SCREENING EAGLE | proceq

UT8000

Flaw Detection

User Manual

Document Information

Document Revision:	1.0
Revision Date:	Sep 13, 2023
Document State:	Released
Company:	Proceq SA Ringstrasse 2 CH-8603 Schwerzenbach Switzerland
Classification:	Technical Manual

Revision History

Rev	Date	Author, Comments
1.0	Sep 13, 2023	MMAG – 1st release
0.9	Jan 1, 2023	MMAG - Initial document

Content

Legal Notice

This document contains important information on the safety, use and maintenance of Proceq products. Read through this document carefully before the first use of the instrument. Observe the safety and warning notes in this documentation and on the product. This is a prerequisite for safe working and trouble-free operation.

Symbols used

- This icon signals important information, specifications, proper working procedure and to avoid data loss, damage or destruction of the instrument.

- This note signifies a warning about dangers to life and limb if the apparatus is handled improperly. Observe these notes and be particularly careful in these cases. Also inform other users on all safety notes. Besides the notes in this instruction manual the generally applicable safety instructions and regulations for prevention of accidents must be observed.

Limitation of use

The instrument is only to be used for its designated purpose as described herein.

- Replace faulty components only with original replacement parts from Proceq.

Liability

Our “General Terms and Conditions of Sales and Delivery” apply in all cases. Warranty and liability claims arising from personal injury and damage to property cannot be upheld if they are due to one or more of the following causes:

- Failure to use the instrument in accordance with its designated use as described in the product documentation.
- Incorrect performance check for operation and maintenance of the instrument and its components.
- Failure to adhere to the instructions dealing with the performance check, operation and maintenance of the instrument and its components.
- Unauthorised modifications to the instrument and its components.
- Serious damage resulting from the effects of foreign bodies, accidents, vandalism and force majeure. All information contained in this documentation is presented in good faith and believed to be correct. Proceq AG makes no warranties and excludes all liability as to the completeness and/or accuracy of the information.

Safety Instructions

The equipment is not allowed to be operated by children or anyone under the influence of alcohol, drugs or pharmaceutical preparations. Anyone who is not familiar with the instrument must be supervised when using the equipment.

- This product is not designed nor rated for use in hazardous locations.
- The instrument UT8000 is only for material testing. It is not allowed to use anything for medical or other purposes!

Reserved Rights

The content of this document is intellectual property of Proceq SA and prohibited to be copied neither in a photomechanical or electronic way, nor in excerpts, saved and/or be passed on to other persons and institutions. This document can be changed at every time and without any prenotification or announcement.

- Unauthorized modifications and changes of the product are not permitted.

Damages during carriage

On receipt of the goods, check for any visible damages on the packaging. If it is undamaged you may sign the receipt of the goods. If you do suspect by visual inspection that damage has occurred, make a note of the visible damage on the delivery receipt and request the courier to countersign it. Moreover, the courier service must be held responsible for the damage in writing.

If a hidden damage is discovered while unpacking, you have to inform and hold the courier liable immediately in the following way: “When opening the parcel we had to notice that … etc.“ This superficial checking of the goods has to be done within the time limit set by the carrier, which is normally 7 days. However, the period could vary depending on the courier. Hence, it is recommended to check the exact time limit when receiving the goods.

If there are any damages also inform your authorized Proceq agent or **Proceq SA** immediately.

Shipment

Should the device be transported again, it must be packaged properly. Preferably use the original packaging for later shipments. Additionally, use filling material in the package to protect the device from any shock during carriage.

Safety notes and hints

- All maintenance and repair work which is not explicitly permitted and described in the present manual shall only be carried out by **Proceq SA** or your authorized service centre, failure to comply voids warranty.
- **Proceq SA** refuses all warranty and liability claims for damages caused by usage of the product in combination with **non-original accessories**, or accessories from 3rd party suppliers.
- Never leave the product under direct sun exposure. Always store the product in its carrying case.

For the operation of the product all local safety regulations apply.

1 Introduction

UT8000 is high quality Conventional Ultrasound instrument.

The product consists of a high-performance sensor and a iOS app, which allows to easily perform advanced measurements. The UT8000 sensor wirelessly connects to the iOS device (e.g. iPad), which runs the UT app. Given mobile data connectivity (Wi-Fi or mobile network), the UT app automatically and safely stores all measurements on the Screening Eagle

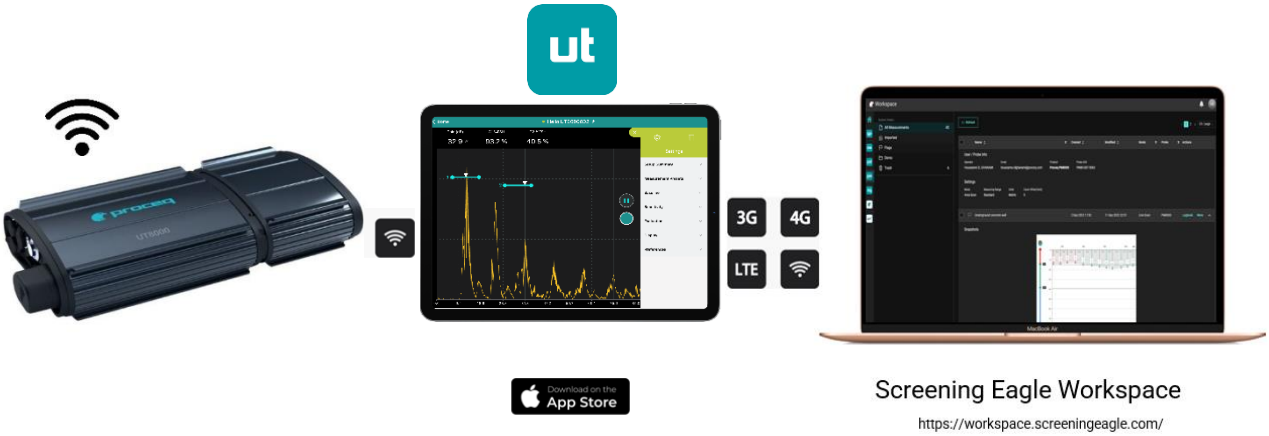


Figure 1: UT8000 System

1.1 Scope of this document

This manual provides information for the UT8000 inspection instrument. It has been designed so that people with good knowledge of conventional ultrasonic testing can easily and rapidly use the UT8000 to make inspections.

1.2 Product versions

In order to be able to use the functionality of the pm app, a software license is required.

The following licenses are available and offer different functionality:

- UT base software
- UT Pro software

Please refer to the table below for the supported features of the respective licenses:

Feature	**UT8000 App Base**	**UT8000 App** Subscription
On-screen gesture controls	**V**	**V**
Velocity and Zero Wizard	**V**	**V**
DAC/TGC Wizard	**V**	**V**
DGS/AVG Base	**V**	**V**
DGS/AVG Advanced – Custom Curves	X	**V**
AWS	**V**	**V**
Peak Memory	**V**	**V**
Logbook	**V**	**V**
Customizable measurement bar	**V**	**V**
Visual and physical alarm	**V**	**V**
Save and recall settings	**V**	**V**
Demo Files	**V**	**V**
Split DAC software	**V**	**V**
QR code probe recognition (not active)	**V**	**V**
Reference A-Scan	**V**	**V**
Live data capture	X	**V**
Indication Table	X	**V**
Reporting	X	**V**
Existing Proceq webtool access	X	**V**
Raw Data output	X	**V**
Cloud	X	**V**
Corrosion thickness measurement	X	**V**
Mode & Grid display	X	**V**
Hardware" Insurance"	X	**V**
CSC	**V**	**V**
B Scan	X	**V**
X Not included, **V** included		

1.3 Software

The state of the art now suggests that software is never entirely error-free. Therefore, it is essential to confirm that the relevant functionalities work flawlessly in the planned combination before employing any software-controlled test equipment.

Please get in touch with your local Proceq agent or distributor if you have any questions regarding using your test equipment.

2 Scope of Delivery

Please refer to the Quick start Guide provided in the standard delivery and available in download section of the product webpage : Proceq UT8000 Quick Start Guide (screeningeagle.com)

3 Measurement Principle

The instructions in this operation handbook will show you how to use your test equipment. The test findings are also influenced by a variety of other parameters, but it is outside the purview of this operating handbook to describe them all. The following three conditions must be met for an ultrasonic inspection to be safe and accurate:

- Operator training
- technical test specifications
- Selection of suitable test instruments

3.1 Operation training

Ultrasonic test procedures must be properly learned to operate an ultrasonic test device.

Adequate knowledge of the theory of sound propagation, the effects of sound velocity in the test material, the behaviour of the sound wave at material interfaces, the propagation of the sound beam, the influence of sound attenuation in the test object, and the influence of surface quality of the test object are just a few examples of what constitutes proper training.

Lack of such knowledge could lead to false test results with unforeseeable consequences.

Many technical societies, business associations, and governmental organizations can provide more detailed information about operator training, qualifications, certification, and test requirements.

3.2 Technical test specifications

Certain technical test standards must be met for every ultrasonic test.

The selection of:

- an acceptable test technique
- the consideration of material qualities
- the defining of the scope of the inspection
- the setting of recording and assessment limitations

are the four most crucial ones.

It is the obligation of those who oversee testing overall to make sure the inspector is completely aware of these standards. The experience with similar test objects serves as the greatest foundation for such knowledge. Also, it's crucial that the inspector fully comprehends all pertinent test specifications.

3.3 Limits of testing

Only those portions of the test object that are covered by the probe's sound beam are included in the information gleaned from ultrasonic tests.

Extreme caution should be exercised when extrapolating any findings from the tested elements to the test object's untested components.

Such conclusions are typically only viable in situations when significant expertise and tested techniques for gathering statistical data are available.

Boundary surfaces in the test object can totally reflect the sound beam, making deeper faults and reflection sites invisible. Therefore, it's crucial to ensure sure the sound beam covers the entire test object, including all locations that need to be tested.

4 Device Overview

4.1 Switching-on and getting started

Please refer to the Quick start Guide available in download section of the product webpage: [Proceq-UT8000-QSG.pdf (screeningeagle.com)]

4.2 Application

The UT8000 instrument is working connected to an iPad device. Once the activation procedure is completed, in accordance with the QSG document, the customer will have complete access to the software.

