Fathom Sensor

USER GUIDE

Fathom Sensor

USER GUIDE

Springville, Utah
801.734.7200
www.wavetronix.com

Wavetronix makes no representations or warranties with respect to this manual and, to the maximum extent permitted by law, expressly limits its liability for breach of any warranty that may be implied to the replacement of this manual with another. Furthermore, Wavetronix reserves the right to revise this publication at any time without incurring an obligation to notify any person of the revision.

This document is intended for informational and instructional purposes only. The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation, and testing of the products with respect to the relevant specific application or use thereof. Neither Wavetronix nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information that is contained herein. Wavetronix shall not be liable for any errors contained herein or for any damages arising out of or related to this document or the information contained therein, even if Wavetronix has been advised of the possibility of such damages. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer shall perform repairs to components. Failure to observe this information can result in injury or equipment damage.

Copyright © 2024 by Wavetronix

All rights reserved. No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the publisher. For permission requests, write to the publisher, addressed “Attention: Permissions Coordinator,” at the address below:
1827 W 650 N
Springville, UT
801.734.7200 ■ www.fathomradar.com

Trademarks

Wavetronix and all associated product names and logos are trademarks of Wavetronix. All other products or brand names as they appear are trademarks or registered trademarks of their respective holders.

US and international patents pending.

Disclaimer: The advertised detection accuracy of the Fathom sensor is based on both external and internal testing, as outlined in each product’s specification document. Although our sensors are very accurate by industry standards, like all other sensor manufacturers we cannot guarantee perfection or assure that no errors will ever occur in any particular applications of our technology. Therefore, beyond the express Limited Warranty that accompanies each sensor sold by the company, we offer no additional representations, warranties, guarantees, or remedies to our customers. It is recommended that purchasers and integrators evaluate the accuracy of each sensor to determine the acceptable margin of error for each application within their particular system(s).

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. Below ISED warning statements are required (both English and French);

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science, and Economic Development Canada’s license-exempt RSS(s). Operation is subject to the following two conditions:

- This device may not cause interference.
- This device must accept any interference, including interference that may cause undesired operation of the device.

ii. L’émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d’Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L’exploitation est autorisée aux deux conditions suivantes :

- L’appareil ne doit pas produire de brouillage;
- L’appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d’en compromettre le fonctionnement.

FM-500-0549
11/24

CONTENTS

5 **Introduction**
5 Guide conventions
5 Documentation and support

1 INSTALLING THE FATHOM SENSOR

7 Connecting the sensor to the RV-C bus
8 Disconnecting the cable connector
8 Fathom connector pinout
9 Fathom cable pinout
9 Determining the sensor location on the tank
10 Placing the sensor on the tank

2 CONFIGURING THE SENSOR

12 **Fathom configuration commands**
13 Setting the tank depth
13 Sending the proprietary prefix command
14 Setting the tank instance
14 Resetting the sensor
15 **Understanding the LED**

3 USING THE FATHOM TESTER (OPTIONAL EQUIPMENT)

16 Fathom Tester pinout
17 Connecting a sensor to the Fathom Tester
19 Changing the tank instance and tank height
20 Updating the Fathom Sensor firmware
21 Tank profile

Introduction

Welcome to the Fathom sensor user guide. This guide will cover installing and configuring a Fathom sensor.

Guide conventions

The following style conventions are used in this guide:

- **Bold** – Commands, options, buttons, and clickable fields.
- *Italic* – Publication titles referenced in text.
- `Courier` – System output such as error message or script; any supplemental code used to configure the product.

Documentation and support

To find the instructions for specific tasks, see the table of contents. If your questions aren't answered in this guide, visit **nexus.fathomradar.com** for access to supplemental materials, like technical documents, knowledge base articles, and troubleshooting information.

For questions, information, technical assistance, or instructions, please contact:

Fathom
1827 W 650 N
Springville, UT
801.734.7200 ■ www.fathomradar.com

Don't try to service or repair this unit; none of its components or parts are serviceable in the field. Attempting to open this unit will

void the customer warranty. Refer all service questions to Fathom technical support or an authorized distributor.

Failure to follow the installation guidelines laid out in this guide could result in decreased performance. If you believe it is necessary to deviate from these guidelines, contact a Fathom engineer or technical support for assistance and recommendations.

