

Transducer Diagnostic Tester

User Guide

TDT1000



Copyright © 2017 Airmar Technology Corp. All rights reserved.

All Rights Reserved. Except as expressly provided herein, no part of this manual may be reproduced, copied, transmitted, disseminated, downloaded, or stored in any storage medium, for any purpose without prior written consent of Airmar. Airmar hereby grants permission to download a single copy of this manual and of any revision of this manual onto a hard drive or other electronic storage medium to be viewed and to print one copy of this manual or any revision hereto, provided that such electronic or printed copy of this manual or revision must contain the complete text of this copyright notice and provided further that any unauthorized commercial distribution of this manual or any revision hereto is strictly prohibited.

Information in this manual is subject to change without notice. Airmar reserves the right to change or improve its products and to make changes in the content without obligation to notify any person or organization of such changes. Visit the Airmar website at www.airmar.com for current updates and supplemental information concerning the use and operation of this and other Airmar products.

Table of Contents

Important.....	4
Cautions.....	5
Introduction.....	5
Kit Includes.....	5
Adapter Cables.....	6
Where to Purchase Parts.....	6
Test Set-up: Transducer.....	7
Test Set-up: TDT1000.....	8
About SensorCheck™ App.....	12
Download SensorCheck App.....	12
Connecting SensorCheck App to TDT1000.....	13
SensorCheck Home Screen.....	14
SensorCheck App Does NOT Connect.....	15
Menu Screen.....	16
History.....	16
Catalog.....	17
Settings.....	17
Identifying the Transducer: Flowchart.....	18
Getting Started.....	18
Searching for XducerID® Feature.....	19
Airmar Transducer with NO XducerID® Feature.....	20
Searching for Transducer by Original Equipment Manufacturer.....	21
Unknown Transducer.....	22
Accessing Database.....	22
SensorCheck Test Screens.....	23
Calibrating.....	23
Measuring.....	24
Test Results.....	25
Test Summary.....	27
Vessel Information.....	28
Chirp Transducer.....	29
Calibrating & Measuring.....	29
Done Screen.....	30
Sharing Test Results.....	31
Interpreting Test Results.....	32
Understanding the Graph.....	32
Testing in Small Bucket of Water.....	33
“In Range” Transducer Results.....	34
“Out of Range” Transducer Results.....	35
Corrupt Data.....	36
Why Does a Transducer Show Poor Results.....	36
Software Revisions.....	36
Customer Service.....	36

IMPORTANT

Before removing and/or returning an “Out of Range” transducer, please contact your service representative for additional product support.

WARNINGS

Follow the precautions below for optimal product performance and to reduce the risk of damage.

CAUTION: The transducer must be connected to the TDT1000 through an adapter cable. Do NOT connect the transducer directly to the TDT1000.

CAUTION: You must have the correct adapter cable for the transducer being tested. Each OEM has specific adapter cables that work with their transducers. You must use the adapter cable that matches the brand of the transducer/instrument.

CAUTION: The transducer and adapter cable must be connected to the TDT1000 before starting a test. Do NOT connect or disconnect a transducer while testing is in progress. Doing so may damage the TDT1000.

CAUTION: Prolonged operation of the transducer in air may cause it to overheat, possibly resulting in failure.

WARNING: Lithium-ion batteries may be hazardous and can present a serious fire hazard if damaged, defective, or improperly used. Exposure to liquids, especially saltwater, can cause internal corrosion, damage to the cells, or to the battery management system. Batteries should be recharged within 24 hours of a full discharge. Do not charge at temperatures below 40°F (4°C).

IMPORTANT: To compare the test results of two transducers, they must both be tested in the same environment. Test results are very different when a transducer is tested in deep water compared to a barrel of water.

IMPORTANT: Please read the instructions completely before proceeding.

Introduction

The TDT1000 is a hand-held device used to check that a depth transducer is functioning properly. It works with all Airmar transducers and most others.

When combined with the SensorCheck™ app on a Bluetooth® LE-enabled iOS or an Android device, it can be used to test a transducer's characteristics. Airmar transducers will be compared to the original factory results. These results can be sent to a boat owner, dealer, installer, or an Airmar technician.

Kit Includes

TDT1000	33-718-01
Adapter cable with terminal box (transducers with NO connector)	33-736-01
AC-DC Power Adapter Kit with international wall-plug adapters	33-739-01
Carrying case	33-740-01
Quick Start Guide	17-632-01
Owner's Guide can be found at www.Airmar.com/tdt1000 .	17-615-01

Adapter Cables

You must have the adapter cable that matches the brand of the transducer and mates with the connector on the transducer being tested. You can purchase adapter cables for almost all transducer/instrument brands.

<u>Adapter Cable</u>	<u>Part Number</u>
Mix & Match Adapter Cable, 1kW, 9F - A connector	33-1323-01
Garmin Adapter Cable, 6M - A connector	33-1324-01
Garmin Adapter Cable, 8M - G connector	33-1325-01
Garmin Adapter Cable, 12M - G connector	33-1326-01
Furuno/Si-tex Adapter Cable, 8M - F (Fuji) connector	33-1327-01
Furuno Adapter Cable, 10M - FU connector	33-1328-01
Raymarine Adapter Cable, 8M - RR connector	33-1329-01
Raymarine Adapter Cable, 6/9F - A connector	33-1330-01
Raymarine Adapter Cable, 11M - LTW connector	33-1331-01
Lowrance Conventional Adapter Cable, 7FB - LR connector	33-1332-01
Lowrance Chirp Adapter Cable, dual 7FB - LR connector	33-1333-01
Simrad Adapter Cable, 7M - A connector	33-1334-01
Navman Adapter Cable, 6M - A connector	33-1335-01
Si-tex Adapter Cable, 8F - A connector	33-1337-01
Koden Adapter Cable, 8M - A connector	33-1338-01
Navico Adapter Cable, dual 9F - A connectors	33-1388-01
Mix & Match Adapter Cable, 600W, 5F - A connector	33-1389-01
Mix & Match Chirp Adapter Cable, 12M - MM connector	33-1390-01

Where to Purchase Parts

Obtain adapter cables from the following:

Gemeco (USA)

Tel: 803-693-0777
email: sales@gemeco.com

Airmar EMEA (Europe, Middle East, Africa)

Tel: +33.(0)2.23.52.06.48
email: sales@airmar-emea.com

Test Set-up: Transducer

IMPORTANT: Transducer Results taken in a barrel will be different from those taken in deeper water. Testing can be done in a 20 - 40 liter (5 to 10 gal.) bucket with a minimum of 12 inches of water. However, test results may be inconsistent due to reflections.

The transducer can be tested in one of two ways:

- Installed in a hull with the boat in water.
- Suspended in a barrel of water (Figure 1).

Testing in a Barrel

How Impedance is Measured

Transducer impedance measurements are taken by applying a small voltage to the transducer at the frequency being measured. The impedance is calculated by comparing the voltage, current, and precise timing between voltage and current. While these measurements are in process, the transducer creates sound waves in the water.

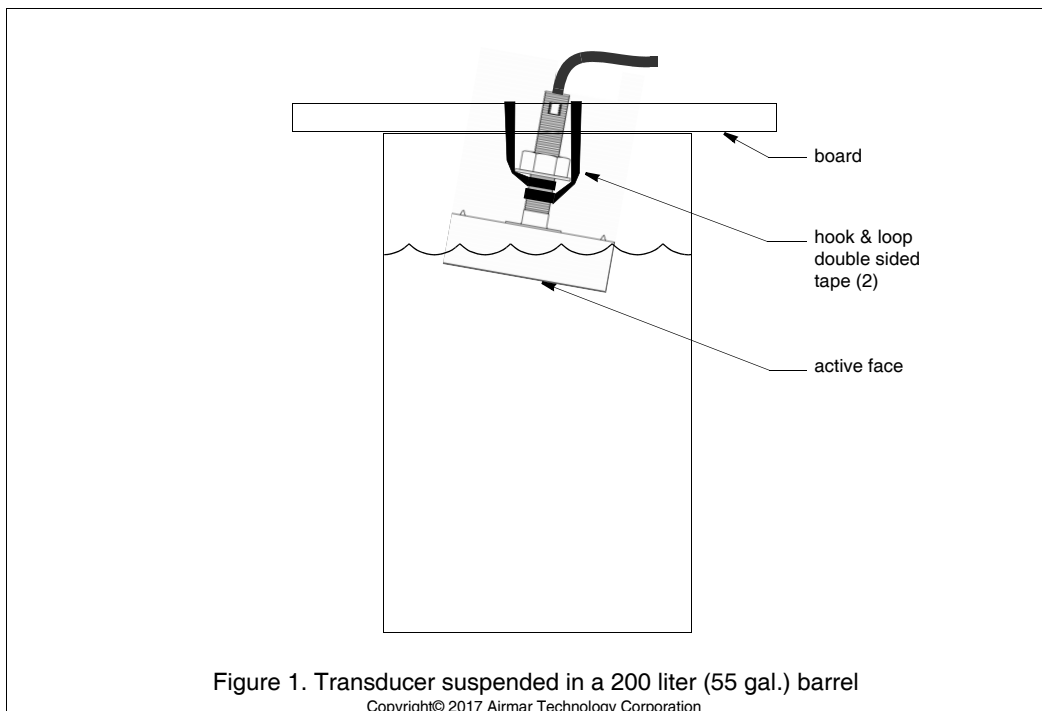
Reflections

Reflected sound received by the transducer creates voltage and current that can interfere with the precision impedance measurement. The smaller the container of water, the more interference the measurement may have. This effect is reduced by using sound absorbing (reflecting/scattering) materials. Another technique is to aim the transducer away from direct reflectors such as the bottom or sides of the water container.

Setting-up Test Environment

CAUTION: DO NOT suspend a transducer by its cable, as it may sever internal connections.

- In general, the deeper the water the more accurate the results. A 200 liter (55 gal.) barrel is recommended.
- Wet the face of the transducer. Then wipe off all air bubbles.
- The active face of the transducer must be submerged in water.
- Slightly angle (10°) the face of the transducer to avoid reflections.
- An improvised support for the transducer will be needed. Avoid suspending the transducer by the cable, because it may sever internal wiring connections.
 - **Thru-hull and transom** mount transducer can be suspended from a narrow board using Velcro® brand, hook and loop, double-sided tape.
 - **In-hull** transducers can be suspended by a rope through the handles.
 - **External, Cavity, Pocket, and Barrel** mount transducers are best tested on a submerged fixture bridging the sides of the barrel.



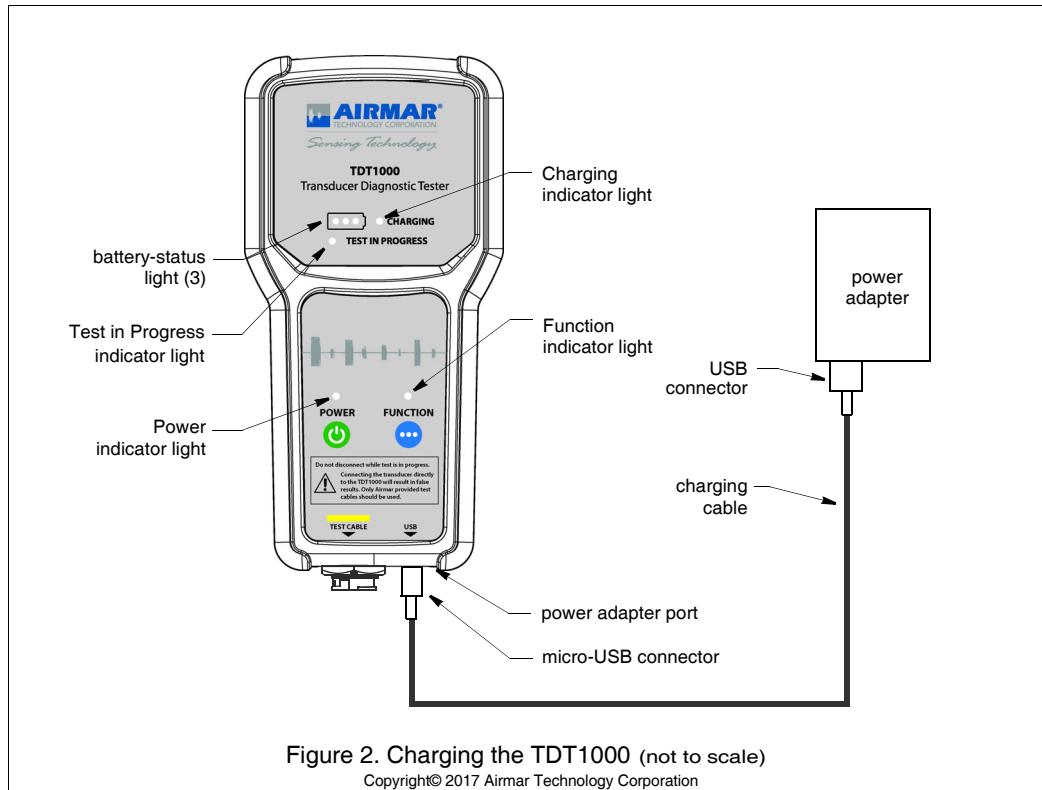
Test Set-up: TDT1000

Battery Check

Be sure the TDT1000 is charged *or* connected to a power supply before testing begins.