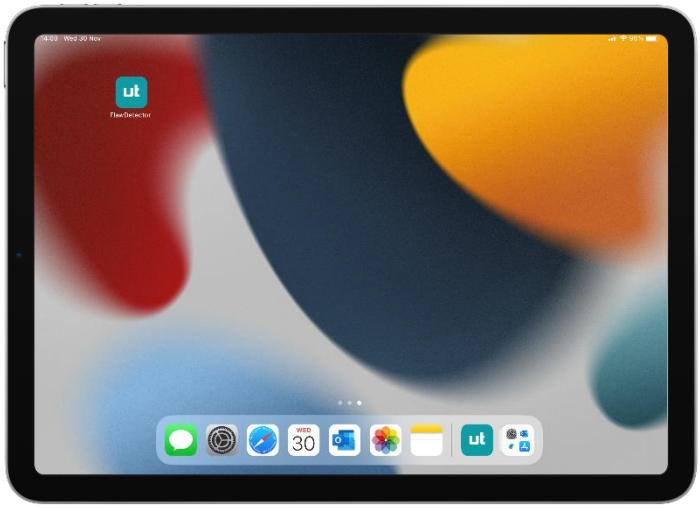


Figure 2: UT App on iPad screen

4.3 Main Menu

Double clicking on the icon present on your tablet you will have access to the main menu of the APP.

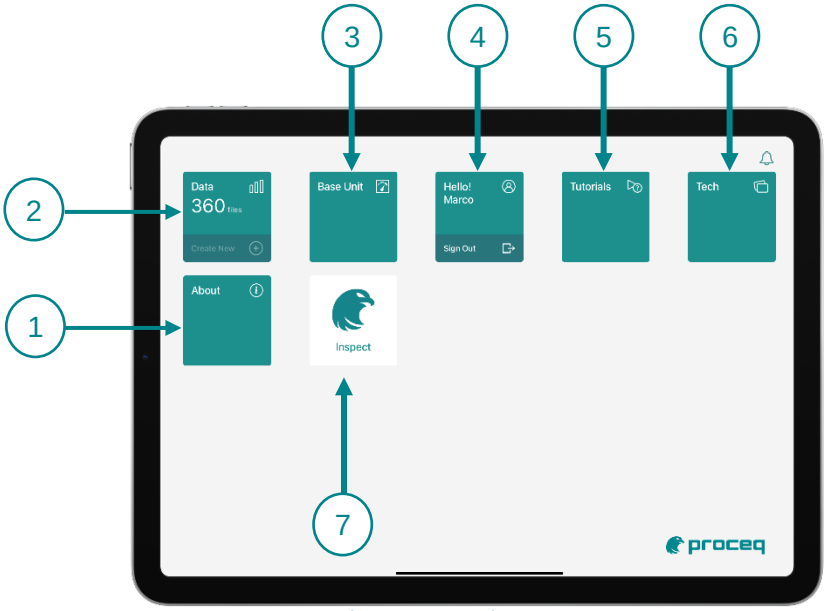


Figure 3: UT Main Menu App

On this screen you have 7 different icons:

1) About
2) Data
3) Base Unit
4) User Profile
5) Tutorials
6) Tech
7) Inspect

4.3.1 About

Under About you will have the information regarding Proceq. Location around the world and contact.

4.3.2 Data

On DATA you have all your recorded inspections. In case of Pro version, the files are also saved on the cloud, and you have the possibility to share them within your team.

The + button will allow you to create a new inspection file.

4.3.3 Base Unit

Click on this icon to select which instrument you want to connect to the tablet.

You have the possibility to connect different instruments to the same tablet, of course one by one. Independently by the UT8000 unit you are using all the file will be saved on your profile.

4.3.4 User Profile

To use the APP you need to input your user name and password being connected to the internet. Automatically, all your files will be uploaded on the tablet, and you can create a new file.

4.3.5 Tutorial

Under tutorial you have the possibility to view the video where is explained how to use the software of the UT8000. Tutorial are divided by feature, and you have the opportunity to download on your tablet; in this way you don't need internet connection to see them.

4.3.6 Tech

Under Tech you have the possibility to verify the portfolio of Proceq and see if there is an instrument you need to perform your control.

4.3.7 Inspect

INSPECT is a comprehensive, cloud-connected software platform that seamlessly integrates into your inspection workflow – facilitating data collection in the field and reporting the way you and your customers like it in a fully digital, customizable and collaborative way.

4.4 New Inspection file

User has the possibility to create an Inspection file starting from a Default Setup or recalling a previous Inspection with his setup.

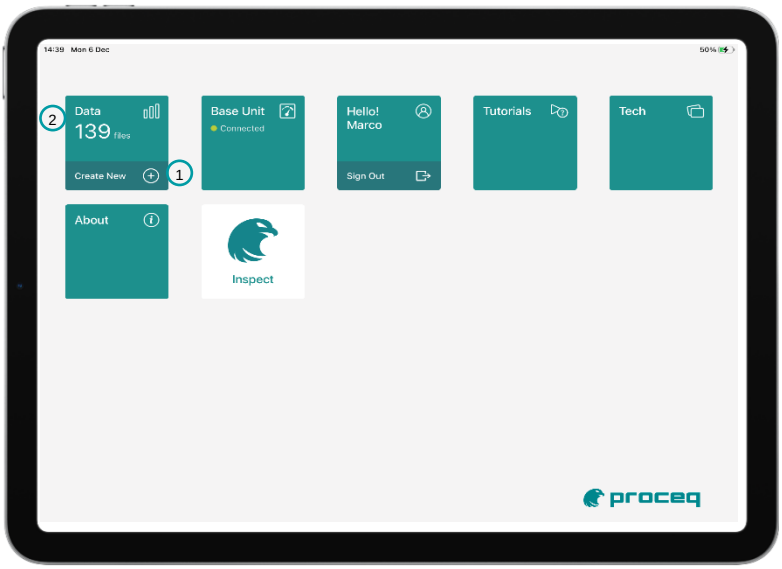


Figure 4: UT Main Menu App, New File creation options

1) Press on ⊕ ,Create New. The file created will have default setup configuration

2) Press on Data. A new window will appear. From here you can choose,still to create a file with Default setup (**a** option) or, selecting a previous file (**b**), create a new one, pressing ⊕ with the previous setup configuration.

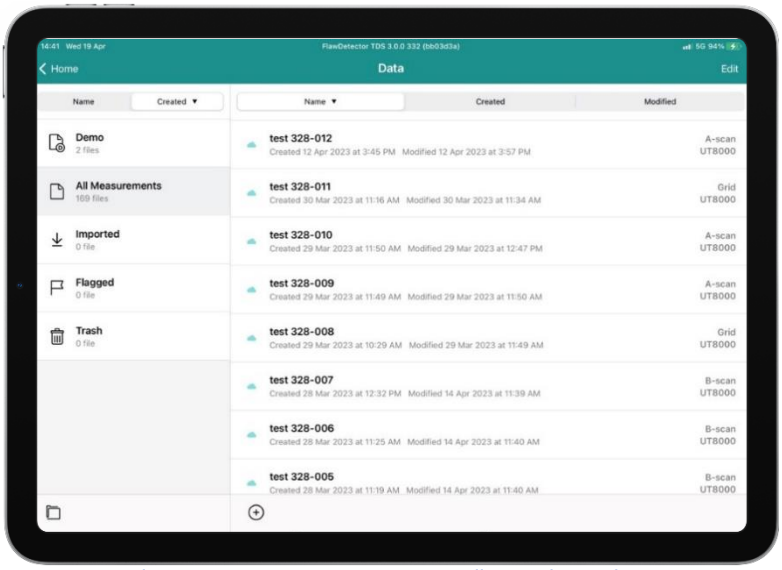


Figure 5: UT Data Menu App, New File creation options

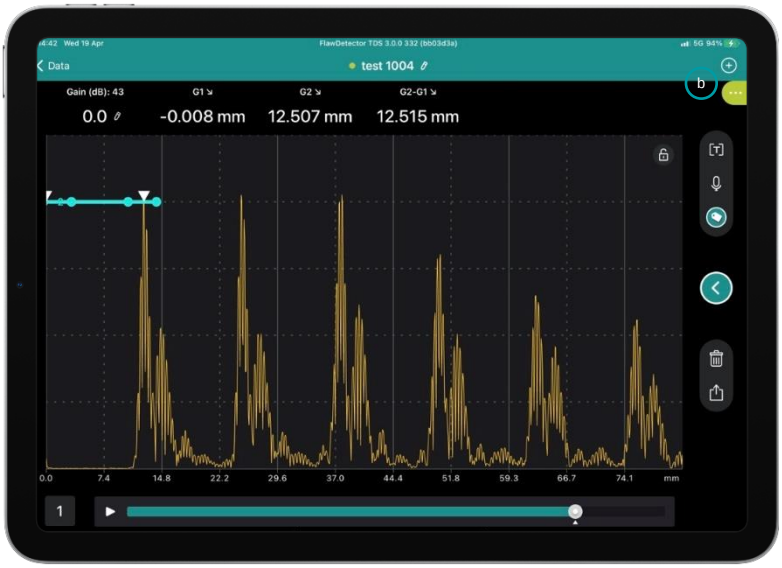


Figure 6: New File with old Configuration Setup creation option

4.5 Drop Down Menu

The drop-down menu will immediately appear after you click the button  after creating a new file. The menu will initially appear on the left side of the screen, but it can be shifted to the right side by choosing the corresponding option under Preference, Menu position.

Figure 2: Drop Down Menu view

The menu has 7 sub levels:

1) Setup Summary
2) Measurement Presets
3) Baseline
4) Sensitivity
5) Evaluation
6) Display
7) Preferences

The table screen is then divided in 4 areas.

