

Xact Small Tank Monitoring System

Operation Manual

XLL100200 – Rev. 3.0

Productivity through Precision™



A product of:

Schmitt Industries, Inc.

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Operation and Specification Manual

for the

Xact Small Tank Monitoring System

XLL100200 – Revision 3.0

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8,104,341

and other patents pending.

Suitable for use in:
Class I Division 2 Group D
Class I, Zone 2 Group IIA (Ex nL 3 G IIA T6)
Non Incendive field wiring outputs for Class I, Division 2, Group D
See control drawing in Appendix A of this manual

 TANK MONITORING SYSTEMS Schmitt Industries, Inc. 2765 NW Nicolai St. Portland, OR USA Phone: 503-227-7908 www.xact-data.com	Model: XACT-02 series	
	Manf. Date: <input type="text"/>	
	Class I, Division 2 Group D	ETL CLASSIFIED
	Class I, Zone2 Group IIA	
	Ex nL 3 G IIA T6	Intertek 4000718

WARNING – EXPLOSION HAZARD – BATTERY MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS.
AVERTISSEMENT – RISQUE D'EXPLOSION – AFIN D'EVITER TOUT RISQUE D'EXPLOSION, S'ASSURER QUE L'EMPLACEMENT EST DESIGNE NON GANGEREUX AVANT DE CHANGER LA BATTERIE

WARNING – EXPLOSION HAZARD – BATTERIES MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS FOR CLASS I, DIVISION 2
AVERTISSEMENT – RISQUE D'EXPLOSION – LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMBLEMES DE CLASSE I, DIVISION 2

Warning: Explosion Hazard. Do Not Remove or Replace Lamps, Fuses, Battery or Plug-In Modules (As Applicable) Unless Power Has Been Disconnected or the Area Is Known To Be Free Of Ignitable Concentrations of Flammable Substances

**NOTICE:
SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR DIVISION 2
ASSEMBLE AS SPECIFIED**

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System Purpose

Xact Small Tank Monitoring System was developed to provide you with a cost effective reliable means of monitoring your inventory. Giving you an up to date and reliable account of exactly how much product is in your tank, will help eliminate outages, partial deliveries, and costly emergency deliveries. This will allow you to concentrate on expanding your customer base and reduce costs. Some of the information offered from the website includes: fill percentage, ambient temperature, ullage, gallons/liters in tank, and history of measurements. Xact Small Tank Monitoring System also allows you to define tank level alarms, which will report directly to your email to notify you of the events when they happen, saving you valuable time.

Operator Safety Summary

This summary contains safety information necessary for operation of Xact Small Tank Monitoring System for propane tanks. Specific warnings and cautions are found throughout the manual where they apply, but may not appear in this summary. Before installing and operating Xact Small Tank Monitoring System, it is necessary to read and understand the entirety of this manual. After reading this Operation Manual, contact Schmitt Industries Inc. if any additional technical assistance is required.

Caution: Complies with FCC RF Exposure Requirements. Users and nearby persons must maintain a separation distance of greater than 20cm (8 inches) from this antenna in operation.

Caution: To avoid equipment damage, do not drop or mistreat.

Caution: Only trained service technicians should attempt to perform service on Xact Tank Monitoring Systems. Disconnect battery power before removing or connecting cables to the Xact components, if such connections exist on your Small Tank Monitor product.

Caution: This is a low voltage system, do not alter or adjust system input voltage in any manner. Substitution of components may impair suitability for Division 2.

Warning: EXPLOSION HAZARD – BATTERY MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS.

