



# TruTank Overview

TruTank is an intuitive tank monitoring system which uses proprietary technology to accurately measure tank volumes in 5 percent increments, even in tanks with odd geometries.

- 1 Fluid tanks display. Simply press and hold a tank graphic for up to 15 seconds to enter the tank diagnostic screens.
- 2 Tank Diagnostics – These pages contain the signal strength display as well as all relevant technical and programming information.
- 3 Faults and Help page – display fault messages (display may vary by system).



## Readings between empty and full

Any time the tank has less than 10% capacity, all readings including the Vegatouch and multiplex screens will show empty. Any time the tank has greater than 90% capacity all readings including the Vegatouch and multiplex screens will read full.



## Overfill scenario and initial Power-up readings (Safety readings)

In the event that the tank has been overfilled and there is no longer an air gap at the top of the tank, the sensors will not be able to display accurate information. Because the sensors report the fill level rising prior to being overfilled, all readings including the Vegatouch and multiplex screens will show that the tank is full. In addition to showing the tank level as full, the tank reading will also have a light blue line under it indicating that the value being shown is not a valid reading. Once the tank is no longer overfilled and has an air gap at the top of the tank, the invalid underline will go away and tanks will begin showing a valid and accurate reading again.



The following is how each tank will read in the event that a tank sensor is unable to work correctly due to being overfilled while there is no power to the tank module.

Fresh tank: Show empty with an invalid line under the reading. Once Sensors are within working parameters again, sensor readings will be displayed, and invalid line removed.

Grey tank: Show Full with an invalid line under the reading. Once Sensors are within working parameters again, sensor readings will be displayed, and invalid line removed.

Black tank: Show Full with an invalid line under the reading. Once Sensors are within working parameters again, sensor readings will be displayed, and invalid line removed.

### Continuous power

By adding continuous power to the tank monitor, it will constantly monitor the fill level and be able to identify when a tank has too much water and is overfilled. Because the monitor will be able to identify when a sensor has been overfilled there will be no reason to display the Safety Reading. Instead, it will accurately show whether the tank is empty or full.

The power draw the monitor will use for all the tanks currently used, is about 50 Mil amps and can be provided through the connector on the back of the monitor. Only the 12v Positive wire will need to be run additionally to allow continuous power, as the ground can come from the 3M connector.

### Diagnostic states that could be reported

1. Issue: Sensor status indicates Sensor Error (report as Fault).

Possible cause: Bad connection to sensor or bad sensor.

What to do: Verify sensor is plugged in. Try unplugging then re-plugging sensor. If this fails to resolve issue, replace sensor.

2. Issue: Sensor status indicates Tank Invalid or Tank Initializing when there is water in the tank (report as Blue Line).

Possible cause: Debris, foam or excessive bubbles in tank could be interfering with the signal or the tank could be over full.

What to do: Ensure the tank is not completely full with no air space at the top of the tank. If there could be solid debris in the tank, try adding water to move the debris away from sensor or drain tank to remove debris. If tank contains liquid with no debris, foam, or bubbles and it is not completely full, check sensor if it continues to read invalid.



3. Issue: Inconsistent reading or weak signal strength.

Possible Cause: The tank sensor needs to have alignment check or possibly the vehicle is not level. Also, possible weak signal caused by using non-twisted sensor wires.

What to do: Check that the vehicle is level. If so, verify that the sensors are aligned properly. Also, twisted pairs need to be used for each sensor with an independent ground for each sensor (not using a common ground).

4. Issue: Sensor status indicates Tank Invalid or Tank Initializing when tank is empty (report as Blue Line).

Possible cause: The sensor is not picking up on the ring down and may need to be replaced.

What to do: Replace the sensor.

5. Issue: On initial 12V system power up, the black and gray tanks read full with a blue line under them and the fresh tank reads empty with a blue line under it.

Possible cause: On initial power up, if there is no water in the tank, the system may have difficulty detecting the no water condition. As a result, it will display a blue line under the tank reading for the appropriate tank and indicate the following:

- Fresh Tank – Shown with a blue line under the tank reading and the tank graphic as being empty. Because the system is not detecting the empty fresh tank correctly, it does not have valid data to display. As a precaution, it will display the fresh tank graphic as empty as this is the least favorable condition for the tank.
- Gray Tank – Shown with a blue line under the tank reading and the tank graphic as being full. Because the system is not detecting the empty gray tank correctly, it does not have valid data to display. As a precaution, it will display the gray tank graphic as full as this is the least favorable condition for the tank.
- Black Tank – Shown with a blue line under the tank reading and the tank graphic as being full. Because the system is not detecting the empty black tank correctly, it does not have valid data to display. As a precaution, it will display the black tank graphic as full as this is the least favorable condition for the tank.

Solution: Add at least 3 inches of water to the tank to allow the sensor to properly initialize. Once there is water covering the sensor, it should start to report correct readings and display the tank levels correctly.

