Ultrasound Solutions

SDT340

TANKTEST MODE

USER MANUAL

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1 Safety

Carefully read this manual before using the SDT340 TankTest. To prevent death or injury risks and severe damage to the unit and its accessories, use only as specified in this manual. Otherwise, the protection provided by the instrument might be impaired. Make sure that all instructions are fully understood and observed.

To avoid personal injury:

- Do not use if damaged.
- Use caution around rotating equipment and keep cords and straps contained.
- Select a safe location for the sensor and proceed with utmost care during its mounting when taking readings on exposed rotating parts.
- Do not operate around explosive gas, vapor, and dust or in damp or wet environments.
- Use proper protective equipment, as required by local or national authorities.
- Do not use the SDT340 in hazardous environments (ATEX environment). Please refer to the SDT270A (Ex proof version) and its marking before considering these restricted areas in the field.
- Never look directly at the laser beam. Never point the laser beam at a person's eye. Do not aim the laser at specular reflection surfaces. Never look at the laser using an optical instrument.

The power supply is designed to operate at ambient temperature between 0 °C to 60 °C (32 °F to +140 °F) up to 90% relative humidity, no condensation. Its storage temperature is between -20 °C to +85 °C (-4 °F to +185 °F). The power supply should never be operated or even stored at places listed below, because this could lead to operating failures:

- Places heavily exposed to moisture or where water condensing may occur.
- Places subject to constant vibrations or to high temperature fluctuations.
- Outdoors.

2 Caution

Do not disassemble the instrument, the sensors, the battery, the battery docking station, and the battery power supply. Do not attempt internal alterations. Do not attempt any repairs. Potential damages will not be covered by the Lifetime Warranty. Contact SDT Ultrasound Solutions or an SDT Authorized Service Provider.

The permissible ambient temperature range for the operation of the SDT340 is -15 °C to +60 °C (5 °F to 140 °F). Relative humidity must be less than 90%, non-condensing.

Due to the typical self-discharge rate of NiMH batteries, it is recommended to charge the battery at least every 3 months, using only the provided charger pack. It is recommended not to store an uncharged/unused battery for more than a few weeks. This would considerably reduce its lifespan.

The SDT340 is equipped with a class 2 laser: risk of eye injury.

- Never look directly to the laser beam
- Never point the laser beam at a person' eye
- Do not aim the laser at specular reflective surfaces
- Never view the laser using an optical instrument

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Ultrasound inspectors using SDT instruments with audio outputs are exposed to sounds levels having noise exposure characteristics daily, which, if not managed by the manufacturer, can increase your risk of hearing loss. Legislation in Europe has fixed a threshold at 80 dB(A) for a maximum exposure of 8 hours per day.

Government Legislated Noise Exposure Levels	
Sound Level dB(A)	Max Exposure Per Day
80	8 hours
83	4 hours
86	2 hours
89	1 hours
92	½ hour
95	15 minutes
98	7.5 minutes

The audio output paired with the Peltor headsets supplied by SDT, having the references FUHDPH-1 and FUHDPH-2 delivers a maximum sound pressure level of 79 dB. SDT makes an additional safety guarantee for our users. When connecting a sensor, or selecting/changing sensors, SDT instruments self-adjust the volume to a default, maximum sound pressure level of 58 dB typical. This applies to all compatible, SDT manufactured sensors and is done so, willingly for the protection and safety of anyone who uses our products. At full power, prolonged listening to the audio signal can cause hearing loss and/or irreversible hearing damage.

3 CE compliance

SDT340 and its accessories have been designed and tested to meet the following directives and standards. The SDT340 kit meets the essential requirements of the applicable European Directives:

- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)

- 2011/65/EU; Restriction of Hazardous Substances (RoHS)

- 2014/35/EU; Low Voltage Directive (LVD), applied to battery charger

- 2006/66/EU; Batteries and accumulators and waste batteries and accumulators

The declaration of CE conformity is available on SDT website at:
https://sdtultrasound.com/support/downloads/certificates/

4 Introduction

The SDT340 TankTest is a control and diagnostic tool for underground storage tanks. The SDT340 includes the following features:

- Ultrasound and vibration measurements through 2 input channels
- 0 Hz to 100 kHz Bandwidth
- 10 minutes record length
- Tree database structure, organized by tank
- 3.5" full-color display 320x480
- On-screen Time Waveform
- Signal play back
- 256 kHz sample rate, reduced to 32 kHz by heterodyning
- 6.5 GB data memory
- Quick and intuitive navigation through database nodes associated with tanks
- Recall of historical data in-the-field
- Bluetooth for wireless audio streaming

5 Field of application

The SDT340, in its TankTest configuration, embeds a guided procedure, detailing the different steps of the control of the tightness of an underground storage installation through the acoustic method.

The procedure does not prejudge, in particular:

- The different preliminary operations, emptying, cleaning, degassing of the tank
- The measures to be taken in order to ensure the safety of the personnel and the third parties
- The use of individual and collective protective equipment
- The regulatory measures to be taken in the event of a leak

The procedure is to be used to ensure the following controls, within a regulatory framework:

- The control of the tightness of a tank with a single metal shell. This check is carried out after cleaning, degassing the tank and reassembling the manhole cover without reconnecting its pipes.
- The inspection of an installation composed of a single shell tank and its pipes. This tightness control is performed after cleaning, degassing the tank, reassembling the manhole plate and reconnecting its associated piping.
- The inspection of the pipes associated with a double shell tank, without cleaning and degassing of this tank.

In the first two cases, after cleaning the tank, the remaining noble product can be put back in the tank before its control.

This procedure is adapted to the regulatory control of storage installations used for heating installations, equipped with tanks and pipes described below, excluding any other type:

1 - NF M88-512 Steel storage tanks - Horizontal tanks for liquid flammable products

2 - NF M88-553 Steel tanks in service with reinforced plastic lining for storage of liquid petroleum products

3 - EN 12285-1 Steel tanks manufactured in workshops

Part 1: Horizontal cylindrical single and double shell tanks for the underground storage of flammable and non-flammable water contaminating liquids

The determination of the vacuum and the admissible product height for acoustic controls, on tanks meeting the construction standards stated above, is imposed, independently of SDT International.

Nominal capacity in liters	Construction standards	External diameter in mm	Nominal thickness in mm	Permissible vacuum in mbar	Maximum product height in m
1500	1 - 2 - 3	1250	5	250	< 1.2
2000	1 - 2 – 3	1250	5	250	< 1.2
3000	1 - 2 – 3	1250	5	250	< 1.2
4000	1 - 2 – 3	1250	5	250	< 1.2
5000	1 - 2 – 3	1500	5	250	< 1.4
5500	1 - 2 – 3	1500	5	250	< 1.4
6000	1 - 2 – 3	1500	5	250	< 1.4
7500	1 - 2 – 3	1900	5	250	< 1.8
8000	1 - 2 – 3	1900	5	250	< 1.8
10000	1 - 2 – 3	1900	5	250	< 1.8
12000	1 - 2 – 3	1900	5	250	< 1.8
15000	1 - 2 – 3	1900	5	250	< 1.8
20000	1 - 2 – 3	2500	6	250	2.2
25000	1 - 2 – 3	2500	6	250	2.2
30000	1 - 2 – 3	2500	6	250	2.2
35000	1 - 2 – 3	2500	6	250	2.2
40000	1 - 2 – 3	2500	6 or 7	250	2.2
40000	1 - 2 – 3	3000	6 or 7	250	2.2
50000	1 - 2 – 3	2500	6 or 7	250	2.2
50000	1 - 2 – 3	3000	6 or 7	250	2.2
60000	1 - 2 – 3	2500	6 or 7	220	1.8
60000	1 - 2 – 3	3000	6 or 7	250	2.2
80000	1 - 2	3000	6	180	1.3
80000	EN 12285-1	3000	7	250	2.2
100000	1 - 2	3000	6	140	0.9
100000	EN 12285-1	3000	7	210	1.7
120000	EN 12285-1	3000	7	180	1.3

This table is also valid for multi-compartment tanks. For these, the total volume of the tank (vacuum and product height) must be taken into account.

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In particular, this procedure is not applicable to tanks that have been converted to a double shell design using:

- A flexible inner lining.
- Reinforced plastic lining.

For these installations, please follow the instructions of the contractor or applicator.

Caution: **Failure to comply with these normative constraints exposes the operator to risks of deformation of the tank leading to a destructive test having no regulatory value. SDT International cannot be held responsible, in case of disregard of the test procedures**

6 Unpacking

The items that follow are included in your purchase of the SDT340 TankTest kit. Unpack and inspect them.

- SDT340
- Wired headset
- Spiral Cable, 2 male 7-pole LEMO connectors
- TankTest sensors (TTR2.012, TTB2.011) mounted on the Camlock
- Flexible Sensor
- USB communication cable

- USB key containing user manuals
- TankTest reporter software
- Battery pack
- Battery charger, power cord, EU, US and UK plugs
- Battery docking station
- Shoulder strap
- Multi-function screwdriver

7 Battery

Caution: **Only use the docking station and the power supply provided by SDT.
Do not store an uncharged battery for more than a few weeks.
Perform preferably a complete charge cycle.
Charge the battery at least every 3 months, even not used.**

The SDT340 operates on a rechargeable Nickel Metal Hydride (NiMH) battery. After unpacking the unit, please fully charge the battery pack before its first use. To charge the battery pack:

- Plug the power supply (*) to the main and connect it ❶ to the docking station. Then the LED is blinking blue.
- Loosen the quick fastener using the screwdriver and remove the battery pack from the unit.
- Place the battery pack in the docking station ❸. The LED should stay on blue for a few seconds and then flash green. Otherwise, perform a force charging by inserting a needle in the reset location ❷.
- When the LED is continuously lit green, the battery is fully charged.
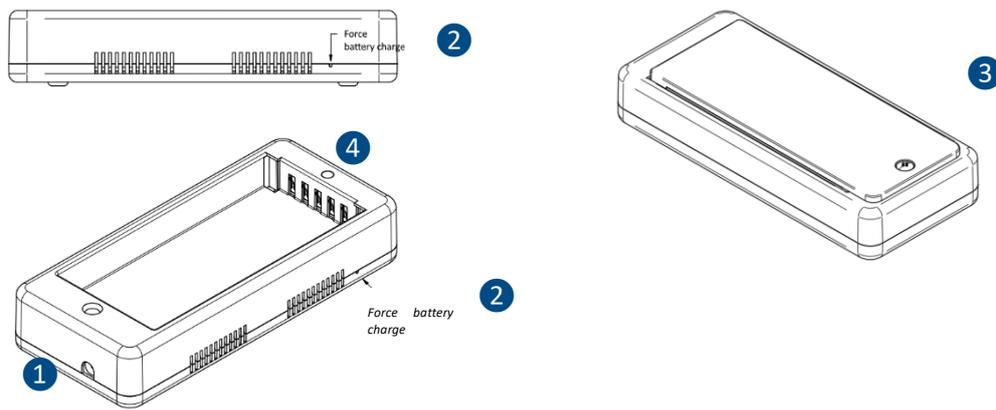
1 Power supply connector
2 Force battery charge location
3 Battery pack placed on the docking station
4 Docking Station LED

AC/DC power supply:	Based on XP Power, Model ACM24 series (you may find other references/brand depending on your order date. Please refer to the label on the transformer)
Power supply:	Input: 100-240 VAC-0.5 A, 50/60 Hz Output: 12 VDC-2000 mA, total regulation 5%, efficiency 88.8 %
Operating temperature:	0 to +60 °C (+32 to 140 °F), < 90 % humidity, non-condensing
Storage temperature:	-20 to + 85 °C (-4 to 185 °F)
Output Power:	Max 24 W
Category:	Class II construction
EMC Emissions:	EN 55032, EN 61000-3
EMC Immunity:	IEC 60601-1-2, EN 61204-3, EN 61000-4, EN 60601-1-2
Electrical safety (LVD):	UL 60950-1, UL 62368-1, ANSI/AAMI ES 60601-1 EN 60950-1, EN/IEC 62368-1, EN 60601-1 CSA C22.2 No. 60601 CCC China Compulsory certification, GB4943 AU/NZ 60950.1 CE: meets all applicable directives UKCA: meets all applicable directives
Weight:	160 grams (0.35 lb)
Dimensions (body only):	88.0 x 30.0 x 57.0 mm (3.46 x 1.18 x2.24'')
AC input plugs:	UK, US, EU
Reference:	https://www.xppower.com/portals/0/pdfs/SF_ACM24.pdf

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(*) The primary plug of the power supply is interchangeable. The procedure of changing is as per the pictures.
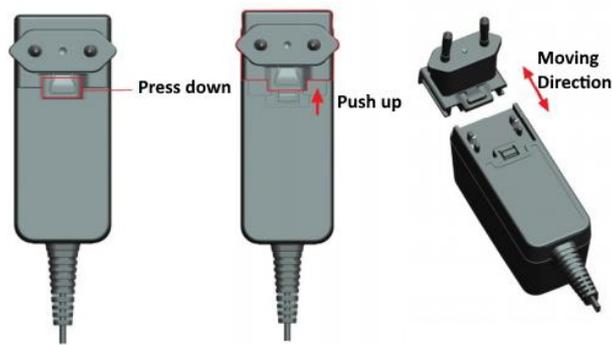
The color of the docking station status LED ④ shows:

- The LED flashes blue – the docking station is powered.
- The LED remains blue illuminated a few seconds when the battery is placed in the docking station – the battery is detected.
  If not, perform a force charge by inserting a needle in the force battery charge location ❷.
- The LED flashes green – the battery pack is charging.
- The LED is green lit continuously – the battery is fully charged.
- The LED flashes red – the docking station detects an abnormal current consumption or an abnormal temperature. Disconnect and then reconnect the power supply from the main to reset the docking station.