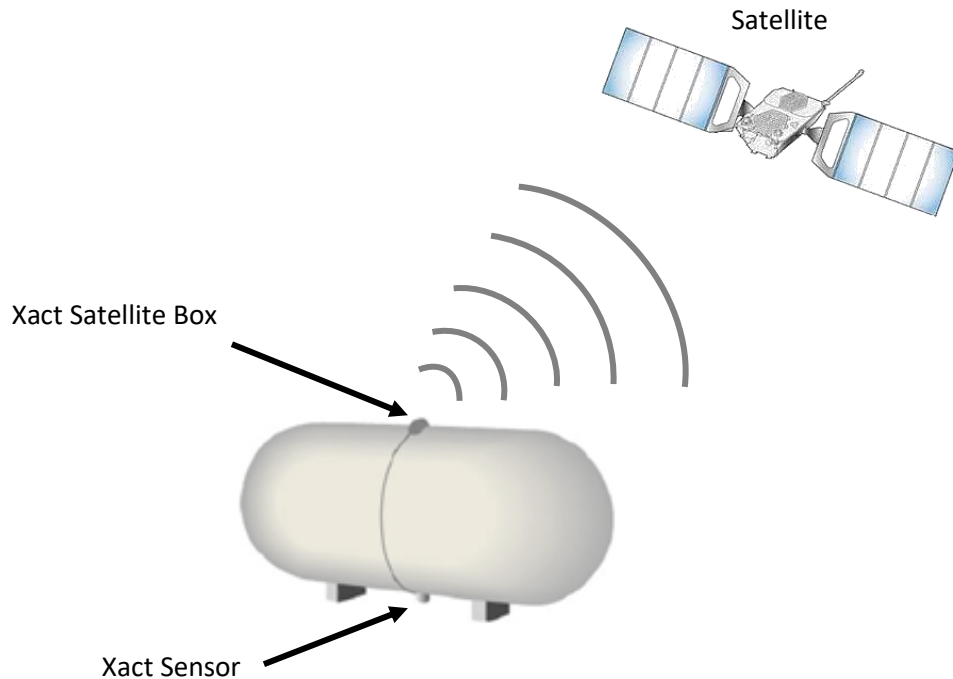
Warning: EXPLOSION HAZARD – BATTERIES MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS FOR CLASS I, DIVISION 2

Xact System Overview

Xact Small Tank Monitoring System consists of two parts: the Sensor and Satellite Box. These parts are designed to be easily installed and configured for use by the end user. During installation the system is located in place on the tank with the attached magnets and is secured in place using the supplied strap at the completion of installation.

The **Sensor** is mounted on the bottom centerline of the tank. The Sensor sends an ultrasonic signal through the wall of the tank and reads the return echo from the surface of the liquid in the tank. By monitoring the time of flight referenced against measured tank dimensions, tank fill levels are automatically calculated and displayed on the Xact Website.

The **Satellite Box** is mounted to the top of the tank and sends the measurement data via satellite to a secure customer website. The measurement data includes: time and date, fill level, ambient temperature, tank capacity, and various alarm settings. It also provides access to the system's user interface with the aid of the Xact Installation Software, allowing set up and configuration of the system on a specific tank. Alarm levels can be set during the installation to notify the user of a refill needed, critical fill level, or a refilled event. The battery is also conveniently located in this box.



System Installation

Xact Small Tank Monitoring System can be easily installed in a short period of time. This section provides instructions for mounting the system on the exterior of the tank. Included are sections covering necessary preparation and installation of the Xact Sensor and the Xact Satellite Box onto the tank.

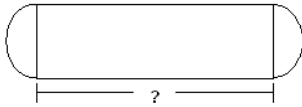


Remove the components from the shipping box and inspect all devices for any potential shipping damage. Connect the sensor cable to the Satellite Box. It is vital that this connection is fully engaged to prevent any water damage!

Selecting Install Location on the Tank

It is important to locate the Xact System on the tank in a safe and convenient location. Special attention should be paid to the location of fill points and discharge piping so as to not interfere with the installation process.

Measuring Tank Dimensions

Measuring the tank dimensions is a critical step in the installation process. Without accurate tank measurements, the Xact System will not be able to correctly calculate the tank liquid capacity. Determine each of the following four measurements for the tank undergoing installation, and write these measurements down using consistent units of measure (Inches or Centimeters) in preparation for system setup and calibration.

- Measure the circumference of the tank using a flexible tape measure.
- Locate the manufacturer nameplate to determine the tank wall thickness. If this number is stated in a fractional form (e.g. 1/6"), divide the top number by the bottom number to calculate a decimal thickness measurement (e.g. 0.166).
- Measure the length (from weld seam center to weld seam center). 
- Determine if the tank ends are Hemispherical  or Elliptical 

Installation of Sensor

The Xact Sensor is mounted externally on the bottom center line of the tank. It sends an ultrasonic signal through the wall of the tank and reads the return echo from the surface of the liquid inside the tank. Using high accuracy electronics to capture the echo, the distance from the bottom of the tank to the surface of the liquid is calculated and reported to the Xact Satellite Box for broadcast.



Caution - Avoid installing the Xact System during tank filling or emptying activity. This might cause a wave action in the tank that will reduce the ability of the system to obtain an accurate fill level.



Caution - For best results the fill level of the tank should be at least 20% full at installation.

