

Xact Large Tank Monitoring System

Operation Manual

XLL100100 – Rev. 3.0

Productivity through Precision™



A product of:

Schmitt Industries, Inc.

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Operation and Specification Manual
for the
Xact Large Tank Monitoring System

XLL100100 – Revision 3.0

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and other patents pending.

Suitable for use in:
Class I Division 2 Group D
Class I, Zone 2 Group IIA ( 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	
	 nL 3 G IIA T6	Intertek 4000718
<p>WARNING – EXPLOSION HAZARD – BATTERY MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS.</p> <p>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</p> <p>WARNING – EXPLOSION HAZARD – BATTERIES MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS FOR CLASS I, DIVISION 2</p> <p>AVERTISSEMENT – RISQUE D'EXPLOSION – LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMBLEMENTS DE CLASSE I, DIVISION 2</p>		

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

The Xact Large 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, gallons/liters in tank, and history of measurements. The Xact System also allows you to define tank fill level alarms, which will report directly to your email to notify you of the events that matter most to you, saving you valuable time.

Operator Safety Summary

This summary contains safety information necessary for operation of the Xact 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 the Xact 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. To avoid electric shock, do not remove the cover of the Satellite Control Unit, or remove cables, with the power connected. Disconnect battery power before removing or connecting cables to the Xact components.
- 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

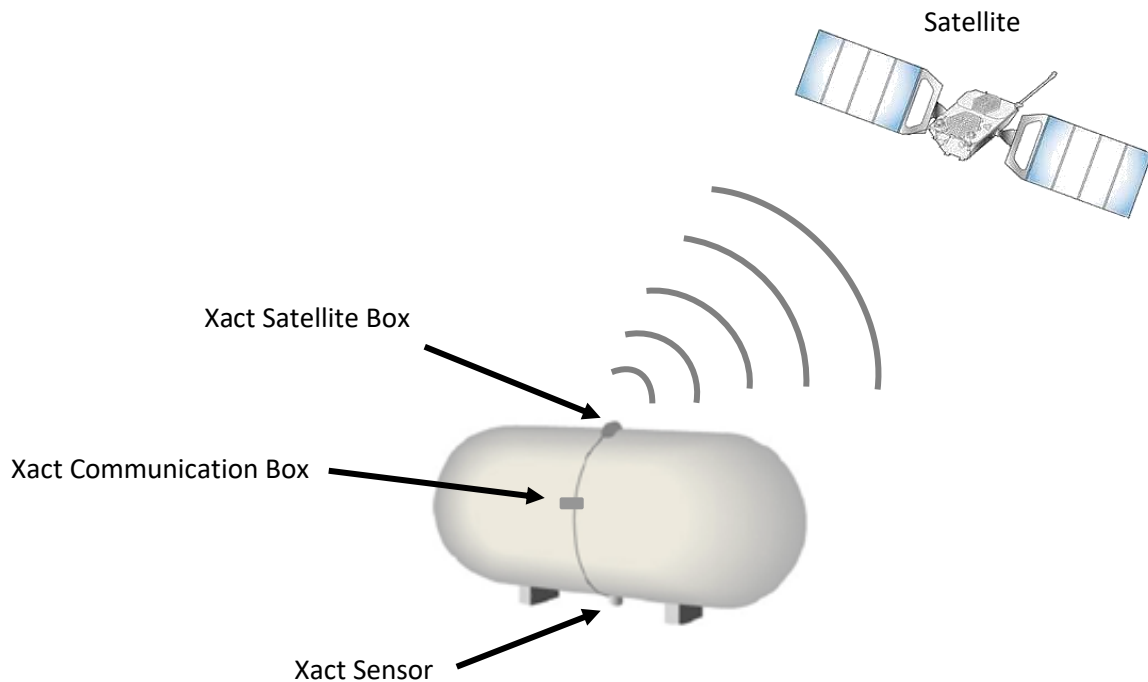
Xact System Overview

The Xact Large Tank Monitoring System consists of three parts: Sensor, Communication Box, 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** (with integral cable) 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 **Communication Box** allows ease of installation and access to the system battery for future replacement. 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.

The **Satellite Box** (with integral cable) 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, and various alarm settings. Alarm levels can be set to notify the user of either low tank levels or overfills.



System Installation

The Xact 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, Xact Communication Box, and the Xact Satellite Box onto the tank.