The SDT340 autonomy is typically 8 hours for a fully charged battery pack and the recharge time is about 7 hours.

You can identify a battery calibration fault as follows:

- Power on the equipment and observe the screen during the initial boot-up process. The normal battery gauge is normally displayed in Green. However, if the battery percentage is above 20% and the battery gauge is displayed in Orange, as shown in the images below, it's recommended to perform a full charge.
- From the home screen, go to "Settings" > "Device Info" > "Battery". Check the calibration status. If it reads "No," it indicates a calibration fault that needs to be addressed with a full battery charge.

If you've identified a battery calibration fault, a full battery charge is required. Follow these steps to perform a full battery charge:

- Use the 340 until you receive the low battery message "Low battery The device will shut down. Please recharge your device". Once this message appears, the equipment will automatically power off. To prevent auto power-down during this discharge process, you can disable the "Auto power Down" mode, in the menu by navigating to "Settings" > "Auto power down."
- After fully discharging the battery, proceed with a new charge. Place the SDT340 battery in its charging dock until a full charge is achieved, indicated by the green LED continuously lit.
- Once the battery is fully charged, you can verify the calibration status and ensure your battery is functioning optimally. When powered up, the battery should indicate a 100% charge level and the battery gauge should be displayed as green, as shown below, go at the Uboot level then go to "Settings" > "Device Info" > "Battery and Check the calibration status. It should now display "Yes," indicating that the battery has been successfully recalibrated.

8 Controls and connections
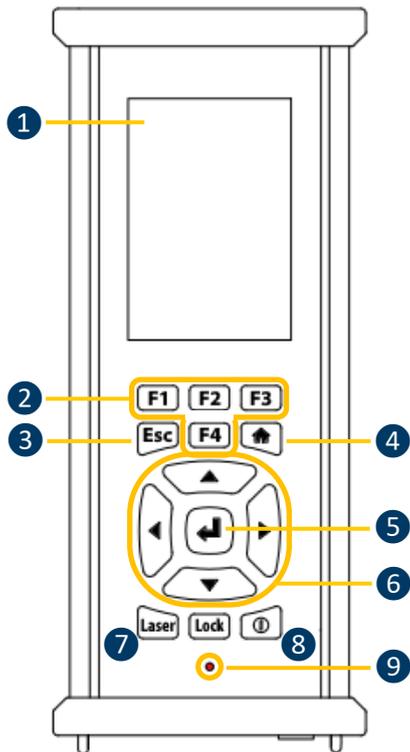
Front panel
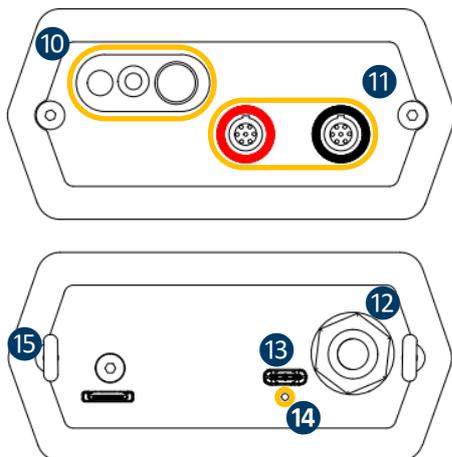
❶ Display

❷ **F1** to **F4**. Their respective function is indicated in the bottom of the display

❸ **Esc (Escape)** for stopping a signal acquisition and going back to the previous menu through setting screens

❹ **Home** for displaying the main menu

❺ **Enter** to start the acquisition and validate changes through setting screens

❻ **Up**, **Down**, **Left** and **Right** navigation keys for the signal, audio amplification adjustment and navigation through the settings screens

❼ Hold-on laser

❽ On/Off

❾ Status LED.

Lateral panels

❿ Laser pointer

⓫ Input channels. Black collar for the black TTB2.011 sensor, red collar for the TTR2.012 sensor. To plug a connector, line up the red dot on the plug with the red mark on the connector. Insert the plug into the connector without any rotating movement. To unplug the connector, move up, towards the cable, the ring located on the bottom of the plug. Only pull the connector without any rotation.

⓬ Wired headset connector, 6.35 mm jack type.

⓭ USB type-C Port.

⓮ Reset location. Insert a needle, the unit will restart.

⓯ Shoulder strap rings.

8.1 Power On

Press the Power button ❽. At power up, device information and battery charge are displayed, then the Home menu is displayed on the screen.

8.2 Sleep Mode

After a few minutes of inactivity, the screen is powered off for battery saving and the status LED is blinking green. Press any key to reactivate the display.

8.3 Power Off

Press the Power button **8**. At the prompt, select **Yes** with the **Left** navigation key **6**, or **No** to continue with the operation. Confirm using **Enter** **5**.

8.4 Driver

The USB driver is automatically installed from the SDT340, once connected to your PC.
In case of synchronization issue, the **driver** file SDT2xxDriverinstaller.exe can download from our website, by clicking this link.

8.5 Plug & Unplug a Sensor

SDT340 has 2 input ports with 7-pole LEMO connectors for external sensors. The channel with the red collar is dedicated to the sensor to be immersed in the liquid as the black one is reserved for the airborne sensor.

LEMO connectors have a sprung-loaded knurled barrel and a coding device to make the connection easier.

To plug a LEMO connector, line up the red dot on the plug with the red mark on the connector. Insert the plug into the connector without any rotating movement.
To unplug, move up the ring located on the bottom of the plug. Be sure to only pull the connector without any rotation and to never pull on the cable itself.

9 Home screen

Connect the sensors to the SDT340 to display the icons associated with the TankTest mode.

1 Tree Structure Data Collection Mode

2 General Settings

3 Guided tank inspection procedure

The icon is available with the SDT340 TankTest provided that both sensors are connected, in the right order.

4 Direct access to the airborne sensor

5 Direct access to the immersed sensor

6 Battery status

7 Audio output (default is mute)

8 USB connection established with the PC

9 Connected headset

10 Time and date scrolling information (synchronized with your PC)

The **Home** screen is displayed a few seconds after the device is turned on.

On top left, date and time are scrolling ❿. On the top right are the connectivity icons (when activated), USB ❽ (when the SDT340 is connected to a computer), wireless headset (when paired), wired headset (when connected) ❾ and battery status ❻.

Use the navigation keys to select an icon and press **Enter** to validate your choice. The selected icon is indicated by a bottom orange line (cf. ❶).

Press **Home** to directly come back to the Home screen from any menu.

When no sensor is connected to the device, the ❸ ❹ ❺ icons are not displayed and the sound icon ❼ is blocked without the ability to adjust the volume. However, the user hears background noise emanating from the internal electronics.

Caution: **It is necessary to connect the two TankTest sensors in the right inputs to display the guided mode icon and the widgets associated with the sensors.**

The flexible sensor for leak detection can be connected to the black input. Once connected and recognized by the device, the icon allows access to the real-time measurements of the flexible sensor.

10 Tree Structure Mode

In this mode, the SDT340 TankTest shows the tests already performed and the status of the database.

Access the mode from the home screen, by clicking on the icon and then pressing **Enter**.

The tree structure mode contains a directory of 50 locations for storing TankTest test data. Only the guided mode, described below, allows this tree structure to be filled. An occupied memory location contains the reference measurements "Ref", as well as the measurements supposedly acquired in vacuum "Test", for each sensor. The measurements are recorded in UTC time.

❶ "Tree Structure" mode

❷ Test performed/memory location occupied. The details entered by the operator when taking the measurements are recalled by pressing the ENTER key.

| /Tank1/	
Node	Tank1
Leak simulator	Yes
Tank diameter (before)	2000 mm
Tank diameter (after)	1800 mm
Liquid height (before)	100 mm
Liquid height (after)	70 mm
Water height (before)	3 mm
Water height (after)	3 mm

❸ Selected memory location

❹ Empty memory locations

❺ Access to reference measurements associated with the location ❸ (if existing)

❻ Access to vacuum measurements associated with the location ❸ (if existing)

In **tree structure mode**, the user only has the possibility to browse the already occupied memory locations to revisit/play back the different measurements.

Tightness control through the acoustic method requires passing successively from one sensor to the other, at ambient pressure and then under imposed vacuum. Each step is recorded in the memory of the device, according to the following logic:

- **TankID**: Tank Identification
  - o **Ref**: Reference measurements
    - ▪ **TTR2.012(RW-32k)**: with the red sensor, in liquid phase
    - ▪ **TTB2.011(Ht-32k)**: with the black sensor, in airborne phase
  - o **Test**: Vacuum measurements
    - ▪ **TTR2.012(RW-32k)**: with the red sensor, in liquid phase
    - ▪ **TTB2.011(Ht-32k)**: with the black sensor, in airborne phase

The example below, applied to the "Tank1" memory location, describes the tree structure mode readback options.

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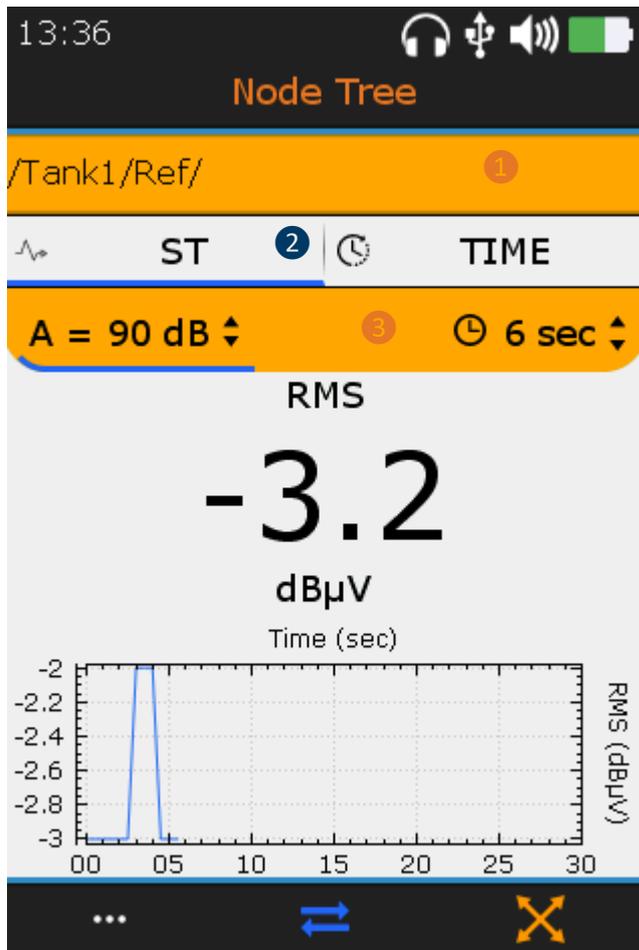
1 Access to reference measurements

2 View Toggle screens with F2 key (ST(RMS) view, TIME (signal) view)
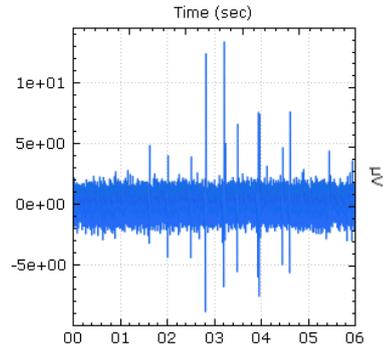
In TIME view, the operator can listen to the audible signal again with the **F4** key or check the 10 most important samples with the **F1** key.

#	sec	µV
1	1.62	4.91
2	2.81	5.46
3	2.81	12.5
4	3.2	13.4
5	3.22	5.09
6	3.49	6.65

3 Reminder of the sensor configuration

The user is not allowed to modify the measurement parameters or to create a new measurement within the tree structure.

The user must refer to the TankTest reporter software manual to manage his data and generate reports.

11 Guided TankTest mode

The guided mode breaks down the acoustic tightness test into several mandatory steps. The operator is invited to interact with the instrument, taking note of the different screens.

All settings are predefined to make the test quick and intuitive, while collecting data of interest that will be recorded in a final report.

From the **Home screen**, select the icon and press **Enter**.

The first screen reminds:

1. That the SDT340 equipment and its accessories are not designed to be used in ATEX zones.

2. That the TankTest sensors must not be disconnected during a guided test, otherwise the measurements will be lost. Disconnecting sensors during a non-finalized test will cause the mode to be closed.