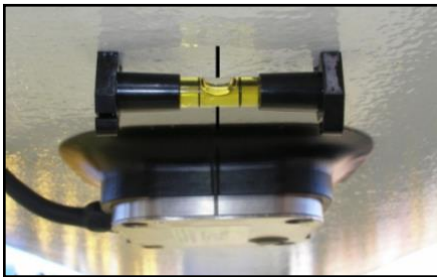
The Sensor must be aligned with the bottom center line of the tank, and located near the tank drain pipe. Ensure that the surface of the tank in the sensor installation location is clean and dry, and any loose paint or foreign material has been removed.

Prior to attaching the Sensor to the tank it is necessary to locate the center line of the tank. Use the Xact Level to mark the bottom centerline of the tank in two places approximately 12" (30cm) apart at the edges of the area where the Sensor will be installed on the tank. Draw a straight line on the tank wall between these marks to produce a reference centerline for installation.



Apply the complete contents of the provided pre-measured packet of acoustic gel to the center of the lens face of the Sensor as shown in the figure. The amount of gel applied is critical to function, so use the entire gel package contents. If you ever need to remove and re-install the Sensor, ensure that both surfaces are wiped clean, then re-apply the pre-measured amount of acoustic gel from a new package.

Locate the Sensor on the center line of the tank by aligning the scribed lines on the sides of the Sensor housing and weather boot, with the center line reference drawn on the tank. Once in correct position, push the Sensor onto the tank surface.



The Sensor is attached to the bottom of the tank with four magnets. Using your free hand push up on the four spring loaded magnets until they contact the tank. Push upward firmly in the center of the Sensor and hold for about 10 seconds to ensure that the acoustic gel is evenly distributed between the wall of the tank and the face of the Sensor. Ensure the Sensor is aligned to the centerline on the tank as you finish.

With the sensor installed on the tank remove the strap from the box. Unroll and holding onto the buckle, throw the loose end over the tank. Route the loose end under the tank and pull it until the buckle is approximately in the middle of the tank. Ensure that the strap is lying flat around the tank and directly over the center of the sensor. Insert the loose end of the strap into the buckle and cinch down tight. This will pull the sensor up flat against the bottom of the tank. Before moving on, ensure the alignment of the sensor with the center line on the bottom of the tank is correct.

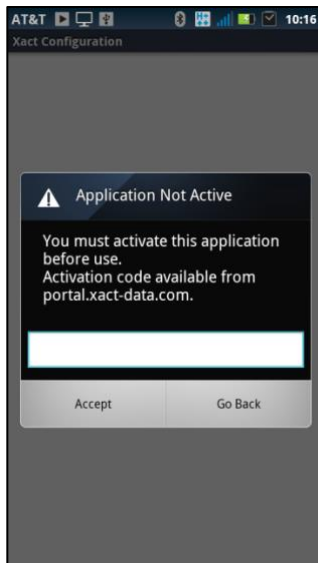
Temporarily place the Xact Satellite box on top of the tank or another flat surface, magnets facing up. Remove the taped plug and set aside for now. Start up your Xact PDA or Android application, and insert the Bluetooth adapter into the 9 pin connector. Connect the battery into its 2 pin locking connector. Both connectors are keyed to prevent accidental misalignment.

System Setup and Calibration

With the Bluetooth and battery connected, refer to the Xact Configurator application or the Xact Setup program on your handheld device to finish the set up and calibration of your Xact System.



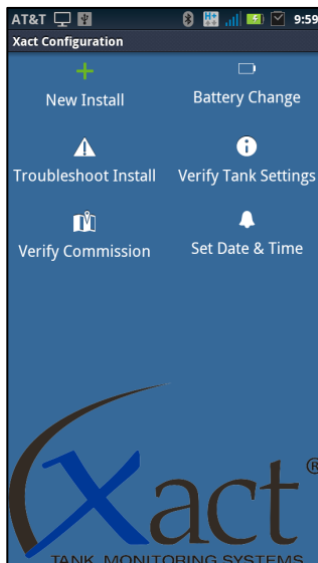
If you receive any error messages after starting the program refer to the troubleshooting section of this manual before continuing. Make sure that all errors have been cleared before continuing with the installation.



Activating your application

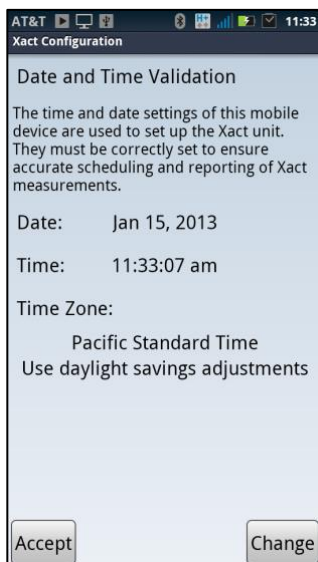
Before you are able to use the Xact application on your Android based device, you must first enter your activation code. If you have not received your activation code please contact your system administrator or your Xact sales representative.

