrument.

- RDO PRO and Aqua TROLL 400 instruments use the RDO Classic Sensor cap that must be replaced annually. When this cap has expired, the exclamation icon appears on screen.

- RDO PRO-X Probes use RDO-X Sensor caps that typically last 2 years. If the RDO-X Sensor cap has exceeded its recommended service period, or if the cap has sustained significant abrasion The Service Needed ⚡ icon appears on screen.

Aqua TROLL 100 and 200 Instruments

Configuring Aqua TROLL 100 and 200 Options

Conductivity/Alpha Coefficient

1. From the main screen, select Menu, Settings, Probes.

2. Select the Aqua TROLL 100 or 200 Instrument.

3. Select Options.

4. Select Conductivity, Alpha.

5. Use the arrow keys to enter the desired coefficient.

6. Select Enter. (The default value is 0.0191.)

Conductivity/Reference Temperature

1. From the main screen, select Menu, Settings, Probes.

2. Select the Aqua TROLL 100 or 200 Instrument.

3. Select Options.

4. Select Conductivity, Tref.

5. Use the arrow keys to enter the desired reference temperature.

6. Select Enter. (The default value is 25° C.)

Conductivity/TDS Factor

1. From the main screen, select Menu, Settings, Probes.

2. Select the Aqua TROLL 100 or 200 Instrument.

3. Select Options.

4. Select Conductivity, TDS.

5. Use the arrow keys to enter the TDS factor.

6. Select Enter. (The default value is 0.6500 ppt.)

Level/Level Mode (Aqua TROLL 200 only)

1. From the main screen, select Menu, Settings, Probes.

2. Select the Aqua TROLL 200 Instrument.

3. Select Options.

4. Select Level, Level Mode.

5. Choose between Depth, Level-DTW, and Level-SE.

   - Depth is the depth of the water above the level sensor.

   - Level-DTW (depth to water) is the distance from the top of a well casing or other level reference down to the water surface.

   - Level-SE (surface elevation) relates the probe measurements to a user-selected level reference.

   > ✔ Refer to the Calibration menu to set the level reference for DTW and SE modes.

Level/Specific Gravity (Aqua TROLL 200 only)

1. From the main screen, select Menu, Settings, Probes.

2. Select the Aqua TROLL 200 Instrument.

3. Select Options.

4. Select Level, Specific Gravity.

5. Choose Fixed or Automatic.

   - For Fixed, enter a desired value and select Enter.

   - For Automatic, the controller will configure the Aqua TROLL to calculate specific gravity automatically.

Calibration Interval

This function will warn you when you are overdue for a user calibration by displaying the graph symbol ⤿ on screen.

1. From the main screen, select Menu, Settings, Probes, Aqua TROLL 200, Options, Cal. Interval.

2. Select the preferred interval from the on-screen options.

Calibrating the Aqua TROLL 100 and 200 Instruments

From the main screen, select Menu, Calibrate, then Aqua TROLL 100 or Aqua TROLL 200. You will have the following options.

- Conductivity
- Zero Pressure (Aqua TROLL 200 only)
- Level Reference (Aqua TROLL 200 only)
- Cal Report
- Defaults

Calibrating Conductivity

The Aqua TROLL 200 Instrument's factory calibration with NIST-traceable standards provides a high degree of linearity across the entire operating range of 5 to 100,000 µS/cm. The Aqua TROLL 200 is capable of meeting its published specifications without requiring additional calibration by the user, as most commercially available standards can introduce a larger potential measurement error than the instrument's initial factory calibration.

> ✔ A user calibration is only recommended if you must conform to a standard operating procedure or if the cell has undergone physical change (e.g., deposits on conductivity cell walls that cannot be removed; physical damage to conductivity cell walls).

1. If you opt to calibrate the Aqua TROLL conductivity cell, refer to the calibration procedure in the Aqua TROLL Operator's Manual for laboratory setup instructions.

2. From the Con TROLL PRO Main menu, select Calibrate, then Aqua TROLL 200 (or 100), then Conductivity.

3. Use the arrow keys to enter the standard value. Select Enter.

4. You will see the Calibration Beginning icon next to the µS/cm value. When the calibration reaches stability, choose Stable to accept the value or Cancel to return to the pre-existing calibration.
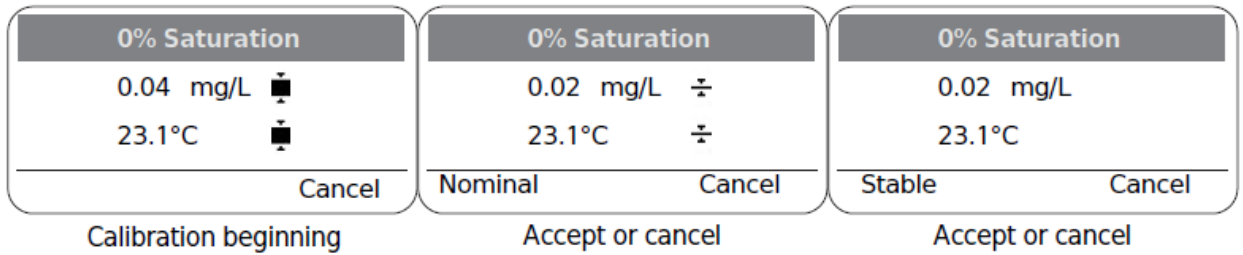
Conductivity	Conductivity	Conductivity
12102 µS/cm ■	12050 µS/cm ÷	12050 µS/cm
23.1 °C ■	23.1 °C ÷	23.1 °C
Cancel	Nominal Cancel	Stable Cancel
Calibration beginning	Accept or cancel	Accept or cancel
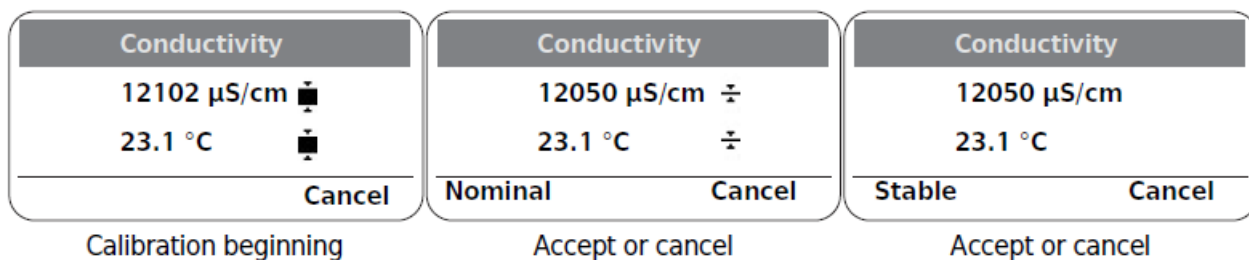
Figure 4.1 Beginning the calibration; accepting or canceling the calibration

Zeroing the Pressure Sensor

Aqua TROLL 200 has been factory calibrated with NIST standards to a greater degree of accuracy than can be achieved in nearly any alternate setting.

> ✔ The pressure sensor in an Aqua TROLL 200 can be "zeroed" in air, but should never be "zeroed" in water. In-Situ Inc. does not recommend zeroing the pressure sensor.

Setting a Level Reference

1. From the main screen, select Menu, Calibrate.

2. Select the Aqua TROLL 200 Instrument.

3. Select Level Reference, and use the arrow keys to enter the level reference value, and Press Enter.

Calibration Hints

Nominal Stability vs. Full Stability

To meet the criteria for a valid calibration point, the change (delta) in probe response is monitored over time. The controller is looking for the calibration solution temperature and the probe readings to settle over a specific time period. The criteria for Full Stability are designed to meet the published specifications. The criteria for Nominal Stability are designed to shorten the calibration time when an approximate calibration is acceptable.

Factory Recalibration

Proper maintenance can improve your results and extend the life of the instrument. When your instrument is overdue for a factory recalibration, the Service Needed ⇕ icon will appear on the display.

- Factory recalibration of the Aqua TROLL Instruments should be performed every 12 to 18 months.

Aqua TROLL 400 Instrument

Configuring the Aqua TROLL 400 Sensor Options

Barometer

1. From the main screen, select Menu, Settings, Probes.

2. Select the Aqua TROLL 400 Instrument.

3. Select Options.

4. Select RDO, Barometer.

5. Use the arrow keys to select "Fixed" or "Auto," and press Enter.

   - If you select "Fixed," you must then enter a barometric value.

   - If you select "Automatic," the Con TROLL PRO will provide a barometric value to the probe.

RDO/Salinity

The Aqua TROLL 400 includes a conductivity sensor. You can use the live values from this sensor for dissolved oxygen calculations or you can enter a default value.

1. From the main screen, select Menu, Settings, Probes.

2. Select the Aqua TROLL 400 Instrument.

3. Select Options.

4. Select RDO, Salinity.

5. Use the arrow key to select "Fixed" or "Auto," and press Enter.

   - If you select "Fixed," use the arrow keys to enter the default salinity value, and press Enter.