1

Installing the Fathom sensor

This chapter will explain how to connect the RV to the Fathom sensor, how to know where on the tank the sensor should be placed, and how to attach the sensor to the top of the tank.

Connecting the sensor to the RV-C bus

1 Apply the silicon grease to the rubber gaskets on the cable plug connector.

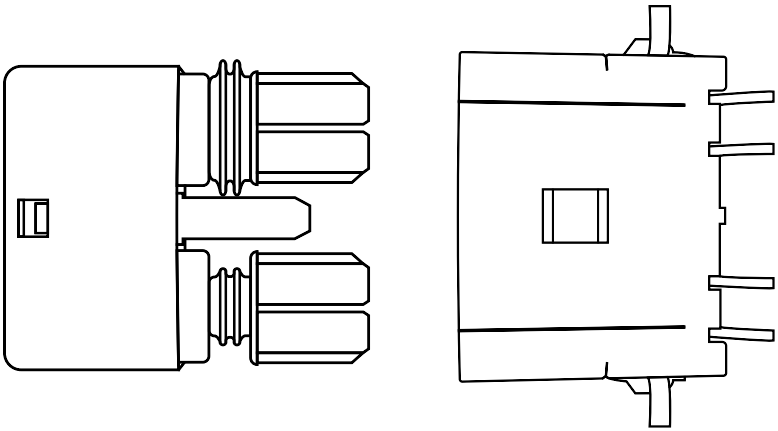


Figure 1. Cable plug connector (left), Fathom socket connector (right)

2 Plug the cable plug connector into the Fathom socket

connector. Make sure the cable plug connector is oriented the correct way. The clasping mechanism should point towards the Fathom sticker.

Note. Disconnecting the cable connector is intentionally difficult once the sensor is mounted to prevent accidental removal of the cable from the sensor.

Disconnecting the cable connector

To release the cable connector after having inserted it into the Fathom connector, squeeze the back of the cable connector top to bottom with your thumb and index finger.

Fathom connector pinout

This diagram shows the Fathom connector's pin assignment.

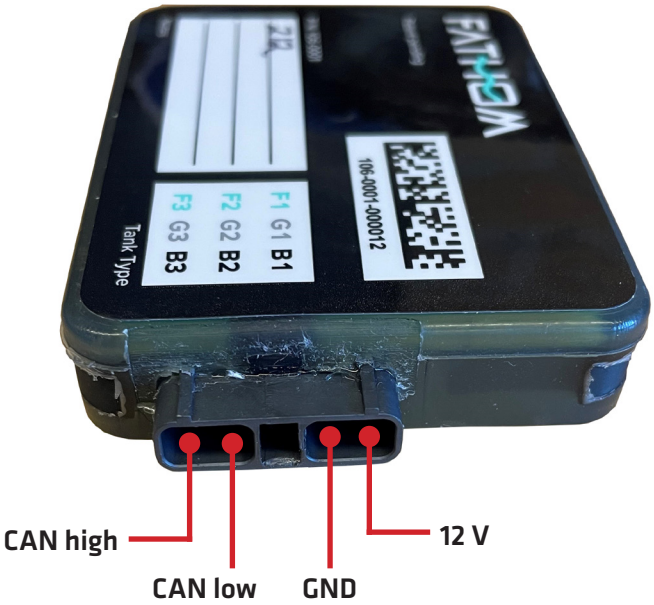


Figure 2. Fathom connector pinout

Fathom cable pinout

The figure below shows the Fathom cable wire connections. In the Fathom cable, the GND and 12 V conductors are a twisted pair and the CAN low and CAN high conductors are a twisted pair.