The application will walk you through step by step the entire set up process. Just ensure that you follow all prompts and answer all questions accurately, to set up the Xact System with your particular tank.



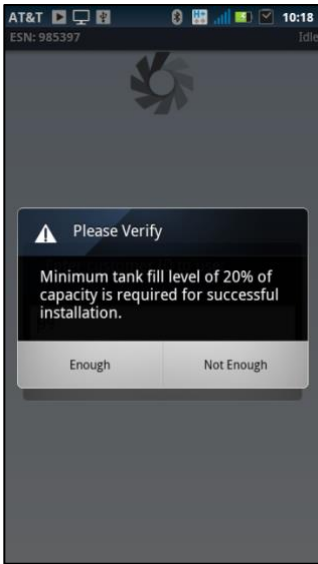
New Installation

To install a new system on your tank, you must first run the Xact application on your Android based device. Once the application is running, connect in your Bluetooth adapter and battery on your Xact unit. When both of these are connected, select **New Install**.

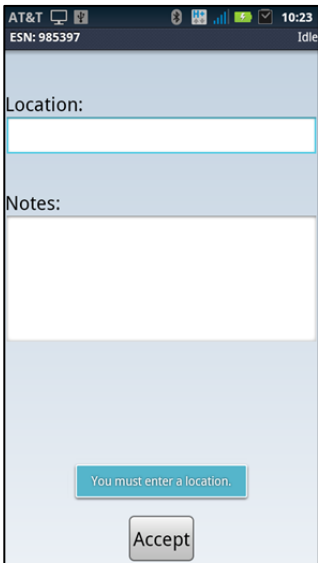


On the first screen you need to confirm that the Time Zone, Time, and Date are correct (select **Accept** or **Change**). The date and time information shown will be used to set the clock in the Xact System, and will become the basis for all subsequent measurement schedules.

If you select **Change**, you will need to input the correct date and time information on your device. When completed, push the **back** button on your device to return to the set up process.



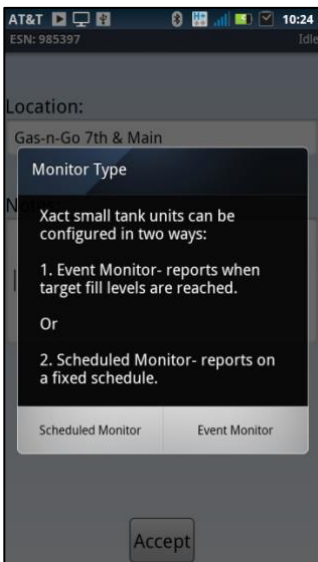
To ensure an accurate installation process, the tank must be at least 20% full. Please verify this minimum fill level.



Enter a unique description or identifier for the tank. This can be the location of the tank or some other means of identification. The name should be something that you and others can easily identify when referred to on the website.

To bring up the onscreen keyboard, tap on the open space below location.

A notes field is provided, however these notes are kept locally on your device and will not be uploaded to the website. Tap the **Accept** button to continue.



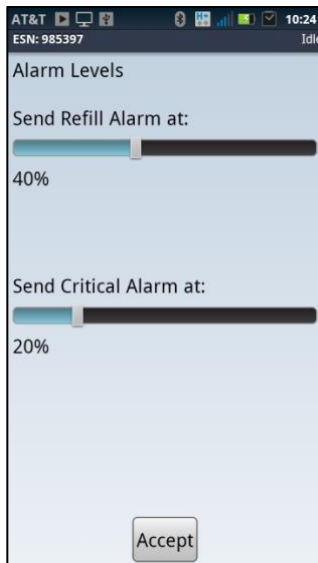
Set Monitoring Mode

A critical step in the set up process is selecting which of the two available monitoring modes is desired for this Xact installation.

Scheduled Monitoring – Measurements are taken and reported on a regular user defined time schedule.

Event Monitoring – Measurements are taken every hour following installation. No reporting of measurements to the website occurs until:

- 1) One of the two Event Alarm fill levels is reached. The Event alarm levels are user defined fill % levels at which a measurement report will be made to the website. Setting these alarm levels is described in the next screen.
- 2) A Refill report occurs whenever a 15% or greater increase in tank fill level is measured, relative to the prior measurement.
- 3) A current fill status report is sent every Sunday afternoon.