Conductivity/Alpha Coefficient

The alpha coefficient is used to convert actual conductivity to specific conductivity. This coefficient is defined by Standard Methods for the Examination of Water and Wastewater based on the chemical composition of the water.

1. From the main screen, select Menu, Settings, Probes.

2. Select the Aqua TROLL 400 Instrument.

3. Select Options.

4. Select Conductivity, Alpha.

5. Use the arrow keys to enter the desired coefficient.

6. Select Enter. (The default value is 0.0191.)

Conductivity/Reference Temperature

Conductivity of a solution changes with temperature, therefore conductivity calibration solution is formulated in relation to a specific temperature called the reference temperature. The Con TROLL PRO default reference temperature is 25° C, but you can change it to reference 20° C if necessary. To determine the reference temperature you should use, refer to your conductivity standard solution.

1. From the main screen, select Menu, Settings, Probes.

2. Select the Aqua TROLL 400 Instrument.

3. Select Options.

4. Select Conductivity, Tref.

5. Use the arrow keys to enter the desired reference temperature.

6. Select Enter. (The default value is 25° C.)

Conductivity/TDS Factor

1. From the main screen, select Menu, Settings, Probes.

2. Select the Aqua TROLL 400 Instrument.

3. Select Options.

4. Select Conductivity, TDS.

5. Use the arrow keys to enter the TDS factor.

6. Select Enter. (The default value is 0.6500 ppt.)

Level/Level Mode

1. From the main screen, select Menu, Settings, Probes.

2. Select the Aqua TROLL 400 Instrument.

3. Select Options.

4. Select Level, Level Mode.

5. Choose between Depth, Level-DTW, and Level-SE.

   - Depth is the depth of the water above the level sensor.

   - Level-DTW (depth to water) is the distance from the top of a well casing or other level reference down to the water surface.

   - Level-SE (surface elevation) relates the probe measurements to a user-selected level reference.

Level/Baro Correction

1. From the main screen, select Menu, Settings, Probes.

2. Select the Aqua TROLL 400 Instrument.

3. Select Options.

4. Select Pressure, Baro Correction.

5. Select "Off" or "On," and select Enter.

   - If you select "On," the probe will apply a barometric correction from the Con TROLL PRO to the reading from the Aqua TROLL pressure sensor.

Level/Specific Gravity

Specific gravity can be used to accurately calculate level measurements based on the dynamic density of solution.

1. From the main screen, select Menu, Settings, Probes.

2. Select the Aqua TROLL 400 Instrument.

3. Select Options.

4. Select Pressure, Specific Gravity.

5. Select "Fixed" or "Auto."

- If you select "Fixed," use the arrow keys to enter a desired value, and select Enter.

- If you select Auto, the Con TROLL PRO will configure the Aqua TROLL 400 to calculate specific gravity using the measurement from the conductivity sensor.

Calibration Interval

This function will warn you when you are overdue for a user calibration by

displaying the graph symbol ⌁ on the screen.

1. From the main screen, select Menu, Settings, Probes.

2. Select the Aqua TROLL 400 Instrument.

3. Select Options.

4. Select Cal. Interval.

5. Use the arrow keys to select the preferred interval from the on-screen options.

Calibrating the Aqua TROLL 400 Instrument

1. From the main screen, select Menu, Calibrate, then Aqua TROLL 400. You will have the following options.

- RDO

- Conductivity

- Level

- pH/ORP 2

2. Place the calibration cap, with the vent hole, on the top of the calibration chamber.

1	Storage cap
2	Calibration cap

Figure 5.1 Storage cap and vented calibration cap shown together

Calibrating the Optical RDO Sensor

Calibration Options

From the main screen, select Menu, Calibrate, Aqua TROLL 400, RDO. You will have the following options.

- Saturation—Choose this option if you want to do a one-or two-point calibration.

- Concentration—Choose this option if you want to calibrate your sensor values to a concentration obtained using another method.

- Cal. Report—Choose this option to view the date of the last calibration. Press the More button to view the Slope and Offset values. Press the OK button when finished.
- Defaults—Choose this option if you want to restore the default calibration.

1-Point Calibration

Water-Saturated Air

1. Place the sponge wafer in the bottom of the calibration chamber and saturate the sponge wafer with approximately 10 mL of water.

2. Gently dry the probe and sensing material with a paper towel, making sure there is no water on the probe and that the sensing element is free of water and fouling.

> ✔ The water temperature should be similar to the sample temperature.

Figure 5.2 Calibration chamber with water-saturated sponge.

3. Place the instrument into the calibration chamber.

> ✔ Make sure there are no water droplets on the sensing element during calibration.

4. Allow 5 to 10 minutes for temperature stabilization prior to calibration. The calibration will stabilize automatically. Do not leave the instrument in the calibration chamber for more than 30 minutes. This can allow condensation to form on the sensing element, giving false low readings after calibration. If condensation does occur, remove the restrictor, dry the sensing element, reattach the restrictor, place the instrument in the chamber, and calibrate.

5. From the Con TROLL PRO main screen, select Menu, Calibrate, Aqua TROLL 400, RDO.

6. Select Saturation, then select One-point cal. Select OK.

7. You will see the "Calibration Beginning" icon next to the mg/L reading. When the calibration is complete, select Stable to accept the calibration or Cancel to return to the pre-existing calibration.

100% Saturation		100% Saturation		100% Saturation	
7.04 mg/L	∎	7.04 mg/L	÷	7.04 mg/L	
23.1 °C	∎	23.1 °C	÷	23.1 °C	
	Cancel	Nominal	Cancel	Stable	Cancel
Calibration beginning		Accept or cancel		Accept or cancel	

Figure 5.3 Beginning the 1-point calibration; accepting or canceling the calibration

2-Point Calibration (100% and 0% Saturation)

100% Calibration Point

1. Set up the calibration equipment. See "1-Point Calibration" on page 26.

2. From the Con TROLL PRO main screen, select Menu, Calibrate, Aqua TROLL 400, RDO.

3. Select Saturation, then select Two-point cal. Select OK.

4. You will see the Calibration Beginning icon next to the % Sat value. When the calibration is complete, choose Stable to accept the 100% calibration point and proceed to the 0% point or Cancel to return to the previous calibration.

5. If you press Stable, the values for the first calibration point will be stored, and you will be prompted to place the probe in the standard solution for the next calibration point.

0% Calibration Point

1. Fill the calibration chamber to the fill line with approximately 150 mL of fresh sodium sulfite solution.

Figure 5.4 Fill the chamber with sodium sulfite to the fill line.

2. Completely submerge the RDO Sensor under the surface of the solution.

3. Select OK.

4. You will see the Calibration Beginning icon next to the % Sat value. When the calibration is complete, choose Stable to accept the calibration or Cancel to return to the pre-existing calibration.
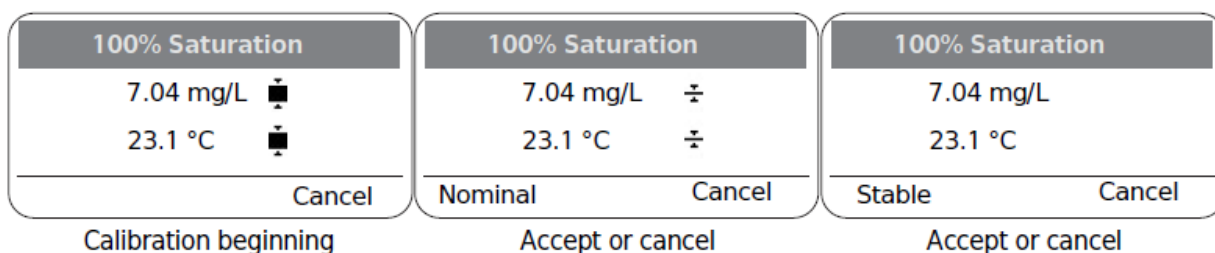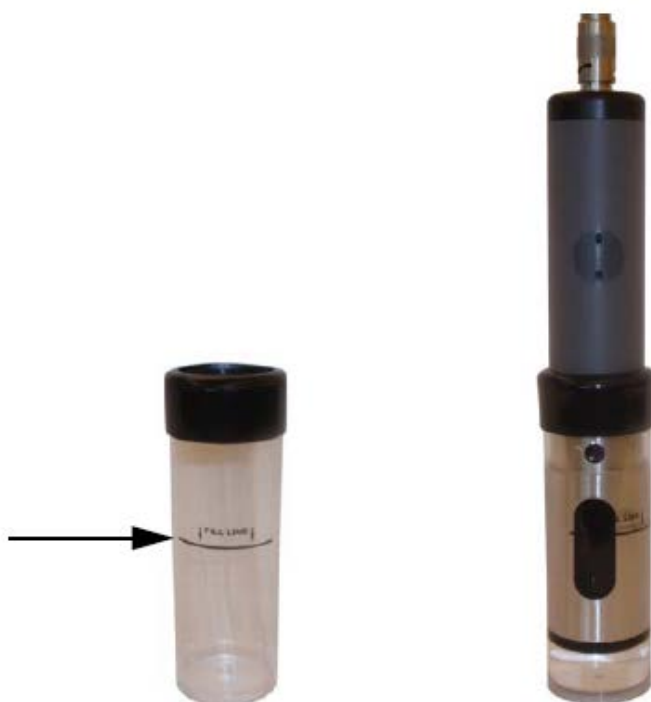
0% Saturation		0% Saturation		0% Saturation	
0.04 mg/L ▮		0.02 mg/L ÷		0.02 mg/L	
23.1°C ▮		23.1°C ÷		23.1°C	
	Cancel	Nominal	Cancel	Stable	Cancel
Calibration beginning		Accept or cancel		Accept or cancel	