Make sure you have all the necessary equipment and authorizations before starting a new acoustic tightness test.
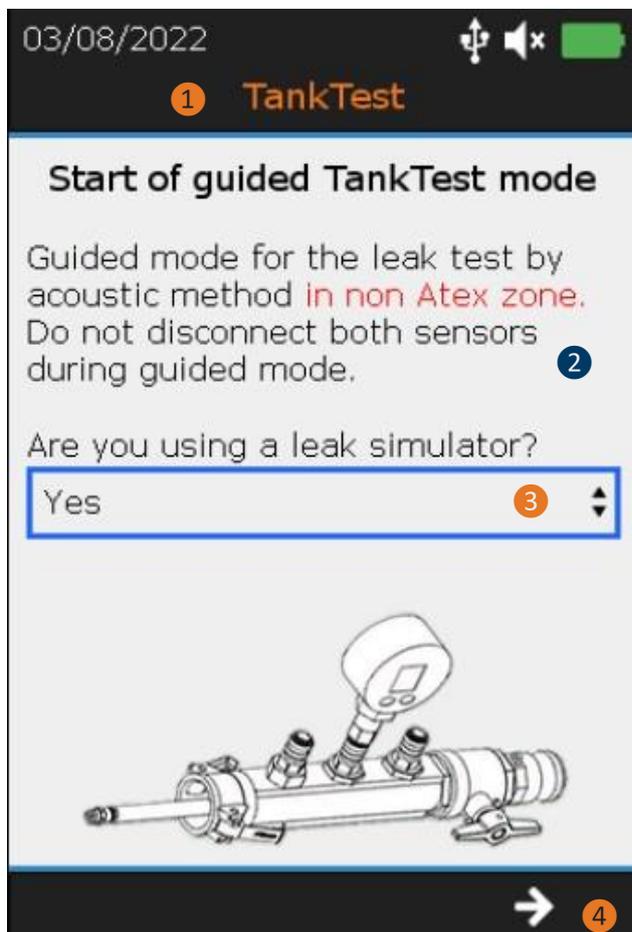
❶ Access to the guided TankTest mode

❷ Usage reminders

❸ User choice: Leak simulator.

In practice, the leak simulator is used at the end of the test as a functional test of the equipment, in the presence of a calibrated flow.

By choosing yes, a message will explicitly ask you to use this equipment at the end of the vacuum measurements.

Refer to the regulations in place in your country to know if this functional test tool is mandatory or optional.

❹ Go to the next step with the **F3** key

The next screen invites the operator to choose a memory location where the measurements associated with the TankTest test will be stored.
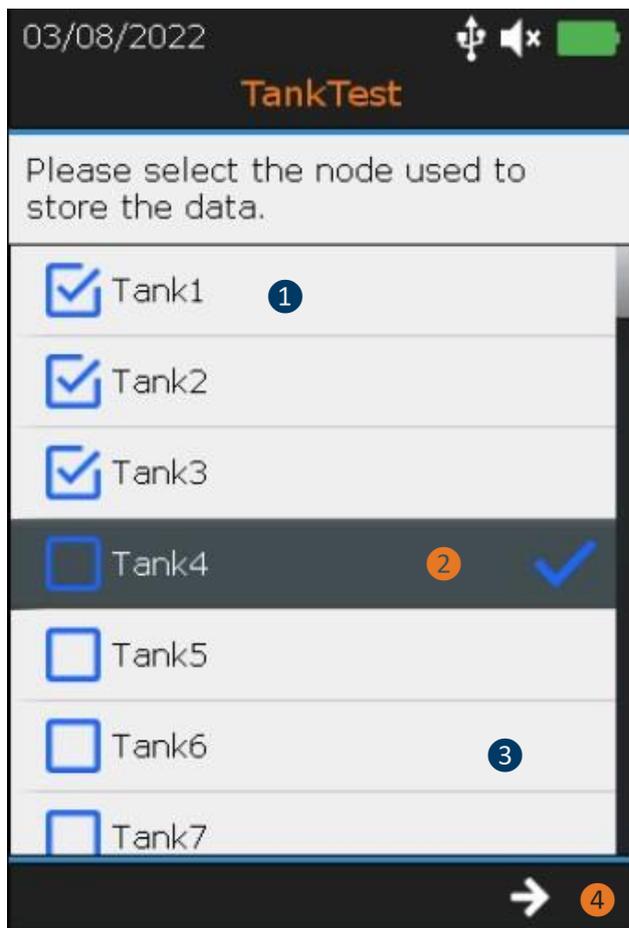
❶ Node or memory location occupied

❷ Node or memory location selected

❸ Remaining nodes or memory locations

❹ Go to the next step with the **F3** key. Confirm the selected choice with **ENTER**
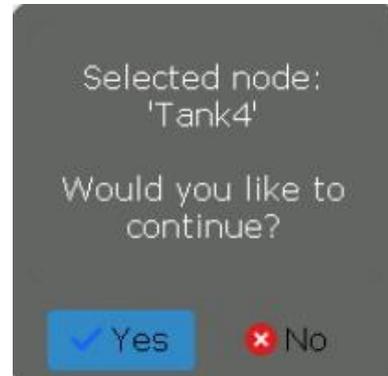
The screen summarizes the acquisition time settings. It is only possible to adjust the acquisition time of the sensors in "TEST" mode. The references associated with the respective background noises of the sensors, on the day of the test, before application of the vacuum is determined on the basis of an acquisition time fixed at 6 seconds, per sensor.

The amplification is preset to +90 dB and will adjust automatically. Adjust the audio volume using the **Left Arrow** and **Right Arrow** keys.

On each sensor, the RMS value is automatically updated 2 times per second.
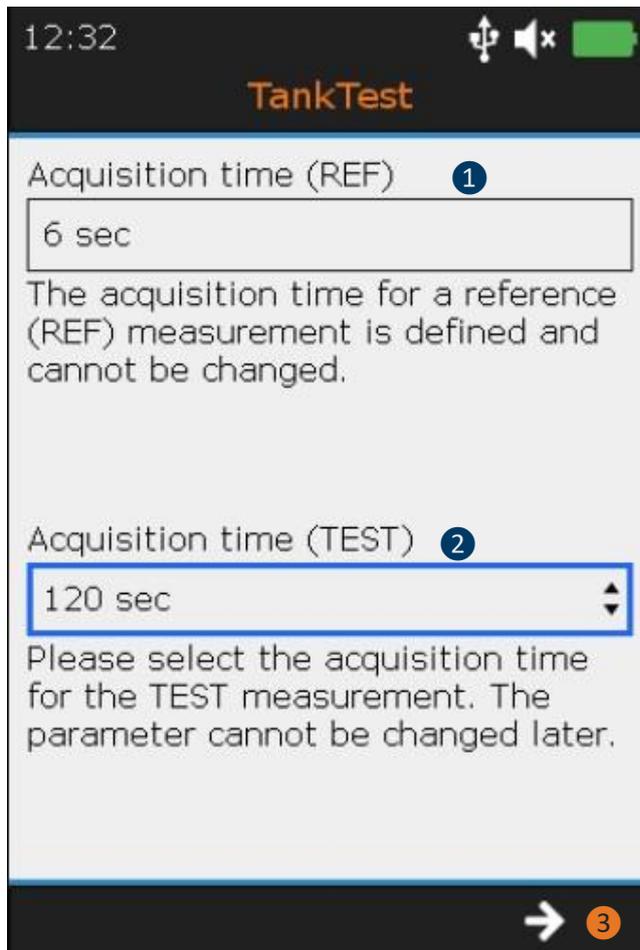
❶ Field associated with the determination of the reference levels (REF), before application of the vacuum. Not configurable

❷ Field associated with the measurements, in vacuum (TEST)

Configurable by the operator, between 20 seconds and 10 minutes, 120 seconds by default

Refer to your country's regulations

❸ Go to the next step with the **F3** key. Confirm the selected choice with **Enter**.

The next step is to fill in the information about the tank to be checked.

Before starting a test, it is usual to proceed to the gauge of the height of the liquid and water by means of a pin inserted by the mechanical sleeve.
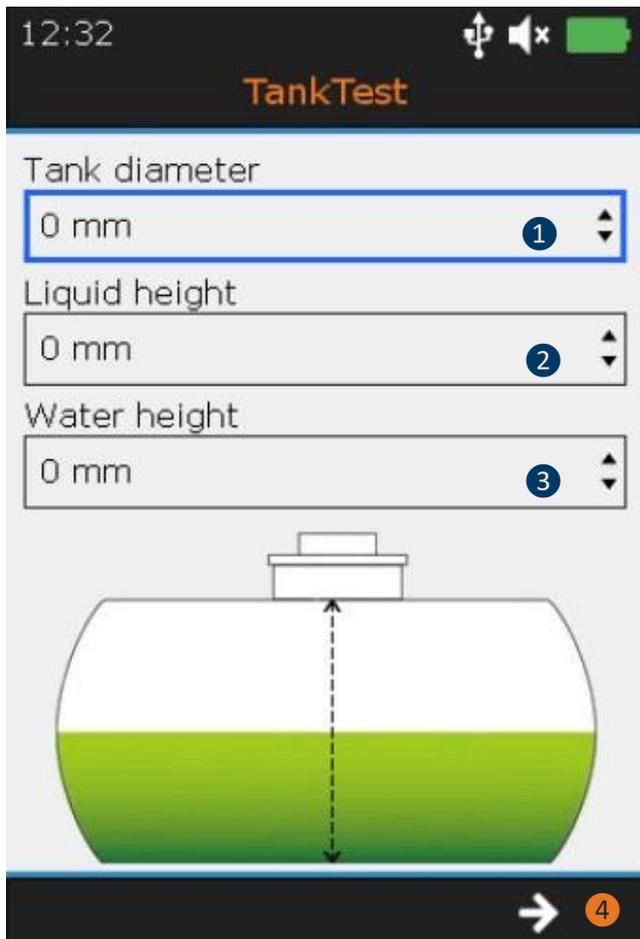
① Diameter of the tank, in mm

② Height of the liquid, before the test

③ Height of water, before the test

④ Go to the next screen with F3

Before proceeding with the installation of the sensors, the following points should be noted:

- The sensors should be handled with care, especially on their sensitive side.
- The sensors are supplied pre-wired on the Camlock. The adjustment of the lengths described in the next step implies manual tightening, using the cable glands located on the Camlock, in order not to damage the seals of the device.

| *Sensitive side of the TankTest sensors* | *Detail of the position of the sensors* |
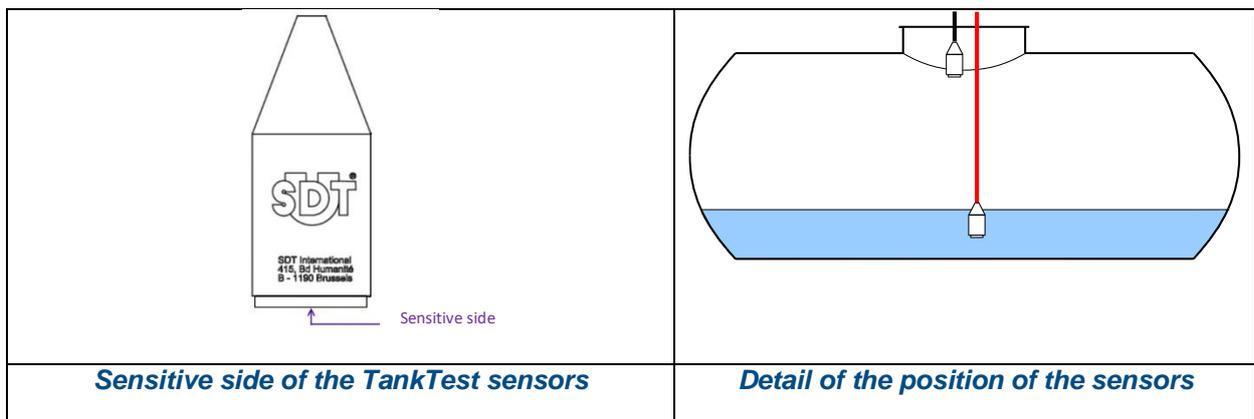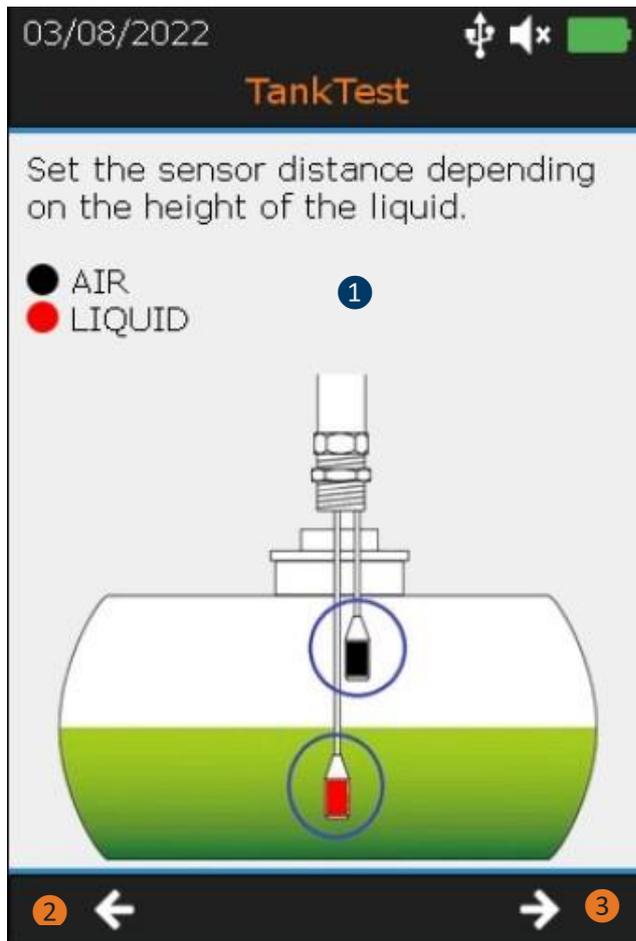
❶ Place the position of the sensors in the tank

Tightening must be done MANUALLY at the cable glands located on the Camlock.