Setting Alarm Levels in Event Monitoring Mode

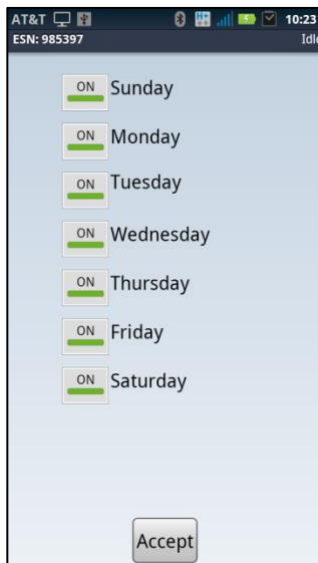
Only active in Event Monitoring Mode.

Alarm levels can only be adjusted at the tank. It is imperative that you set these correctly, since revisiting the tank is required to make changes.

Refill Alarm. Refill is the first alarm level you will set. This percentage will be your first notification on the website of tank draw-down.

Critical Alarm. Critical is the second notification of tank draw-down. This alarm report will also be made a second time, 24 hours later, if no Refill event occurs. Set the threshold of this alarm to ensure that you will have plenty of time to get to this tank before it is empty.

Select the correct percentages by sliding the bar, and Tap the **Accept** button to continue.



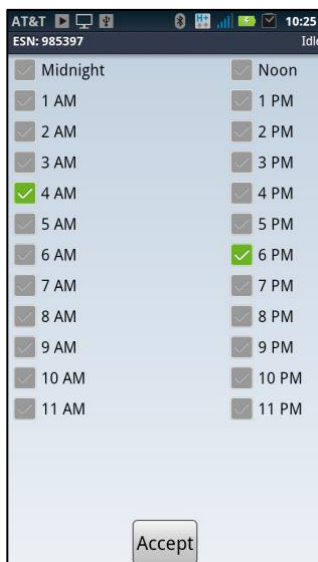
Setting Measurement Cycles in Scheduled Monitoring Mode

Only active in Scheduled Monitoring Mode.

On the following screens you will setup a schedule that determines how often the Xact Tank Monitoring System will take measurements and report the results.

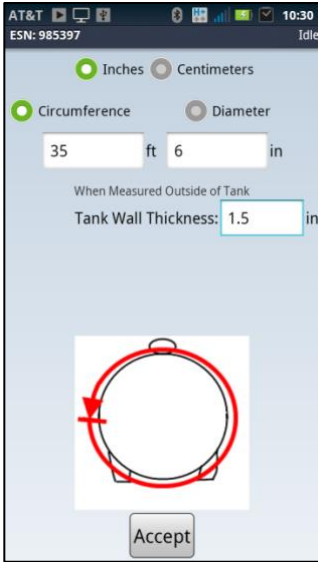
Be advised that a schedule with higher numbers of measurements will produce higher monthly monitoring costs for the system.

First indicate the day(s) of the week the system should measure and report. Tap the **Accept** button to continue.



Next select the hour(s) of the day in which you want measurements to be taken. The Xact Tank Monitoring System will wake up at a random time during the selected hour(s) to measure and report the fill level of the tank.

For the most accurate measurement results you should select hours that the tank will not be active with filling or dispensing. For example before and after business hours or during any other period of time that is known to be a quiet or inactive period for the tank. Tap the **Accept** button to continue.



Enter Tank Dimensions

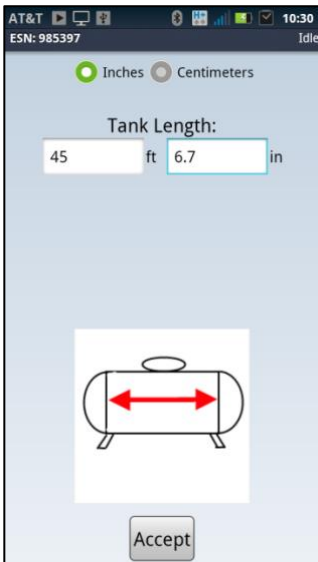


It is very important that all tank measurements entered are accurate. The Xact System calculates the volume of the tank based on this information. If the tank dimension measurements are not accurate, the reported fill volume will be inaccurate.

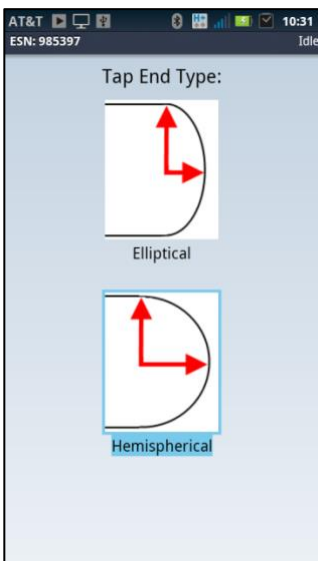
Select the **Circumference** radio button and enter the circumference measurement taken earlier.