Figure 5.5 Beginning the 2-point calibration; accepting or canceling the calibration

5. Once calibrated, remove the sensor, and thoroughly rinse to remove any excess sodium sulfite.

Calibration using the Concentration Option

1. From the Con TROLL PRO main screen, select Menu, Calibrate, Aqua TROLL 400, RDO, Concentration.

2. With the RDO sensor deployed in the water, take a measurement using your method of choice.

3. Enter the value from your reference method as the "Standard Value" shown on the Con TROLL PRO screen. Select Enter.

Calibrating the Conductivity Sensor

The Aqua TROLL 400 Instrument's factory calibration with NIST-traceable standards provides a high degree of linearity across the entire operating range of 5 to 100,000 μS/cm. The Aqua TROLL 400 is capable of meeting its published specifications without requiring additional calibration by the user, as most commercially available standards can introduce a larger potential measurement error than the instrument's initial factory calibration.

> ✓ A user calibration is recommended only if you must conform to a standard operating procedure or if the conductivity cell has undergone physical change (e.g., deposits on conductivity cell walls that cannot be removed; physical damage to conductivity cell walls).

1. From the Con TROLL PRO main screen, select Menu, Calibrate, AquaTROLL 400, Conductivity.

2. Select Calibrate. You are prompted to place the probe in the calibration standard. Fill the calibration cup with approximately 150 mL of the desired calibration solution.

3. Place the instrument in the calibration standard and allow time for the temperature to stabilize.

4. While keeping the instrument and calibration cup upright, gently tap the sides of the cup against your hand, or the edge of a counter, to release air bubbles from the sensor.

5. Press OK.

6. You will see the Calibration Beginning icon next to the μS/cm value. When the calibration reaches stability, select Stable to accept the calibration or Cancel to return to the pre-existing calibration.
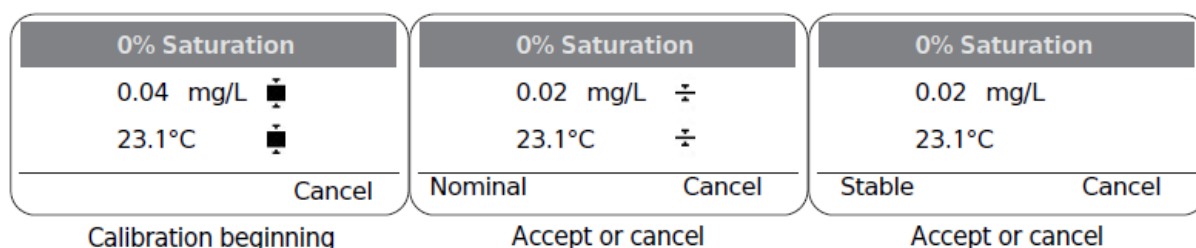
7. If you select Stable, the Standard Value screen appears. The instrument auto-detects the standard solution in which it was calibrated. Use the arrow keys if you need to change the calibration standard value, and select Enter.

8. Press the More key to view the cell constant.
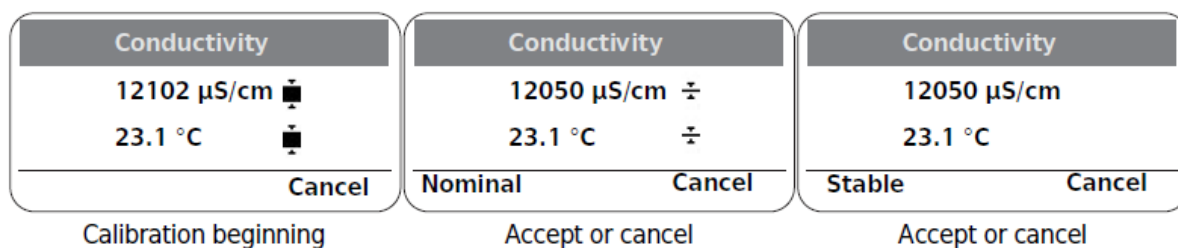
Figure 5.6 Beginning the calibration; accepting or canceling the calibration

Calibrating Pressure/Level

Zero Pressure

The Aqua TROLL 400 Instrument has been factory calibrated with NIST-traceable standards to a greater degree of accuracy than can be achieved in nearly any alternate setting.

> ✓ The pressure sensor can be "zeroed" in air, but should never be "zeroed" in water. In-Situ Inc. does not recommend zeroing the pressure sensor.
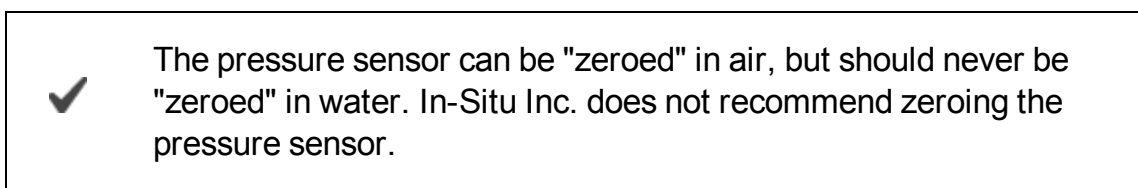
1. From the main screen, select Menu, Calibrate.

2. Select the Aqua TROLL 400 Instrument.

3. Select Level.

4. Select Zero Pressure and wait for the calibration to complete.

5. Select Enter or Cancel.

Calibrating the pH/ORP Sensor

The Aqua TROLL 400 Instrument includes one sensor that measures both pH and ORP, but the two parameters are calibrated separately.

Calibrating the pH Sensor

1. From the Con TROLL PRO main screen, select Menu, Calibrate.

2. Select the Aqua TROLL 400 Instrument.

3. Select pH/ORP.

4. Select pH, and press Select.

5. Select One-point cal., Two-point cal., or Three-point cal., and press Select.

6. Place the instrument in the calibration standard and allow time for the temperature to stabilize.

7. Press OK.

8. You will see the Calibration Beginning icon next to the mV and temperature values. When the calibration reaches stability, select Stable to accept the value or Cancel to return to the pre-existing calibration.

9. When you select Stable, the Standard Value screen appears. The instrument auto-detects the standard buffer in which it was calibrated. Use the arrow keys if you need to change the calibration buffer value, and select Enter.

10. If you are performing a multi-point calibration, you are prompted to place the probe in the next buffer, and press OK.

11. Continue in this manner until the calibration is complete.

Calibrating the ORP Sensor

1. From the Con TROLL PRO main screen, select Menu, Calibrate.

2. Select the Aqua TROLL 400 Instrument.

3. Select pH/ORP.

4. Select ORP, and press Select.

5. Use the arrows to select either Quick Cal, ZoBell's, or Other standard calibration solution, and press Select.

> ✓ The "Other" option should be used when you want to calibrate Aqua TROLL 400 to another instrument, or when you are using a calibration standard other than Quick Cal or ZoBell's.

6. Place the Aqua TROLL 400 in the solution.

7. Press OK.

8. You will see the Calibration Beginning icon next to the mV and temperature values. When the calibration reaches stability, select Stable or Cancel to return to the pre-existing calibration.

9. If you select Stable, the Standard Value screen appears. The instrument auto-detects the calibration standard in which it was calibrated. Use the arrow keys if you need to change the calibration standard value. If you selected "Other" in Step 3, it is important to enter a value.

Calibration Hints

Nominal Stability vs. Full Stability

To meet the criteria for a valid calibration point, the change (delta) in sensor response is monitored over time. The controller is looking for the calibration solution temperature and the sensor readings to settle over a specific time period. The criteria for Full Stability are designed to meet the published specifications. The criteria for Nominal Stability are designed to shorten the calibration time when an approximate calibration is acceptable.

Factory Recalibration

Proper maintenance can improve your results and extend the life of the instrument. When the instrument is overdue for a factory recalibration, the Service Needed ↕ icon will appear on the display.

- Factory recalibration of the Aqua TROLL 400 Instrument should be performed every 12 months.
- RDO Classic Sensor caps must be replaced annually.