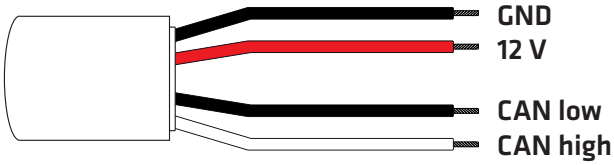


Figure 3. Fathom cable pinout

Determining the sensor location on the tank

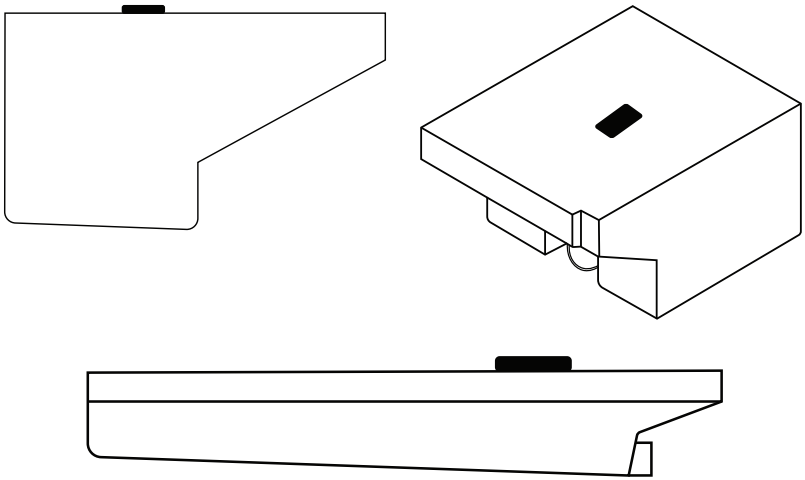
Before removing the adhesive cover on the bottom of the Fathom sensor, you will need to determine the appropriate sensor location on the tank.

The guidelines below will help you determine the best location for a particular RV tank:

- The sensor should be placed above the deepest part of the tank. This will ensure the most accurate readings for tank liquid levels.
- The sensor must be placed on a flat surface. Any bumps on the surface of the tank may result in sensor detection and adhesion issues. If needed, the desired sensor location can be lightly sanded down to ensure a level surface.
- The sensor should not be placed right next to the edge of a tank. We recommend leaving at least six inches between the sensor and the edge of the tank.
- The sensor should not be placed above any support structures within the tank.

Note. Given the variety of RVs and RV tank shapes, sensor placement will vary.

To help illustrate these guidelines, below are some example tank shapes and the recommended placement of the sensor:



Placing the sensor on the tank

Now that the Fathom sensor is wired to the RV and you have determined the best location for the Fathom sensor, you can now prepare the surface for the sensor adhesive.

Follow the steps below to attach the Fathom sensor to the top of the tank:

1. Make sure the location is flat.
2. Sand down the surface as needed.
3. Use solvents such as Heptane or Isopropyl alcohol to clean the tank surface.
4. Allow the surface to dry completely.
5. Remove the adhesive cover on the bottom of the sensor and place the sensor in the desired location on the tank.

   It is recommended that you apply firm, even pressure and mild heat (between 70° and 100° F) to the tape for the best application. Avoid placing the tape on the tank in environments with temperatures below 50° F, as this can cause the tape to become too firm to adhere to the tank surface properly. Once the tape is adhered, low temperatures will not effect the existing bond between the sensor and the tank. The tape will reach 50% strength within 20 minutes and 100% strength after 72 hours of application.

   The purpose of the 3M 300LSE tape is to permanently attach the Fathom sensor to the tank. The Fathom sensor can detect the liquid level without being securely attached to the tank if it

Note. The sensor uses 3M 300LSE tape to adhere to the tank surface.

is flush against the surface of the tank. If testing the placement on a specific tank or tank configuration, it might be useful to try different positions before applying the adhesive.

2

Configuring the sensor

Depending on your situation, the Fathom sensor may either come pre-configured, or you may need to complete the sensor configuration yourself.

If you are configuring the sensor yourself, you may want to use the Fathom Tester (see chapter 3) or a third-party tool that supports Fathom configuration. The sensor can also be configured manually using software that can monitor and send CAN bus messages to and from the sensor, such as PCAN-View. You will use RV-C commands in the software to communicate with and configure the sensor.

The sensor also comes with an LED light that blinks to show its current status to help troubleshoot any issues.

Fathom configuration commands

RV-C commands are sent through the CAN bus software to communicate the needed changes to the correct sensor. The commands consist of an addressable portion (usually in the CAN ID) and the desired configuration information (usually in the CAN data). Bolded values represent values that are dependent on the sensor and the desired command.

Additionally, if the command is proprietary, you must send the Proprietary Prefix command first before sending the next command.