## Diagnostic Information Display

To be highly cautious with the messages we display and to prevent unnecessary service calls, we recommend displaying messages in 2 different methods.

The first is the Error/Fault warning. This message would be visible from both the main screen in the coach as well as the tank screen in the wet bay. From both home screens, a warning message will display (in the same way we display other faults) indicating there is a fault. The fault page will display the error, possible cause and what to do about it. The only message that will display with the error/fault message is Issue #1 from above, Sensor Error.

The second message that will be displayed is a service note. This message will typically take care of itself and is intended to give additional information but not alarm or indicate there is an error with the tank system. Because this message does not indicate an error or fault, no error or warning will be displayed on either of the Home screens. Instead, a blue line will appear under the reading on the wet bay screen, indicating that the message is not valid. From the main screen in the coach, the fault page will display a service note giving additional information about the issue, possible cause and what to do about it. Issues 2-5 as previously described will all display as a service notice.



# TruTank Diagnostics

- **LVL (Level):** Percentage readout of the level of liquid in the tank.
- **Max Depth:** This just means the max programmed height of the tank.
- **SR (Short Range):** This indicates the power at which the sensor is being driven when in Short Range mode. We have found that the ideal value for majority of applications is 220mv for the Short Range mode.
- **LR (Long Range):** This indicates the power at which the sensor is being driven when in Long Range mode. We have found that the ideal value for majority of applications is either 75mv or 125mv for the Long-Range mode, depending on the application. (125mv is more typical)
- **MODE:**
  - **SR (Short Range):** This mode is active when the level in the tank is within 1-5cm. This mode optimizes the system for level within the 1-5cm level range. Within this level range, the settings required for measuring levels above 5cm would be too sensitive and could cause erroneous readings. Therefore, a system that would automatically apply settings based on the level in the tank was required.
  - **LR (Long Range):** This mode is active when the level in the tank is above 5cm. The requirement for Long Range mode is the same as why Short Range mode won't work for Long Range mode - above a level of 5cm, the settings that would be ideal for a range within 1-5cm would not provide the best level readings at a level above 5cm.
  - **SIG STR (Signal Strength):** This mode is active when the system is in signal strength mode. Typically, this mode will only be active when viewing the diagnostics page and will be disabled when you exit the diagnostics page. The system will toggle between Signal Strength mode and either Short Range or Long-Range mode, depending on the level in the tank. The reason why the system toggles between these modes in this fashion is because the settings that are required to gather the signal strength is not ideal for consistent level readings.
- **AT THLD (Auto Threshold):** When enabled, Auto Threshold allows the system to optimize settings for either the Short-Range mode and Long Range mode, in theory. This allows the system to automatically adjust the sensor sensitivity based on various factors such as tank level, matter in the tank or mis-aligned sensors. This feature should be disabled and indicated by a "DSBLD". We have found that this feature does not work as it should at this time and should be disabled. These settings are now set manually.
- **STATUS:**
  - **Valid:** The sensor is good and providing a valid reading.
  - **Invalid:** The sensor is bad, mis-aligned or blocked and not providing a valid reading.
  - **Sensor Check:** The system is looking for the sensor.
  - **Initializing:** The system is initializing the sensor. If the system is unsuccessful at initializing the sensor, it will continue to attempt to initialize and eventually give an Invalid status.

- **ERR SMPL (Error Sample):** This just logs the amount of errors the system is experiencing. The system could be logging errors due to a marginal sensor, misalignment, a blocked sensor or some other factor that could be causing errors in the system. This tool is helpful, for example, there could be a marginal sensor that seems to be working intermittently. In this scenario, you may see the error sample count increase to 20 and then drop back to 0, then log another 15 errors, then drop back to 0 and so on. This would give you the indication on an intermittent issue. However, if you see the error sample count maxed out at 255, this will tell you there is a definite constant issue with that sensor. This value will reset if you exit and re-enter the diagnostics page.
- **SIG STR (Signal Strength):** This value and graph provides a textual and graphical readout of the strength of the signal being returned to the sensor. The graph is color coded so anything in the green is a good signal, yellow is marginal and red is a poor signal.
- **SigStrMeasures (In relation Signal Strength):** This just logs the number of signal strength measurements the system has taken. This value will max out at 255 and will reset if you exit and re-enter the diagnostics page.
- **MinAvgSigStr (Minimum Average Signal Strength):** This provides a readout of the lowest average signal strength value.
- **AvgSigStr (Average Signal Strength):** This provides a readout of the average of the MinAvgSigStr and VarLastSigStr.
- **VarLastSigStr (Signal Strength Variance):** Specifies the maximum moving variance on the signal strength measurements. If the variance exceeds this, the water is unstable and the signal strength value will be considered invalid. The latest signal strength value will be reported regardless of the variance.
- **Blue Line:** A blue line will appear under the tank level reading to indicate when the tank status is not valid. Please note that in a case where the tank reading was valid and providing valid level readings, the moment an issue is detected and the tank status became invalid, the level readout will continue to indicate the last known valid reading on the tank level readout.