Cal. Report

1. From the main screen, select Menu, Calibrate.

2. Select the Aqua TROLL 400 Instrument.

3. Select the appropriate parameter.

4. Select Cal Report to view the last time the sensor was calibrated. Select More to view more calibration information.

Defaults

1. From the main screen, select Menu, Calibrate.

2. Select the Aqua TROLL 400 Instrument.

3. Select the appropriate parameter.

4. Select Defaults and Enter to restore the sensor to factory calibrated values.

Level TROLL Instrument

Configuring Level TROLL Options

Setting the Level Mode

1. From the main screen, select Menu, Settings, Probes.

2. Select the Level TROLL Instrument.

3. Select Options, then Level Mode.

4. Choose between Depth, Level-DTW, and Level-SE.

    - Depth is the depth of the water above the level sensor.

    - Level-DTW (depth to water) is the distance from the top of a well casing or other level reference down to the water surface.

    - Level-SE (surface elevation) relates the instrument measurements to a user-selected level reference.

    > ✔ Refer to the Calibration menu to set the level reference for DTW and SE modes.

Entering the Specific Gravity

1. From the main screen, select Menu, Settings, Probes.

2. Select the Level TROLL Instrument.

3. Select Options, then Specific Gravity.

4. Enter a desired value and select Enter.

Setting the Calibration Interval

This function will warn you when you are overdue for a user calibration by displaying the graph symbol ⤧ on screen.

1. From the main screen, select Menu, Settings, Probes.

2. Select the Level TROLL Instrument.

3. Select Options, then Calibrate Interval.

4. Select the preferred interval (ranging from one week to 12 months) from the on screen options.

Calibrating the Level TROLL Instrument

The Level TROLL instrument has been factory calibrated with NIST-traceable standards to a greater degree of accuracy than can be achieved in nearly any alternate setting.

Zero Pressure

> ✔ The pressure sensor in the Level TROLL Instrument can be "zeroed" in air, but should never be "zeroed" in water. In-Situ Inc. does not recommend zeroing the pressure sensor.

1. From the main screen, select Menu, Calibrate, Level TROLL, then Zero Pressure.

Calibration Hints

Nominal Stability vs. Full Stability

To meet the criteria for a valid calibration point, the change (delta) in sensor response is monitored over time. The controller is looking for the calibration solution temperature and the sensor readings to settle over a specific time period. The criteria for Full Stability are designed to meet the published specifications. The criteria for Nominal Stability are designed to shorten the calibration time when an approximate calibration is acceptable.

Factory Recalibration

Proper maintenance can improve your results and extend the life of the instrument. When the instrument is overdue for a factory recalibration, the Service Needed ⇕ icon will appear on the display.

- Factory recalibration of the Level TROLL Instruments should be performed annually.

Current Loops and Relays

Configure the Current Loops

If you have wired 1 or 2 current loop outputs as described in the Con TROLL PRO Installation Manual, configure these outputs after all probes and parameters have been configured.

1. From the main screen, select Menu, Settings, Outputs, then Current Loops.

2. Choose the appropriate current loop.

3. Under each current loop, you will have 6 options to choose from.

   - Enable/Disable: Choose to enable or disable the current loop.
   - Parameter: Select a probe and corresponding parameter to output.
   - 4 mA Value: Enter the value for the monitored parameter to correspond with 4 mA.
   - 20 mA Value: Enter the value for the monitored parameter to correspond with 20 mA.
   - 4 mA Trim: Adjust the 4 mA value of the controller to achieve a loop current of 4 mA.
   - 20 mA Trim: Adjust the 20 mA value of the controller to achieve a loop current of 20 mA.

4. Add a second loop if necessary.

Configure the Relays

If you have wired 1 or 2 relays as described in the Con TROLL PRO Installation Manual, configure these outputs after all probes and parameters have been configured.

1. From the main screen, select Menu, Settings, Outputs, then Relays.

2. Select Relay 1 or Relay 2.

> ✓ If your system was wired to make use of both a low and a high-voltage relay on Relay 1 or Relay 2, be aware that the relays will activate together.

3. Under each relay, you will have 6 options to choose from.

   - Enable/Disable: Choose to enable or disable the relay.
   - Select Mode, then choose High Alarm or Low Alarm.
   - Select Parameter to scroll through the list of available parameters and select a parameter.
   - Select Setpoint to enter the value to turn the relay on.
   - Select Deadband to enter the difference in parameter value to turn the relay off.
   - Select Test to turn the Relay on or off to test the system.

Alarms Setpoints and Deadbands

High Alarm Mode

- The relay is turned on if the current reading is equal to or greater than the setpoint value.

- The relay is turned off if the current reading is less than or equal to the setpoint minus the deadband.
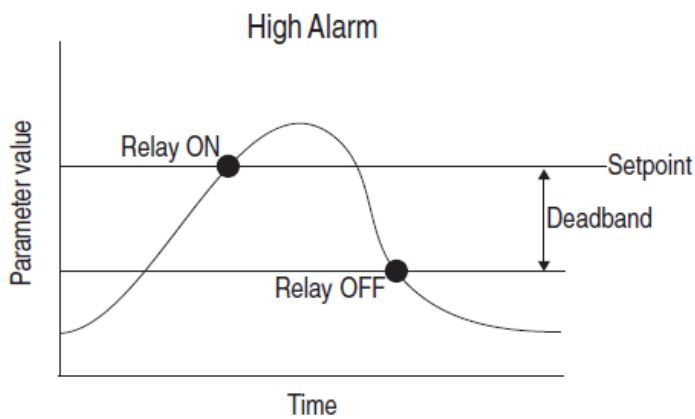
Figure 8.1 High Alarm relay behavior

Low Alarm Mode

- The relay is turned on if the current reading is equal to or less than the setpoint value.

- The relay is turned off if the current reading is greater than or equal to the setpoint plus the deadband.
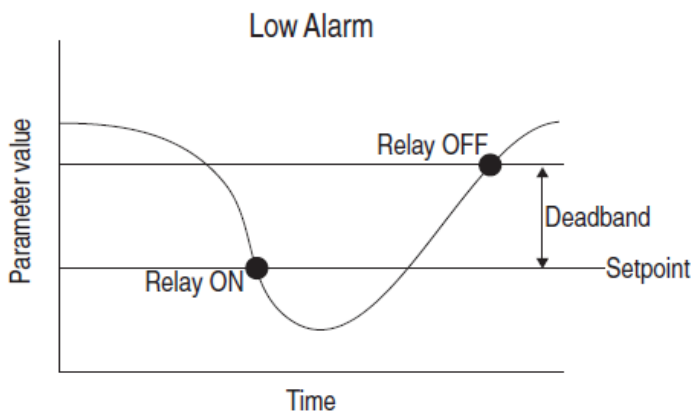
Figure 8.2 Low Alarm relay behavior

Hold (Pause) the Outputs

You may temporarily pause the outputs.

1. From the main screen, select Menu, Hold Outputs. All measurement updates will stop and the current values and outputs will be held until you select Resume.

2. You can use the View function and arrow keys to scroll through the parameters.

Logged Data

Con TROLL PRO Models AC-L and DC-L have logging capabilities. Parameters are logged according to a set value as described in ***Setting the Log Interval*** The logged parameters are those enabled in ***Enabling and Disabling Parameters***

Viewing Logged Data

1. From the main screen, select Menu, Data Log.

2. Select the probe and parameter that you want to view.

> ✔ Probe A parameters are labeled with A. Probe B parameters are labeled with B, and Con TROLL PRO parameters are labeled with C.

3. Use the arrow keys to scroll through the data.

Downloading Data Using Win-Situ 5 and a PC

Configuring the *Bluetooth* Utility for PCs with Factory-Enabled Bluetooth Communications

1. Open the ***Bluetooth*** Devices utility. Click the Add button.
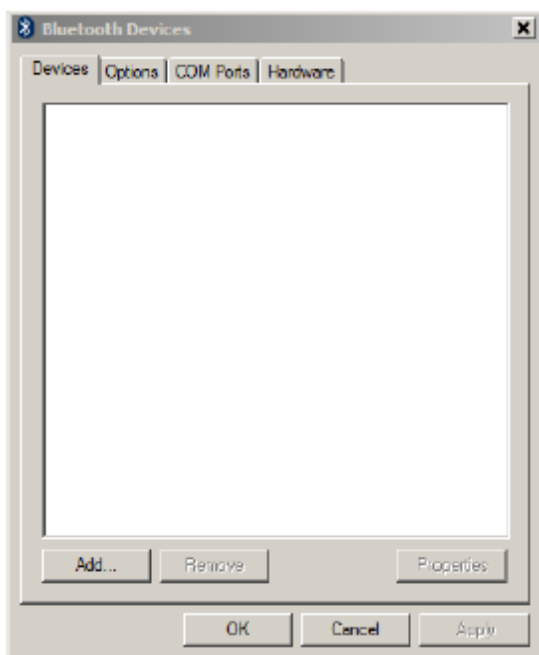
2. The Add ***Bluetooth*** Device Wizard opens. Click the Next button.