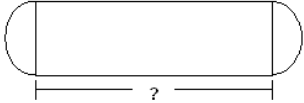


Remove the components from the shipping box and inspect all devices for any potential shipping damage. Connect the sensor cable to the cable coming out of the Communication Box. It is vital that this connection is fully engaged to prevent any water damage!!

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. Try and locate the Sensor near to the tank drain line.

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. 7/8"), divide the top number by the bottom number to calculate a decimal thickness measurement (e.g. 0.875).
- 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.

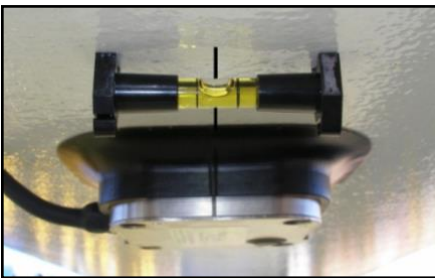
The Sensor must be aligned with the bottom center line of the tank, and located near the tank drain pipe. Ensure that the surface of the tank in the installation location is clean and dry, and any loose paint or foreign material has been removed.

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 picture. 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.



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. 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.

Installation of Communication Box

The second part of the system is the Xact Communication Box. The Communication Box houses the battery and allows a convenient access point for the user to setup the Xact Tank Monitoring System via a Bluetooth adapter and handheld device.



Caution – The cables on the Xact System are not hot-swappable. Do not plug cables into the Communication Box with the battery plugged in, or damage to the electronics will result.



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

Place the Communication Box on the side of the tank in a position that is vertically aligned with the Sensor, and so that any slack in the Sensor cable is removed. The cable should lie along the surface of the tank straight up from the Sensor.

Temporarily place the Satellite Box on the side of the tank as shown, held in place with the attached magnets.



Final Hardware Installation

Working from the cable side of the Satellite Box, slip the included strap through the two bottom strap holes on the Satellite Box and continue to pull the strap through until you reach the black mark on the strap approximately ten feet from the buckle.

Throw the loose (non-buckle) end of the strap over the top of the tank far enough that it can be reached on the other side of the tank. You can tie a screwdriver or some other object to the strap end for added weight to assist with this.

Untwist the strap so it lies against the surface of the tank, and ensure that the strap is vertically aligned with the Communication Box and Sensor location. Go around to the other side of the tank and begin to pull down on the loose end of the strap until the Satellite Box starts sliding straight up the tank. Continue gently pulling the Satellite Box up the tank until the slack is removed from the Satellite Box cable, or until the Satellite box is at the desired location near the top of the tank. **Do not pull hard enough to move the Communication Box and Sensor.** If there is any slack left in the Satellite Box cable, coil the excess cable and secure with a cable tie wrap to remove the slack.



Leaving the strap lying beside the Sensor (not over it) insert the loose end of the strap into the buckle and loosely tighten the strap. The buckle end should end up lower than the Communication Box, somewhere between the Communication Box and Sensor.

Turn the Xact Communication Box on end and slide the strap into the strap holder on the underside.

Proceed with tightening the hardware strap until hand tight. There will continue to be some give in the strap which is normal, do not over tighten.

Lift the strap over the center of the Xact Sensor, being careful to not move it. Ensure the strap lays flat on tank and directly across the Sensor.

Ensure that the Sensor has not moved off the centerline of the tank. If it has, try to push it back into place. If you are unable to do this, loosen the strap a little, retry, and retighten the whole assembly.

Tuck as much of the cables under the strap as you can reach or use tie wraps to secure cables to the strap. The loose end of the strap should also be tied off or secured.

The hardware installation is complete when the Xact Sensor is lined up correctly with the centerline mark, the Xact Satellite Box is near to the top of the tank, and all of the slack is out of the cables between the three connected components.



Preparing for System Setup and Calibration



Use a #2 Philips screw driver to remove the Xact Communication Box cover. The four screws are captured in the lid to prevent accidental loss while opened. It may be convenient to only loosen and not fully unscrew one of the four screws, allowing the lid to be rotated out of the way.

With the cover removed, start up your Xact PDA or Android application; connect the battery in the Communication Box into its 2 pin locking connector. The battery plug is keyed to prevent accidental misalignment.