A) Tablet area where you can have information about the date, time, file name, battery level

B) Toolbar Menu area where you can visualize up to 5 voices

C) Menu area, it can be on the left or on the right side of the screen and it is possible to hide during the inspection

D) Active inspection area, it can be wilder once the menu is hided

4.5.1 Setup Summary

On the Setup Summary Menu you have the following information and parameters:

1) Quick Guide Manual Menu: to recall previous configuration
2) QR Code: To scan a QR code present on the Probe or o the component to inspect to upload a configuration (Not active yet)
3) Detail: To view all the inspection parameter
4) Setup File: To save and/or rename a Setup Configuration

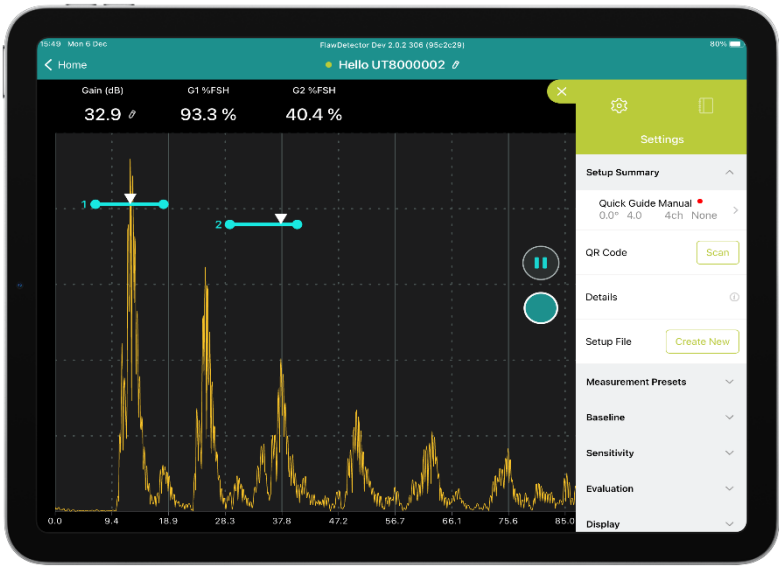
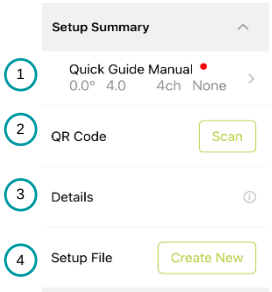


Figure 3: Setup Summary view



4.5.1.1 Quick Guide Manual

The quick guide manual gives you the fundamental knowledge you need to know which configuration file you are using throughout the inspection, such as the type of probe and the information regarding active curves.

In the Figure 9 you have the following base information in the Quick Guide Manual:

- 0.0°, it means you are using a Zero-degree probe
- 4.0, it means you are using a 4 MHz probe
- None, it means that no curve is active on your inspection

If a RED dot is visible, it means that some parameters have been modified. Then you can decide to create a new Setup file, consequently the RED dot will disappear.

You have also the possibility to recall an old Setup file searching by:

- Alphabetically
- Created
- Last Used
- Probe frequency

4.5.1.2 QR Code (Not Active yet)

You have the possibility to create QR code and add it on your probe.

When you press Scan the camera of your tablet is activating and the QR code is read, automatically the probe is recognized by the UT8000.

4.5.1.3 Details

The popup with a complete Setup Details will appear on your screen when you click the ibutton. Then, you will have the chance to examine each parameter that was used throughout the inspection.

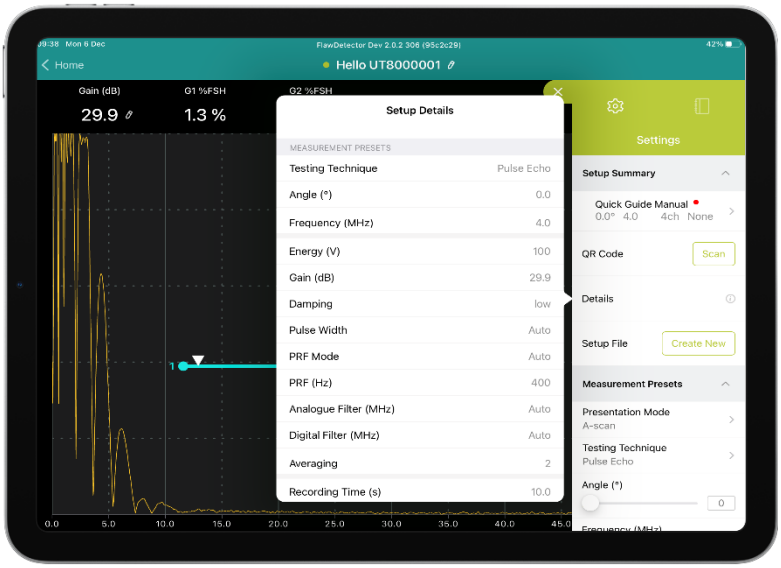


Figure 9: Setup Details Window

4.5.1.4 Setup File

You have the opportunity to create a Setup file, setup that can be used in different inspection files. The name is Alfa Numeric.

4.6 Measurement Presets

You can find all the parameters you need to select the technique you want to use and the variables you need to set up the control in the Measurement Presets Menu, such as:

- Probe configuration
- Filters
- PRF
- Energy

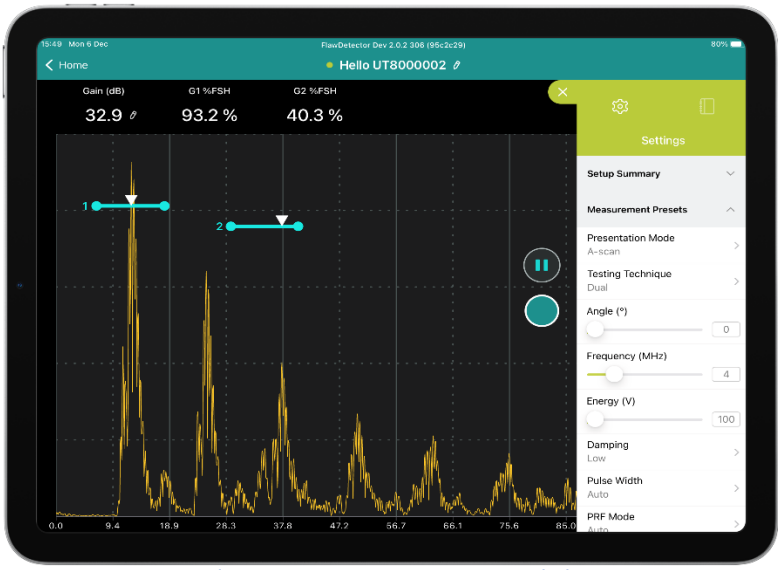
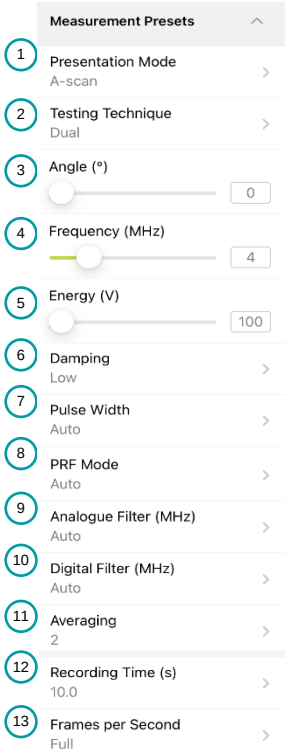


Figure 10: Measurement Presets Window



1. Choose between A-Scan inspection, Grid Mode, B-Scan
2. Select the Technique: Pulse Echo, Dual, Thru
3. Input the Probe parameter: Angle
4. Input the Probe parameter: Frequency
5. Setup the Voltage
6. Damping: Low or High option
7. Pulse Width: Low or Narrow
8. PRF: Auto or Manual
9. Analogue Filter: choose between the 5 options
10. Digital Filter: choose between the 9 options
11. Averaging: choose between the 6 options
12. Recording time: choose between the 11 options
13. Frame per Second: choose between the 4 options

4.6.1 Presentation Mode

As first step you need to decise witch kind of visualization, inspection, you need.

You have the possiblity to choose between:

- A-Scan
- Grid Mode
- B-Scan
    - Cross Sectional
    - Thickness Profile
    - Single Value

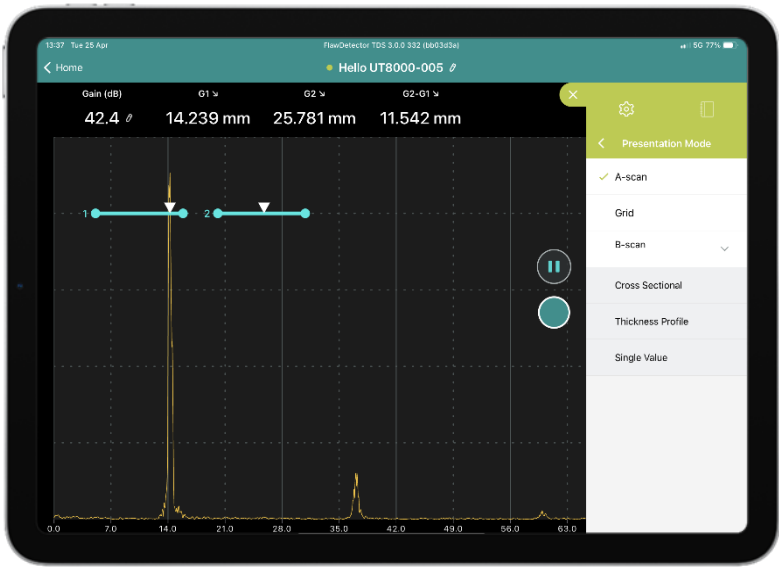


Figure 11: Presentation Mode Selection

Once you select the Mode needed the active screen zone will change accorderly, as repoted in the images below.

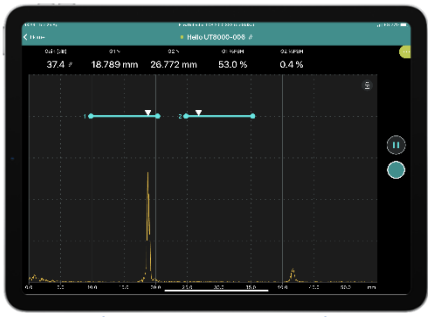


Figure 12 A: A-Scan Mode

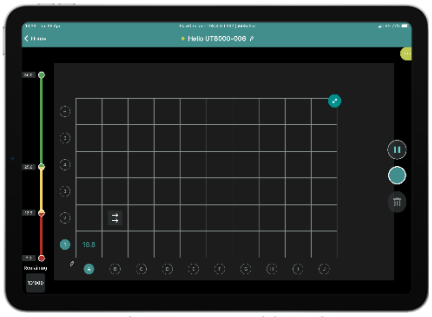


Figure 12 B: Grid Mode

Figure 12 C: B-Scan Mode

4.6.2 Testing technique

Ultrasonic testing is a versatile inspection method, and inspections can be accomplished in a number of different ways.

In this menu you have the possibility to choose the technique for your inspection.