3. Set the Con TROLL PRO in the Enable Pairing mode. From the main screen select Menu, Settings, Communication, Bluetooth, Enable pairing.

4. The Wizard will search for the Con TROLL PRO device.
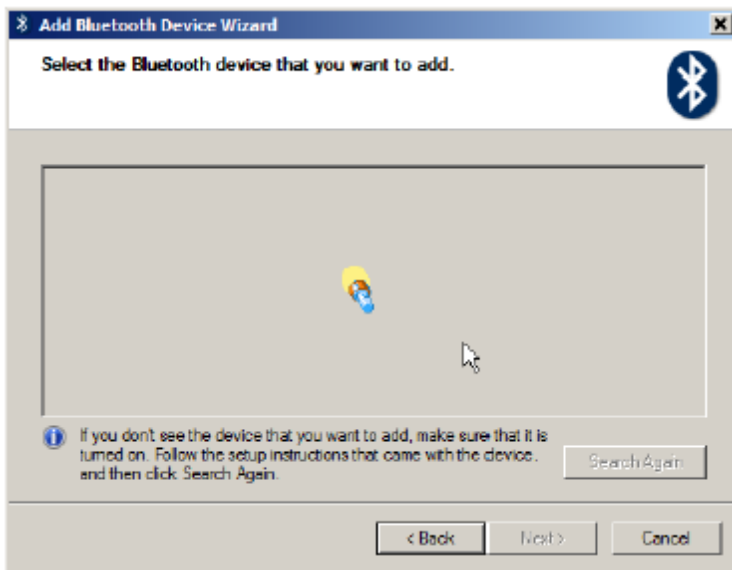
5. Select the Con TROLL PRO device.
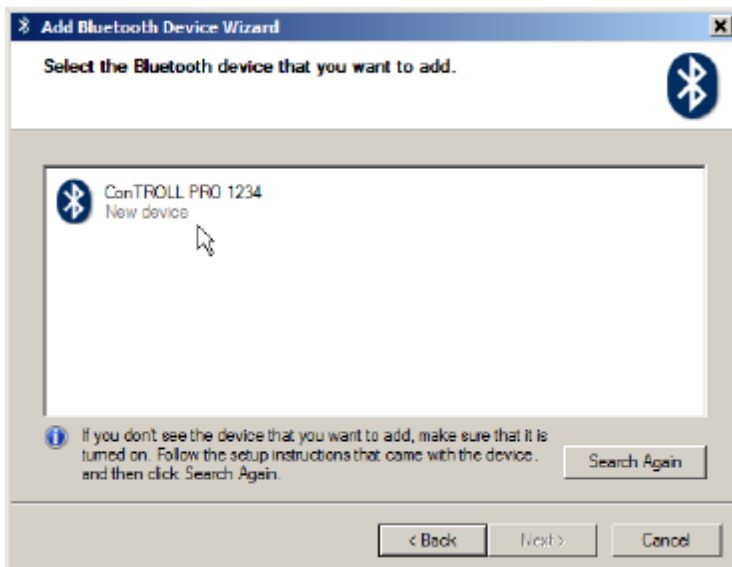
6. If you are prompted for a passkey or a PIN enter 0000.
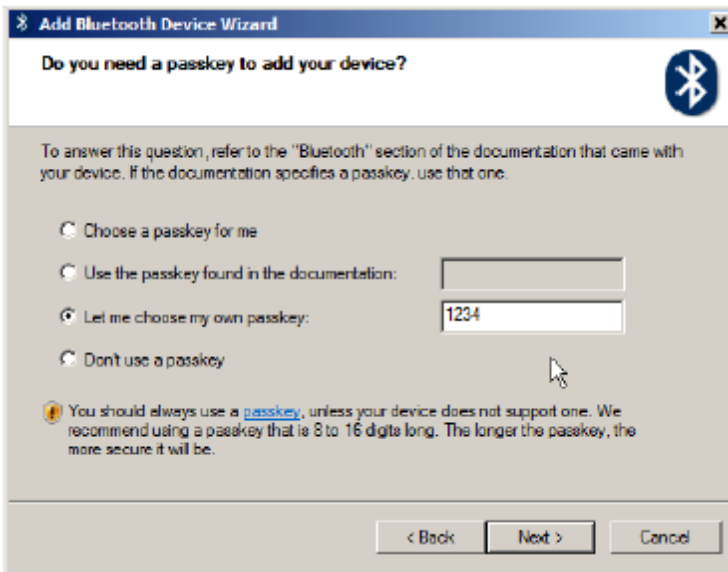
7. Click the Finish button.

8. Open the Bluetooth Devices utility.
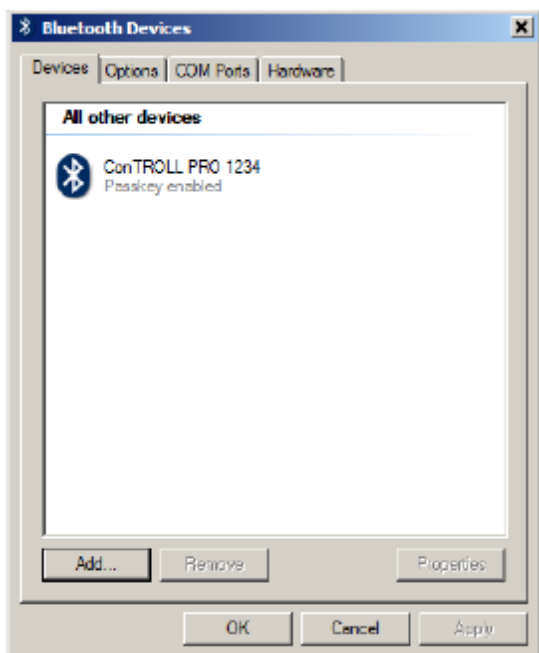
9. Select the Options tab. Select the check boxes shown below.
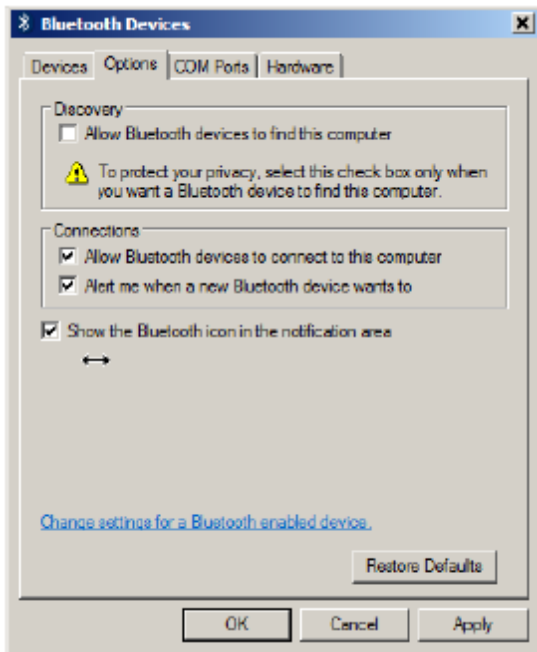
10. Click the COM Ports tab. Note the Port number of the Outgoing port (in this example, Port 17). You will need to select this port in the Win-Situ 5 Comm Settings window.
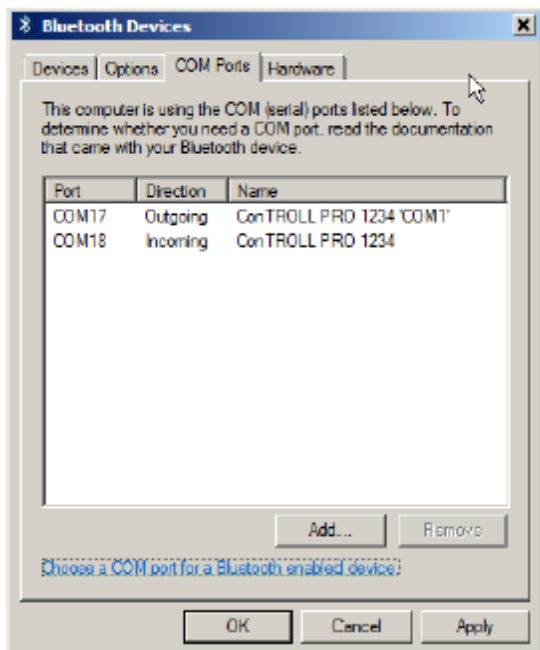
Configuring the *Bluetooth* Utility for PCs Not Factory-Enabled with Bluetooth Communications (Example)

The following example shows how to configure the *Bluetooth* utility provided with the Cirago *Bluetooth* USB Adapter using Toshiba 6.0 Software and Drivers. If you have a different third-party *Bluetooth* USB adapter and software CD, you will have a different set of steps. The steps below are provided for illustrative purposes only.