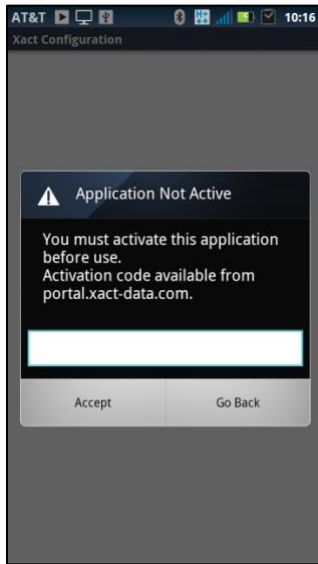
Finally insert the Bluetooth adapter into the 9 pin connector. Again the Bluetooth is designed to only connect one way to prevent accidental misalignment.

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.



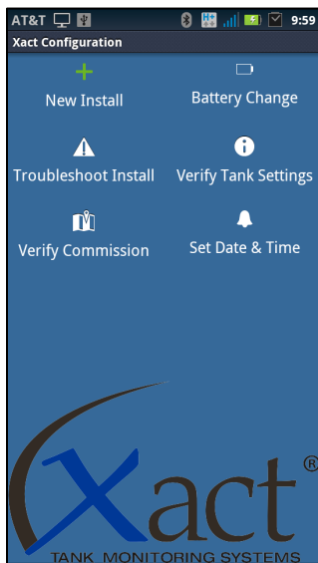
If you receive any error messages after starting the program refer to the troubleshooting section of this manual before continuing. Make sure that all errors have been cleared before continuing with the installation.



Activating your application

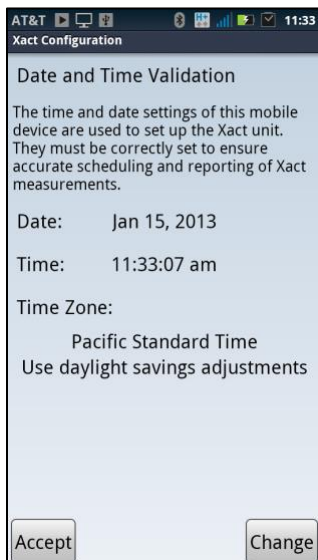
Before you are able to use the Xact application on your Android based device, you must first enter your activation code. If you have not received your activation code please contact your system administrator or your Xact sales representative.

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.



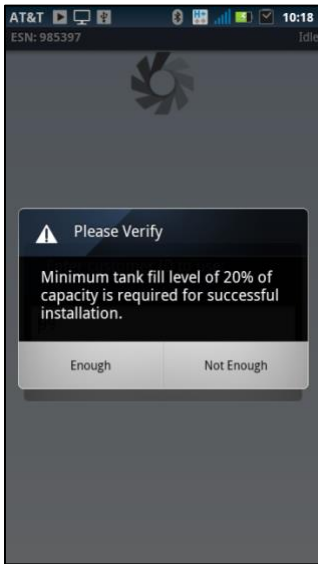
New Installation

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, plug in your Bluetooth adapter and battery on your Xact unit. When both of these are plugged in, select **New Install**.

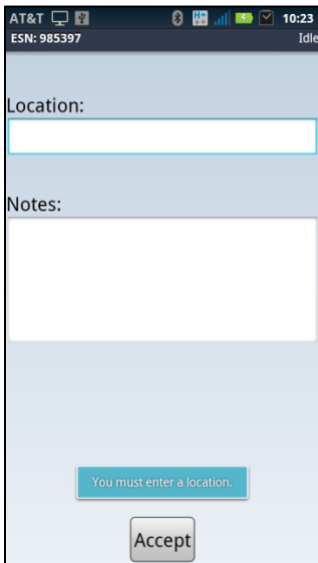


On the first screen you need to confirm that the Time Zone, Time, and Date are correct (select **Accept** or **Change**). The date and time information shown will be used to set the clock in the Xact System, and will become the basis for all subsequent measurement schedules.

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.



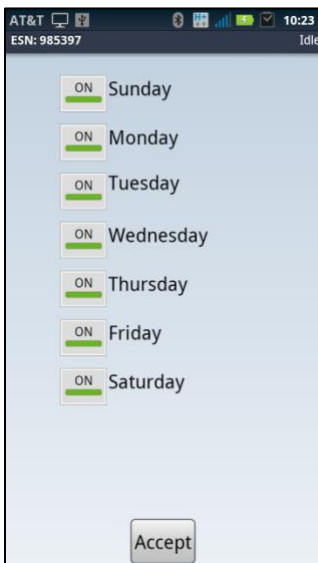
To ensure an accurate installation process, the tank must be at least 20% full. Please verify this minimum fill level.