Setting the tank depth

The tank depth is determined using the distance from the sensor on top of the tank to the bottom of the tank. Send the following CAN ID and data to the device to set the tank depth for your sensor:

CAN ID	Data	Proprietary?
19FFB4**xx**	**aa** 01 **bb** 64 FF FF FF FF	No

Notes:

- **xx –** The source address of the device completing the configuration.
- **aa –** The instance of the device you are configuring.
- **bb –** The depth of the tank in centimeters.

Some tanks have a concave roof. If the sensor is placed on a concave area of the tank, you may need to adjust the tank depth value to account for the bend to ensure accurate readings.

Sending the proprietary prefix command

Send the following CAN ID and data to the device to be able to send proprietary messages to your sensor:

CAN ID	Data	Proprietary?
18EF**yyxx**	46 41 54 48 4F 4D 32 34	N/A

Notes:

- **yy –** The source address of the device you are configuring.
- **xx –** The source address of the device completing the configuration.

This message must be sent before any proprietary messages. After sending this, you must send the desired proprietary message within **two seconds** of the prefix command transmission.

Setting the tank instance

The tank instance is the type of water that the tank will be holding, such as fresh, gray, or black water. Send the following CAN ID and data to the device to set the tank instance of the device:

CAN ID	Data	Proprietary?
18EF**yyxx**	69 6E 73 74 6E 63 65 **aa**	Yes

Notes:

- **yy –** The source address of the device you are configuring.
- **xx –** The source address of the device completing the configuration.
- **aa –** The value corresponding to the tank instance you want to set. The tank instance values are hexadecimal values that can be done with a prefix 0x (for example, 0x00) or a trailing "h" (for example, 00h):
  - **00** — Fresh 1
  - **01** — Black 1
  - **02** — Gray 1
  - **10** — Fresh 2
  - **11** — Black 2
  - **12** — Gray 2
  - **20** — Fresh 3
  - **21** — Black 3
  - **22** — Gray 3

Resetting the sensor

Resetting the sensor will power-cycle the device. Tank instance, depth, and sensor address are maintained through a reset. Send the following CAN ID and data to the device to reset the sensor:

CAN ID	Data	Proprietary?
18EF**yyxx**	52 45 53 45 54 58 30 30	Yes

Notes:

- **yy –** The source address of the device you are configuring.
- **xx –** The source address of the device completing the configuration.

Understanding the LED

The Fathom sensor LED represents the status of the sensor, which can help with understanding and troubleshooting the device.

The LED has has two modes for indicating different conditions.

LED state	Sensor status	Notes
Constant blinking every second from initial boot up	CAN is connected.	Upon boot up, the sensor will begin blinking every second and will continue blinking as long as the sensor is powered.
10 fast blinks then blinking every second	No CAN connection.	Ten fast blinks at boot up indicates that the device is not connected to CAN. Once the CAN bus is connected, the device will need to be rebooted. (In future versions the device will connect to CAN whenever the bus is connected without a reboot of the sensor.)

3

Using the Fathom Tester (optional equipment)

The Fathom Tester is a handheld computer used to configure Fathom sensors. It can display status information from the sensor and provide configuration and updating functionality.

The Fathom Tester comes with a power supply and a cable that connects the sensor to the Fathom Tester.

Fathom Tester pinout

This diagram shows the Fathom Tester pinout.

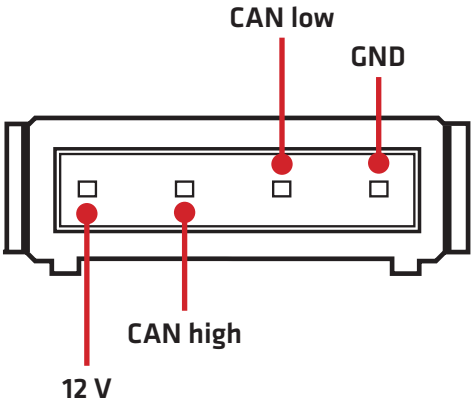


Figure 4. Fathom Tester pinout

Connecting a sensor to the Fathom Tester

1 Plug the power cable into a power source. The Fathom Tester can be powered by any 12 V power source, such as a 12 V wall outlet adapter. Once plugged in, the Fathom Tester screen will show no sensor detected.