1. Install the Bluetooth drivers from the manufacturers disk provided with the Bluetooth hardware adapter.

2. Start the Bluetooth connection manager from the icon in the bottom right corner of the screen.

3. Click the "New Connection" button to start the connection Wizard. Select the "Express Mode" option and click Next. Allow the unit to search for devices.

4. When the search is complete, the device list will be displayed. Each Con TROLL PRO will be displayed with their respective site names. If a site name is not yet programmed into the Con TROLL PRO, the displayed name will be the serial number of the unit. Select the Con TROLL PRO you want to connect to and click Next. The software will map a virtual serial port to the *Bluetooth* connection of the selected Con TROLL PRO.
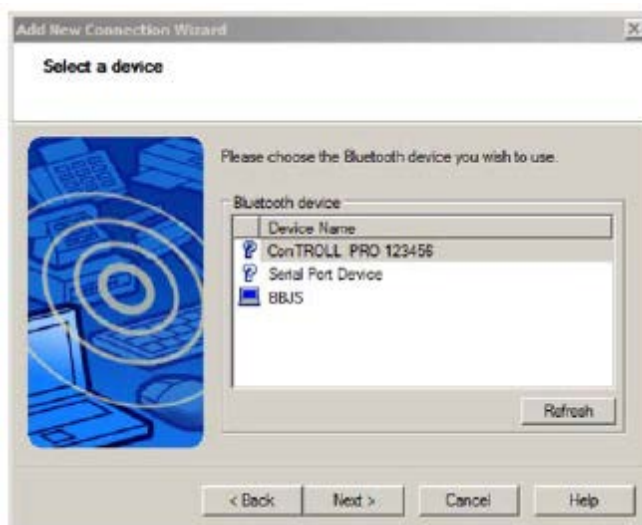
5. Click Next and the connection Wizard will complete and return to the connection manager. To open the *Bluetooth* connection for use, select the connection and double click it, or right click and select "Connect."

6. Each time you connect, you will have to enter the passkey. The passkey for the Con TROLL PRO is by default its serial number. In our example, we have to enter 123456. If an Administrator password is configured for the local display, the passkey will be that password.

7. Once connected, the connection manager will show the *Bluetooth* connection as active.

Connecting a TROLL Com Communication Cable to the Controller (*Bluetooth* Alternative)

Wiring a direct connection to the ConTROLL PRO may be helpful to some customers who do not want to connect to Win-Situ 5 with a *Bluetooth* connection.

1. Users can hard-wire a stripped-and-tinned RuggedCable System and TROLL Com directly to a ConTROLL Pro monitor instead of connecting with a Bluetooth connection. Connect the cable to the PLC board.

Connect black wire to GND
Connect green wire from cable to 485 A-
Connect blue wire from cable to 485 B+

2. After wiring the stripped-and-tinned Rugged Cable, connect either a cable connect USB or RS232 TROLL Com communication cable to the twist-lock connector on the cable.

3. Attach the TROLL Com to a PC running Win-Situ 5 or a RuggedReader running Win-Situ Mobile.

4. Click the Connect button to initiate communications between the controller and the PC software.

Connecting the Con TROLL PRO to Win-Situ 5 Software

1. Install Win-Situ 5 from the In-Situ software CD. Open Win-Situ 5.

2. In the Win-Situ 5 menu bar, select Preferences, then Comm Settings.

3. Make sure that the communication settings are set as follows.
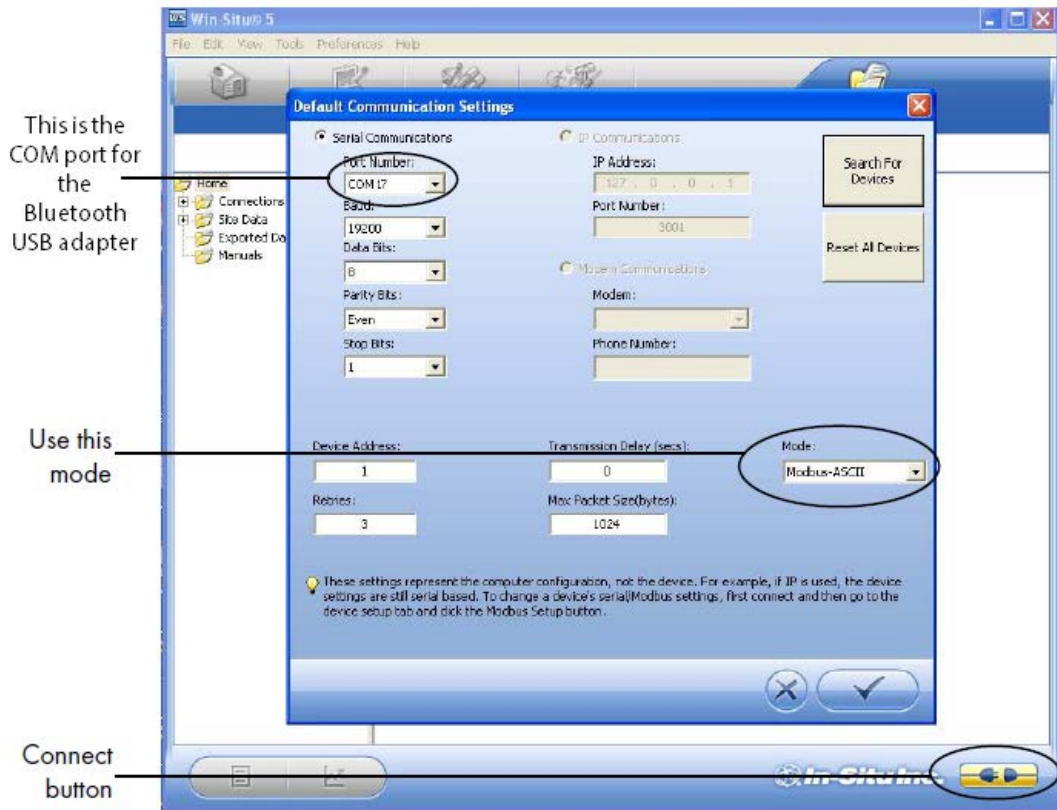
4. Click the Connect button. The Home screen appears. It displays the ambient temperature and barometric pressure measured by the Con TROLL PRO device. The software also creates a log file using the serial number of your Con TROLL PRO device.

5. Click the Logging tab.
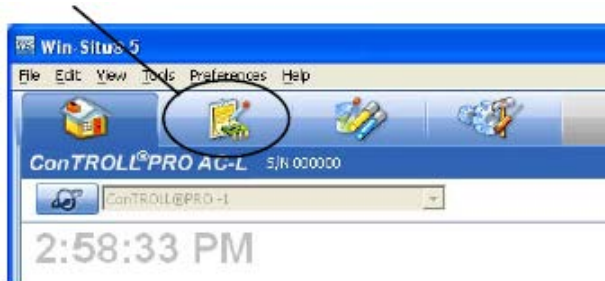
6. Select the log and click the Download button.

My Data tab

Select log
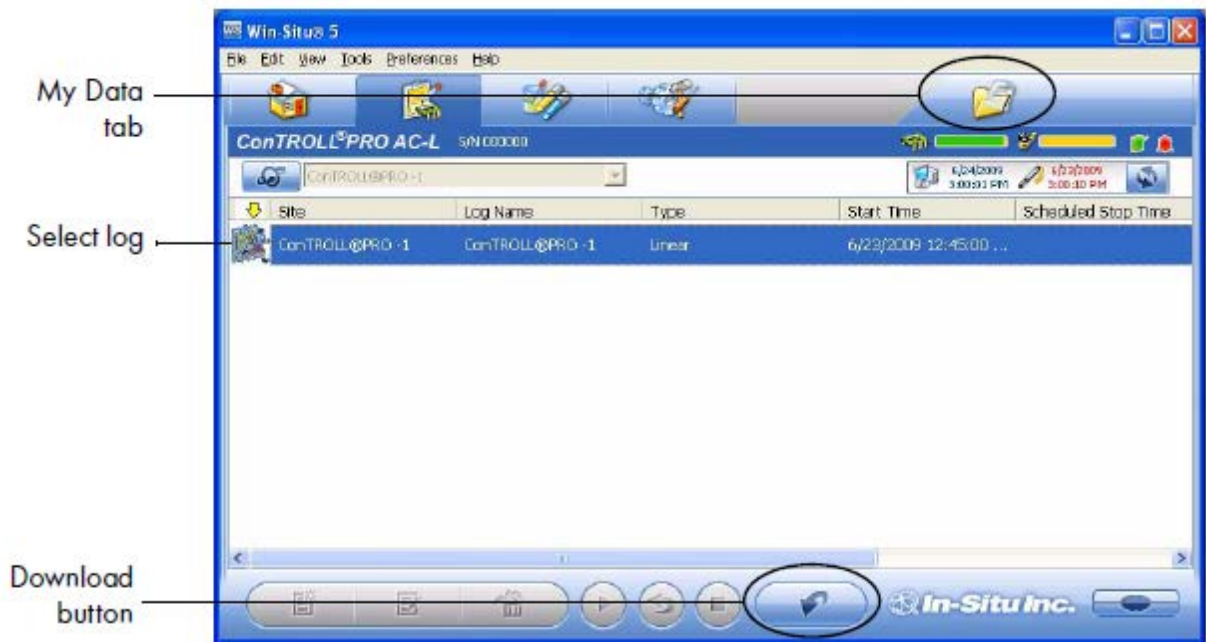
Download button

7. Click the My Data tab shown in the figure above. You can view your data in the right window or download it as a *.csv or *.txt file.