1. Power the TDT1000 ON by pushing the green **Power** button (Figure 2). The indicator light will glow green.
2. Check that at least one of the battery-status lights is illuminated green.

NOTE: The battery will stay charged for up to 4 hours of continuous use.



Charging

NOTE: It is time to recharge the battery when there is only one battery-status light illuminated.

1. Plug the USB connector on the charging cable into the power adapter (Figure 2).
2. Plug the power adapter into a power supply.
3. Plug the micro-USB connector on the charging cable into the USB port on the TDT1000.
4. When the TDT1000 is charging, the Charging light will glow amber.
5. When the TDT1000 is fully charged, the Charging light will no longer be illuminated. Disconnect the charging cable from the TDT.

Connecting

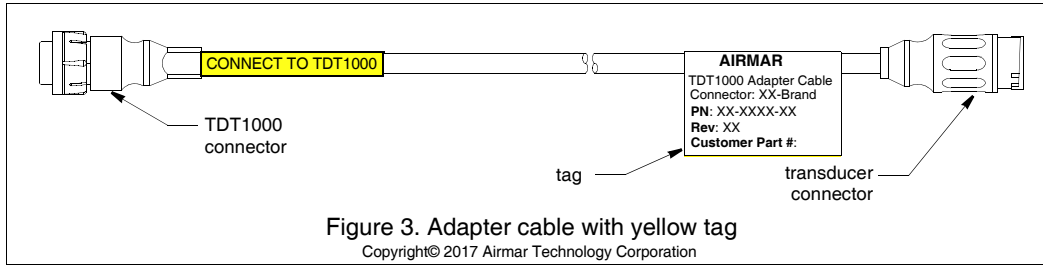
All transducers must be connected to the TDT1000 through an adapter cable. If the transducer has a connector, you need a purchased adapter cable. It must match the brand of the instrument and the number of pins in the connector of the transducer. For transducers with NO connector use the supplied adapter cable with terminal box to connect to the TDT.

Transducer with Connector

IMPORTANT: All adapter cable tags have a yellow label “Connect to TDT1000.”

1. Each OEM has specific adapter cables. Be sure you have the correct one. Check the adapter-cable tag to be sure it matches the brand of the instrument and number of pins in the transducer connector (Figure 3).

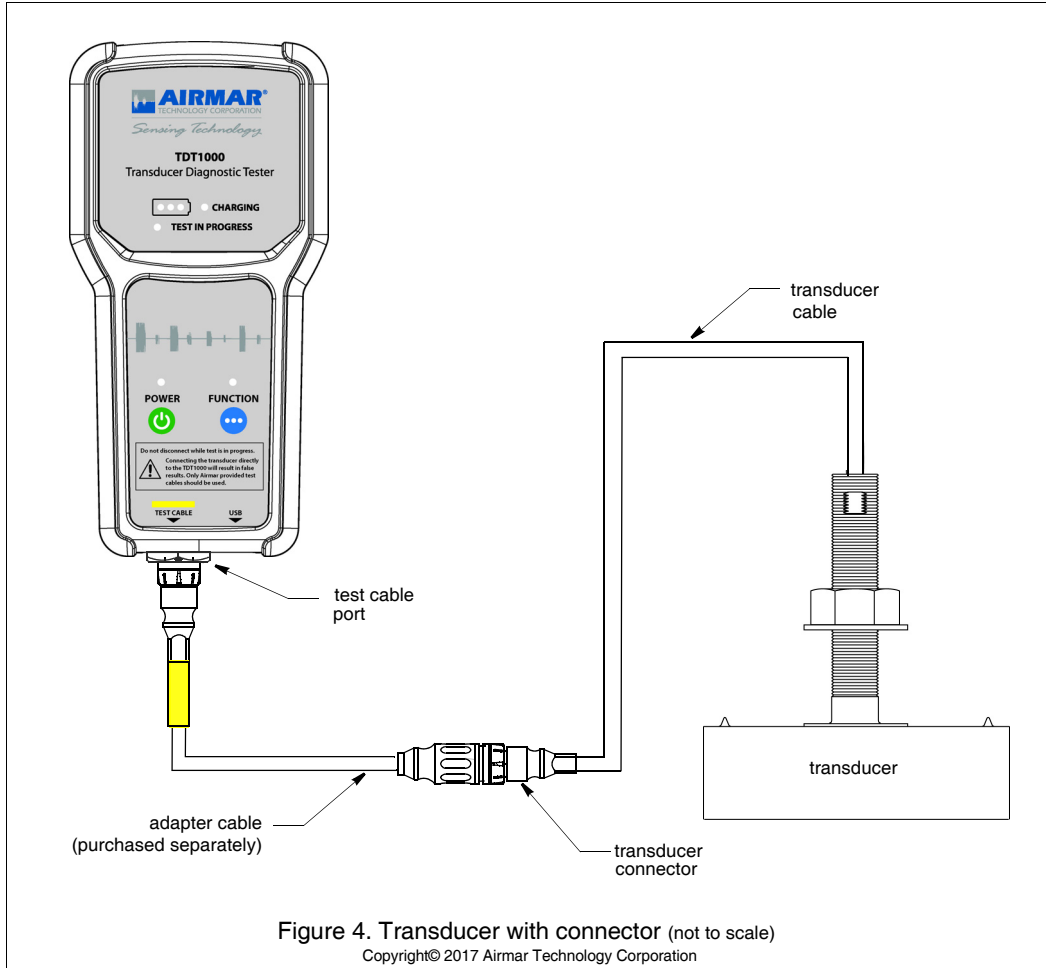
NOTE: Many cables look alike or have the same connector.



2. If the transducer is connected to an instrument, disconnect it.

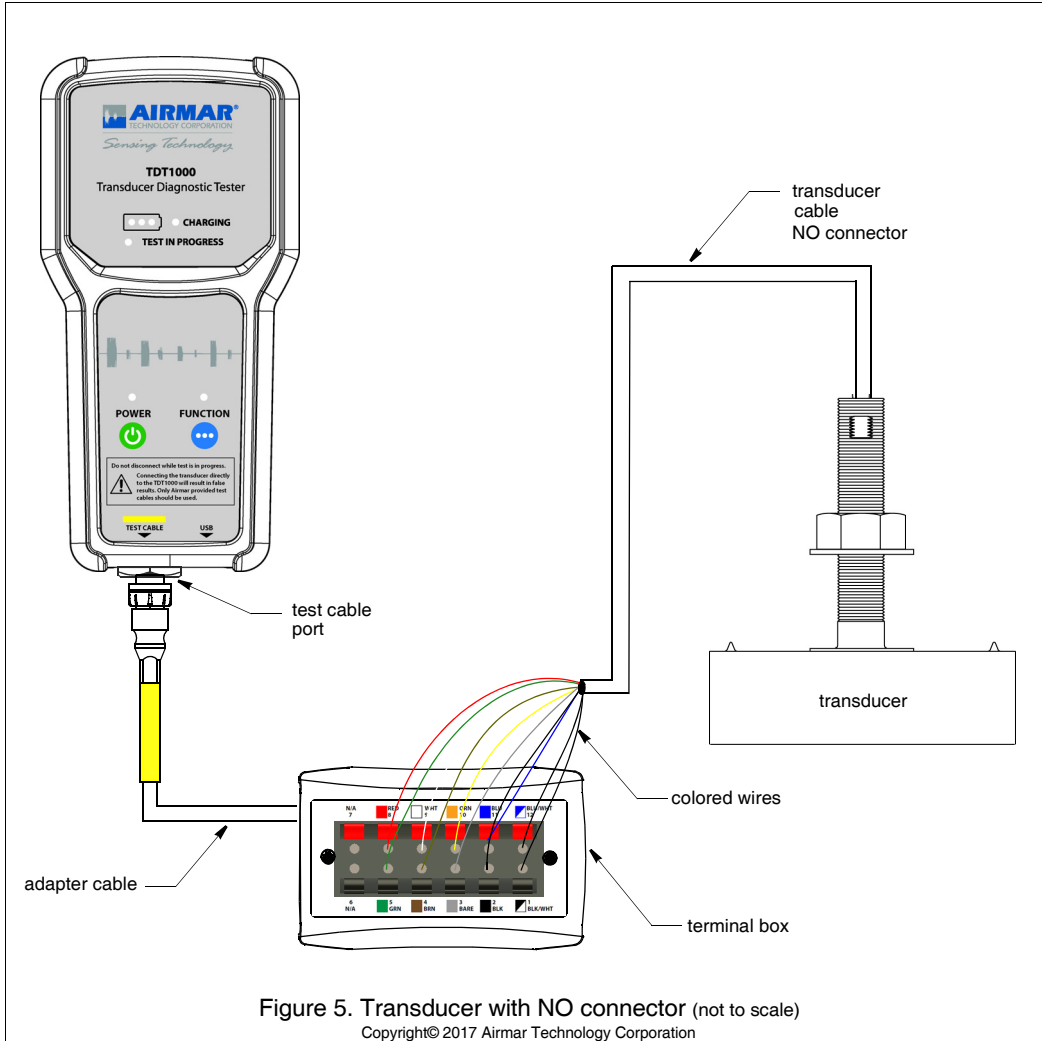
3. Plug the transducer connector into the adapter cable.

4. Plug the adapter cable into the test cable port on the TDT1000 (Figure 4) Twist and lock the connector.



Transducer with NO Connector

1. Use the supplied adapter cable with terminal box. Connect each colored wire in the transducer cable to the matching colored terminal in the terminal box. Follow the color code on the terminal box label.
2. Visually inspect all the wires. There should be no frayed strands or loose ends to cause shorting. Do NOT include colored insulation inside a terminal. Check to be sure each wire is held firmly within its terminal.
3. Connect the adapter cable to the TDT1000 at the test cable port (Figure 5).



About SensorCheck™ App

The SensorCheck app will interface with the TDT1000:

- To find the Airmar XducerID® feature if it is present.
- To identify a transducer with NO XducerID feature.
- To test a transducer's characteristics.
 - Acceptable minimum impedance range.
 - Acceptable frequency range.
- To compare a transducer being tested to Factory Data.
- To judge a transducer as either
 - "In Range": The transducer is functioning properly.
 - "Out of Range": The transducer may not be functioning properly. Or there may be a problem with the test set-up or the instrument. Do NOT remove/return the transducer. Contact your customer service representative.
- To summarize information about a transducer and the vessel in which it is installed.
- To store test history.
- To share test results.

Download SensorCheck App

The SensorCheck app by Airmar is compatible with Bluetooth LE-enabled iOS or Android devices.

1. Go to the App Store or Google Play (Figure 6).
2. Search on the word Airmar.
3. Download the free SensorCheck app.

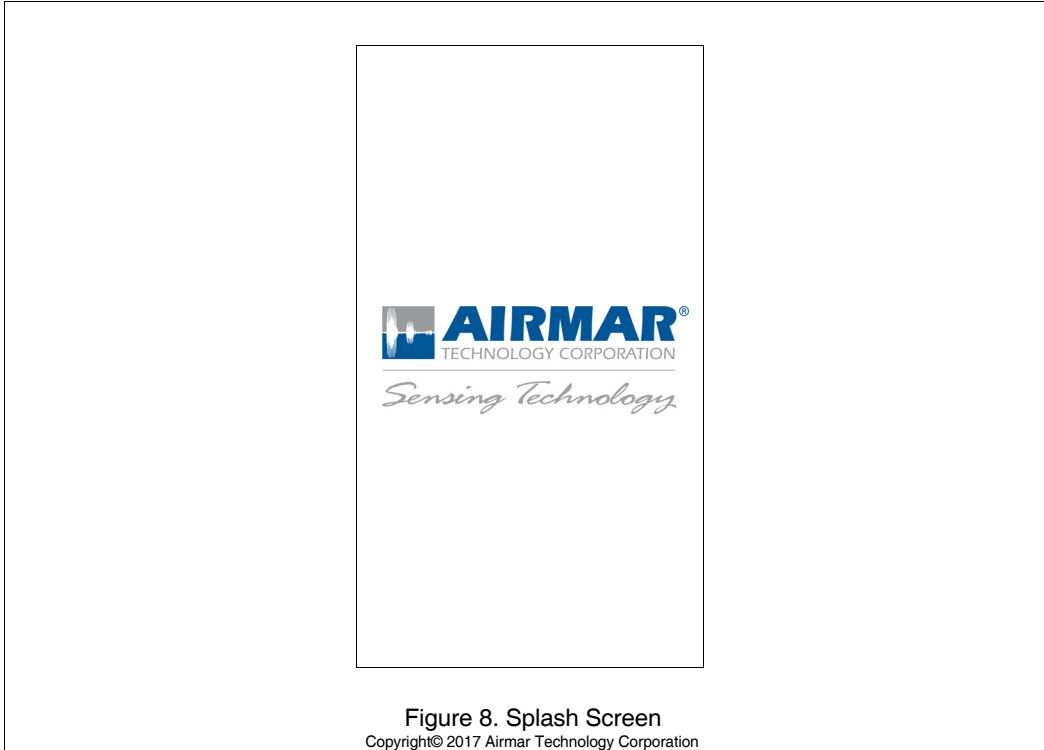
NOTE: The SensorCheck app can be connected to only one TDT1000 at a time.