Three options are available:

- Pulse Echo
- Dual
- Thru

4.6.2.1 Pulse Echo

To be used in combination with Normal or Angle Probe, single Christal

4.6.2.2 Dual

To be used in combination with Normal or Angle Probe, dual Christal

4.6.2.3 Thru

To be used with Trough trasmission tehcnique.

4.6.3 Angle

You have the possibility to select, typing the value or scrolling the bar, the angle of the probe you are using in degrees.

4.6.4 Frequency

In this menu you can select the frequency of your probe. UT8000 has a range from 0.2 MHz to 20 MHz

4.6.5 Energy

You can use the function ENERGY to set the penetration or sound energy. You have the possibility to set up a value between 100 to 400 V, with step 100.

Note: Take care to verify your probe specification. What is the maximum Volt value allowed by the probe supplier.

4.6.6 Damping

The probe is matched using this function. The height, width, and resolution of the echo display can all be changed by adjusting the damping level of the probe oscillating circuit.

You have two options:

- Low
    - With this setting, the echoes are given a low damping and grow higher and wider.
- High
    - With this setting, higher-resolution echoes while lowering the echo height.

4.6.7 Pulse Width

You can use the function WIDTH to adjust the pulse width for the square-wave pulser. You have two options, low or narrow.

4.6.8 PRF Mode

The number of times an initial pulse is triggered each second is indicated by the pulse repetition frequency. You can choose whether you require the maximum PRF value possible or whether a lesser value will do.

To prevent phantom echoes, smaller PRF values are required for larger test objects. Smaller PRF values, on the other hand, result in a slower A-scan update rate; large values are therefore necessary if a test object is to be scanned quickly.

You can choose between:

- Auto
    - PRF is setup automatically by UT8000
    - Manual
        - You need to setup the Hz you want to use, value can be between 10 to 2000 Hz

4.6.9 Analogue Filter and Digital Filter

By adjusting a frequency filter until a distinct echo is visible, the signal can be improved. Filter and dampening interact with one another. To attain the best outcome, you must therefore test every combination that is conceivable.

4.6.10 Averaging

This function averages many A-scan frames into a single frame to improve the A-scan representation.

4.6.11 Recording Time

With the UT8000 you have the possibility to setup a “recording time” for your A-scan inspection.

This allows you to keep saved the last 1 to 10 second of A-scan in loop. The entire raw data will stay available and will permit you to review a A-scan pick and save the information.

You can setup a reding time value between 0 to 10 second.

4.6.12 Frames per Second

In this menu you can setup 4 different options:

- Full
- Medium
- Low
- Single

4.7 Baseline

On the Baseline Menu you have the possibility to setup the information about the component you are going to inspect and the calibration process.

The first parameter to setup is regarding the typology of item you are going to inspect.

Is it flat or curved? This will modify the Menu to support the configuration.

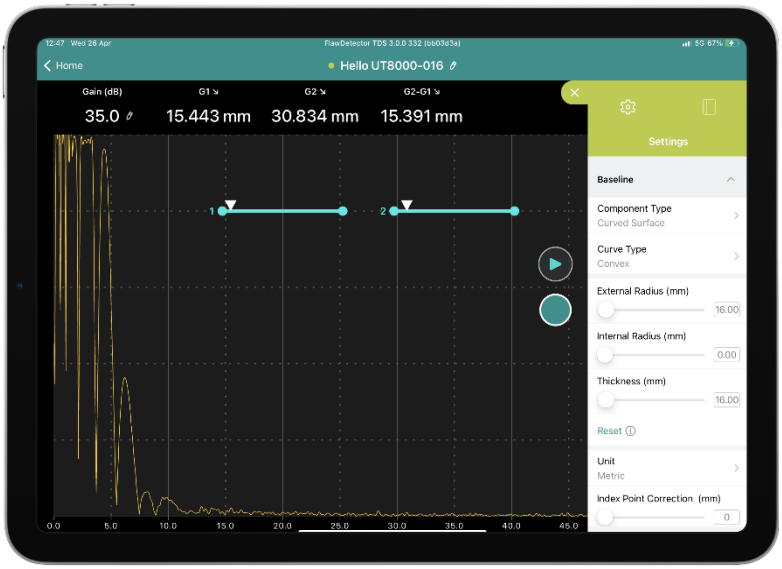
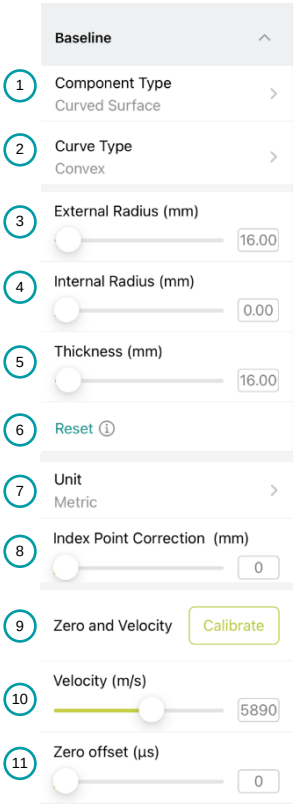
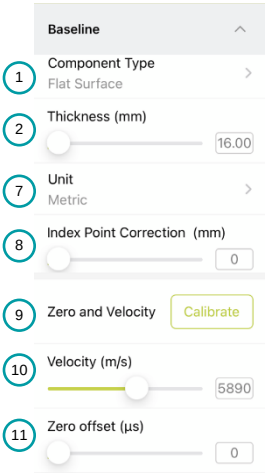


Figure 13: Presentation Mode Selection

Baseline Menu with Curves Surface



Baseline Menu with Flat Surface



4.7.1 Component type

You have the possibility to choose between flat and curved surface. In case of curve surface selection, the CSC function is going to be activated automatically.

The symbol CSC appear on the A-Scan screen as in the figure 14.

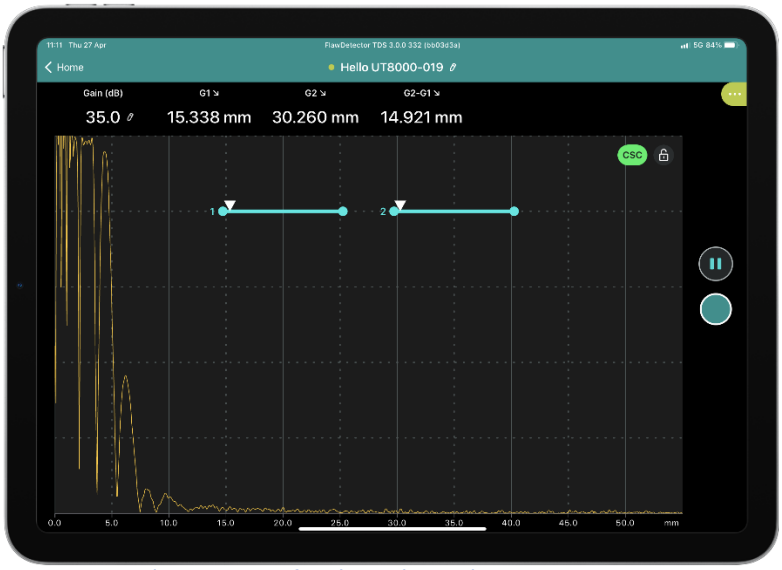


Figure 14: CSC function active on the A-Scan Screen

4.7.1.1 Curved Surface Correction (CSC)

When working on curved test pieces, curved surface correction (CSC) software is employed to give precise measurement of reflector depth and location. Leg length, reflector depth, and surface distance can all be determined by straightforward trigonometry in the case of standard flat plate tests as well as axially oriented tests of pipes and similar goods. However, these calculations are inaccurate when evaluating curved parts in the circumferential direction since the curvature effectively forced reflectors to slip away from the probe, prolonging the sound path and altering the reflection angle at the inside surface of the component.

4.7.2 Curve Type

Once you have selected a curved component you have the possibility to select from which side you are going to inspect it. Is the item, convex or Concave? Are you going to inspect from the inside surface or from the outside surface.

Check the diagram clicking on the ℹ and take the decision in accordance.

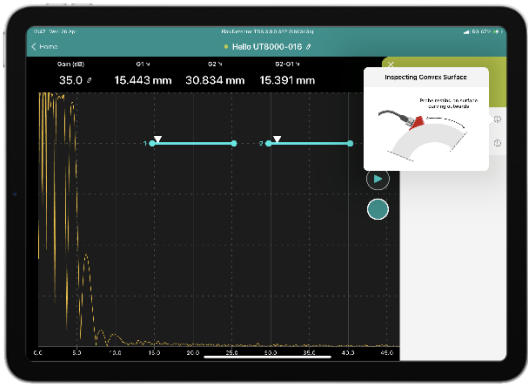


Figure 15 A: Convex Surface

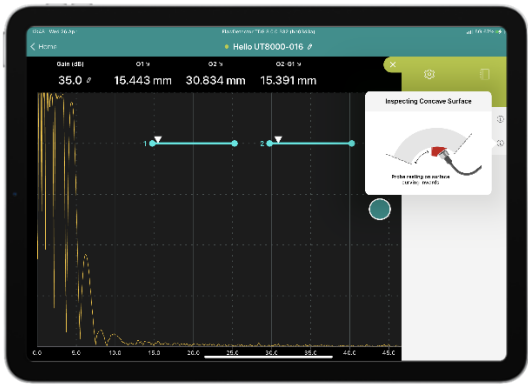


Figure 15 B: Concave Surface

4.7.3 External Radius

You can provide the details about the object you are inspecting in this field. The external radius in this instance. This information is relevant for the CSC function.

4.7.4 Internal radius

You can provide the details about the object you are inspecting in this field. The internal radius in this instance. This information is relevant for the CSC function.

4.7.5 Thickness

You can provide the details about the object you are inspecting in this field. The thickness in this instance. This information is relevant for the CSC function.

4.7.6 Reset

To activate the CSC function two on three parameters, have to be setup, the third is automatically fulfilled. If you want to change your parameter press reset.

4.7.7 Unit

This setup allow you to select in which unit you want to see the horizontal axis. You can decide between:

- Metrics→ mm
- Imperial→ Inches
- Nanosecond

4.7.8 Index point correction

When you are using angle probes can be useful to setup this parameter to support the localization of the event you catch on the A-Scan.

The index point correction (X) is the distance between the edge of the probe and the exit point of the ultrasound wave.