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.

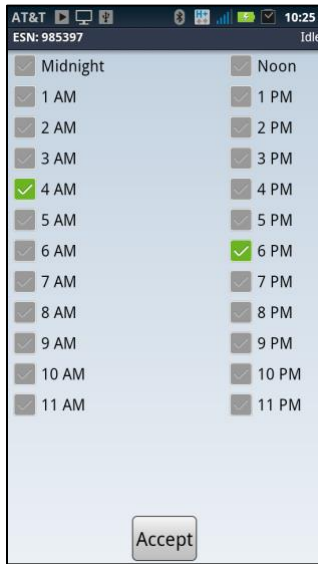


Setting Your Measurement Cycles

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.

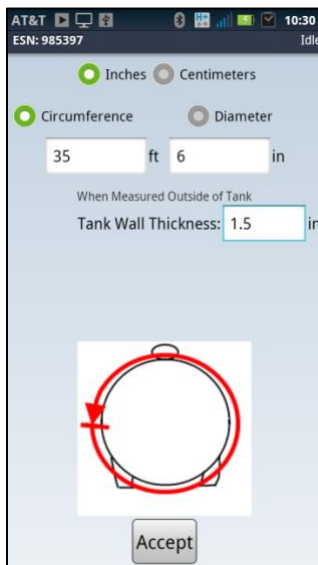
Be advised that a schedule with higher numbers of measurements will produce higher monthly monitoring costs for the system.

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.



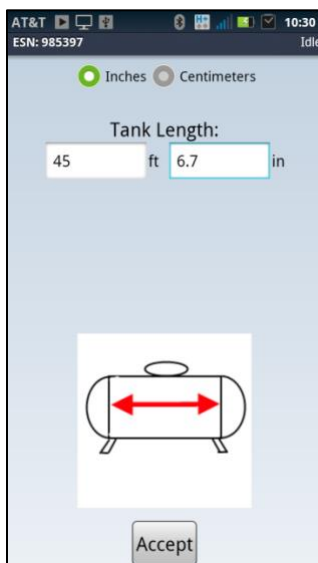
Enter Tank Dimensions



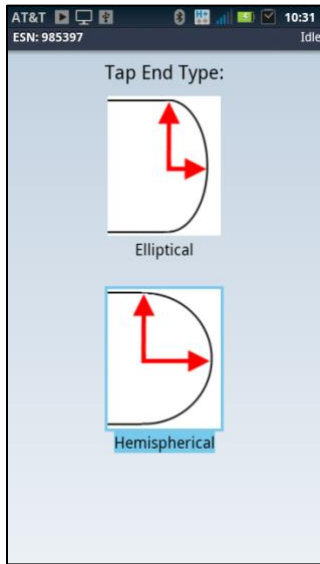
It is very important that the tank measurements entered be accurate. The Xact System calculates the volume of the tank based on this information. If the tank dimension measurements are not accurate, the calculated fill volume will be inaccurate.

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

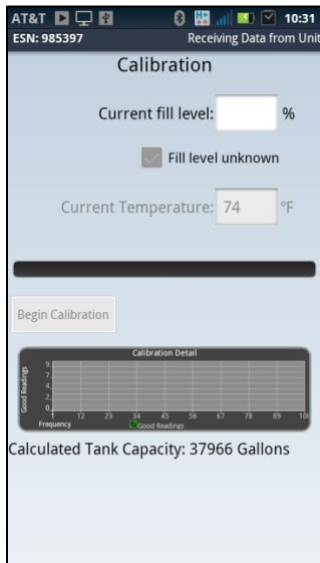
Wall thickness – From the manufactures name plate, enter the tank wall thickness, unless you entered an inside diameter. If the unit of measure is a fraction, divide the top number by the bottom number to calculate the required decimal equivalent. (e.g. 15/16" = .938") Tap the **Accept** button to continue.



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.