Connecting SensorCheck App to TDT1000

NOTE: For the SensorCheck app to be fully functional, connect the mobile device to the Internet.

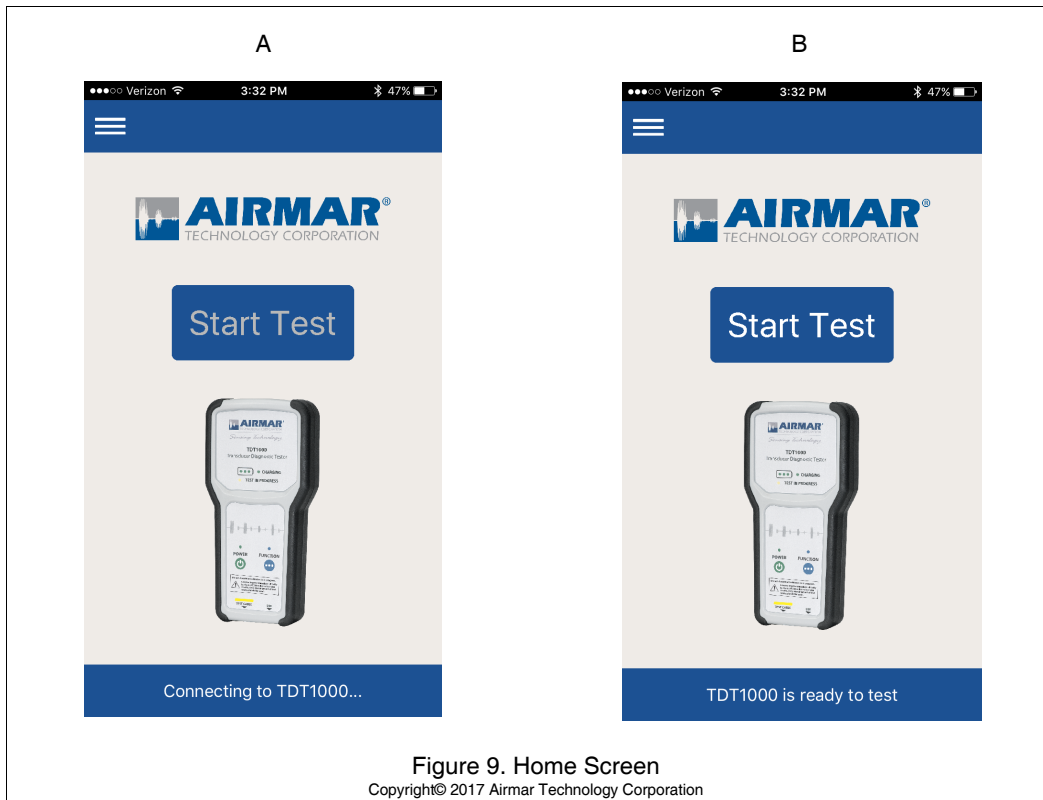
1. Have the mobile device fully charged or connected to power.
2. Be sure the Bluetooth setting is ON.
3. Place the mobile device within Bluetooth range of the TDT1000.
4. Power the TDT1000 ON by pushing the **Power** button (Figure 2).
 - The Function light will glow white for a second as the TDT performs a self-check.
 - The the Power light will glow green.
5. Start the SensorCheck app on your mobile device.
6. The splash screen will appear momentarily when the SensorCheck app connects to the TDT1000 (Figure 8).



NOTE: The SensorCheck app should reconnect to the last know TDT1000 automatically.

SensorCheck Home Screen

- After the Splash screen, the home screen will appear (Figure 9-A).
- “Connecting to TDT1000” will appear on the blue ribbon at the bottom of the screen.
- When “TDT1000 is ready to test” appears, you can begin a test (9-B).

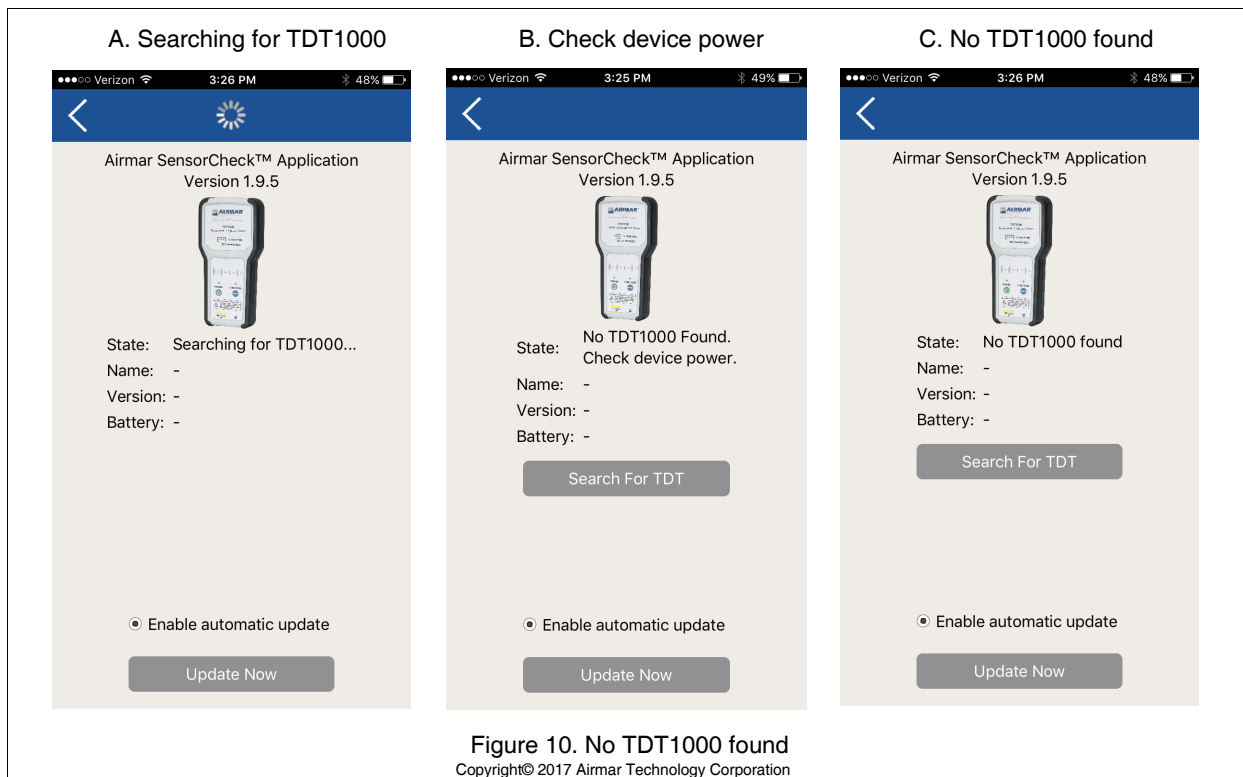


SensorCheck App Does NOT Connect

NOTE: The TDT1000 will automatically power off in five minutes if there is no activity.

“State” is the condition of the SensorCheck app at the current time.

- Your SensorCheck app will say “Searching for TDT1000” (Figure 10-A).
- If “No TDT1000 Found” appears, try again by touching the **Search for TDT** button (Figure 10-B).
- If “Check device power” appears, be sure the TDT1000 is powered ON.
- If “No TDT1000 found” appears, you will see the screen below (Figure 10-C).
 - The SensorCheck app can connect to only one TDT1000 at a time.
 - If you are still unable to connect, make sure another mobile device is not already connect to the TDT1000.



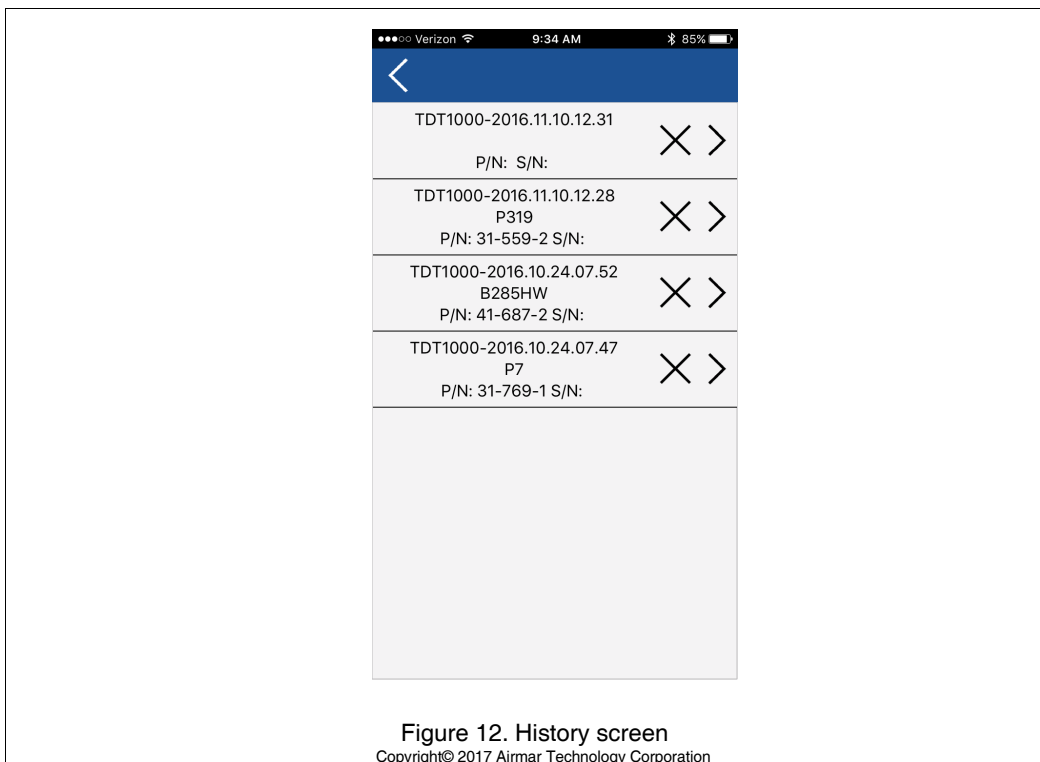
Menu Screen

The pull-down menu on the home screen includes the following (Figure 11):



History (Figure 12)

- View all past test results.
- Delete unwanted test results.



Catalog

If you cannot identify the transducer you are testing, touch **Catalog**. The link will take you to the marine Transducer section of Airmar's website.

User-defined Measurements is NOT available at this time.

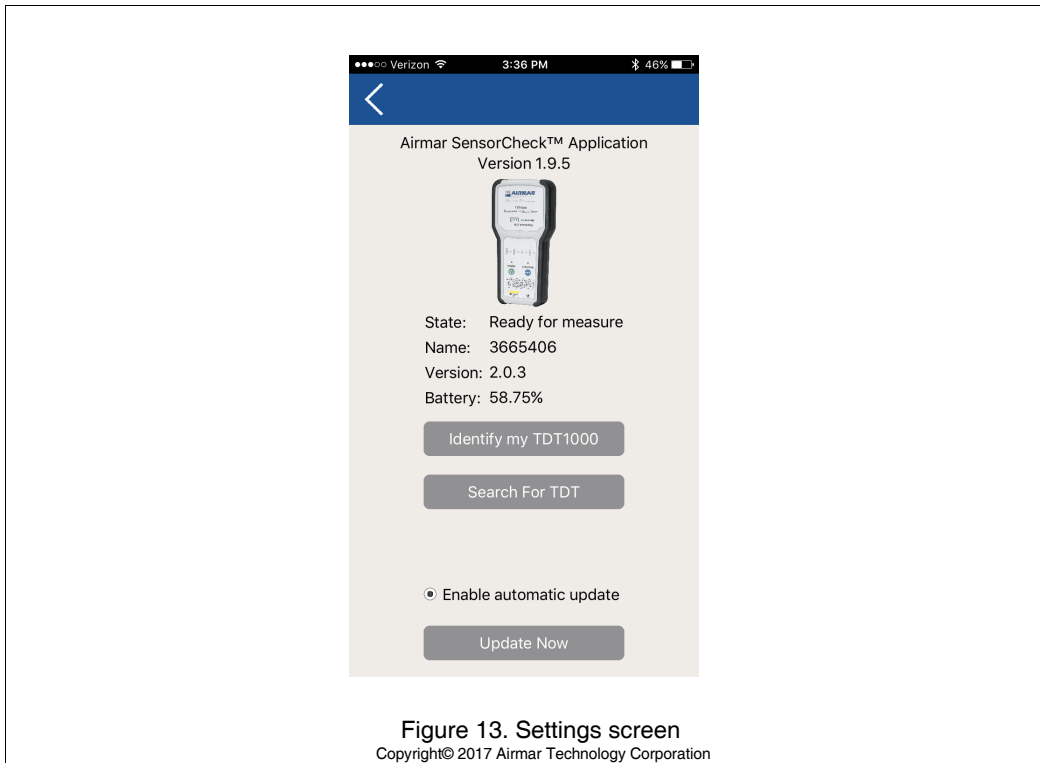
Settings

The Settings screen has information about the TDT1000 (Figure 13).