8. To export, right click the log in the data tree and select Export to CSV or Export to Text.

Right click on the data log shown
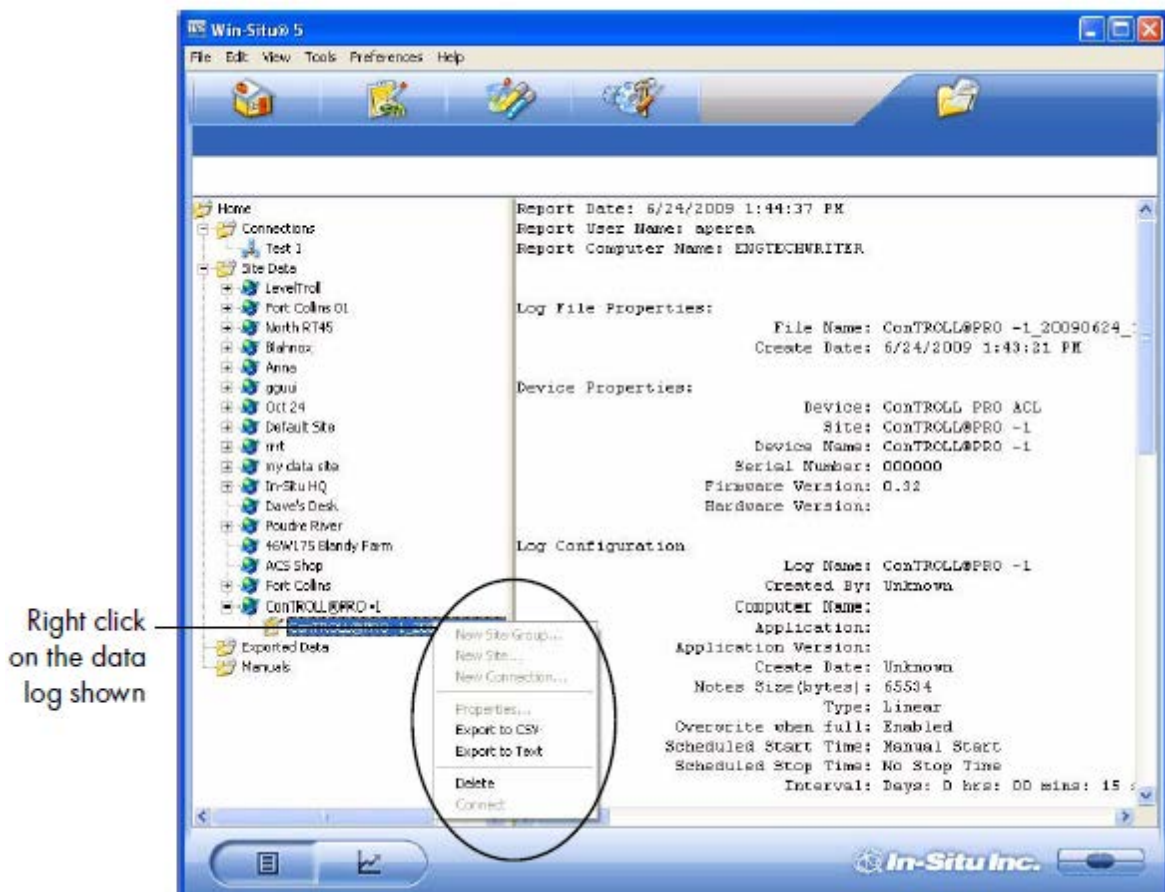
9. Click the Connect button to disconnect your *Bluetooth* communications.

Downloading Data using Win-Situ Mobile and a RuggedReader Handheld PC

Configuring the *Bluetooth* Utility on the RuggedReader PC

1. From the Start menu, select Settings.

2. Tap the Connections tab, then tap the **Bluetooth** icon.
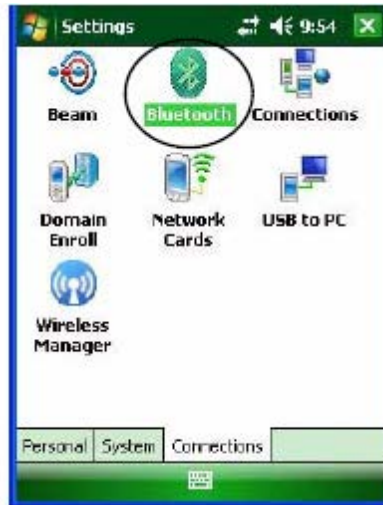
3. Tap Add new device. Select the Con TROLL PRO device and tap Next.

4. Enter the passcode. The passcode for the Con TROLL PRO is by default its serial number. If an Administrator password is configured for the local display, the passkey will be that password.Tap Next. If the password is successful, the Device Added message will appear.

5. Click Done, then select the Com Ports tab. Tap New Outgoing Port.
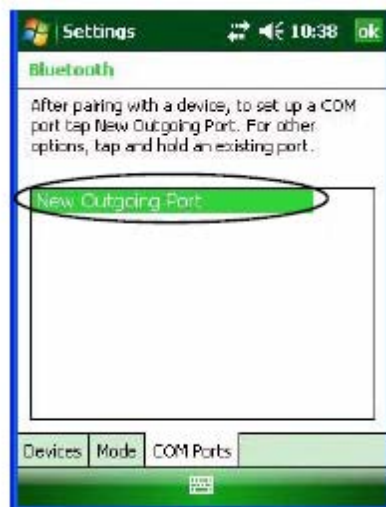
6. Select your Con TROLL PRO device. Tap Next.

7. Make note of the Com Port number (COM2 in this example). Tap Finish.

Connecting the Con TROLL PRO to Win-Situ Mobile Software

1. Tap Start, then Win-Situ Mobile.

2. Tap File, then Comm Settings.

3. Select Customize serial settings and tap the forward arrow. A warning appears. Tap the Yes button.

4. A series of screens will appear. Move through them by tapping the forward arrow button.

   - Make sure that the Port Number matches the port number assigned by the Bluetooth Utility in the previous section.

   - Make sure that ASCII, not RTU, is selected. Tap the Check Mark button.
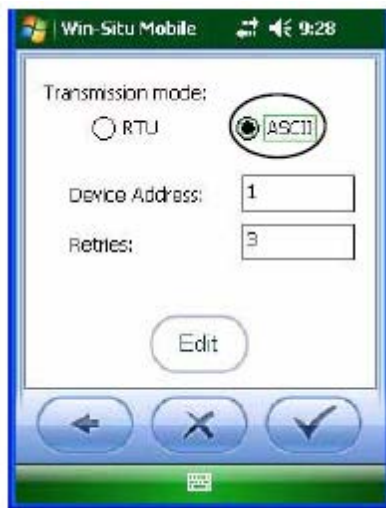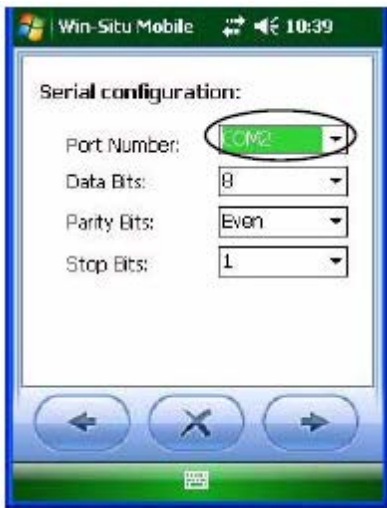
5. You will return to the "Home" screen. Tap the yellow Connect button.The temperature and barometric pressure from the Con TROLL PRO will appear.

6. Tap the View menu, then select Logging.

7. Tap the Con TROLL PRO log to highlight it. Then tap the Download button. Select the how much data to download: All, New, or a set Interval. Tap the Check Mark button to begin the download.

8. Tap the Check Mark button when the download is complete. You may also view the data now. Select Yes, to view the data.