Wall thickness – From the manufacturer's name plate, enter the tank wall thickness, unless you entered an inside diameter. If the unit of measure is a fraction, divide the top number by the bottom number to calculate the required decimal equivalent. (e.g. 5/16" = .312") Tap the **Accept** button to continue.

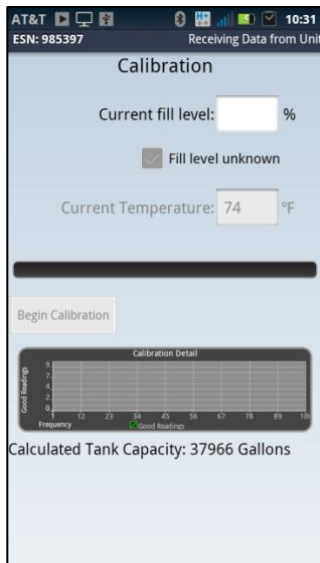
Most small tanks have a shell thickness of .32".



Enter the length of the tank (from weld seam center to weld seam center). The manufacturer's nameplate may give you an overall length. This will include the end walls and therefore should not be used. Ensure that the correct unit of measurement is displayed. Tap the **Accept** button to continue.



Select the type of end cap that matches the tank being installed.



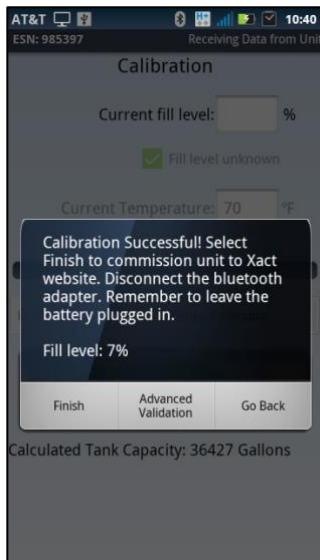
Calibration

Confirm the calculated tank capacity displayed at the bottom is reasonable. This is the exact tank water capacity according to the dimensions you entered earlier. This may vary slightly from the tank manufacturer's name plate. If you feel this is incorrect, push the back button on your device to verify your measurements.

In order for the Xact Tank Monitoring System to more accurately calibrate to the tank, some information is helpful. Enter the approximate fill level of the tank.

Once you have entered this information tap on the **Begin Calibration** button to continue. If you don't have this information check the box next to **Fill level unknown** then tap on the **Begin Calibration** button.

Based on the information you provided in the previous steps, the Xact System will perform a calibration cycle that sets the Xact Sensor for optimal performance for the individual tank.



Progress of the Calibration is indicated by the bar, and should complete in about 2-6 minutes. The application indicates if the calibration cycle was successful or not by displaying the appropriate screen.

If the cycle is unable to calibrate, or if you receive an error message, see the troubleshooting section of this manual for further assistance.