- **State:** The condition of the TDT1000 at the current time
- **Name:** The serial number of the TDT1000
- **Version:** The firmware version in the TDT1000
- **Battery:** The percentage of battery charge available
- **Identify my TDT1000** button: If you are using more than one TDT1000, your mobile device will remember the last TDT used.
 - Touch the **Identify my TDT1000** button to find the current TDT being used.
 - The Function light on the connected TDT will flash blue.
- **Search for TDT** button: You can change from using one TDT1000 to a different TDT.
 - Place the mobile device next to a different TDT1000.
 - Touch the **Search for TDT** button on your mobile device.
- **Enable Automatic Update** button: When this button is filled, the mobile device automatically connects to Airmar's transducer database and gets the latest transducer data.
- **Update Now** button: Touch this button to get the latest transducer data from Airmar's database.

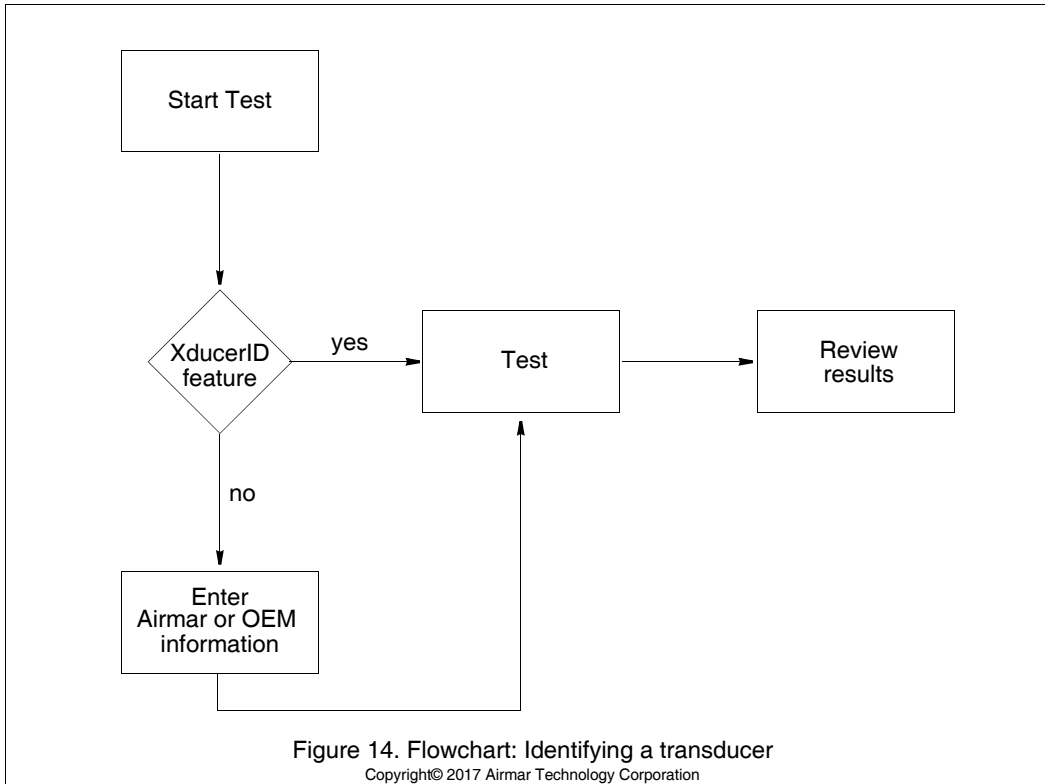
Help

Touch **Help** to link to the TDT1000 web page on the Airmar.com website.



Identifying the Transducer

Depending on whether or not the XducerID feature is present, follow one of the sequences shown in the flow chart below (Figure 14).



Getting Started

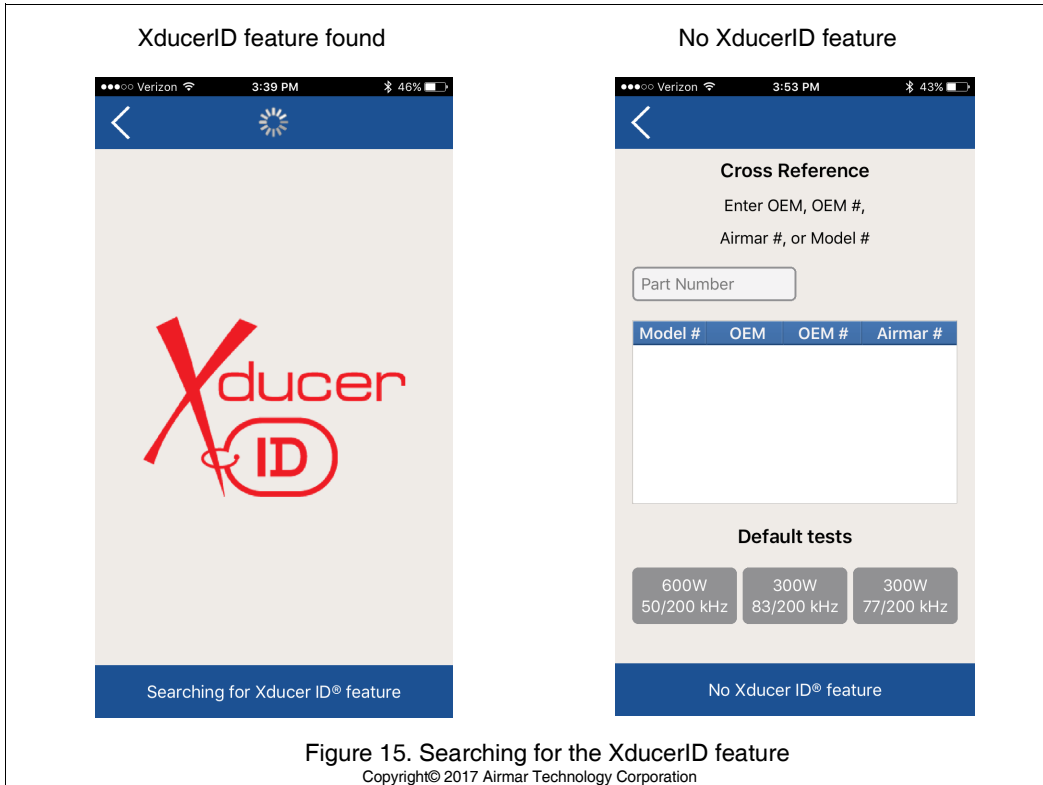
1. Power the TDT1000 ON by pushing the **Power** button (Figure 2). Wait until the indicator light glows green.
2. Check that at least one of the battery-status lights is glowing green.
3. Open the SensorCheck app on your device and connect to the TDT1000 via Bluetooth.
4. Touch the **Start Test** button on the SensorCheck app to begin testing.

NOTE: The blue ribbon at the bottom of the screen will indicate the TDT1000's current activity.

Searching for XducerID feature

The SensorCheck app automatically looks for the XducerID® feature. “Searching for XducerID® feature” will appear on the blue ribbon at the bottom of the screen while the SensorCheck app looks for this feature (Figure15).

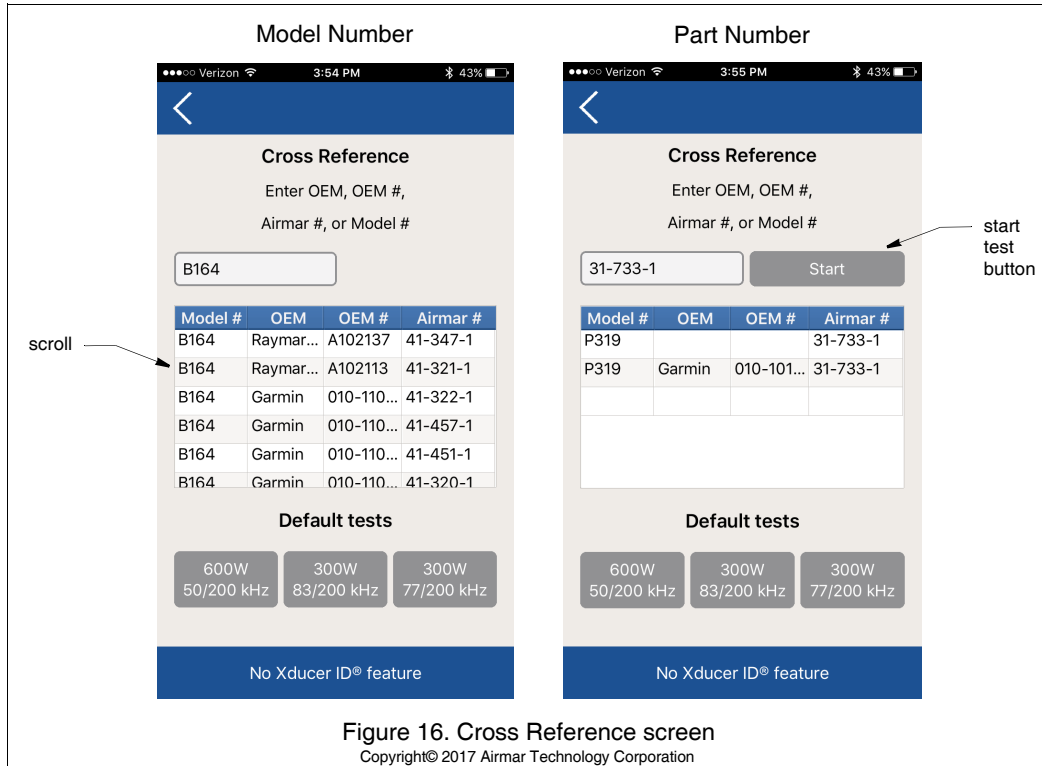
- **XducerID®:** The transducer being tested is an Airmar transducer with the XducerID feature. Actual Factory Data for this serial number will be retrieved from Airmar’s database. The blue plot line/ curve represents the actual factory test data for that specific transducer.
- **No XducerID® feature:** The transducer being tested does not have the XducerID feature. The Cross Reference screen will appear.



Airmar Transducer with NO XducerID Feature

NOTE: The part number of an Airmar transducer is printed on the cable tag.

- Enter either the model number or the part number of the transducer in the empty field (Figure 16).
- If the model number and the part number are unknown, scroll through the Cross Reference table.
- Touch to highlight the correct transducer. It will populate the field and the **Start** button will appear.
- Touch the **Start** button.



Searching for Transducer by Original Equipment Manufacturer

- Enter the name of the OEM, the OEM model number, or the OEM part number in the empty field (Figure 17). The information may be found on the cable tag.
- Scroll through the Cross Reference table.
- Touch to highlight the correct transducer. It will populate the field and the **Start** button will appear.
- Touch the **Start** button to begin testing.