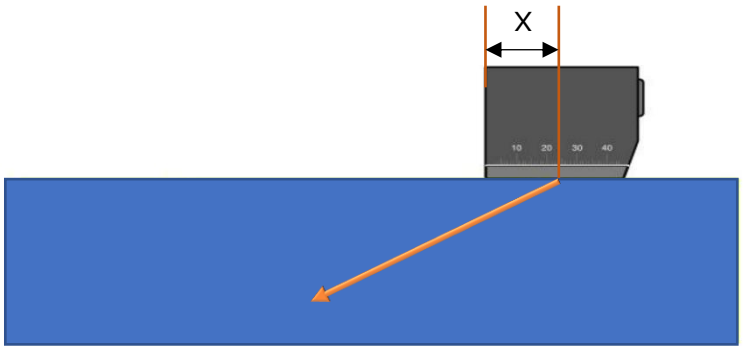


Figure 16: Explanation of Index correction point (X)

4.7.9 Zero and Velocity, Calibration

The Zero and velocity calibration is the function that allow you to calibrate the probe. Before to calibrate the instrument, you need to complete the setup.

4.7.10 Velocity

Every material has a different ultrasound velocity. Even for the same type of material, for example steel, the velocity can be lightly due to different characteristic of the material itself.

A list of the most common materials and their velocities is available in the Appendix A.

4.7.11 Zero Offset

The zero offset is the value that compensates for the portion of the total pulse transit time that represents factors other than the actual sound path in the test piece. Cable delays, transducer delays, couplant delays, electrical switching delays in the gauge, and other significant delays are all combined to form the zero value.

4.8 Sensitivity

You can set the parameters for the A-scan pick visualization under the sensitivity Menu and choose which of the curves used for the scaling procedure to activate.

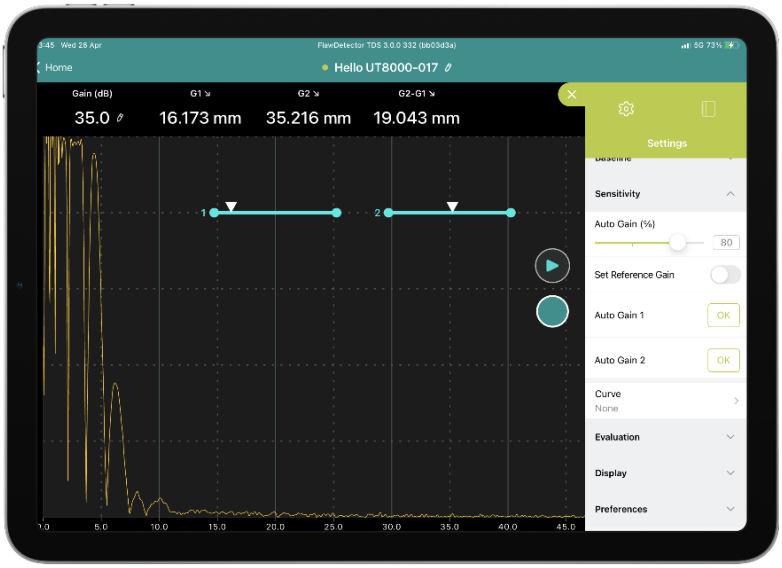
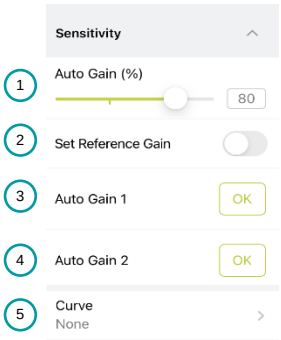


Figure 17: Sensitivity Menu



4.8.1 Auto Gain

The auto gain scroll bar allows you to setup to which percentage of the screen you want to regulate you're A.-Scan pick

4.8.2 Set Reference Gain

Activating the Set reference Gain you will have highlight, on the toolbar Menu, the value of the Gain you want to use as reference. Variation of the gain value will be display as minus or plus dB from the reference value.

4.8.3 Auto Gain 1

Pressing the button OK the A-Scan pick will be setup in according with the Gate 1 to the percentage you have setup in advance.

4.8.4 Auto Gain 2

Pressing the button OK the A-Scan pick will be setup in according with the Gate 2 to the percentage you have setup in advance.

4.8.5 Curve

Under the Curve sub Menu you have the possibility to choose between different options:

- DAC
- TCG
- DGS/AVG

The configuration menu of the curve will change in according to your choice.

The AWS feature is directly available under the measurement toolbar menu

4.9 Evaluation

In the Evaluation menu you have the possibility to setup the 2 gates present on the UT8000

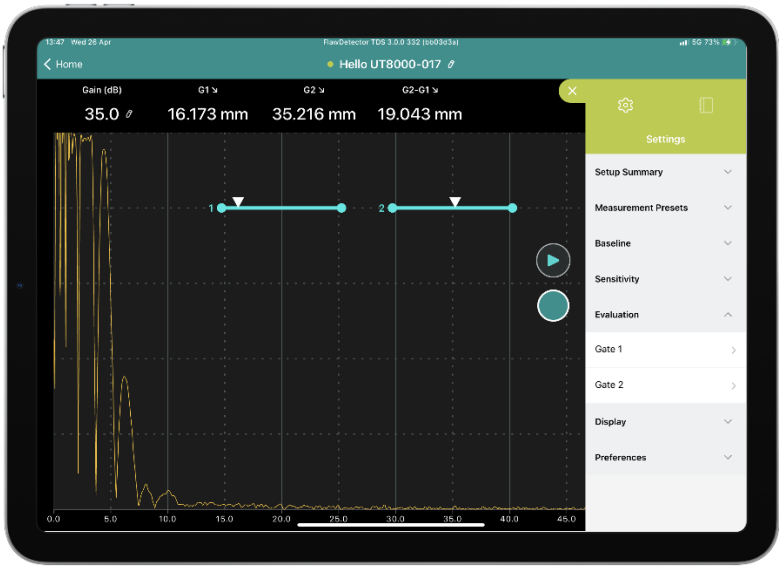


Figure 18: Evaluation Menu

4.9.1 Gate 1 /Gate 2

You can configure the information about Gate 1 and/or Gate 2 in this submenu. This menu allows you to set the starting point, width, and height of the object. Additionally, you have a choice of how to trigger the A-Scan with Gate 1/Gate 2:

- Highest Peak
- First Peak
- J-Flag

The Lock option allows you to block the Gate position on the screen.

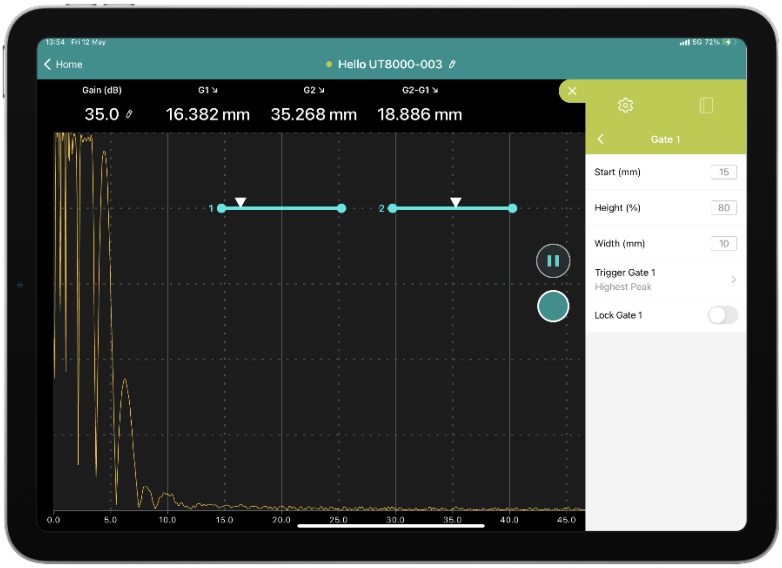


Figure 19: Gate Menu

4.10 Display

In the display Menu you can setup parameters that have influence on the visualization of the A-Scan. It also allows you to select witch parameters you want to visualize in the toolbar area

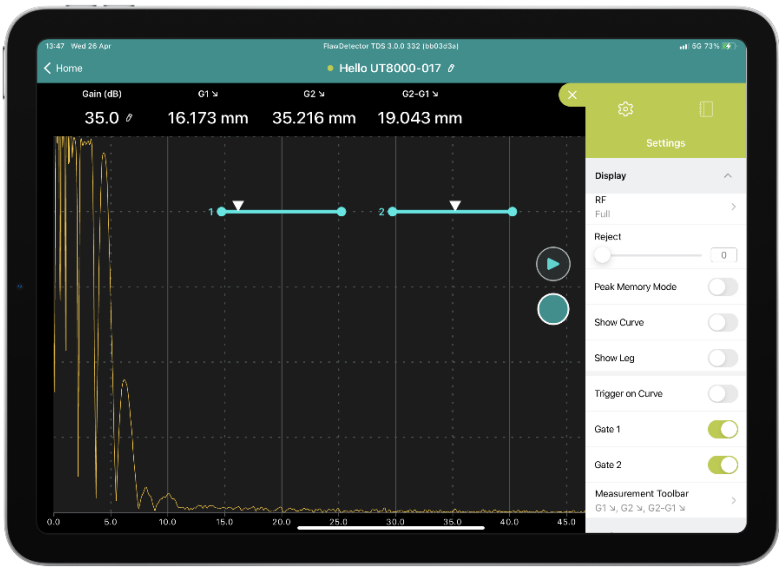
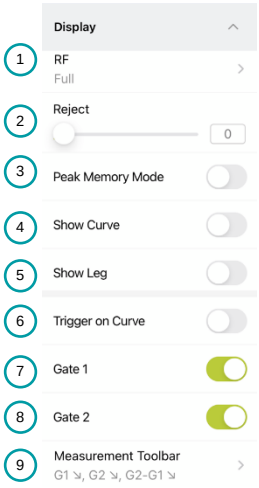


Figure 20: Display Menu



4.10.1 RF

With the RF function you have the possibility to visualize, on the screen, the ultrasound wave in different modality. This feature allows you to choose the echo pulses' rectification mode based on your application.

4.10.1.1 Radio Frequency (RF)

There isn't any rectification. True amplitude is displayed for both the positive and negative wave components.

4.10.1.2 Positive Half

The screen only shows positive half-waves above the baseline.

4.10.1.3 Negative Half

Above the base line, the screen only shows negative half-waves.

4.10.1.4 Full

On the screen, all half-waves are visible above the base line.