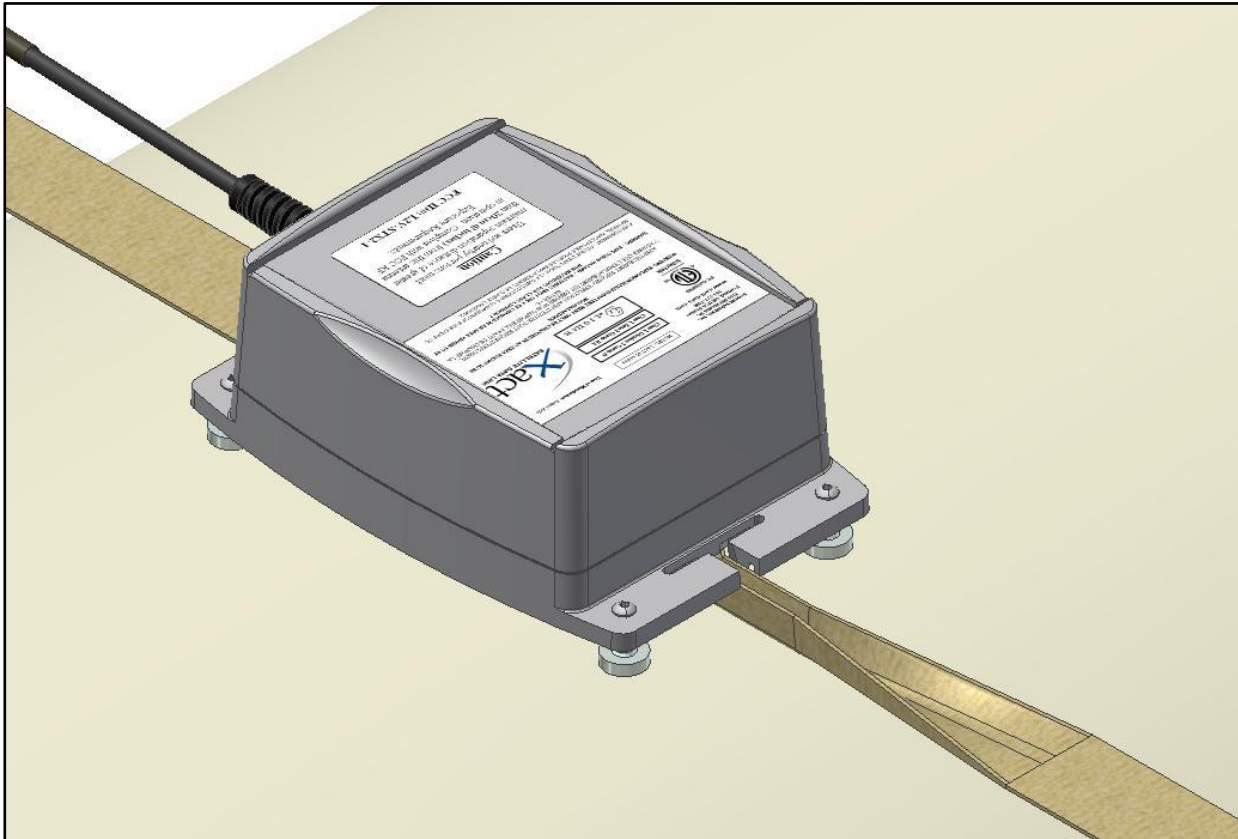
Upon a successful calibration, select **Finish**. Xact Small Tank Monitoring System will now establish communications with the satellite system and transfer the information to the web site. This process can take up to 45 minutes, depending on satellite location. **DO NOT UNPLUG THE BATTERY.** Remove the Bluetooth adapter, retrieve the 2" plug that you set aside earlier, and firmly insert it into the hole in the bottom plate of the Satellite Box. Ensure this is completely seated and flip the box right side up.

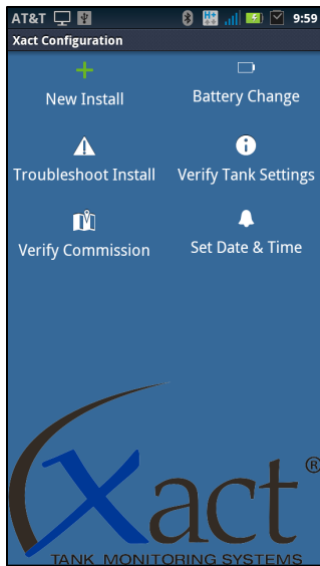
While the system is completing the process of sending setup information, you should immediately proceed to finish the installation of the hardware.

Final Hardware Installation

With the Satellite box right side up, move it until it lays directly over the strap. Loosen the strap so that you have enough slack to route it through the slots on the bottom plate of the box. Pinch the strap into a “V” shape facing up. Slip the open part of the “V” through the slot in the plate. Once through, open it until it lays flat. Repeat this process on the other side.

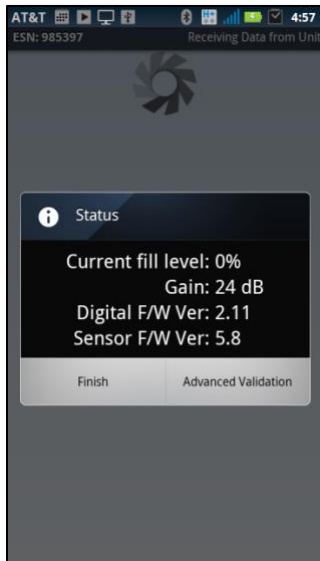
Once the strap is in place, cinch it down snugly. Ensure that the strap is lying flat over the top of the sensor and around the rest of the tank. See that the Sensor is still aligned correctly with the center line of the bottom of the tank. Once everything is in place, the strap can be cinched hand tight.