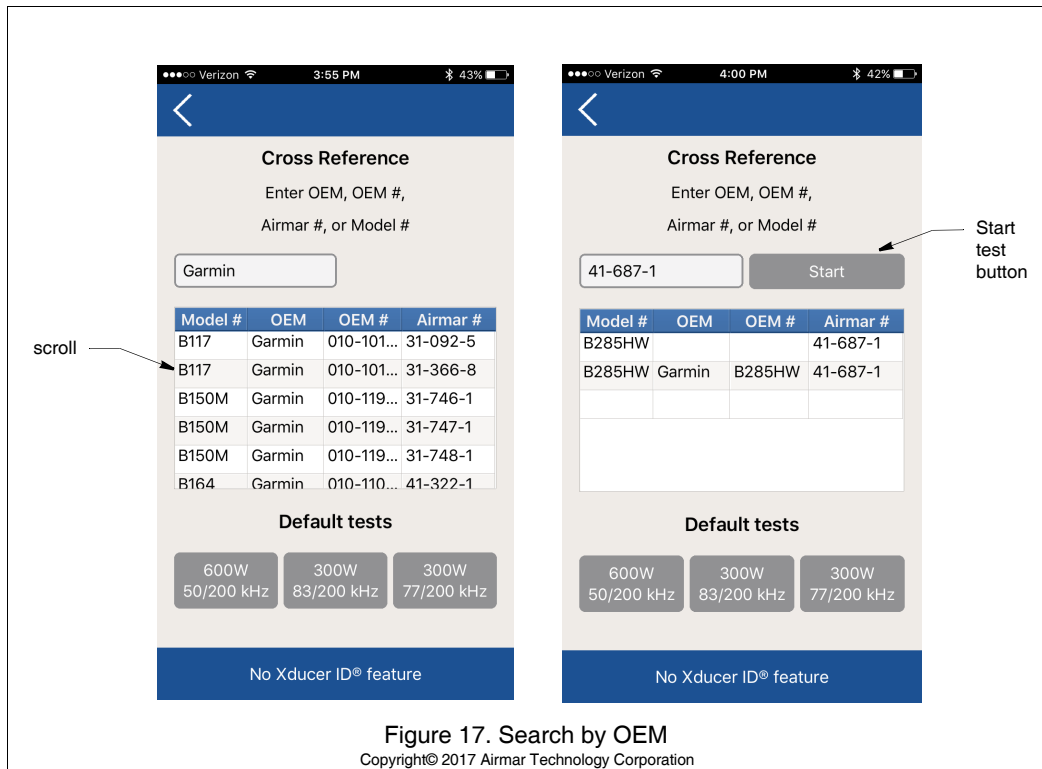
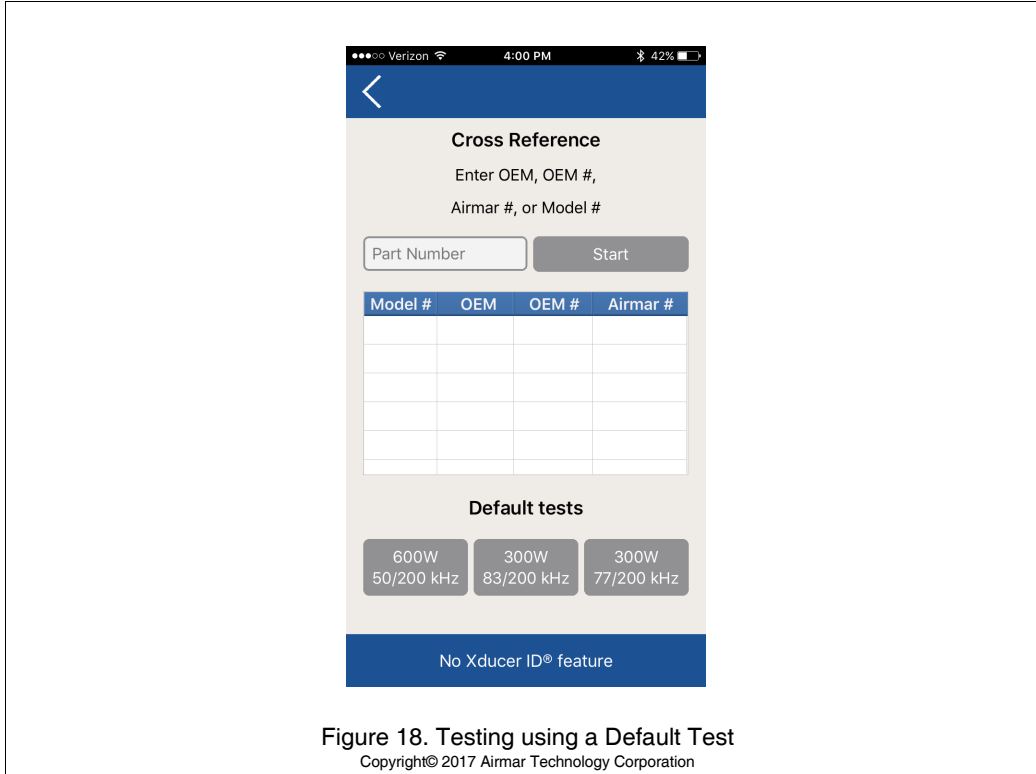


Figure 17. Search by OEM
Copyright© 2017 Airmar Technology Corporation

Unknown Transducer

- If you know the power or frequency of the echo sounder, you can test a transducer by selecting the appropriate Default Test.
- Touch the appropriate **Default Test** to begin testing (Figure 18).



Accessing Database

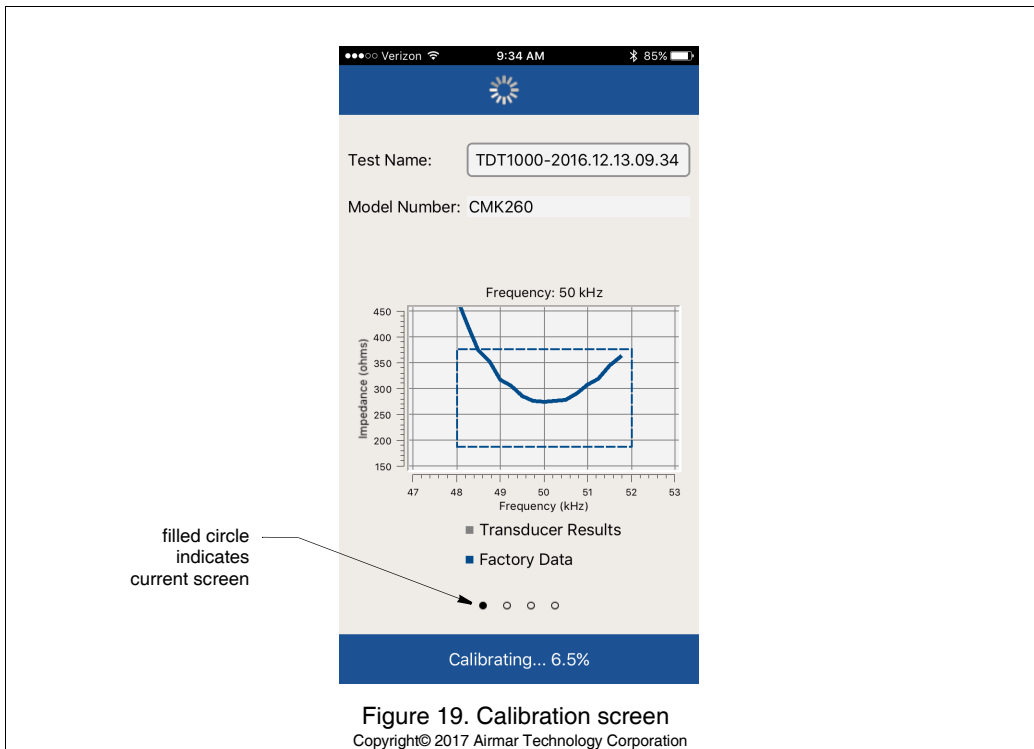
“Accessing database” will momentarily flash on the blue ribbon when the SensorCheck app is entering the Airmar database.

SensorCheck Test Screens

NOTE: Dual-frequency transducers—Each frequency will be tested separately.

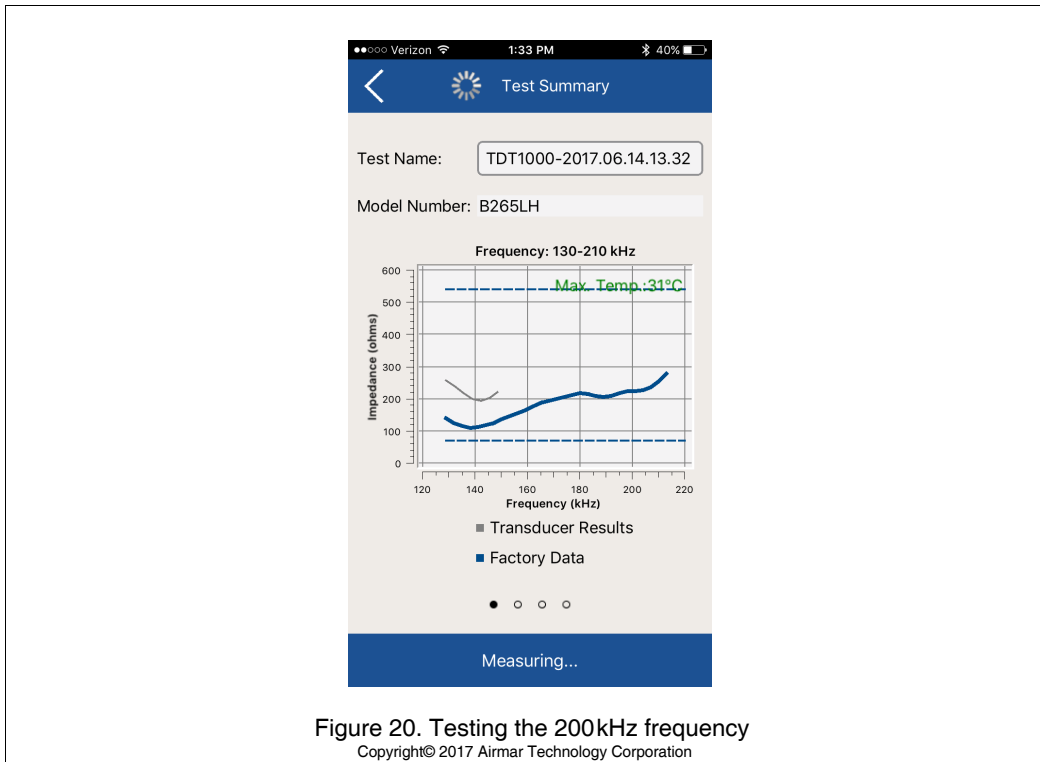
Calibrating

- “Calibrating” will appear on the blue ribbon at the bottom of the screen (Figure 19).
- The Test in Progress light on TDT1000 will flash blue while it is calibrating.
- The test parameters for the transducer will be loaded into the SensorCheck app.
- The screen will display the following information:
 - Test Name: The default test name will be TDT1000 with the date and time of the test. The test name can be changed at any time the “Test Name” field is visible.
 - Model Number: The model number of the transducer.
 - Graph: At the beginning of the calibration process, a plot line/curve in blue will be shown. The curve represents the factory test data for the transducer.
 - Circles located above the blue ribbon at the bottom of the screen indicate the number of screens in the test. The filled circle indicates the current screen.



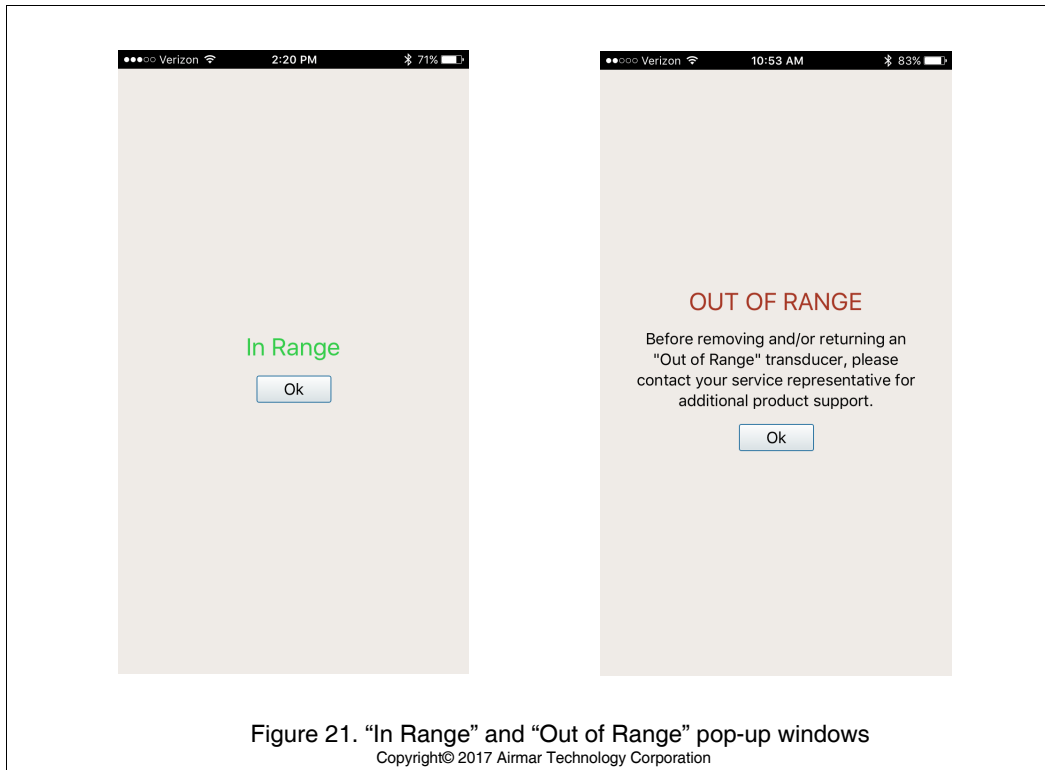
Measuring

- “Measuring” will appear on the blue ribbon at the bottom of the screen (Figure 20).
- The Test in Progress light on TDT1000 will flash amber while it is testing.
- Graph: As the measuring proceeds, a plot line in grey will be drawn. The plot line represents the data points of the current test.