❷ Return to the previous step with **F2**

❸ Go to the next step with **F3**

The adjustment of the sensor position is explained below:

- Adjust the height of the BLACK sensor (TTB2.011) so that its sensitive side is located at the level of the connection of the bottom of the flange to the tank shell.
- Adjust the height of the RED sensor (TTR2.012) so that its sensitive side is immersed in the liquid, without touching the bottom of the tank. The amount of liquid must be sufficient to allow the sensor to be fully immersed.
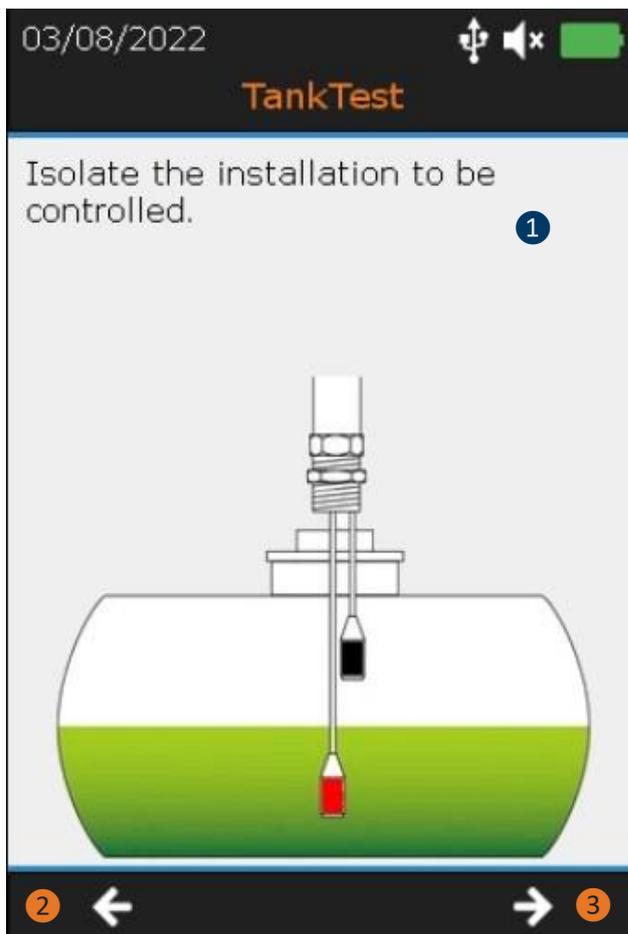
❶ Isolate the installation to be controlled

Follow the instructions on the screen:

- Seal the "open" parts of the installation with plugs

- Install the leak simulator between the camlock and the tank, if selected in step 1 and close its valve

- Lock the Camlock and the leakage simulator to the system

❷ Return to the previous step with **F2**

❸ Go to the next step with **F3**
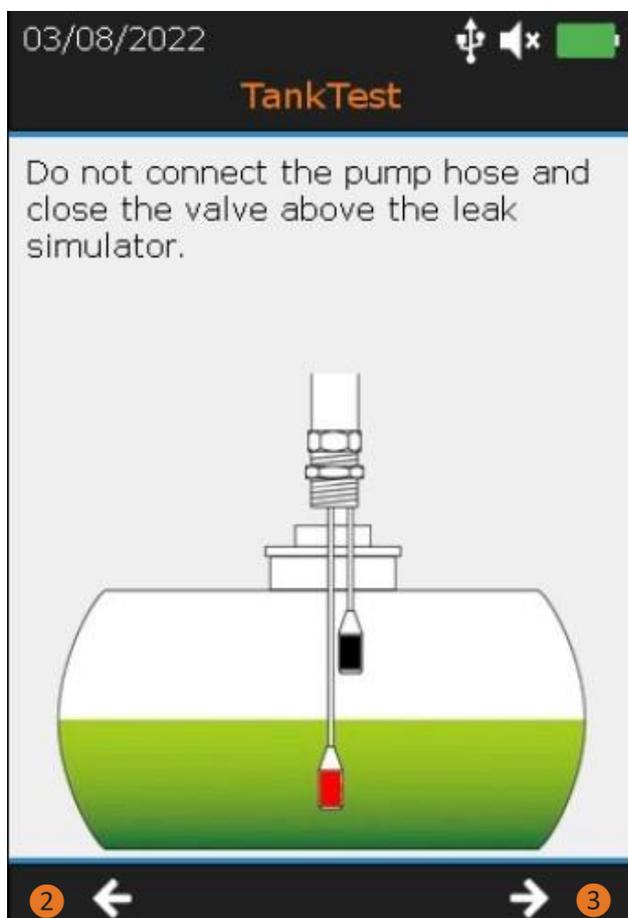
The test equipment is now installed. The following screen details the predefined settings on the SDT340 TankTest device.
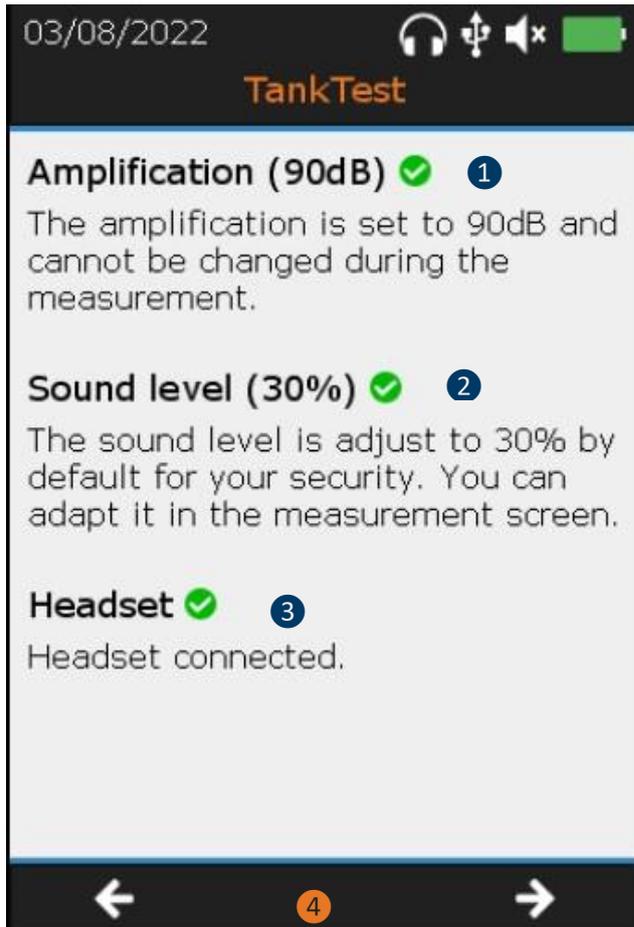
1 Sensor amplification is set to maximum

2 The sound level of the helmet is preset to 30%, for safety. The operator will be able to adjust this level afterwards.

3 The headset is plugged in

4 Go to the next screen with the **F3** key or return to the previous screen with the **F1** key

The next step is to characterize the background noise of the installation to be controlled. These successive measurements, in the airborne phase and in the liquid phase, are called "reference measurements".

The operator wears the headset during this operation and can, at his convenience, adjust the volume of the audio output, until a comfortable sound level is obtained.

When the operator judges that there is no disturbing noise coming from the headset and that the values observed on the screen are relatively stable (typically less than 0), he can start an acquisition by pressing the ENTER key. After a few seconds, the device will display the average measurement frozen on the screen, resulting from the 6 seconds of acquisition. The operator can visualize the signal with the F2 key to assess the global stability then confirm the saving with ENTER or cancel the present acquisition with the ESC key then restart an acquisition with ENTER.

In the event of abnormal background noises, identify then remove the source(s) of the disturbing noise, wait for a calmer moment and start again the operation "measurement of the reference", until measurements judged valid are obtained. If these conditions cannot be met, the tightness test cannot be performed properly.

The operator can save as many reference measurements as he deems necessary. The last acquisition will be considered as a "valid" reference to be compared with the measurements acquired in vacuum, during the guided mode. All the reference measurements will be available in the tree structure mode

as well as in the TankTest Reporter software used for the edition of the reports, after having exported the data on your computer.
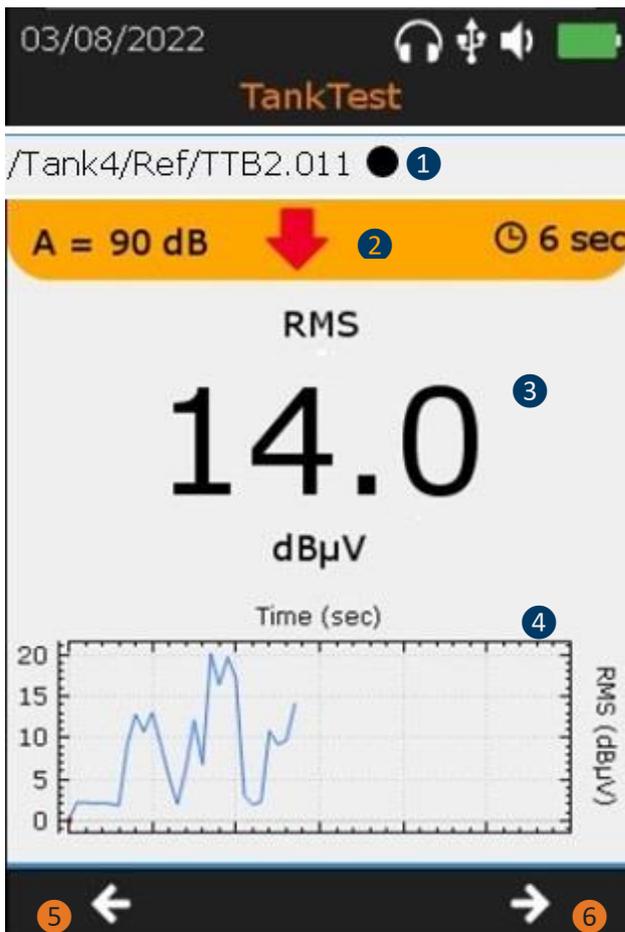

1 Identification of the memory location (Tank4/Ref) as well as the sensor considered (TTB2.011•= airborne phase)

2 Reminder of the sensor configuration (blocked on A=90 dB with an acquisition time of 6 seconds)

3 Real time value of the measurement

4 Trend observed in the last 30 seconds

5 Return to the previous screen with the F1 key

6 Switch to red sensor (i.e. TTR2.012 •= liquid phase)

It is necessary to take successively, a reference measurement with the TTB2.011 sensor as well as a reference measurement with the TTR2.012 sensor (in the liquid), to continue the guided mode. The latter are useful for characterizing the "ambient" background noise in the tank, in the airborne phase and in the liquid phase.

Caution:

To continue, please save at least one measurement TEST with both sensors (black and red).

Press the **Enter** key to initiate signal collection on the corresponding sensor. A loading screen will inform about the progress of the measurement. The trend is proposed on the screen, in addition to the audio rendering.
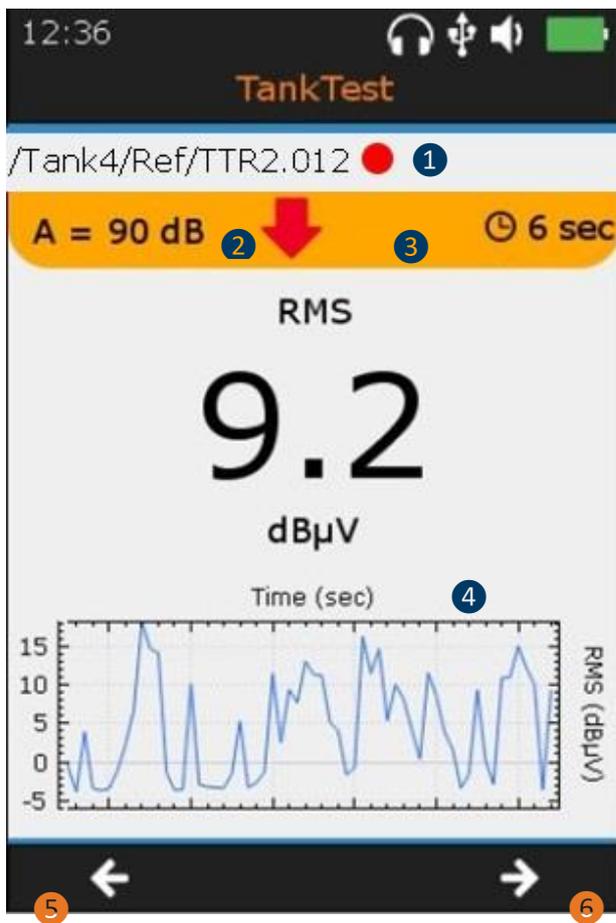
❶ Example of the taking of the reference on the TTR2.012 sensor •

❷ Summary screen. The measurement is frozen on the screen after an acquisition. Press the **Enter** key to validate the acquisition or ignore the present acquisition with the **Esc** key then restart a collection with **Enter**.

❸ Switch to the signal display screen with the **F2** key
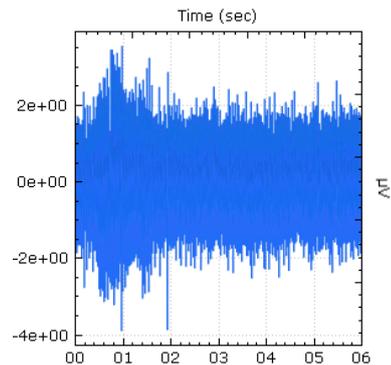
❹ Measured RMS trend

❺ Display of the 10 most important signal samples with F1 (from the TIME screen)

❻ Switch to the red sensor (i.e. TTR2.012 •= liquid phase) with F3

Once at least one reference measurement has been saved per sensor, the operator can access the "continuity test" screen with the **F3** key or repeat the acquisition of reference measurements.