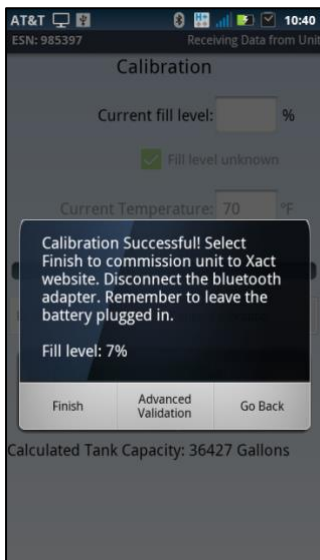
Calibration

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 manufacturers name plate. If you feel this is incorrect, push the back button on your device to verify your measurements.

Enter the current fill level of the tank. This information is helpful during the calibration cycle.

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.

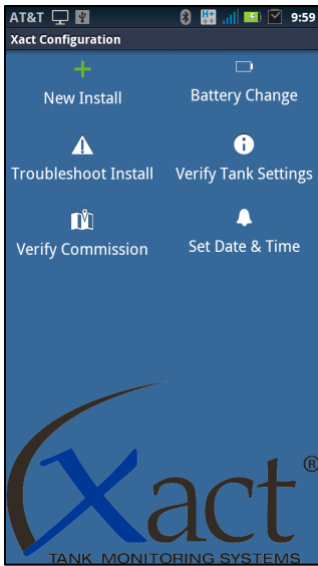
Based on the information you provided in the previous steps, the Xact System will perform a calibration cycle that sets the Xact Sensor for optimal performance for the individual tank.



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 you receive another error message, see the troubleshooting section of this manual for further assistance.

Upon a successful calibration, select **Finish**. The Xact 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 and secure the lid on the communication box. Ensure the lid and cables are secure.

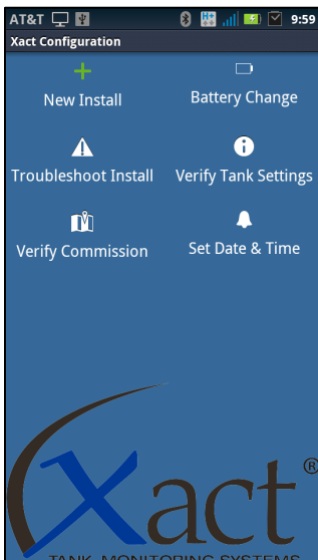


Reading Tank Fill Levels

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 take the Xact Communication Box cover off 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 Xact Communication Box cover. Before you leave, ensure that the cover is tightly sealed.



Changing the Battery

After time, it may be necessary to change the battery. To do so open the Xact Communication Box to expose the battery. Unplug the battery and remove it. 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.

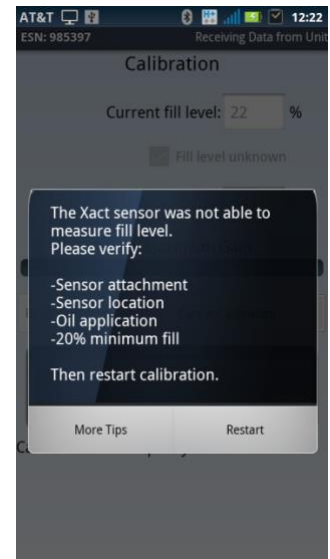
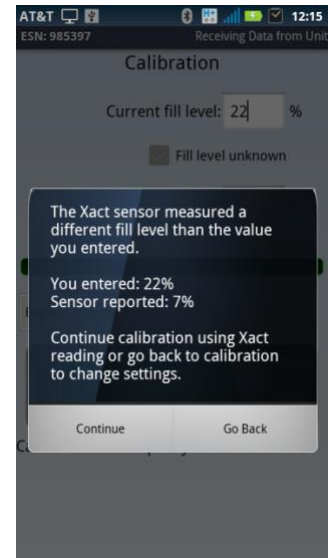
The second screen shown indicates that calibration failed with no fill level detected.

Verify that the tank is at least 20% full. Calibration should not be performed on tanks with less than 20% fill.

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.

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.



Appendix A - Control Drawing

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

NON-INCENDIVE FIELD WIRING APPARATUS

XACT TRANSMITTERS
 XACT10096 TRANSMITTER :XACT, 8 ft (2.4 m)
 XACT15096 TRANSMITTER :XACT, w/COM. BOX

ASSOCIATED NON-INCENDIVE FIELD WIRING APPARATUS

XACT COMMUNICATION/BATTERY BOX
 XACT20001 COMMUNICATIONS BOX: XACT MEASUREMENT SYSTEM