Test Results

- An “In Range” or “Out of Range” pop-up window will appear when the test is finished (Figure 21).
- Touch **OK** to view the “Done” screen.



- “Done” will appear on the blue ribbon at the bottom of the screen when the test is finished (Figure 22).
- The data for the transducer being tested will appear as a grey plot line on the graph.
- “In Range” transducer
 - “In Range” will appear in green if the transducer is functioning properly.
 - The inflection point of the grey plot line will be within the dotted lines.
 - NOTE:** *The inflection point is the lowest mark on a plot line.*
 - The grey plot line will roughly follow the shape of the blue, Factory Data curve.
- “Out of Range” transducer
 - “Out of Range” will appear in red if the test shows data outside of the factory limits
 - The inflection point of the grey plot line will be outside the dotted lines.
 - NOTE:** *An “Out of Range” finding can be caused by factors other than the transducer*

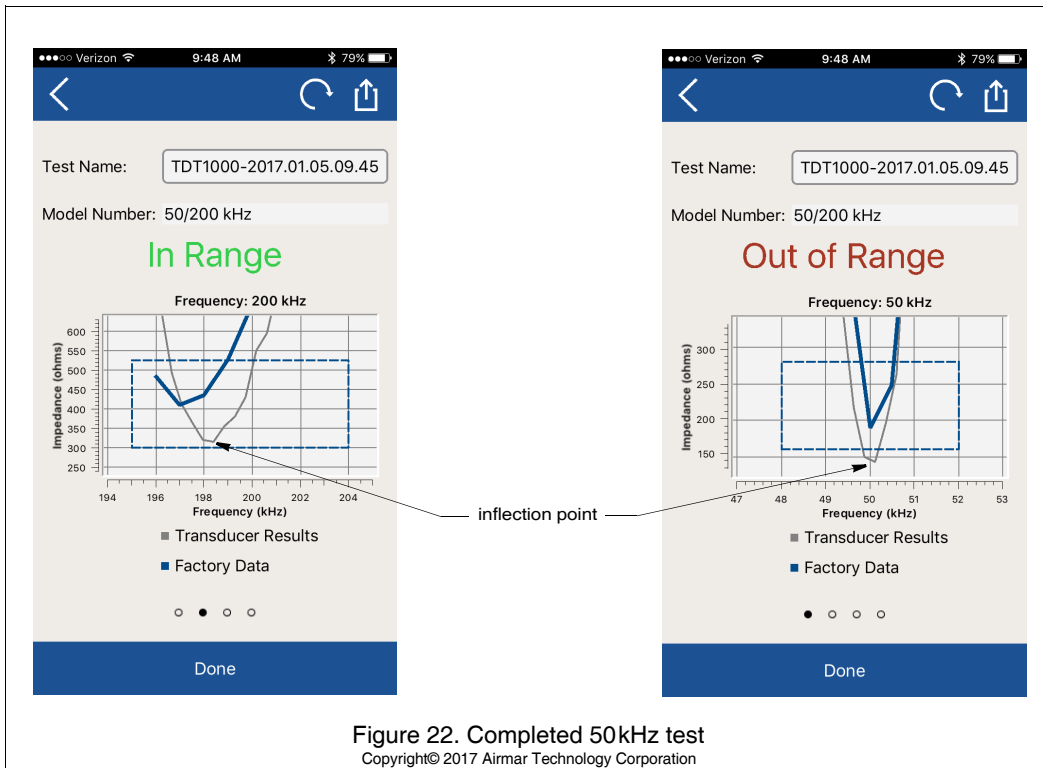


Figure 22. Completed 50kHz test
Copyright© 2017 Airmar Technology Corporation

Test Summary

- “Test Summary” will appear on the blue ribbon at the top of the screen (Figure 23).
- “Done” will appear on the blue ribbon at the bottom of the screen.
- The SensorCheck app will automatically identify the transducer and display the available information:
 - Test Name: The default test name will be TDT1000 with the date and time of the test. The test name can be changed at any time the “Test Name” field is visible.
 - Model Number
 - Part Number
 - Serial Number (XducerID feature only)
 - Date of Manufacture (XducerID feature only)
 - Runtime: The number of hours the transducer has been ON. (certain XducerID versions only)
 - Ambient Temperature: The temperature of the liquid surrounding the transducer—either sea water or propylene glycol. (if available)
 - Results: “In Range” or “Out of Range” is given for each frequency tested.
 - Max. Temp.: The maximum temperature of the ceramic for each frequency tested. (Available for certain XducerID versions only)
 - Circles indicate the number of screens in the test.

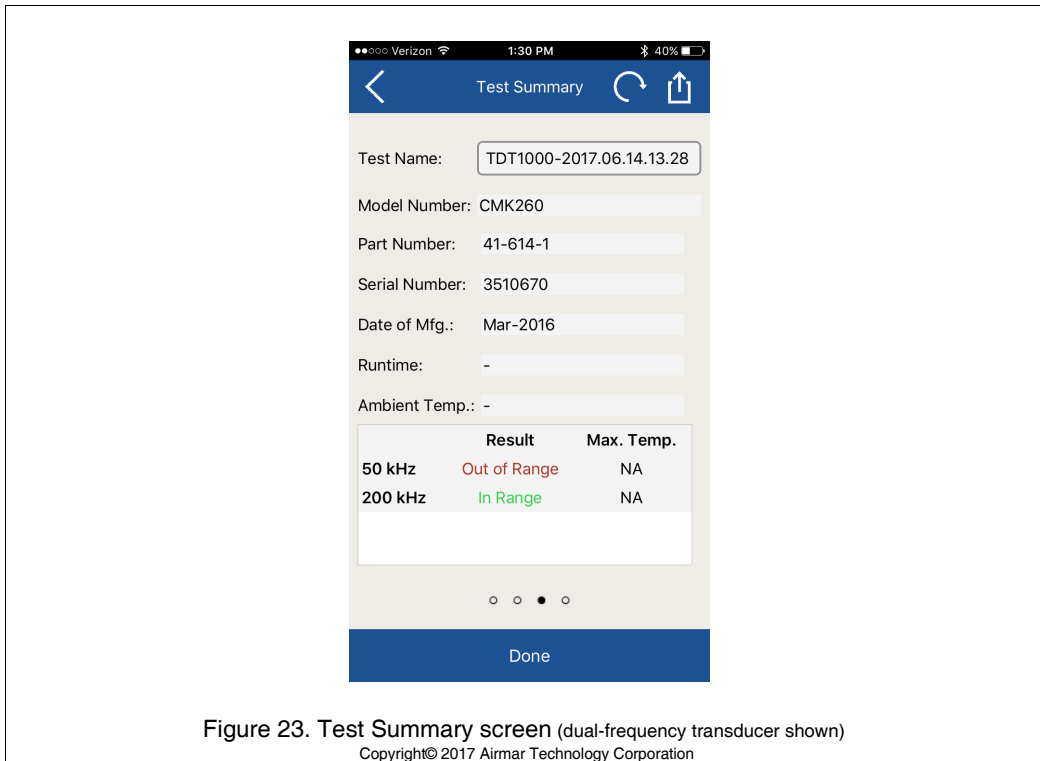


Figure 23. Test Summary screen (dual-frequency transducer shown)

Copyright© 2017 Airmar Technology Corporation

Vessel Information

- “Vessel Information” will appear on the blue ribbon at the top of the screen (Figure 24).
- The user can add information about the vessel and the test.
 - Test Name: The default test name will be TDT1000 with the date and time of the test. The test name can be changed at any time the “Test Name” field is visible.
 - Model Number: The model number is automatically filled if available.
 - Transducer Install Date: Enter the date the transducer was installed.
 - Vessel Name: Enter the name of the boat.
 - Vessel Size: Enter a range from the drop-down menu.
 - Echo Sounder: Enter the brand and model number of the instrument.
 - Test Notes: Add comments here such as:
 - Frequencies of the transducer.
 - Additional transducers on the boat.

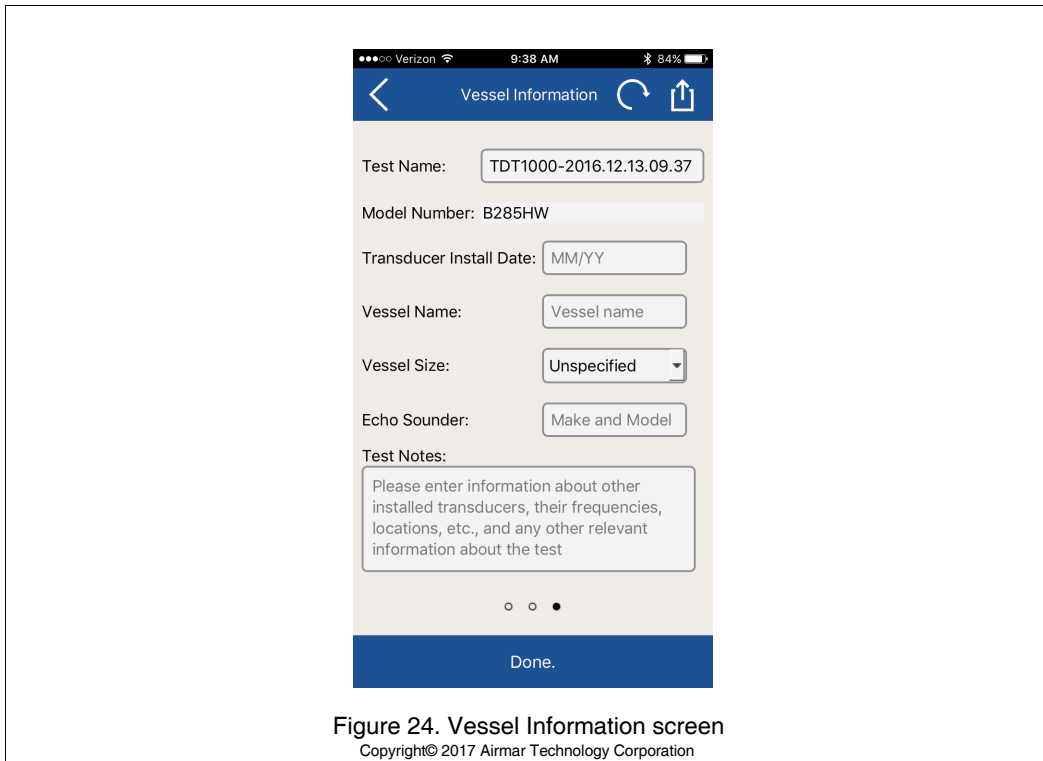


Figure 24. Vessel Information screen

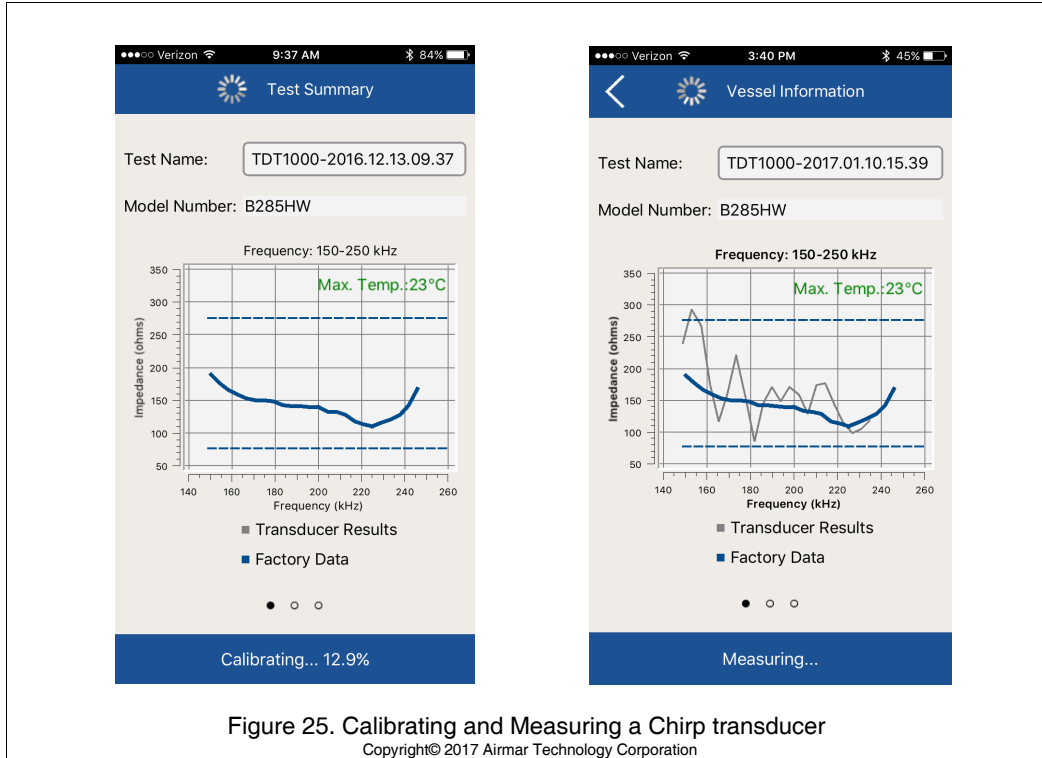
Copyright© 2017 Airmar Technology Corporation

Chirp Transducer

The TDT1000 will test the range of frequencies at which a Chirp transducer works best.