4.10.2 Reject

The reject has the function to “cancel/cover” a percentage of the A-scan.

4.10.3 Peak Memory Mode

When peak mode is active you will have the possibility to keep visible on the screen the maximum envelop of the A-Scan.

4.10.4 Show Curve

When one of the curves; DAC, TCG, DGS/AVS are active you can still decide to see them o the screen or not activating or disactivating this functionality.

4.10.5 Show Leg

The instrument may label the legs for the first three reflections for better alignment.

4.10.6 Trigger on Curve

4.10.7 Gate 1

This option let you decide if you want to visualize on the screen the Gate 1

4.10.8 Gate 2

This option let you decide if you want to visualize on the screen the Gate 2

4.10.9 Measurement Toolbar

In the measurement toolbar sub Menu you can select which parameters you want to visualize in the toolbar area. You can select up to 4 extra values that in addition to the Gain value will be visualized on the tablet.

The list of the value is represented in the following table.

Measurement toolbar option		No Curve	DAC	TCG	DGS/AVG	AWS
Symbol	Description	Active				
		Yes/No				
G1 ↘	Gate 1 Soundpath Distance	Y	Y	Y	Y	Y
G1 ↓	Gate 1 Depth to Reflector	Y	Y	Y	Y	Y
G1→	Gate 1 Surface Distance	Y	Y	Y	Y	Y
G1%FSH	Gate 1 Current Amplitude	Y	Y	Y	Y	Y
G1%↑	Gate 1 Maximum Amplitude	Y	Y	Y	Y	Y
G2 ↘	Gate 2 Soundpath Distance	Y	Y	Y	Y	Y
G2↓	Gate 2 Depth to Reflector	Y	Y	Y	Y	Y
G2→	Gate 2 Surface Distance	Y	Y	Y	Y	Y
G2%FSH	Gate 2 Current Amplitude	Y	Y	Y	Y	Y
G2%↑	Gate 2 Maximum Amplitude	Y	Y	Y	Y	Y
G1%C	Gate 1 Amplitude to Curve	N	Y	Y	Y	N
G2% C	Gate 2 Amplitude to Curve	N	Y	Y	Y	N
G1dBC	Gate 1 dB to Curve	N	Y	Y	Y	N
G2dBC	Gate 2 dB to Curve	N	Y	Y	Y	N
AWS A	AWS A	N	N	N	N	Y
AWS B	AWS B	N	N	N	N	Y
AWS C	AWS C	N	N	N	N	Y
AWS D	AWS D	N	N	N	N	Y
G2-G1 ↘	Echo to Echo G2-G1 ↘	Y	Y	Y	Y	Y
G2-G1↓	Echo to Echo G2-G1 ↓	Y	Y	Y	Y	Y
G1→ - X	Gate 1 Surface distance - Index point correction	Y	Y	Y	Y	Y
G2→ - X	Gate 2 Surface distance - Index point correction	Y	Y	Y	Y	Y

Table 1: toolbar parameters list

4.11 Preferences

In the display Preference you will have parameter that will permit you a customization of the menu position and alarm settings.

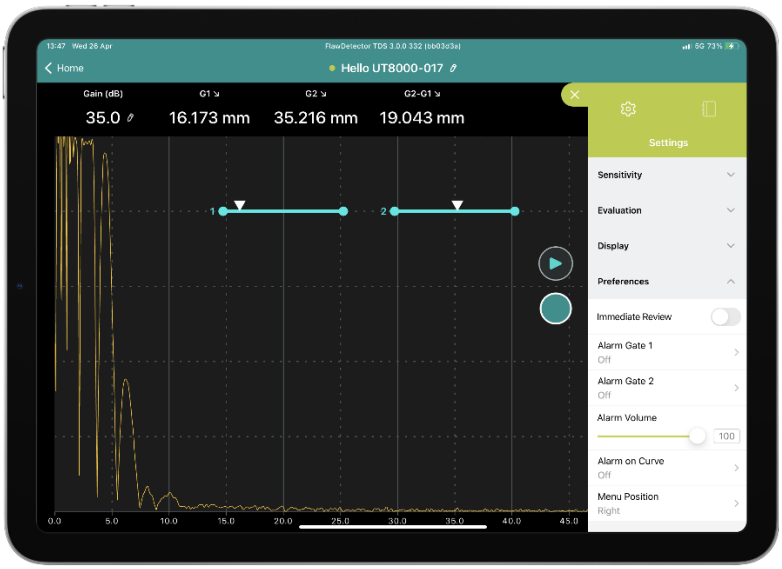
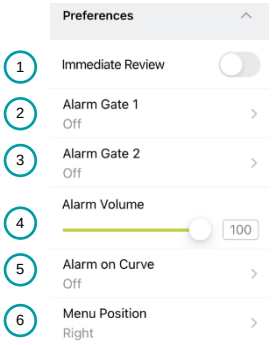


Figure 21: Preference Menu



4.11.1 Immediate Review

The function Immediate review allows you, when in grid mode, to pass automatically from Grid to A-Scan view every time you save a value in the cell.

This provides you the opportunity to double check and the value selected.

4.11.2 Alarm Gate 1

When the A-Scan is exceeding the Gate 1 an audio alarm informs you.

4.11.3 Alarm Gate 2

When the A-Scan is exceeding the Gate 2 an audio alarm informs you.

4.11.4 Alarm Volume

This parameter allow to setup the volume of the alarms

4.11.5 Alarm on Curve

When the A-Scan is exceeding the reference curve, active on your screen, an audio alarm informs you.

4.11.6 Menu Position

In according with your preference and how you want to handle the tablet you can decide to have the menu on the right or on the left of the screen.

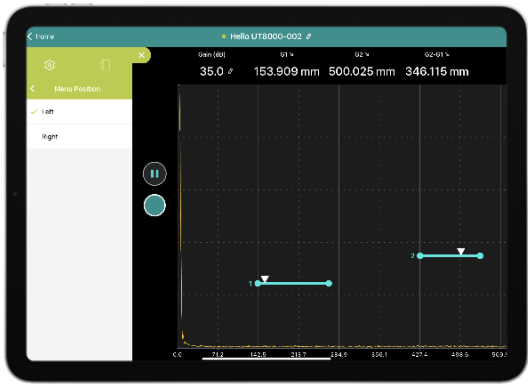


Figure 22 A: Menu on Left Side

Figure 22 B: Menu on Right Side

5 Presentation Mode

5.1 Gesture Control

With the Gesture Control of your iPad, you have the possibility to change view and parameters in a easy and fast way.

5.1.1 Swipe up or down

With only one finger you can change the Gain, increasing (moving up) or decreasing it (moving down).

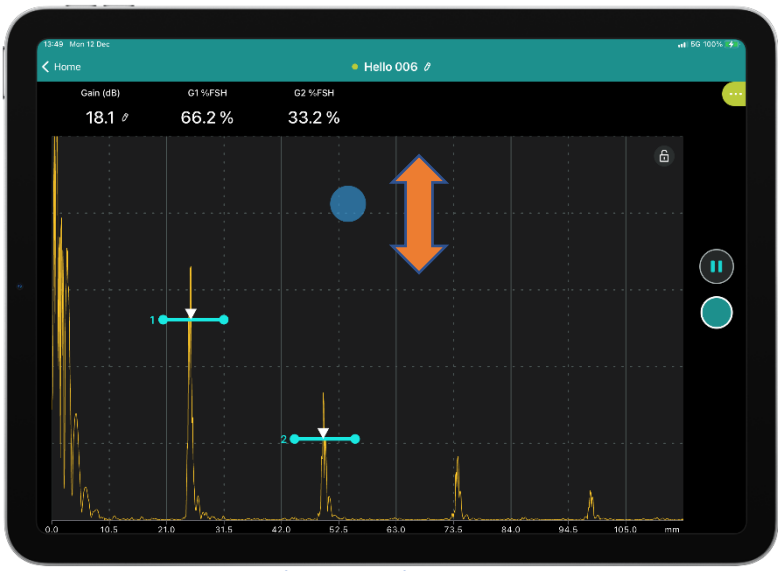


Figure 23: Swipe Gesture

5.1.2 Pinch

With two fingers you can change the Horizontal range, increasing (enlarging) or decreasing it (tightening)

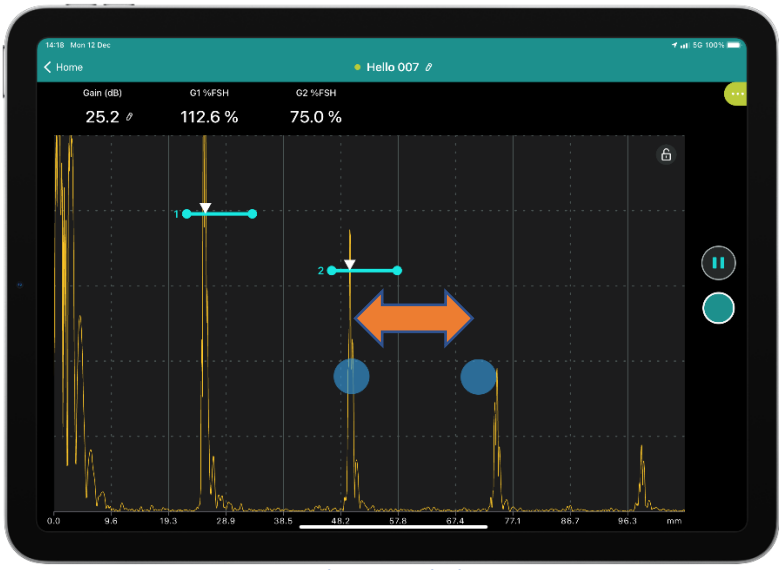


Figure 24: Pinch

5.1.3 Double Swipe up or down

When you are in Grid mode, using two fingers you can switch between the Grid mode and the A-Scan view. This will allow you to verify the value reported in the Grid Cell.

You just need to Swipe the two fingers up or down to change between the Grid view and the A-Scan view related to the cell.