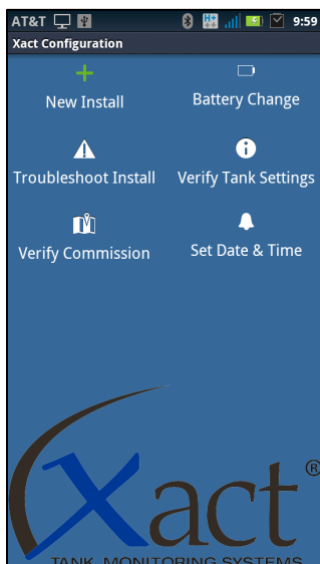


Reading Tank Fill Levels

At times it may be necessary to take a manual measurement reading rather than waiting for the periodic measurements. To take a manual measurement, you first need to loosen the strap so there is enough slack to remove the strap from the slots in the Satellite box, remove the 2 inch plug from the bottom plate, and plug in the Bluetooth adapter. Open the Xact application on your handheld device, and select the **Verify Tank Settings** icon.



The Xact System will measure the tank fill level and display it here. Select **Finish** when complete. Once complete, exit the Xact application, remove the Bluetooth adapter, and replace the 2 inch plug. Re-route the strap through the Satellite box. Before you leave, ensure that the plug is secure, the strap is over the sensor, the sensor is correctly aligned on the bottom of the tank, and the strap is cinched tight enough that it pulls the sensor up into the bottom of the tank.



Changing The Battery

To change the battery, loosen the strap so there is enough slack to remove it from the slots in the Satellite box. Flip the Satellite box upside down to expose the four screws in the bottom plate and remove them. Remove the lid to expose the battery. Remove the 2 inch plug in the bottom plate, unplug the battery, loosen the velcro strap, and remove the battery. Place the new battery in the correct location, tighten the velcro strap around it, route the battery connector to the opening from the plug, replace the bottom plate and secure it onto the housing with the four screws. Do not over tighten these screws. Plug in the new battery and your Bluetooth adapter. From the application menu, select **Battery Change**. **Accept** the correct time zone, time, and date, tap the **Finish** radio button. You will be prompted after the Xact System has updated the time. Select **Finish** when complete.

Troubleshooting

In the event the Xact calibration process fails, it will report one of two results:

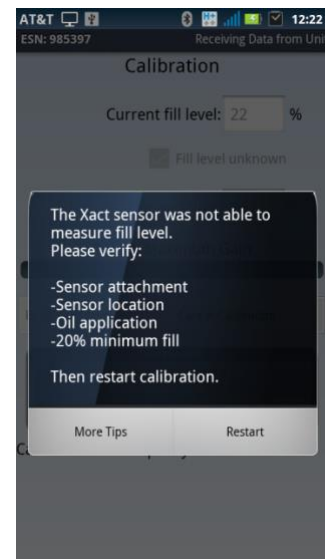
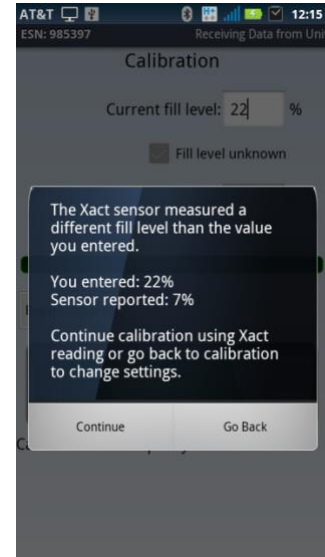
The first screen shown at right indicates that calibration failed because the fill level measured is different than the expected fill level entered by the installer. This usually means that the value entered by the installer was in error due to incorrect readings from the float gauge on the tank.

If a fill percentage was used during the calibration, deselect this and check the **Fill level unknown** box and re-run the calibration cycle. If the calibration result is again unsuccessful, follow the instructions below.

The second screen shown indicates that calibration failed with no fill level detected.

1. Verify that the tank is at least 20% full. Calibration should not be performed on tanks with less than 20% fill.
2. Loosen the strap and remove the sensor. Ensure that the tank is free of debris at the installation point, and that the tank is level from end to end. Clean the gel off of the lens, reapply the correct amount of gel, then re-install the sensor, making sure that the sensor is installed with the correct alignment. Tighten strap and run the calibration cycle.
3. If the calibration result is again **unsuccessful**, it may be necessary to move the Xact System to a new location on the tank and try again. Repeat the installation process until you achieve a **successful** calibration. Some tanks are more difficult to set up and the Xact System will only allow a successful calibration at a good installation point on the tank.

During the installation process you might encounter various “Error” notices in the application software. These notices generally deal with low power issues, or disconnected wires. Follow the prompts to resolve problems. Adherence to these suggestions will help achieve a successful installation.



System Wiring Schematic

FOR USE IN CLASS 1 DIVISION 2 GROUP D HAZARDOUS LOCATIONS, AND CLASS 1 ZONE 2 GROUP IIA