The continuity test consists of applying a slight vacuum to the tank to be tested to ensure that the entire system, including the pipes, is considered "closed". The ends must be properly sealed with dedicated plugs. The operator can see the suction effect of the vacuum at each end. At the end of this operation, release one end completely in order to restore the ambient pressure in the installation. At the same time, make sure that this disturbance associated with a leak is recreated by the device, both in the signal trend monitoring and in the audio.
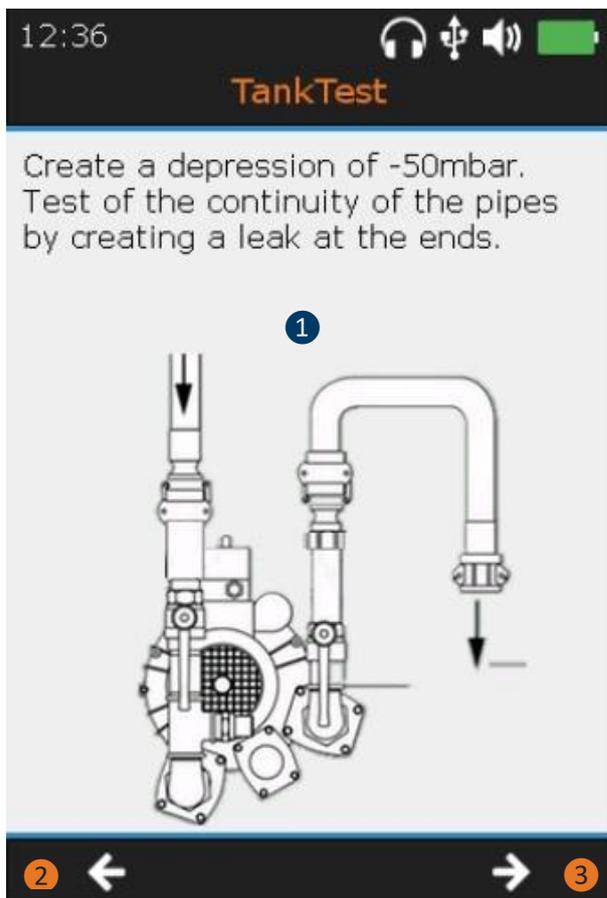
1 Continuity test

Open the valve(s) and make sure that a small vacuum can be applied to the system and then release this vacuum from one end.

Check that the disturbances are recreated by the device.

If you encounter problems at this stage, check the continuity of the installation, especially the pipes.

2 Return to the "reference" measurements with the **F1** key

3 Go to the next screen with the **F3** key

Once the continuity test has been successfully completed, the operator is taken to the selection of the vacuum to be applied for a regulatory leak test.

Refer to the table in Section 5 to determine the allowable vacuum value associated with the design standards.
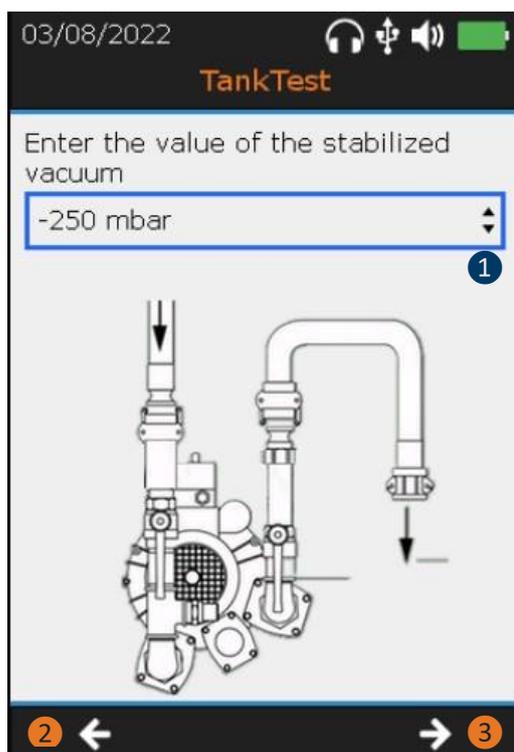
1 Enter the value of the stabilized vacuum. Use the directional arrows "**up**" and "**down**" on the device.

Turn on the vacuum pump with the valve open. When the vacuum reaches the target value, close the valve and stop the vacuum pump. Wait a few moments until the manometer indicates a constant value, called "stabilized", to be entered. Turn the pump on again if necessary.

If the vacuum is not maintained continuously, check the continuity of the installation.

2 Return to the previous screen with the **F1** key

3 Go to the next screen with the **F3** key

The next step is to take measurements of the system under stabilized vacuum. These successive measurements, in airborne and liquid phase, will be recorded in the memory location named "Test", associated with the tank number chosen at the beginning of the guided procedure.

The stabilized vacuum must be maintained at +/- 5% of the target value. If pressure is lost, restart the vacuum pump and open the valve to restore an acceptable pressure for the regulatory test.
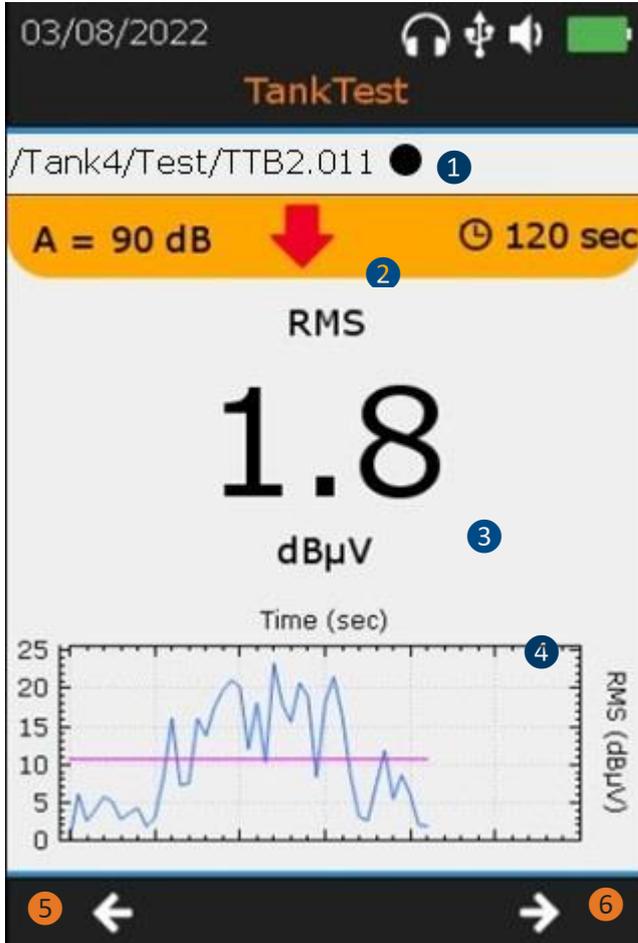
❶ Identification of the memory location (Test) as well as the sensor considered (TTB2.011 •= airborne phase)

The operator wears the headset, in order to detect possible anomalies by listening.

In case of rapid loss of vacuum, check the continuity of the installation.

❷ Settings imposed on the acquisition. By pressing **Enter**, the operator will trigger an acquisition of X seconds and the progress screen will be displayed.

❸ Real-time RMS value (calculated over ½ second)

❹ RMS trend observed in the last 30 seconds

The curve -- recalls the previously saved reference. The blue curve represents the values in vacuum.

❺ Return to the previous screen with the **F1** key

❻ Switch to the next screen with F3, repeat a recording from the red sensor (i.e. TTR2.012 •= liquid phase)

It is necessary to take successively, a measurement in vacuum with the TTB2.011 sensor as well as one with the TTR2.012 sensor (in the liquid), to continue the guided mode. These are compared to the background noise associated with the reference values.

Caution:

❶ Acquisition screen (trigger with the **Enter** key)

❷ Progression of the acquisition

Note 1: When using the leak simulator, the message "Create a leak with the leak simulator" will appear in red towards the end of the progress.

Note 2: At the end of the progression, the screen is frozen. The operator can preserve the measurement by pressing **Enter** or not consider it by pressing **Esc**, then start a new acquisition with **Enter**. The message below will confirm the taking into account of the measurement.

An equivalent message will be proposed in case of cancellation. This message must be confirmed by the operator.
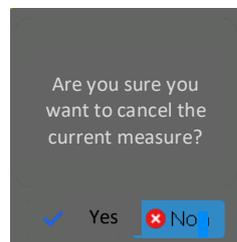
❸ RMS trend observed in the last 30 seconds. Reminder of the reference measurement.

If you have taken both measurements at low pressure, press **F3** to switch to the next screen.

Note: **The leak simulator is proposed by SDT for functional testing purposes, in accordance with regulatory constraints. This tool allows to attest the functioning of the measurement chain, the day of the intervention. The leak generator allows to generate calibrated leaks under vacuum.**
**It does not exempt from the periodic calibration of the equipment.**
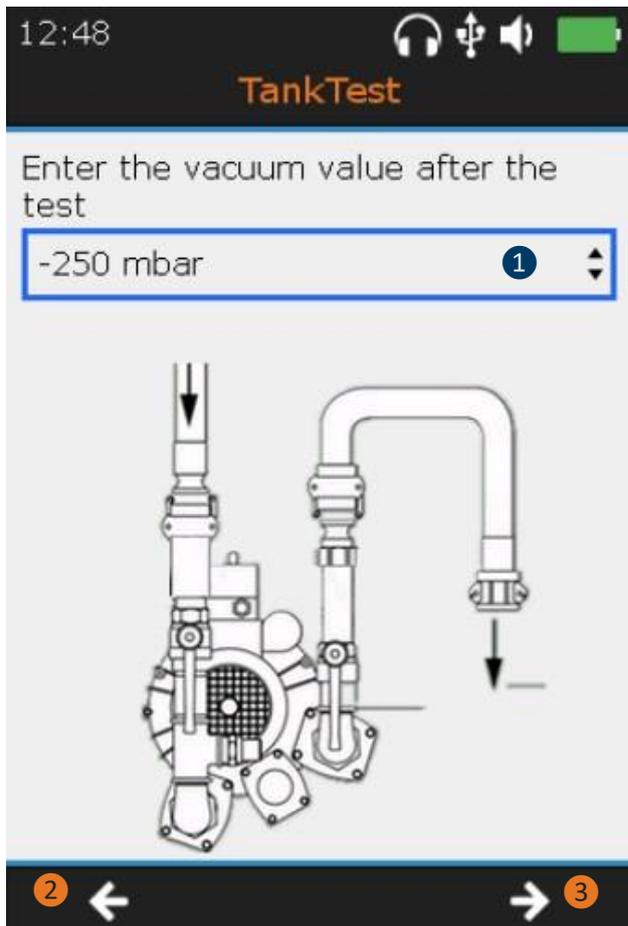
❶ Read the vacuum value on the pressure gauge. Use the "**up**" and "**down**" arrows to make your choice.

❷ Return to the "measurement" screens with the **F1** key, especially if the vacuum value has dropped by more than 5% from the stabilized value

❸ Go to the next screen with the **F3** key

The tightness test is complete. The next step prompts the operator to restore the system to normal pressure conditions.
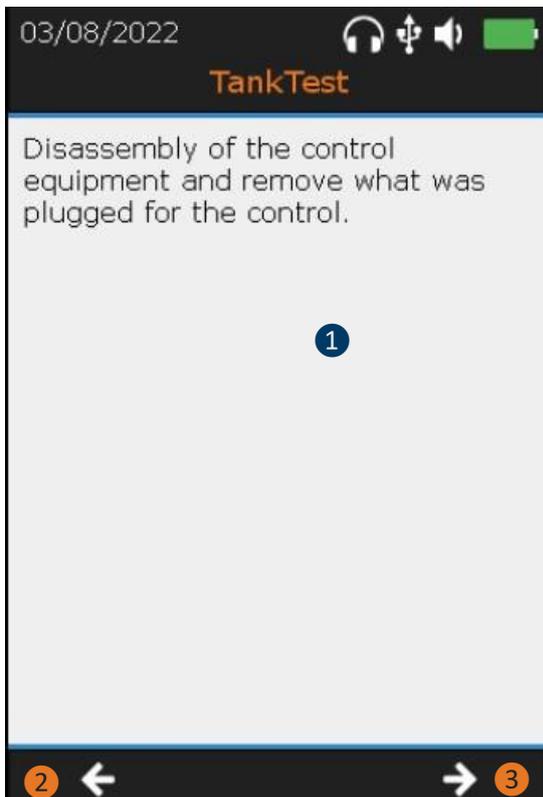
❶ Instructions for the end of the test

❷ Return to the previous screen

❸ Go to the next screen with the **F3** key

For all purposes, the operator is asked to measure and then fill in the following information:

- Diameter of the tank
- Height of the liquid
- Height of water

Once this data has been validated with the **F3** key, the operator successively reads the following summary screens, using the **F1** and **F3** keys:

- Summary of the guided mode
- Reminder of recorded signals (1 screen per sensor)

Finally, the final screen asks the operator to save the entire test performed.
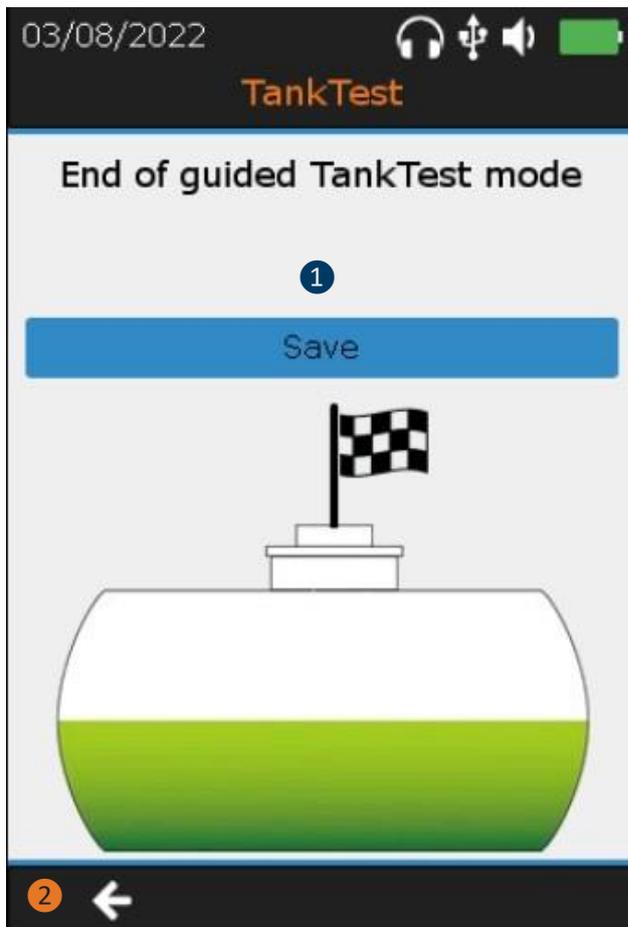
❶ Final screen of the guided mode

Press **Enter** to store the entire tightness test.