Figure 25 A: Double Swipe to A-Scan

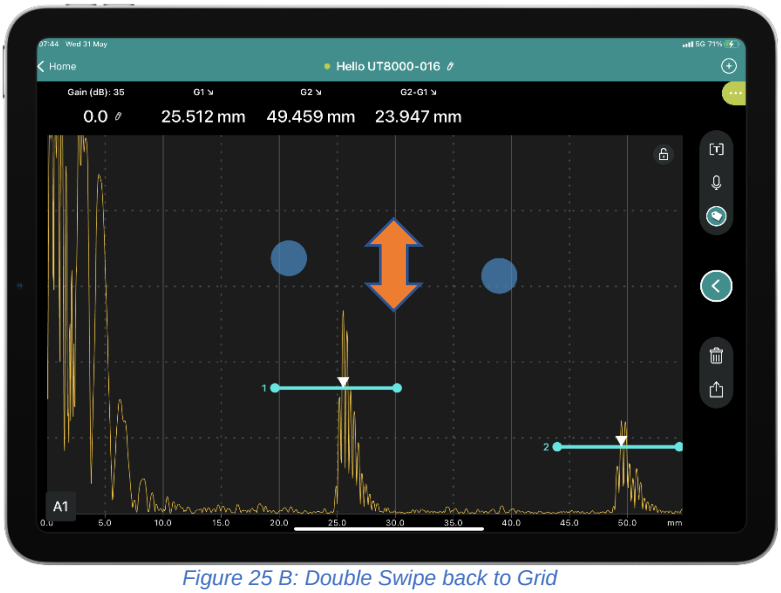


Figure 25 B: Double Swipe back to Grid

5.1.4 Lock Screen

Working with a Touch screen instrument you have the possibility to block/unblock the screen to avoid any accidental change in the parameters. You just need to click on the lock icon present on the screen. If you have setup the menu on the right side, hide it to see the lock icon.

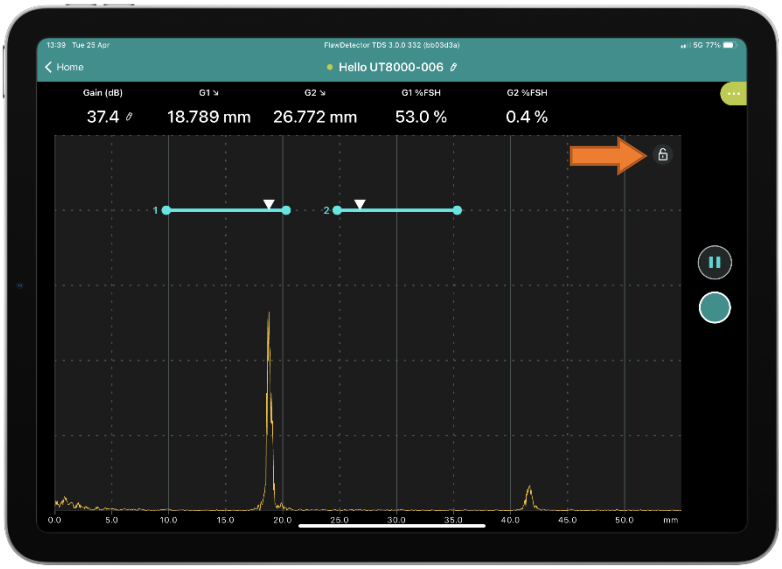


Figure 26: Lock Screen Option

5.2 A-Scan

In A-scan mode you have the possibility to work keeping the Menu Visible or Hidden, in this way you can increase the Active aera of the screen. Both gates will be automatically visible and active on the screen.

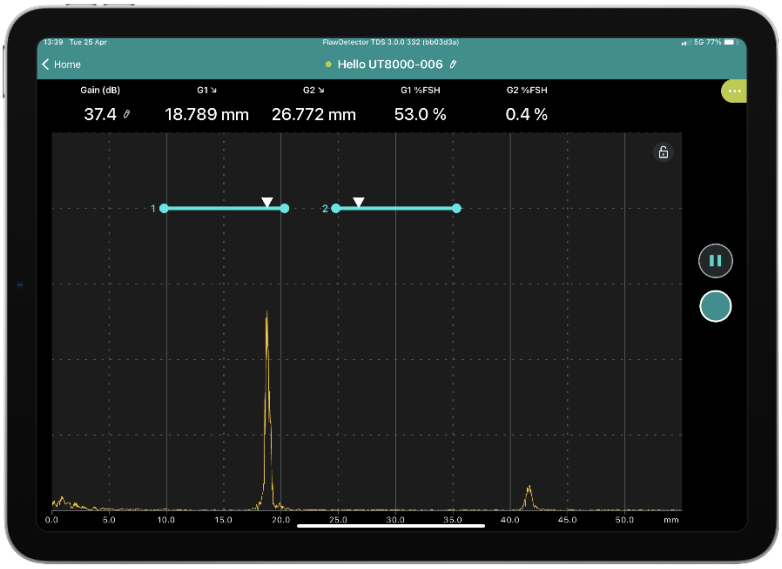


Figure 27: A-Scan Main View

To recall or to create a new Setup File please check the chapter about Setup Summary, as well if you want to change or create a new file name.

Once you have selected or setup the probe you are going to use it is time to calibrate the instrument.

5.2.1 Calibration

Calibration process is quite simple. You can calibrate the zero and velocity using the wizard. From the Baseline Menu click on the Calibrate button (figure 28)

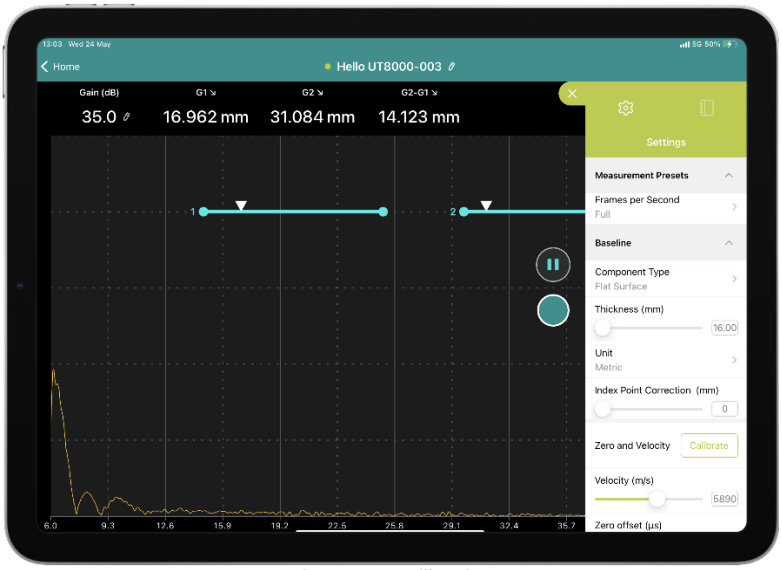


Figure 28: Calibration

The first step to control is that the range of the screen is correct for the calibration. If not, you can increase or decrease it with the finger pitch, see image 29 A.

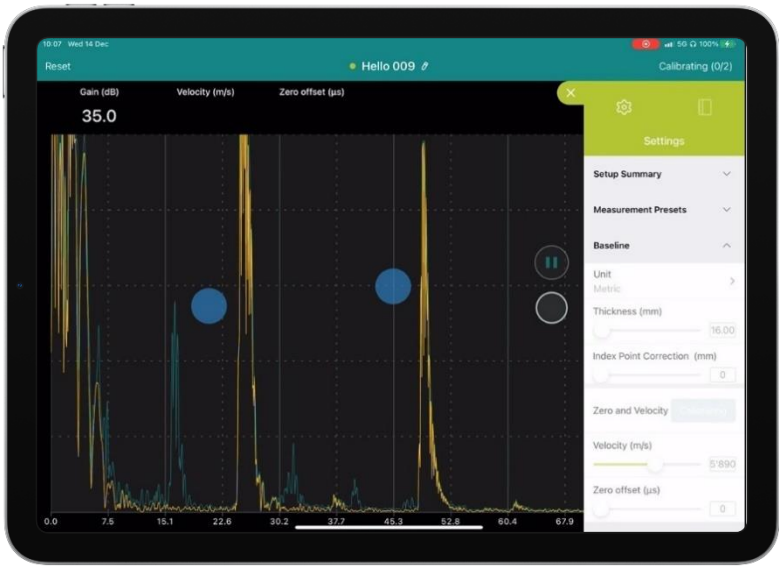


Figure 29 A: Calibration Process

The Gain can be also changed:

- Typing the value in the Gain Cell
- With the swipe finger gesture control

Remember that when you start calibration, automatically, the Pick memory option is getting active. You can simply reset it pressing the reset button on the top left corner of the Active Inspection area. So once you have regulated the gain and the range press on it to rest the previous pick of the A-Scan, figure 29 B

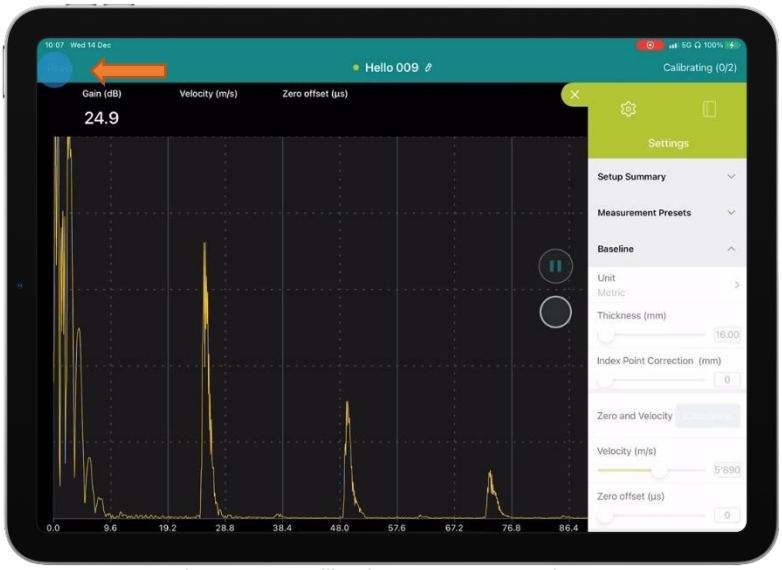


Figure 29 B: Calibration Process, Reset button

Now you simply need to select the first pick you want to use, figure 29 C, for the calibration and type on the popup appeared the correct value (figure 29 D). Then repeat the process for the second pick you want to select.