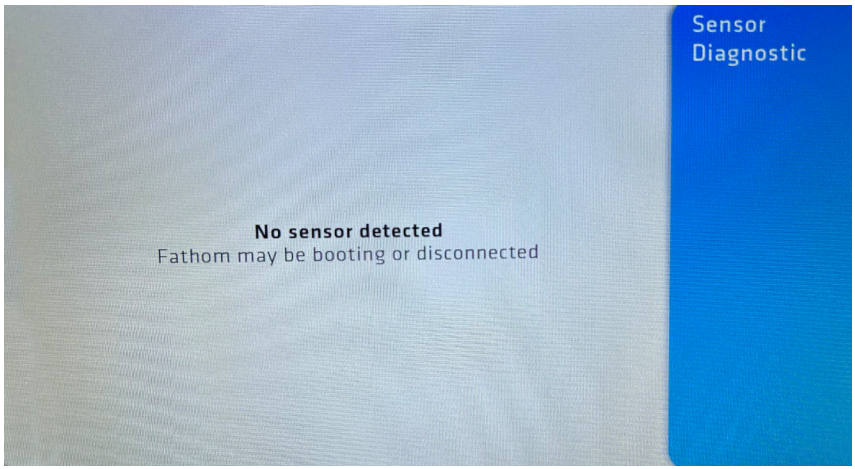


Figure 5. No sensor detected

2 Connect the sensor to the Fathom Tester using the sensor cable. Once the Fathom sensor is detected, you will have real-time sensor diagnostics as well as tank status information.

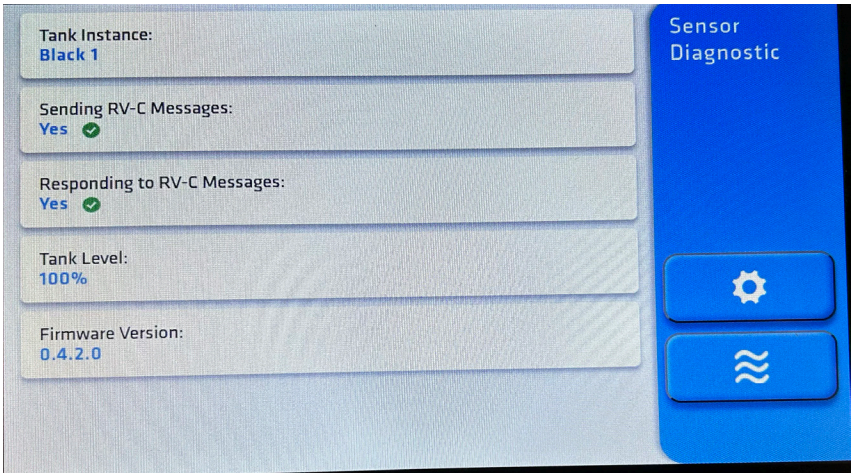


Figure 6. Sensor Diagnostic screen

The Sensor Diagnostic screen shows the following:

Setting	Description	Detail
Tank instance:	Shows the type of tank the Fathom sensor is installed on.	Change this on the Tank Calibration screen.
Sending RV-C Messages:	Shows if the Fathom Sensor is sending RV-C messages.	If this says No, the sensor is not sending messages to the Fathom Tester and is not working correctly.
Responding to RV-C Messages:	Shows if the Fathom Sensor is responding to Fathom Tester messages.	If this says No, the sensor is not responding to messages from the Fathom Tester and is not working correctly.
Tank Level:	Shows the percentage of liquid in the tank.	N/A
Firmware Version	Shows the firmware the Fathom Sensor is using.	Update this by using a USB drive with an update file.

Changing the tank instance and tank height

The Fathom Tester allows you to easily change the type of tank the sensor is monitoring and the tank height. Follow the steps below to change the tank instance:

1 Press the gear ⚙ icon and the Tank Calibration screen will appear.

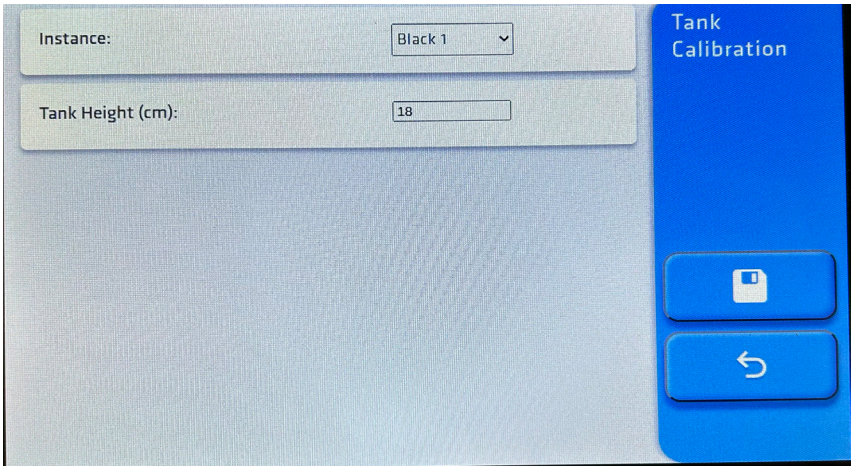


Figure 7. Tank instance

2 Use the **Instance:** drop-down menu to change the tank type.

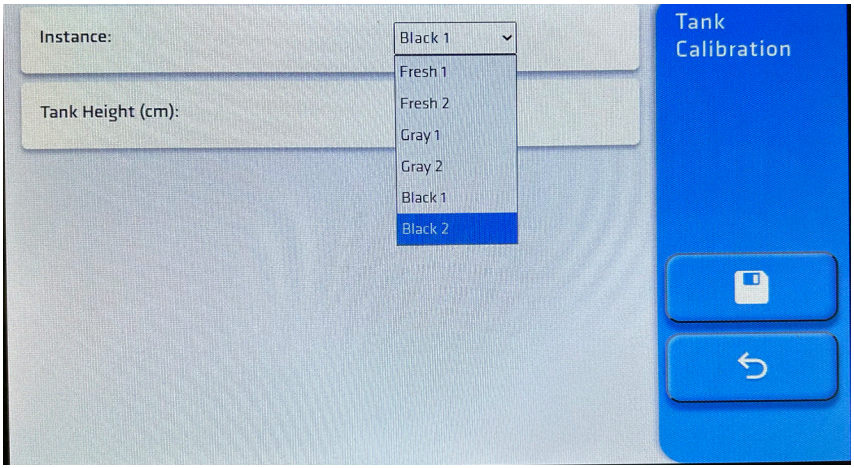


Figure 8. Instance: drop-down

3 Use the **Tank Height (cm):** field to change the tank height.

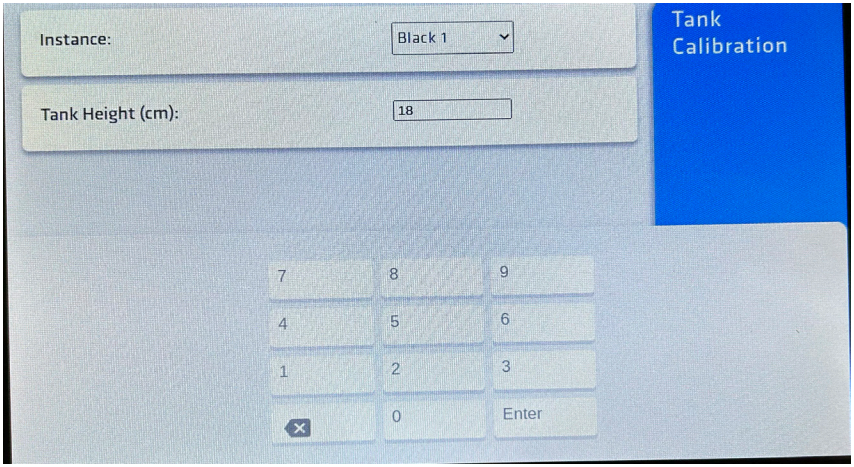


Figure 9. Tank Height drop-down

4 Click the Save button.

Updating the Fathom Sensor firmware

1 Plug in a USB drive with an update file on it. The tester will automatically detect the firmware file on the USB drive. Sensor firmware will be updated over the CAN bus and will take approximately five minutes.

Note. The USB should be empty except for the firmware file.