A message will confirm the saving. The operator can then revisit his measurements from the "tree structure" mode.

The data is saved successfully.

❷ Return to the previous screen with the **F1** key

Note:

If the guided mode is abandoned, before the final confirmation of the data recording, the measurements carried out beforehand will not be saved in the device.

Once saved, the operator can consult these different measurements, from the tree structure mode, in the memory location chosen at the beginning of the guided mode.

12 Measurement in Free mode tab

From the home screen, it is possible to use the TankTest sensors in free mode, independently in order to ensure their respective operation.

Select the desired sensor (or) and press **Enter**.

The real time measurement screen appears:

The following parameters can be modified, using the directional arrows on the device and the **F2** key:

- Acquisition time
- Amplification
- Audio volume

Outside the guided mode, saving of signals is not allowed. The operator can perform various functional tests from this mode, but without being able to save them in the device's memory.

The screen below is common to both TankTest sensors and the flexible sensor:
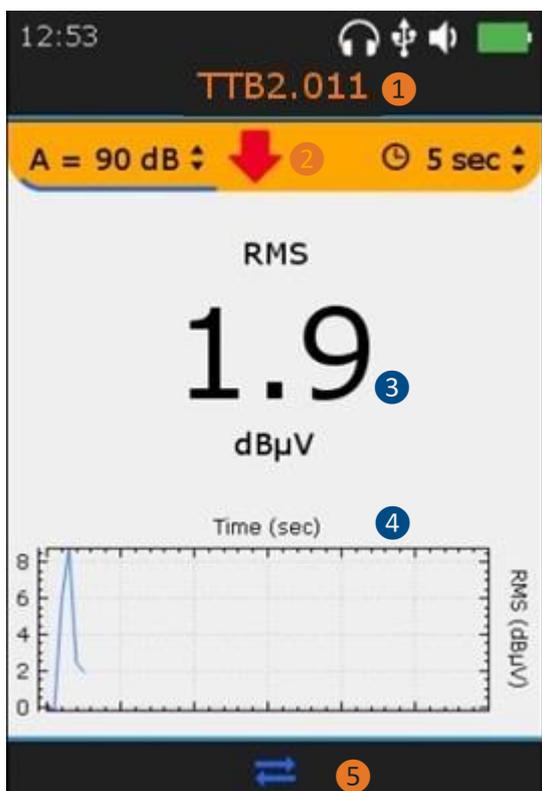
① Sensor ID

TTB2.011 for the " Black " sensor

TTR2.012 for the " Red " sensor

FLEXID2 for the flexible sensor

② Settings access

Note: The red arrow and the LED on the front of the unit guide the choice of the optimal amplification which allows the collection of properly amplified signals.

Position the cursor on the amplification using the **F2** key and then use the "Up" or "Down" directional arrows as suggested by the red arrow.

③ RMS Value

④ RMS trend observed in the last 30 seconds

⑤ **F2** to display the Time Waveform, if the operator has previously initiated a temporary acquisition with the **Enter** key. Press **Esc** to ignore the present acquisition.

13 General settings

From the **Home** screen, select General settings icon and press **Enter.** With the **Up** and **Down** navigation keys highlight the desired settings and confirm your choice with **Enter**.
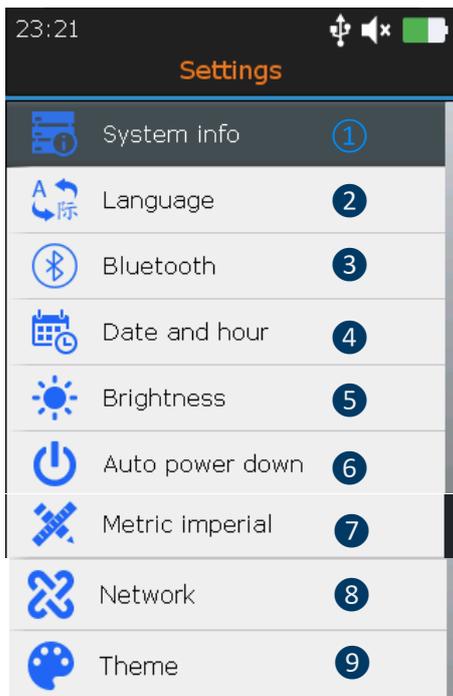
1 System info setting
2 Language setting
3 Bluetooth setting
4 Date and hour setting
5 Brightness setting
6 Auto power down setting
7 Metric imperial setting
8 Network setting
9 Theme setting

From the System Information screen, press **Enter**.

13.1 System info
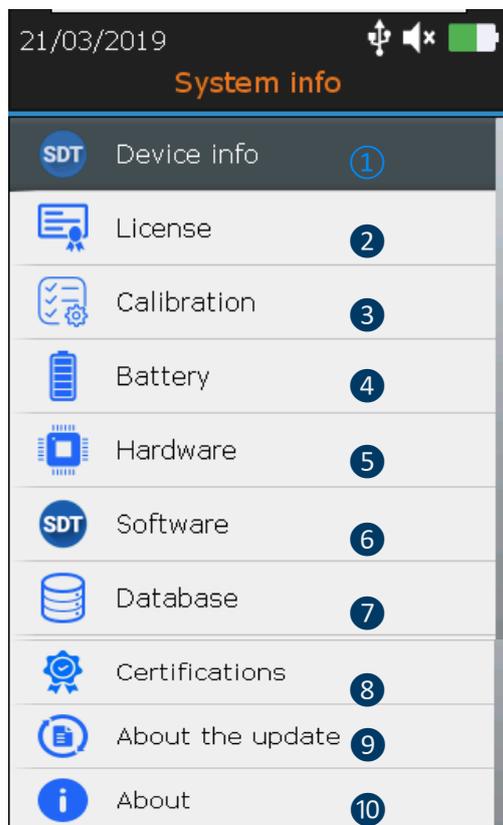
1 Device info
2 License info
3 Calibration info
4 Battery info
5 Hardware info
6 Software info
7 Database info
8 Certifications' info
9 About the update info
10 Manufacturer Info

From the Device Info screen, press **Enter.**

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13.1.1   Device info

16:45	① Equipment number

Device info

Equipment No	①	284190012
PCB Serial ID	②	0A80C2043410...
PCB No	③	278190064
PCB Issue	④	3
Batch No	⑤	2
Batch Month	⑥	2
Batch Year	⑦	19

① Equipment number
② PCB Serial ID number
③ PCB number
④ PCB issue number
⑤ Batch number
⑥ Batch manufactured month
⑦ Batch manufactured year

With the **Up** and **Down** navigation keys highlight the desired settings and confirm your choice with **Enter**. Press the button **ESC** to display the previous screen.

13.1.2   License info

00:13

License

Level	①	SDT340
Option	②	-

① License level
② License option

With the **Up** and **Down** navigation keys highlight the desired settings and confirm your choice with **Enter**. Press the button **ESC** to display the previous screen.

13.1.3   Last calibration date

16/04/2019

Calibration

Date	①	16/04/2019

① Last calibration date

With the **Up** and **Down** navigation keys highlight the desired settings and confirm your choice with **Enter**. Press the button **ESC** to display the previous screen.

13.1.4 Battery info

1 Current capacity (in %)
2 Battery serial ID
3 Battery serial number
4 nominal capacity (in mAH)
5 Number of charge/discharge cycles
6 Battery temperature (in °C or °F)
7 Charge/discharge current (in A)
8 Nominal voltage (in V)
9 Power (in W)

With the **Up** and **Down** navigation keys highlight the desired settings and confirm your choice with **Enter**. Press the button **ESC** to display the previous screen.

13.1.5 Hardware info

1 CPU frequency
2 RAM capacity (in MB).
3 Internal memory (in MB)
4 Internal available memory (in MB)
5 External memory (in GB)
6 External available memory (in GB)
7 Speed Ethernet MAC (in Mbps)
8 Screen resolution

With the **Up** and **Down** navigation keys highlight the desired settings and confirm your choice with **Enter**. Press the button **ESC** to display the previous screen.

13.1.6 Software info

16/04/2019		
Software		
Firmware	**1**	1.518.0
Kernel	**2**	109
FPGA	**3**	89
UBoot	**4**	113
Library	**5**	1.10
Build	**6**	20190405.1348
Bluetooth audio	**7**	V6.1.5

1 Firmware version

2 Kernel version.

3 FPGA version

4 UBoot version

5 Library version

6 Build version

7 Bluetooth audio version

With the **Up** and **Down** navigation keys highlight the desired settings and confirm your choice with **Enter**. Press the button **ESC** to display the previous screen.

13.1.7 Database

16:48		
Database		
SQLite version	**1**	3.8.7.1
TankTestReport...	**2**	11
SDT340 Sensors	**2**	10
SDT340 Config	**2**	3

1 SQLite version

2 Databases

With the **Up** and **Down** navigation keys highlight the desired settings and confirm your choice with **Enter**. Press the button **ESC** to display the previous screen.

13.1.8 Certifications and markings reminder

16/04/2019	
Certifications	
C E	**1**
(WEEE symbol)	**2**

1 CE compliant

2 WEEE Directive compliant

With the **Up** and **Down** navigation keys highlight the desired settings and confirm your choice with **Enter**. Press the button **ESC** to display the previous screen.

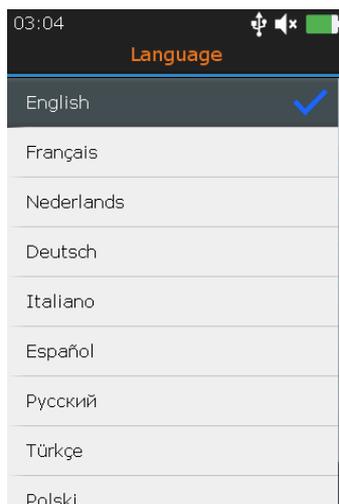### 13.1.9   About the update
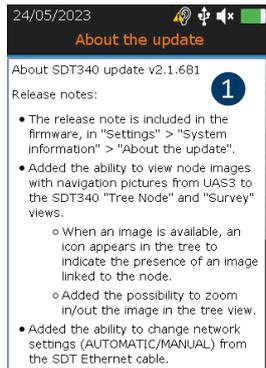
   ❶ Release notes

Figure 13-1-9: Certifications

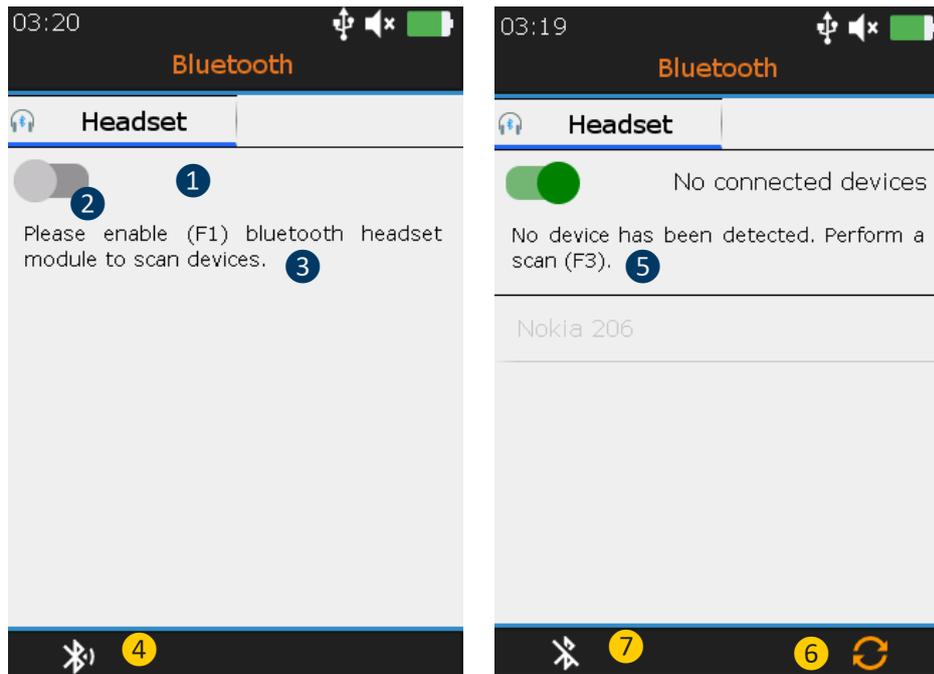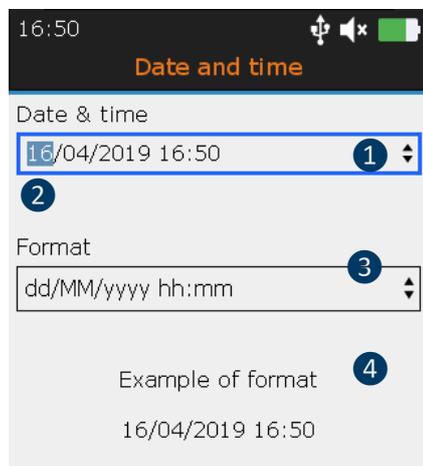### 13.1.10 Manufacturer info
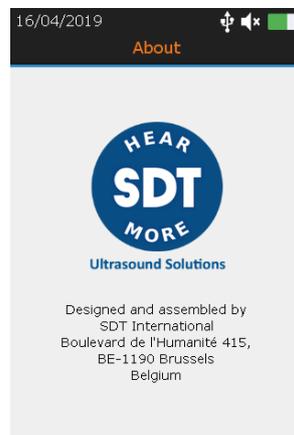
13.2 Language

With the **Up** and **Down** navigation keys highlight the desired settings and confirm your choice with **Enter**. Press the button **ESC** to display the previous screen.