Calibrating & Measuring

- The “Frequency” range being tested will appear above the graph (Figure 25).
- The “Maximum Temperature” of the ceramic will appear near the top of the graph.
The maximum temperature experienced by the transducer can be useful in diagnosing transducer performance. A high temperature may be due to operating a chirp transducer out of water. Overheating can lead to degraded transducer performance. The TDT will usually detect this as an “Out of Range” impedance.
- “Max. Temp.” displayed in green indicates that the temperature of the ceramic inside the transducer is operating within the normal range (<40°C).
- “Max. Temp.” displayed in red indicates that the ceramic inside the transducer has overheated (>40°C).



Done Screen

- Graph: “In Range” transducers will have impedance data where the plot line follows the general shape of the Factory Data curve (Figure 26). The impedance data will fall within the acceptable range for the transducer’s specified frequency range.
- “Done” will appear on the blue ribbon at the bottom of the screen when the test is finished.

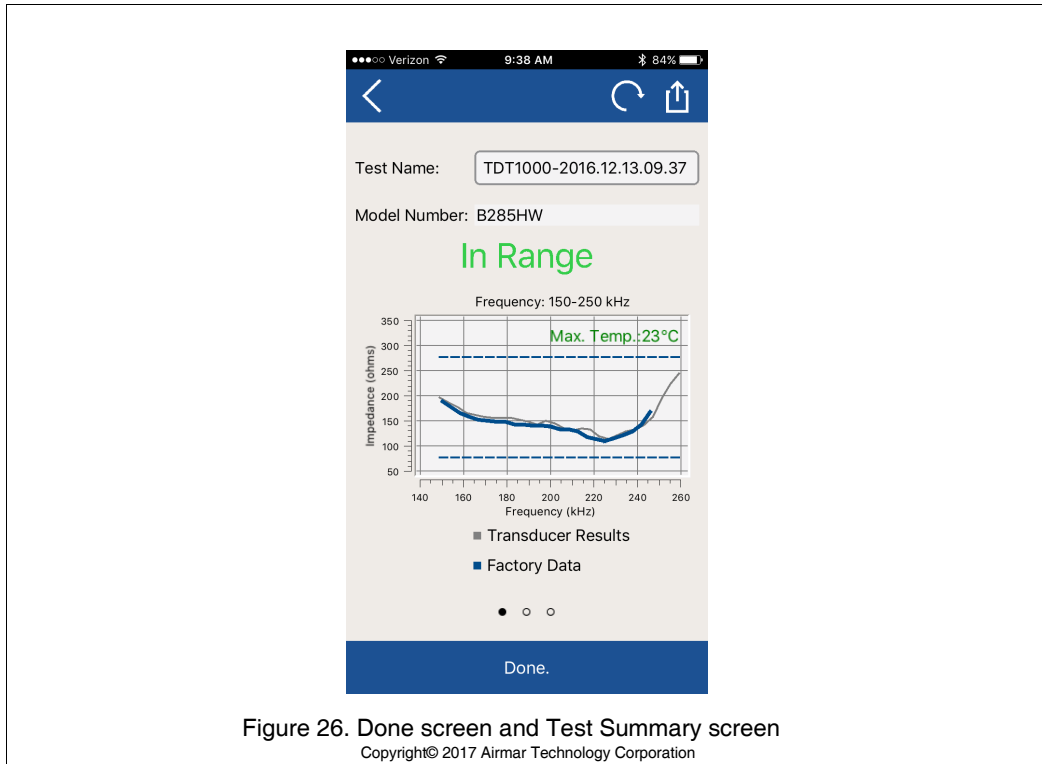
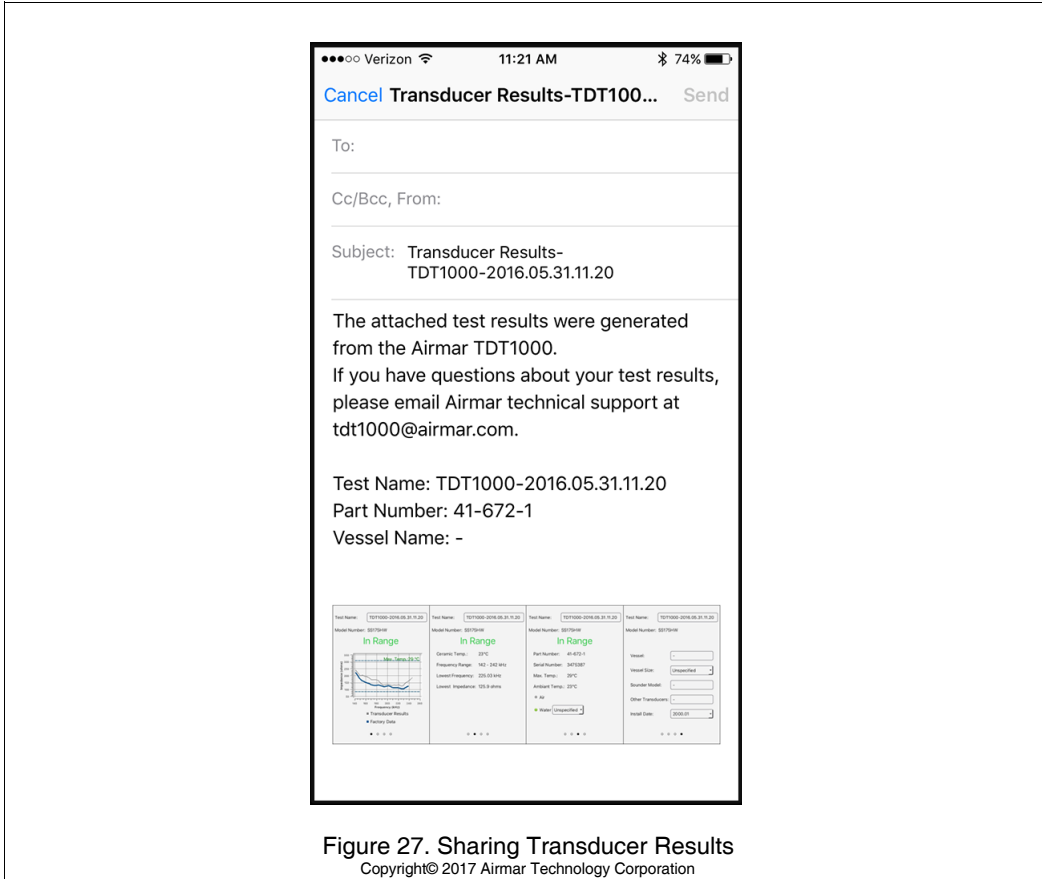


Figure 26. Done screen and Test Summary screen
Copyright© 2017 Airmar Technology Corporation

Sharing Test Results

IMPORTANT: If your test results say “Out of Range”, email the Transducer Results to Airmar or your service representative. Do NOT remove the transducer at this time.

- Transducer Results can be sent to a boat owner, dealer, installer, an Airmar technician, or others.
 - To contact Airmar Technical Support, send your email to tdt1000@airmar.com.
- All the test screens will be within the body of the message (Figure 27).

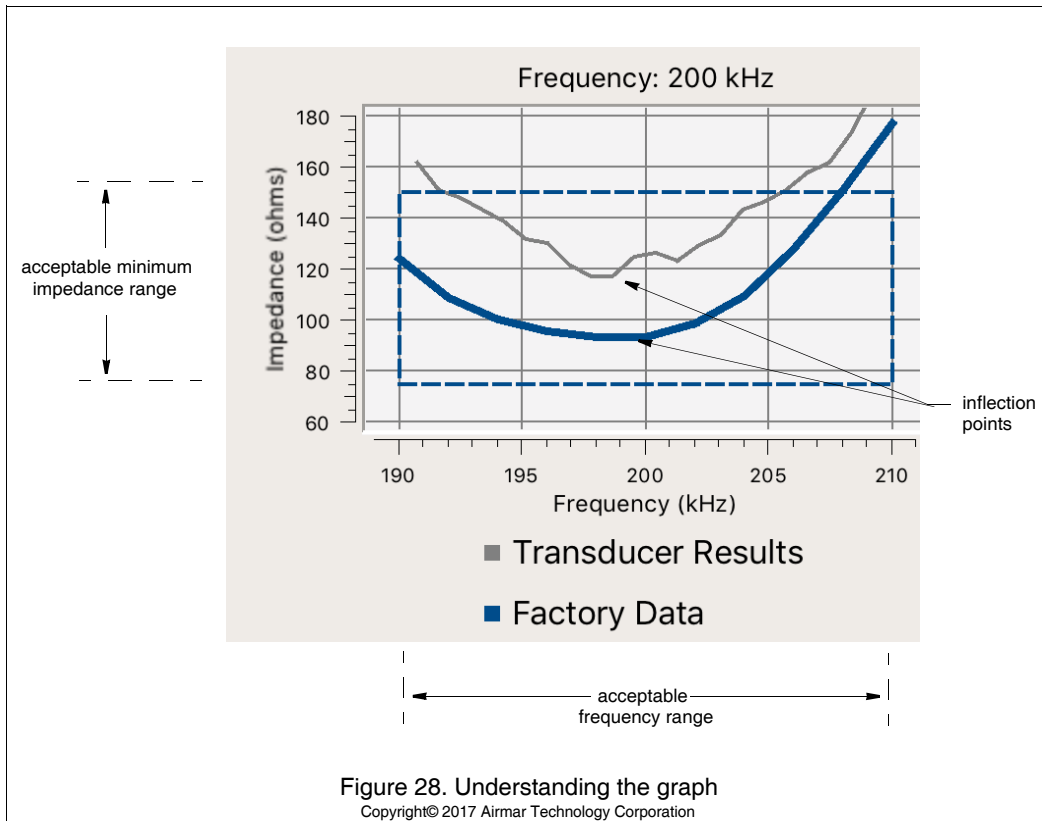


Interpreting Test Results

IMPORTANT: Minor deviations between the Transducer Results plot line and the Factory Data curve are most likely caused by the testing environment.

Understanding the Graph

- The area inside the *dotted lines* is the acceptable impedance and frequency range of the transducer being tested (Figure 28). The ranges will vary depending upon the frequency and impedance of the transducer.
- The inflection point is the minimum data point. The inflection point of the Transducer Results will fall within the dotted lines.
- The inflection points of the Transducer Results plot line and the Factory Data curve do not need to meet

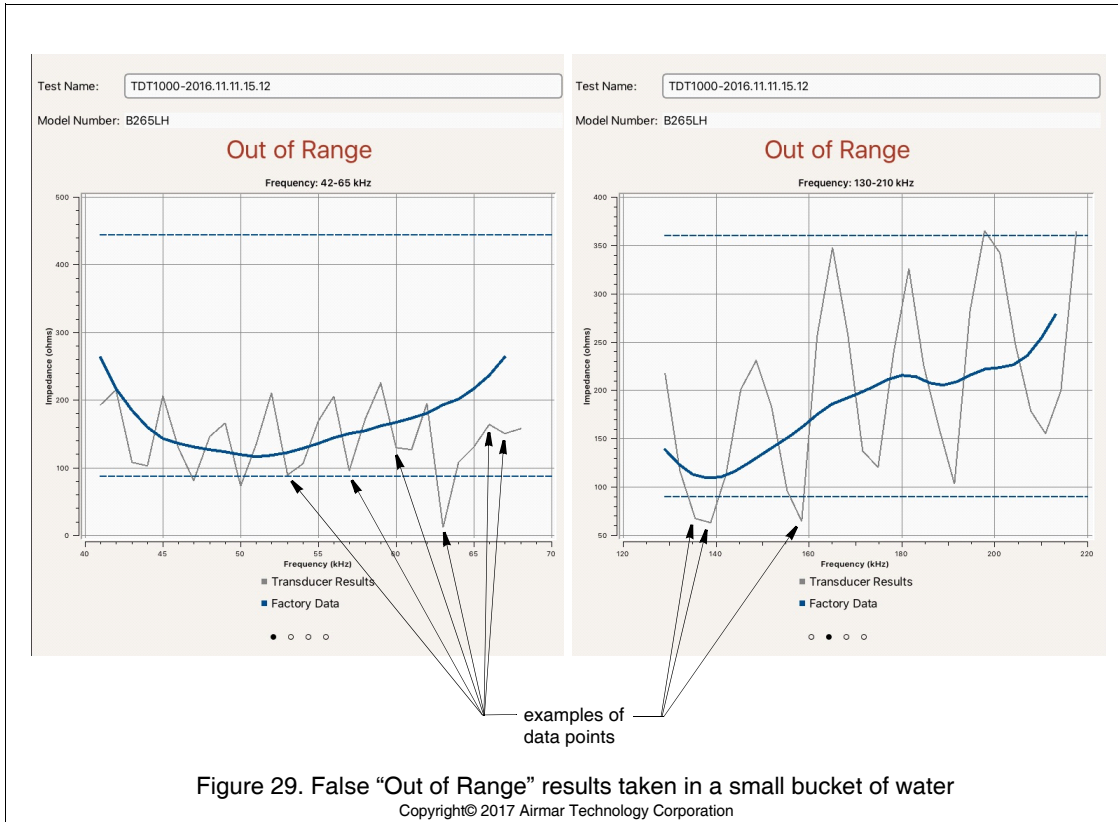


Testing in Small Bucket of Water

NOTE: The smaller the container of water, the more interference the measurement may have.