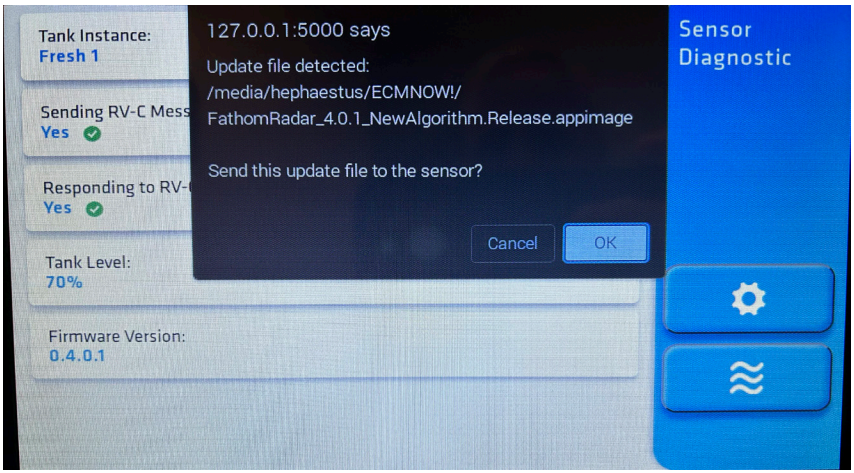


Figure 10. Updating firmware

2 Press **OK** and the Fathom Tester will update the sensor firmware.

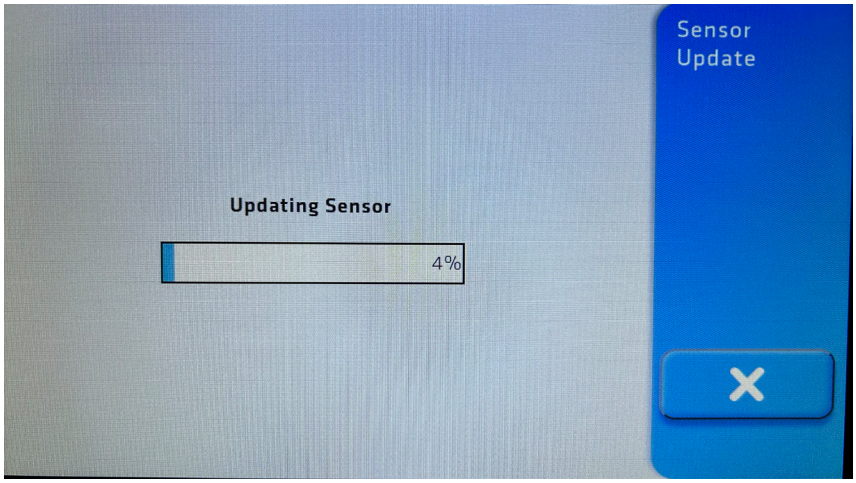


Figure 11. Updating sensor

Tank profile

This screen is currently not functional. In the future, the Fathom Tester will include a tool that will allow you to define complex tank geometries. Currently only the tank height can be configured as described previously.

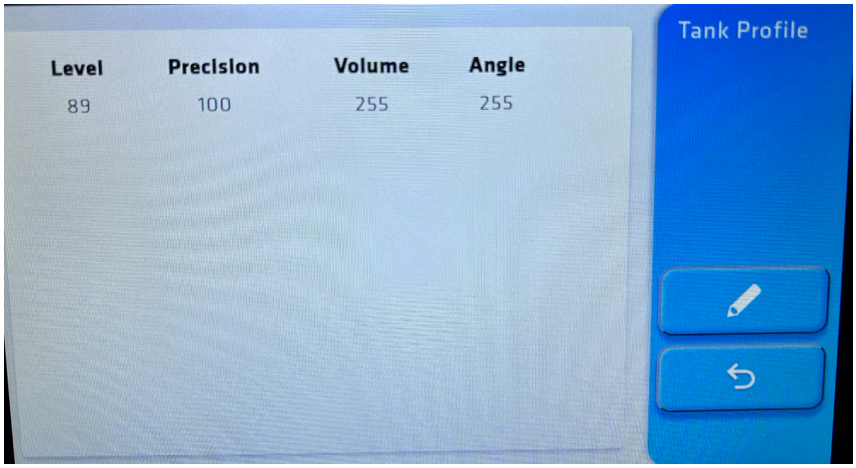


Figure 12. Tank Profile screen

FATHOM

www.wavetronix.com