13.3 Bluetooth

1 Blue line indicates that the headset is selected

2 Indicator to enable and disable Bluetooth

3 Instruction to enable Bluetooth

4 Turn Bluetooth on

5 Instruction to pair the headset

6 Scan

7 Turn Bluetooth on

Press **F1** **2** **to enable** the Bluetooth headset module. Switch on the headset. The headset must emit a blue flashing light. **Press F3** to pair **6** the SDT340 with the headset.
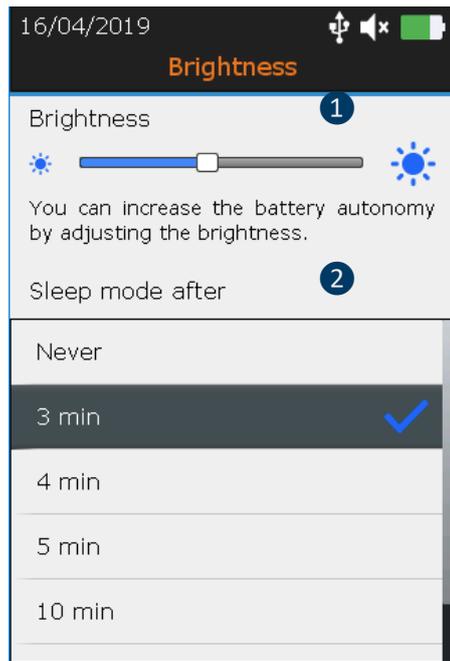
13.4 Date and time format

1 Locale date and time

2 Blue frame indicates the selected field

3 Date and time settings format

4 Example of format

With **Left and Right** Buttons highlight the desired field **2**. With the **Up** and **Down** navigation keys increase or decrease the settings values. Confirm your choice with **Enter**.

13.5 Brightness
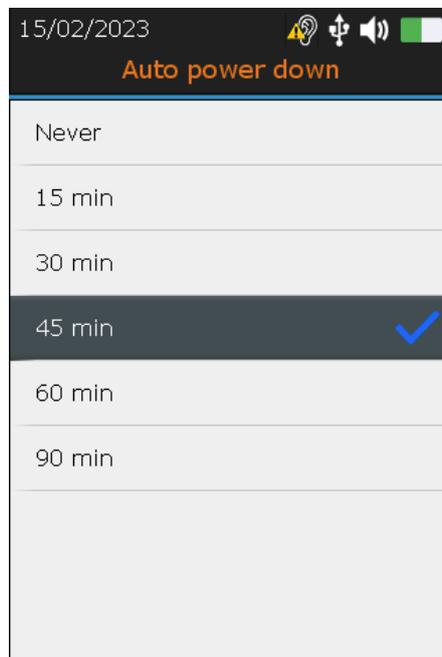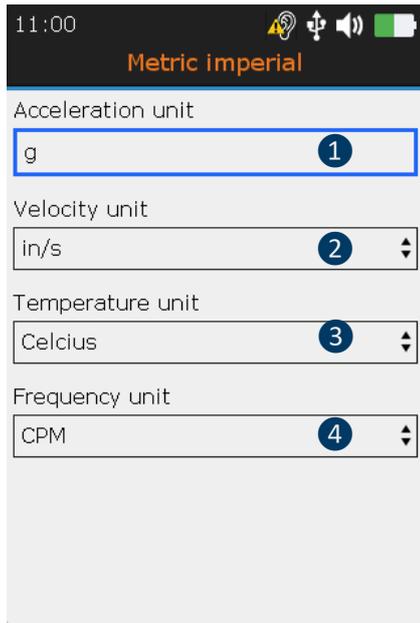

❶ Brightness adjustment

❷ Sleep mode delay

With the **Left** and **Right** you can adjust the brightness of the screen. And with the **Up** and **Down,** you define the sleep mode delay.

13.6 Auto power down

With the **Up** and **Down** navigation keys highlight the desired settings and confirm your choice with **Enter**. Press the button **ESC** to display the previous screen.

13.7 Metric imperial

❶ Acceleration unit

❷ Velocity unit

❸ Temperature unit

❹ Frequency unit

With **Left and Right** Buttons highlight the desired field. With the **Up** and **Down** navigation keys change the settings values. Confirm your choice with **Enter**.

13.8 Security

Listening to headphones too loud for too long can cause noise-induced hearing loss.

Due to safety standards, the maximum output level is limited by the firmware. However, in case of very noisy environments, the default attenuation level of the provided headset might not be enough for reliable diagnosis. user can voluntarily bypass the safety protection and expose himself to potentially harmful sound levels.
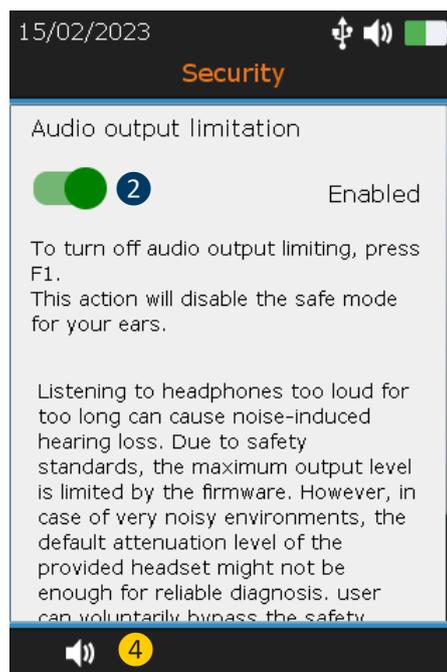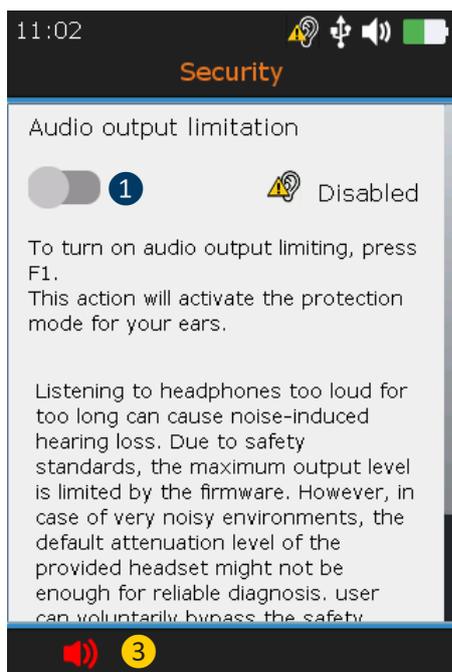
❶ Turn on audio output limitation

❷ Turn off audio output limitation

❸ Audio output limitation is disabled

❹ Audio output limitation is enabled

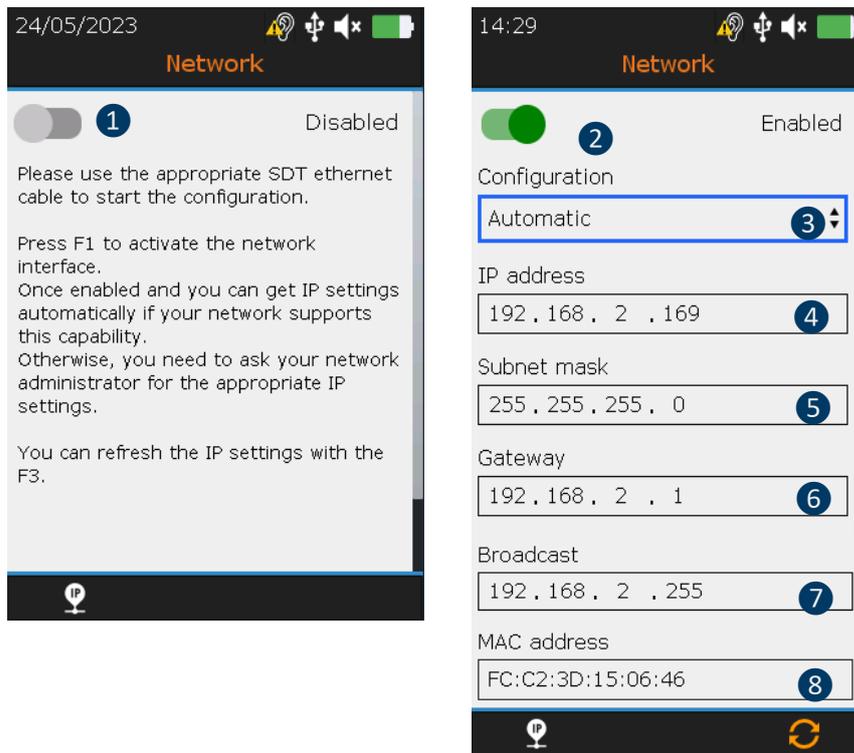Press **F1** **1** **to enable** the audio output limitation.

13.9 Network

Figure 19-9: Network

1 Turn on to configure the network settings

2 Turn off the network configuration

3 Automatic/Manual configuration
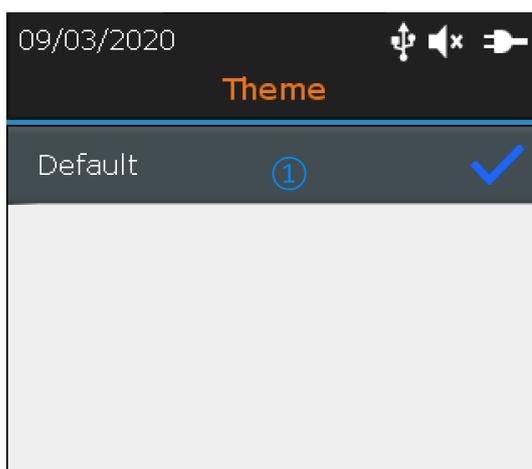
4 IP Address

5 Subnet mask

6 Gateway

7 Broadcast

8 MAC Adress

With **Left and Right** Buttons highlight the desired field. With the **Up** and **Down** navigation keys change the settings values. Confirm your choice with **Enter**. Fields can only be modified in the case of **manual** configuration.

13.10 Theme

1 Choose by default

You can use this feature to change the appearance of your screen. With the **Up** and **Down** navigation keys highlight the theme you want and confirm with **Enter**.