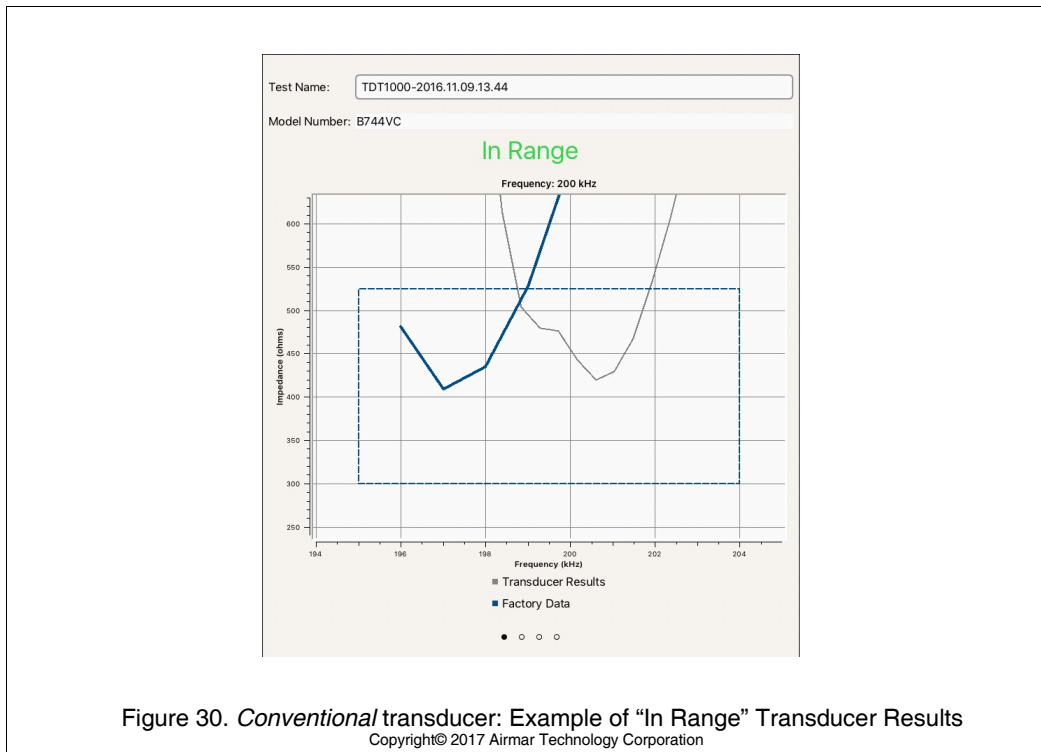
The “Out of Range” Transducer Results below show that the test bucket was too small (Figure 29). The transducer should be re-tested in a larger container.

- Transducer Results produced from a small bucket will have more minimum and maximum data points.
- Data may cross the Factory Data plot line many times.



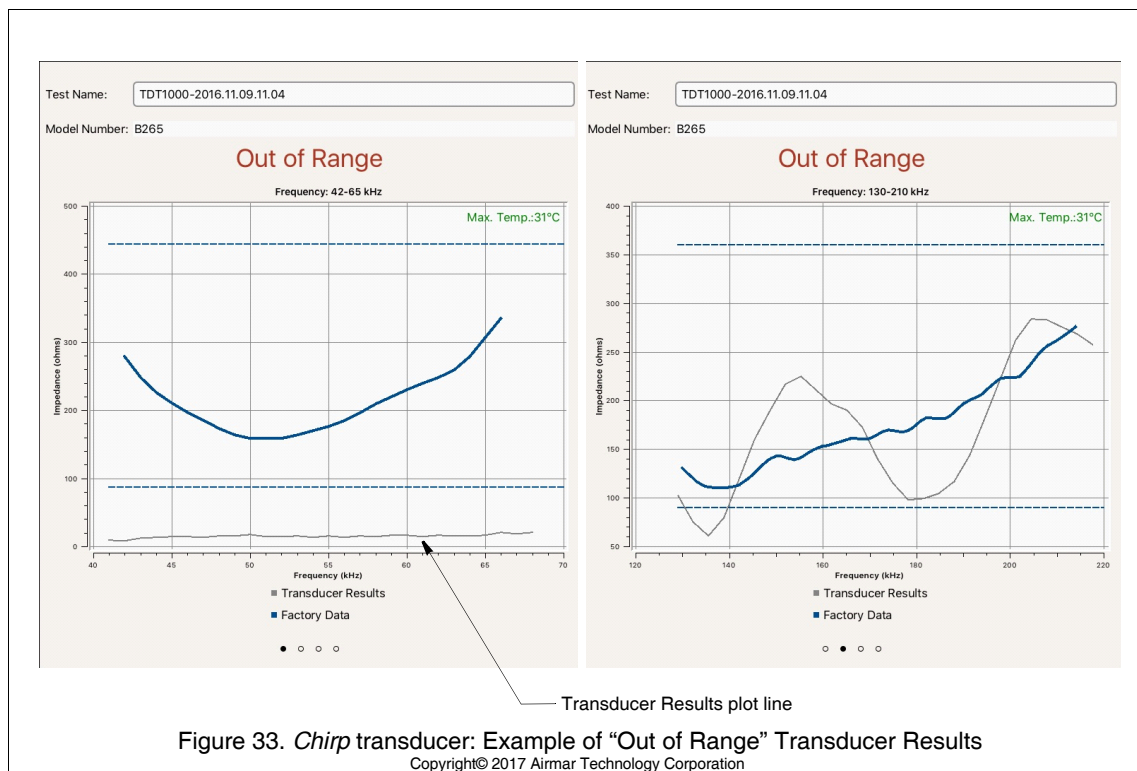
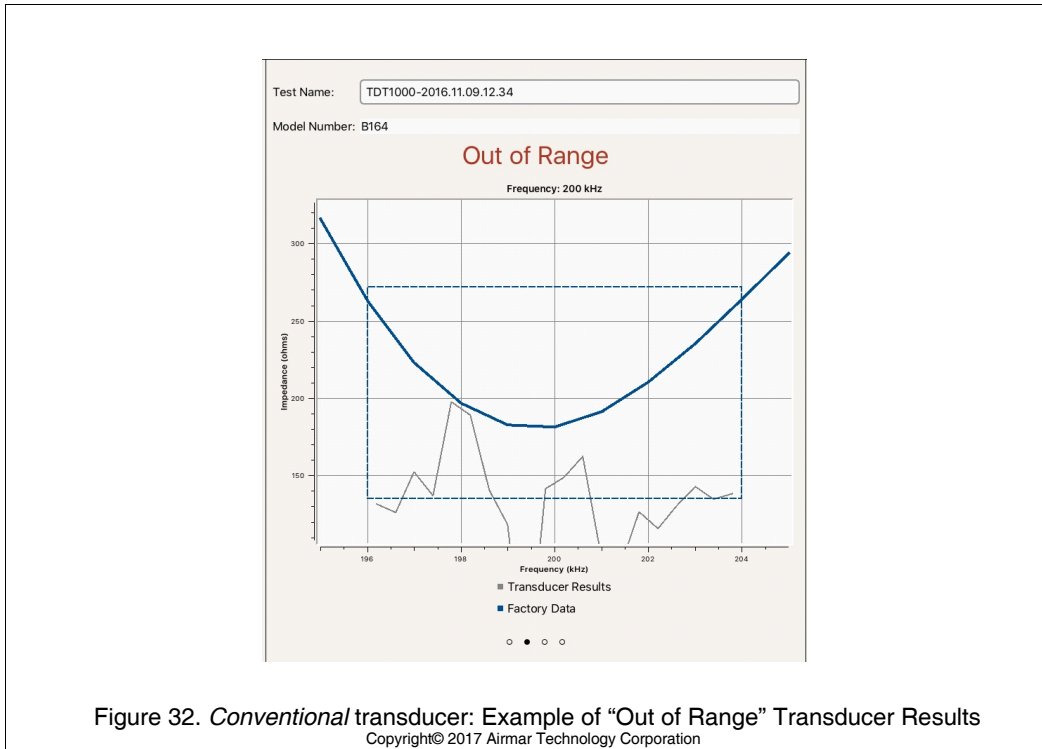
“In Range” Transducer Results

- Transducer Results will have a plot line that follows the general shape of the Factory Data curve (Figures 30 and 31).
- The inflection point of the Transducer Results plot line will fall within the dotted lines.
- The inflection points of the Transducer Results plot line and the Factory Data curve do not need to meet.



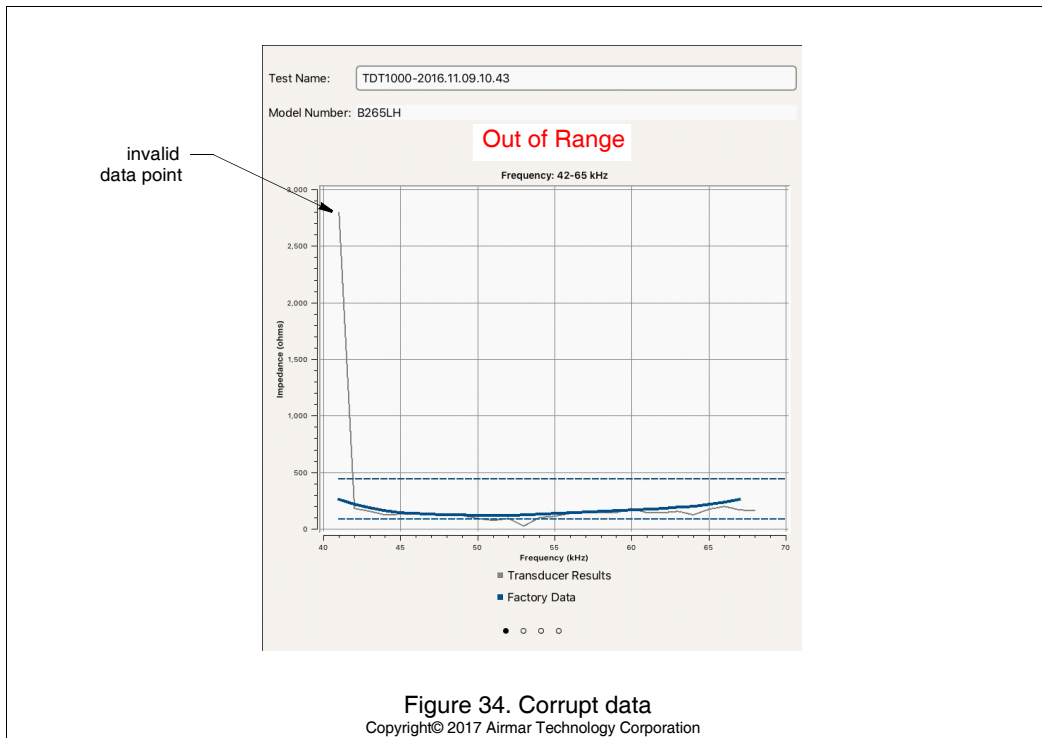
“Out of Range” Transducer Results

- The shape of the Transducer Results plot line will look different from the Factory Data curve (Figures 32 and 33).
- The inflection point of the Transducer Results plot line will be outside the dotted lines.



Corrupt Data

Occasionally, data can be corrupted by a single, invalid data point (Figure 34). If you see a similar reading, re-test the transducer.



Why Does a Transducer Show Poor Results?

There are many causes for poor transducer performance such as:

- The transducer was hit by an object in the water.
- The boat scraped the bottom.
- The transducer overheated. This may have been caused by the following:
 - Prolonged operation while out of the water
 - Applying too much electrical power
 - Installing an in-hull transducer in a hot location such as an engine room
- The transducer has reached the end of its working life.

Software Revisions

Airmar may release updated versions of the SensorCheck software. These revisions will be automatically updated on your device through the App Store or Google Play Store.

Customer Service

Contact Airmar Technical Support at ttd1000@airmar.com.

Obtain parts from the following:

Gemeco

USA

Tel: 803.693.0777

email: sales@gemeco.com

Airmar EMEA

Europe, Middle East, Africa

Tel: +33.(0)2.23.52.06.48

email: sales@airmar-emea.com



35 Meadowbrook Drive, Milford, New Hampshire 03055-4613, USA
www.airmar.com