9. The data log will open. Each parameter is selectable from the pull-down menu.
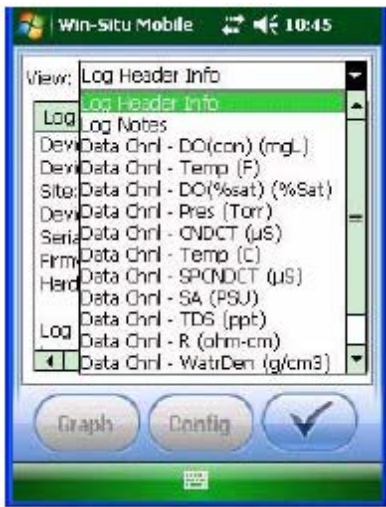
10. To export the data to csv format, tap File, then Options. Tap Export All Now, then the Check Mark button to export all data from this log to csv.
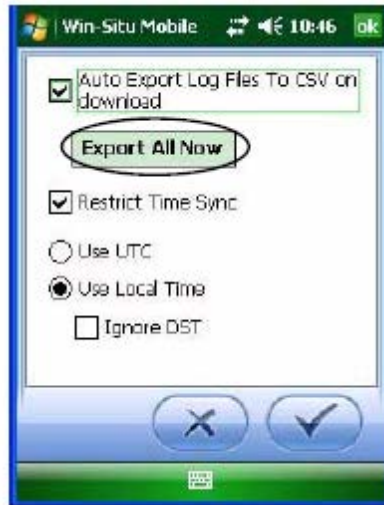
Bluetooth Special Hints

The **Bluetooth** Connection Manager has several helpful functions.

- Rename your **Bluetooth** connection to something more meaningful. Right click the connection in the **Bluetooth** connection manager and select the rename menu option.

- Use this menu to disconnect and connect the **Bluetooth** link.
- Using this menu to select "Detail" and have Win-Situ launched automatically when you connect the **Bluetooth** link.

Troubleshooting

Diagnostics

Con TROLL PRO diagnostics allow you to find serial numbers, firmware and hardware versions, calibration, and power information.

1. Select Menu, Diagnostics.

2. Select the probe, then Enter.

Con Troll PRO Diagnostics Menu

- Serial number
- Firmware version
- Hardware version
- External power voltage

RDO PRO, RDO PRO-X, RDO Titan, AquaTROLL 400

- Serial number
- Firmware version
- Hardware version
- Cap expiration date
- Cap serial number

Level TROLL (300, 400, 500, 700) and AquaTROLL 200

- Serial number
- Firmware version
- Hardware version
- Sensor range and type
- Last factory calibration date
- External power voltage
- Battery % remaining

Aqua TROLL 100

- Serial number
- Firmware version
- Hardware version
- Last factory calibration date
- External power voltage
- Battery % remaining

Special Note Regarding RDO Cap Placement

The Con TROLL PRO will not provide a warning message when the RDO probe cap is nearing expiration. However, the cap expiration date is available in the RDO diagnostics menu. When the cap is expired, the Con TROLL PRO screen will display the following icon for the probe ⇕.

Finding Calibration Data and Constants

1. Select Menu, Diagnostics.

2. Select the probe, then Enter.

3. Scroll down to the Cal option. Select Enter.

Stored calibration data

RDO PRO	Level TROLL	Aqua TROLL
Slope	None	Cell constant
Offset	None	Cell constant

Troubleshooting Power Issues

⚠️ Danger

Only properly trained and qualified personnel should troubleshoot the power connections described here. See the Installation Manual for additional wiring and hazard information.

⚠️ Danger

On AC models, make sure that power to the instrument is disconnected before removing the protective AC panel or troubleshooting AC connections. See the Installation Manual for additional wiring and hazard information.

```
┌─────────────────────┐
│     Con TROLL PRO    │
│     not turning on   │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│  Check external power.│
│  Use a volt meter to test│
│  AC or DC power source.│
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│  Use a volt meter to │
│  check the clock battery.│
│  Replace if necessary.│
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ Check the wiring connec-│
│ tions. Are they secure and│
│   correct? Make sure the│
│  insulation is not blocking│
│    the connection.   │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│   Try to turn on the │
│   controller. Does it│
│       connect?       │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│  Contact Technical   │
│      Support.        │
└─────────────────────┘
```
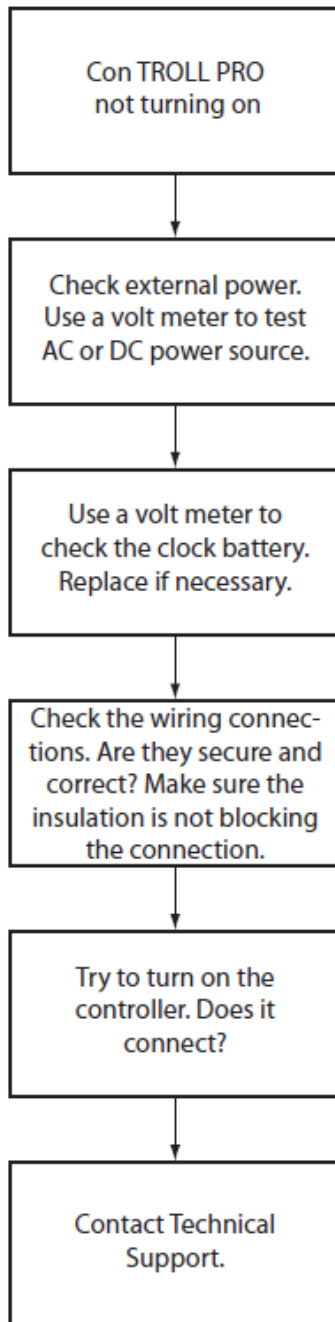
Troubleshooting Probe Connection Issues

```
┌─────────────────────┐
│  Unable to connect  │
│      to probe       │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐        No      ┌──────────────────────────┐
│  Do you have the    │───────────────▶│  Check the RS485 wiring  │
│ equipment available │                │  connections. Are they   │
│ to connect to       │                │  secure and correct? Is  │
│ Win-Situ 5?         │                │  the insulation blocking │
└─────────────────────┘                │     the connection?      │
          │ Yes                        └──────────────────────────┘
          ▼                                         │
┌─────────────────────┐  No  ┌──────────────────┐   ▼
│ See if it will      │─────▶│ Is the probe     │  ┌──────────────────────┐
│ connect to          │      │ powered by an    │  │ Does the probe       │
│ Win-Situ 5.         │      │ internal battery │  │ require external     │
└─────────────────────┘      │ (Level or Aqua   │  │ power (RDO PRO)?     │
          │ Yes              │ TROLL)?          │  └──────────────────────┘
          ▼                  └──────────────────┘            │ Yes
┌─────────────────────┐               │ Yes                  ▼
│ If yes, reset the   │               ▼          ┌──────────────────────────┐
│ probe communications│    ┌──────────────────┐  │ Check the power wiring   │
│ settings to the     │    │ The internal     │  │ connections. Are they    │
│ default settings and│    │ probe battery may│─▶│ secure and correct? Is   │
│ reconnect to the    │    │ be dead. Use     │  │ the insulation blocking  │
│ controller.         │    │ external power or│  │ the connection?          │
└─────────────────────┘    │ contact Technical│  └──────────────────────────┘
          │                │ Support.         │            │
          ▼                └──────────────────┘            ▼
┌─────────────────────┐                       ┌──────────────────────────┐
│ Try to connect the  │                       │ Try adding the probe     │
│ probe. Does it      │                       │ again. Does it connect?  │
│ connect?            │                       └──────────────────────────┘
└─────────────────────┘                                   │
          │ No                                            │ No
          ▼                                                │
┌─────────────────────┐                                   │
│ Contact Technical   │◀──────────────────────────────────┘
│ Support.            │
└─────────────────────┘
```

Troubleshooting Bluetooth Communications Issues

Problem	Solution	
I can't get the Bluetooth connection between the controller and my PC/RuggedReader to work.	Is the Bluetooth symbol present on the Con TROLL PRO screen?	No—Turn on the Bluetooth connection. See "Enabling Bluetooth® Communications on the Controller" on page 9.
		Yes—Continue troubleshooting.
	Is anyone else already connected to the Con TROLL PRO monitor?	Yes—Ask them to disconnect their connection.
		No—Continue troubleshooting.
	Is something obstructing the signal between the PC/RuggedReader handheld and the Con TROLL PRO monitor (such as a wall, door, or other metal object)?	Yes—Remove the obstruction.
		No—Reboot the PC/RuggedReader and try again, then contact Technical Support.
I have a Bluetooth connection, but I can't connect the Con TROLL PRO to Win-Situ 5.	Is the Port that is selected in Win-Situ's Comm Settings window the same port that appears in the Device details window of the Bluetooth software?	No—Change the Comm settings in Win-Situ 5 to reflect the actual port.
		Yes—Continue troubleshooting.
	Are the Comm setting in Win-Situ 5 set to RTU or ASCII?	No—Change the Comm settings in Win-Situ 5 to ASCII.
		Yes—Continue troubleshooting.
	Has the Bluetooth connection been lost?	Yes—Reconnect.
		No—Contact Technical Support.
Win-Situ 5 is not responding when I try to view my data or export to csv.	Are you logging data at fast intervals, logging many parameters, or have you downloaded a very large data log? Do you have an older, slower PC?	Yes—Step away from the computer for 5-10 minutes and see if the problem resolves itself.
		No—Contact Technical Support.