Ultrasound Solutions

14 Using the TankTest Reporter software

Connect the SDT340 to a computer on which SDT TankTest Reporter is installed, using the USB cable provided.
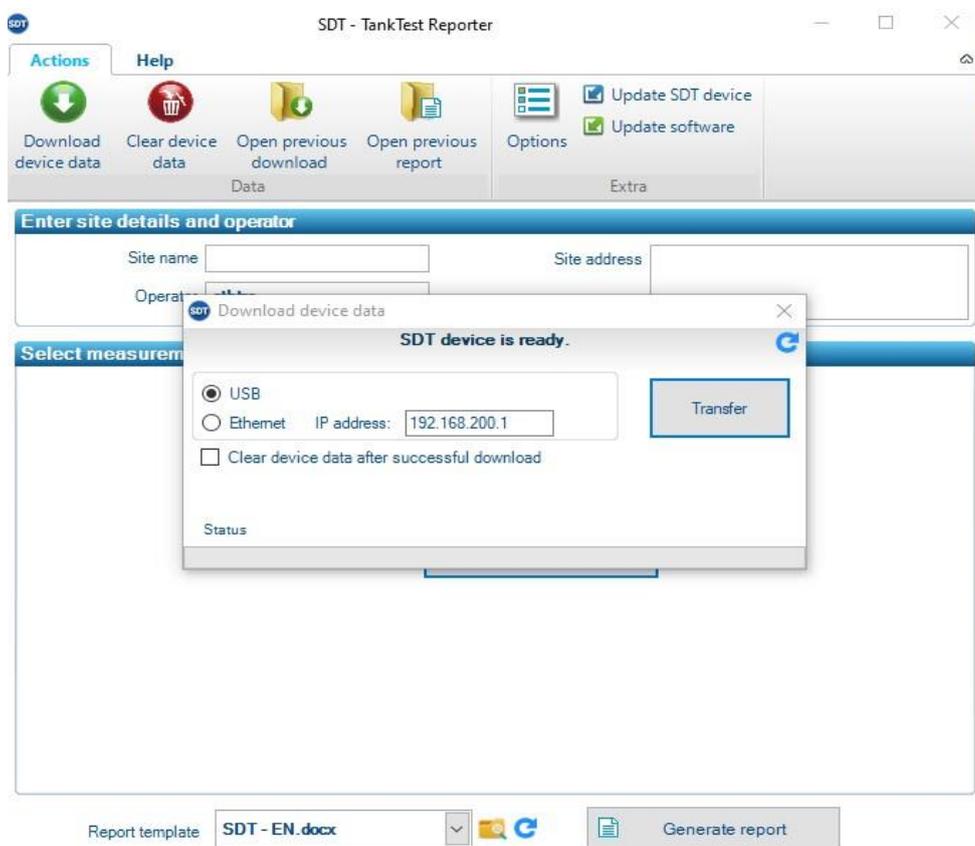
Start the software, supposedly up to date, with an activated license and an internet connection.
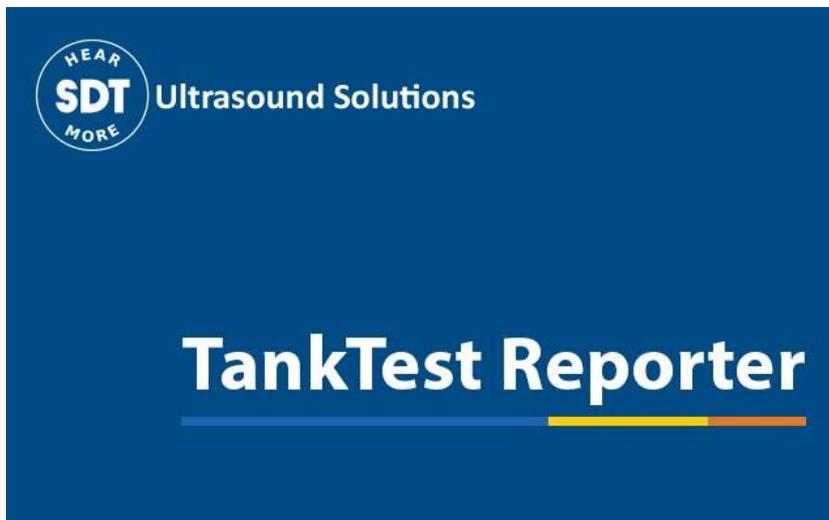
Refer to the software manual for instructions on how to do this.

14.1 Exporting your data

Once the software has started and the connection between the SDT340 and your computer has been established, go to the main screen and select "Download device data".

A pop-up window appears, inviting you to start the transfer, if the device is recognized by the computer.

Click on "Transfer" to export your data from the SDT340 to the software.

After a few moments, the measurements made in guided mode are available in the software and can be used for report creation.

Please note that the data remains in the device, as long as the user does not voluntarily decide to delete it.

However, SDT recommends that the internal memory of the unit be regularly erased, limited to 50 nodes/tanks.

14.2 Cleaning the device memory

On the main screen, go to the option "Clear device data" and follow the instructions given.

Make sure you have exported your data to the software from the previous point before cleaning the memory of the device.
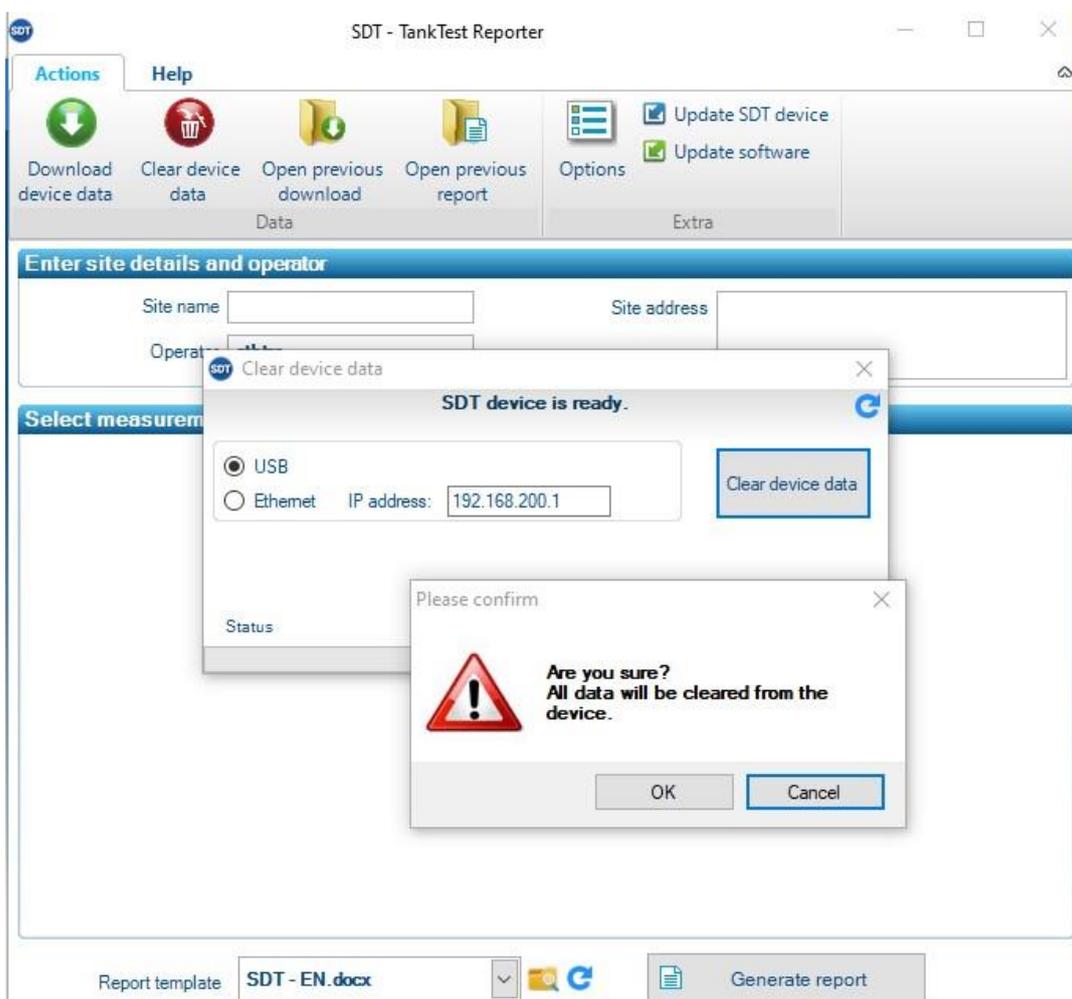

After a few moments, the memory of the SDT340 device is completely restored. The data contained in the device has been permanently deleted. The tree structure mode now contains only empty memory locations.

14.3 Updates

From the main screen, use the "Update SDT device" option to ensure you are using the latest firmware version.

This operation requires your computer to be connected to the internet.
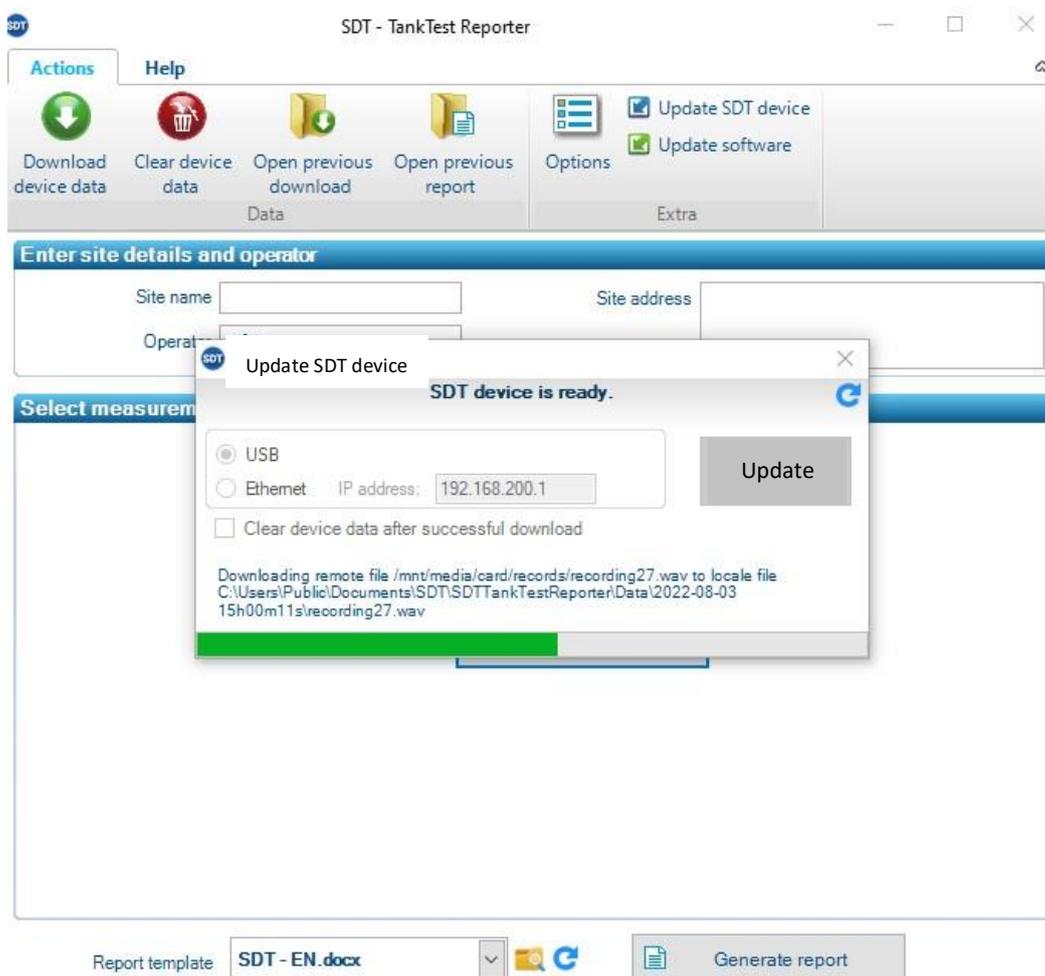
SDT recommends this simple procedure, which can solve potential problems encountered by users.

15 Recommended calibration intervals

SDT recommends annual recalibration of SDT instruments and **annual** verification of sensors to benefit from its **limited lifetime warranty**. This periodicity is coherent with the observed long-term stability of SDT electronic equipment's.

However:

- For new equipment leaving the factory the initial period is extended to 15 months instead of 12 (to avoid any possible discrimination between users due to transportation time, customs clearance, etc.).
- SDT recognizes that each customer may have their own Quality Assurance Standards and internal requirements. If a customer has established a Quality Assurance Program that includes a documented procedure for measurement deviations, and if an instrument and the relevant sensor show acceptable deviations and do not show signs of physical damage, then calibration periodicity could be extended to two years.

- Third party organizations having more authority (Class, or State Administrations) may have defined their own regulations for example 6 months, or 2 years calibration interval: by evidence, local legally applicable regulations supersede SDT rules.

For these reasons, SDT Calibration Certificates does not mention a "calibration due date" anymore, but simply the "last calibration date".

For user convenience, the date of the last calibration of an SDT200, SDT270, SDT LUBExpert and SDT340 instruments can also be found in the menu screens.

Note! Only the users of SDT200, SDT270, SDT LUBExpert, SDT Checkers range, SDT T-Sonic1, SDT T-Sonic9 and SDT340 can benefit from a limited lifetime warranty.

This text refers to SDT document DC.QUAL.005[1].

16 Warranty

SDT International guarantees the SDT340 unit against manufacturing faults for an unlimited period, provided that the device is calibrated annually and that other conditions to benefit from the lifetime warranty are respected. With the exception of the battery and accessories (charger, headphones) these are guaranteed for a period of 6 (six) months. The limited lifetime warranty covers all material supplied and implies the free replacement of all parts that contain a manufacturing fault.

The limited lifetime Warranty does not include shipping, handling and importation.

The limited lifetime warranty is void if misused, or an accident damages the product, if the product is altered in any way, if an unauthorized party attempts repair, or the unit is opened without written authorization of SDT International.

In the event of a defect, contact your local SDT representative or SDT International.

17 Responsibility limits

Neither the company SDT International, nor any related company, will in any circumstances be liable for any damages, including, without limitation, damages for loss of business, business interruption, loss of information, defect of the SDT340 unit or its accessories, bodily harm, loss of time, financial or material loss or any other indirect or consequential loss arising out of the use, or inability to use this product, even when it has been warned of possible damages.

18 Destruction and recycling of waste equipment

In conformance with European Union (EU) Directives and in particular with Directive 2006/66/EU "Batteries" and Directive 2012/19/EU "WEEE – Waste Electrical and Electronic Equipment", SDT International is organizing the management of waste equipment. However local legal regulations have precedence.

Thus, SDT Customers may:

- Either transfer a waste apparatus to a local company that will recycle it in accordance with applicable local laws
- Or return the waste apparatus to SDT International or to an SDT Dealer

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[1] This document is part of SDT's quality management system (ISO-9001 certified).

- For an apparatus that contains a battery, SDT International will transfer the battery to a local company that will recycle it in accordance with EU "Batteries" Directive and Belgian laws.

SDT International will transfer the rest of the apparatus to a local company that will recycle it in accordance with EU "WEEE" Directive and Belgian laws.

19 Copyright

Revision	Writer	Nature of modification	Approved
07			
06			
05			
04	CGI 22/09/2023	Note on the battery	CMA
03	MUN 24/05/2023	Updated screens + new sections	GGH
02	GGH 15/02/2023	Updated screens + new sections	MUN
01	CMA 12/07/2022	Original version	CGR