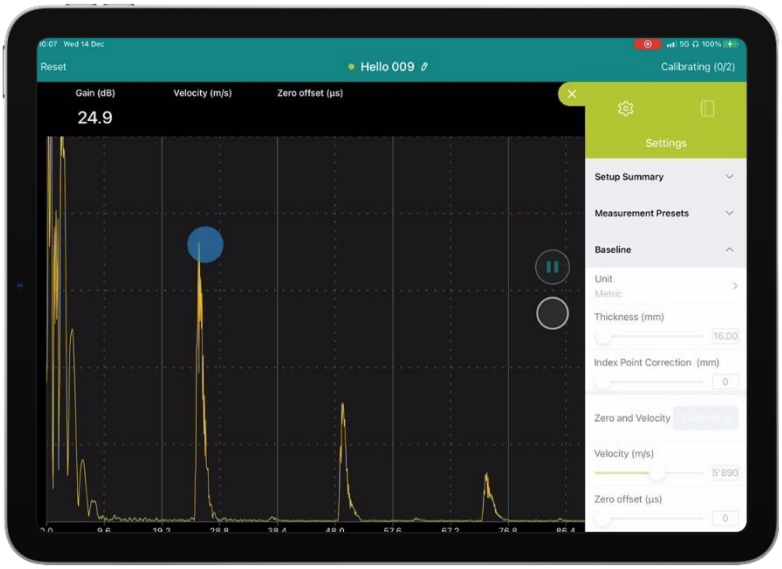


Figure 29 C: Calibration Process Point Selection

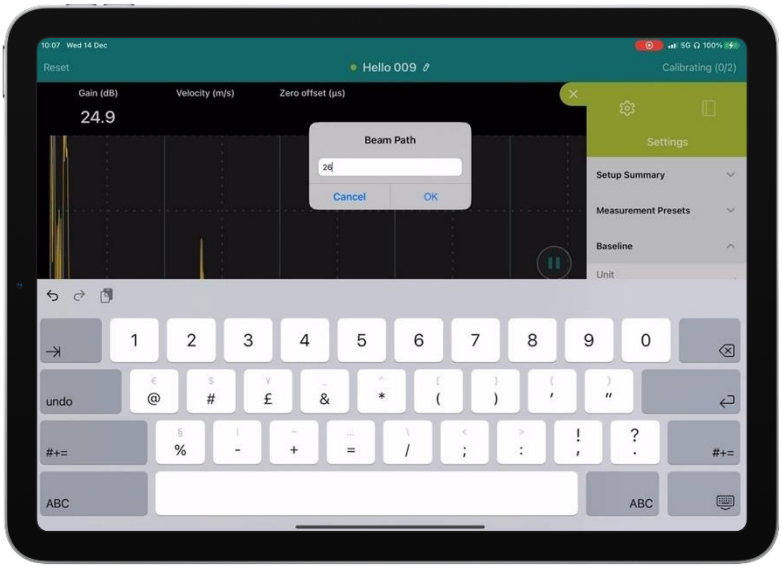


Figure 29 D: Calibration Process Input value

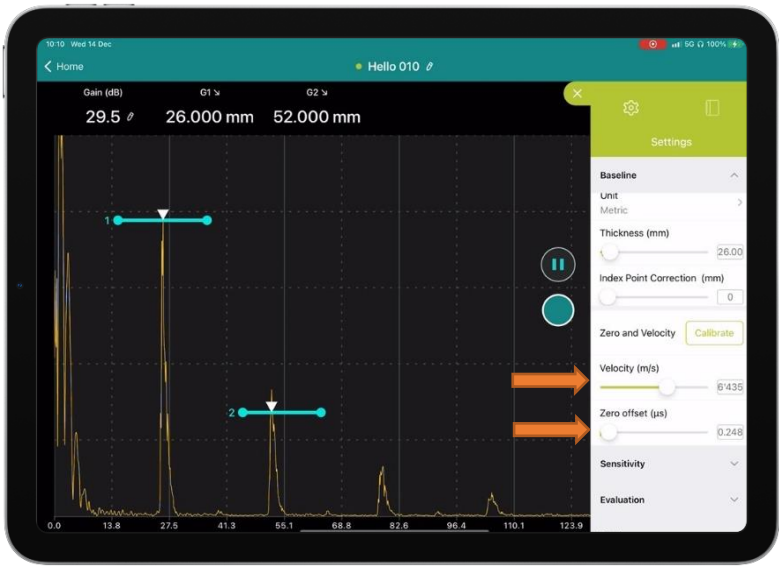


Figure 29 E: Calibration Done

Once the 2 points needed for the calibration are selected press on the “DONE” button present on the top right corner of the screen. Automatically Velocity and Zero Offset will be updated.

If you are using an angle probe you have the possibility to choose the typology of echo you are going to select (Figure 29F):

- Beam Path
- Angle 2 radius
- Angle 2 points

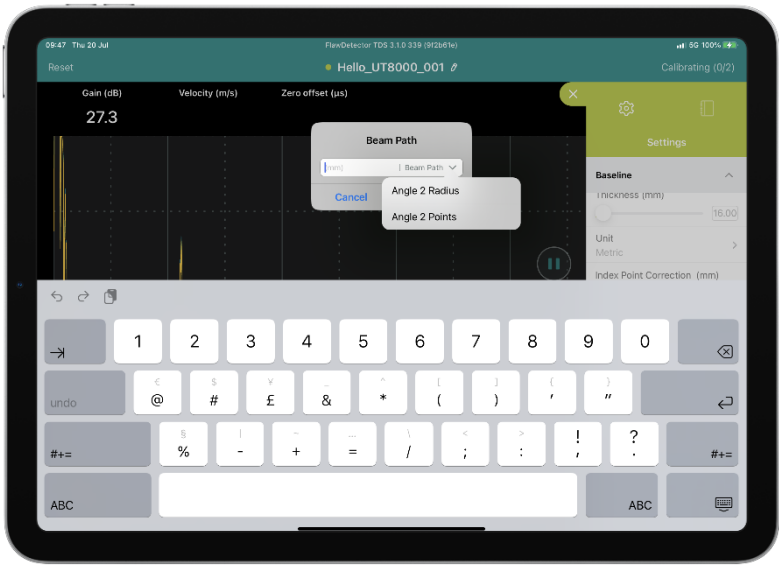


Figure 29 F: Calibration Option with Angle Probe

In case you already know the parameters, velocity and Zero offset, you can type them directly for a manual calibration.

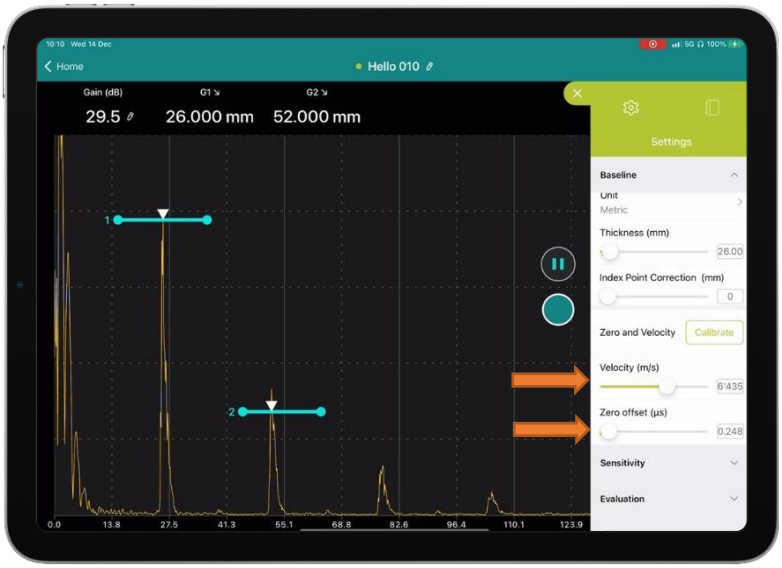


Figure 29 F: Manual Calibration

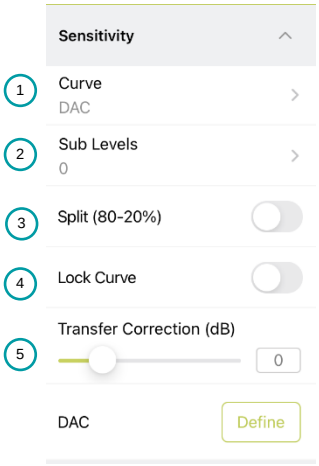
5.2.2 Evaluation

You have the possibility to select different kind of method for evaluating the measured reflect echoes.
Under the Menu Sensitivity you have the option curve. In this sub menu you can choose between:

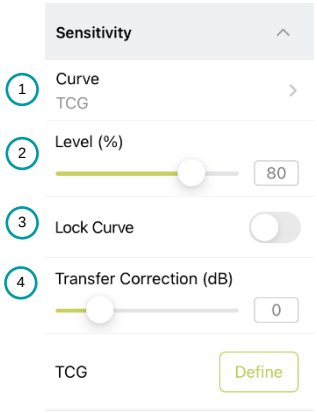
- DAC
- TCG
- DGS

With the selection of the curve the submenu Sensitivity will change consequently:

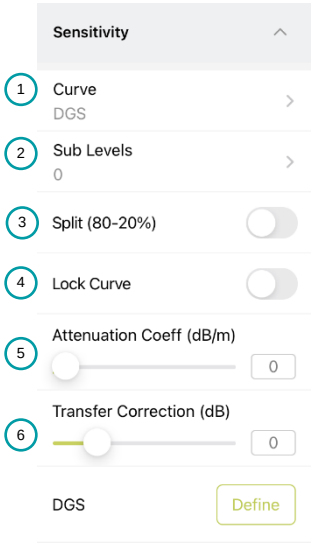
DAC



TCG



DGS



5.2.2.1 Curve

On the Curve option you can select between None or 3 different curves: DAC, TCG or DGS.

5.2.2.2 Sub Level

With the option DAC or DGS you have the possibility to create and visualize up to 5 Sub level curves on the screen

5.2.2.3 Split (80-20%)

When the signal has too much attenuation (thick materials), the user can start another DAC or DGS by selecting the Split DAC or Split DGS option. When the curve drops below 20%, the height of the curve is automatically extended to 80% of the full screen height.

5.2.2.4 Lock Curve

The lock curve option allows you to block the curve on the screen, any change of the parameter will not have influence on the curve position.

This option has to be use carefully understanding the impact of the changes.

5.2.2.5 Transfer correction

Transfer correction is the gain difference between your calibration block and the part to be inspected at a similar depth. Transfer correction will compensate for differences such as surface finish, material composition and heat treatment.

5.2.2.6 DAC

The distance-amplitude correction (DAC) can be used to analyse reflector echoes.
When you select DAC curve option the sub menu is changing highlighting the information needed to define the DAC curve.

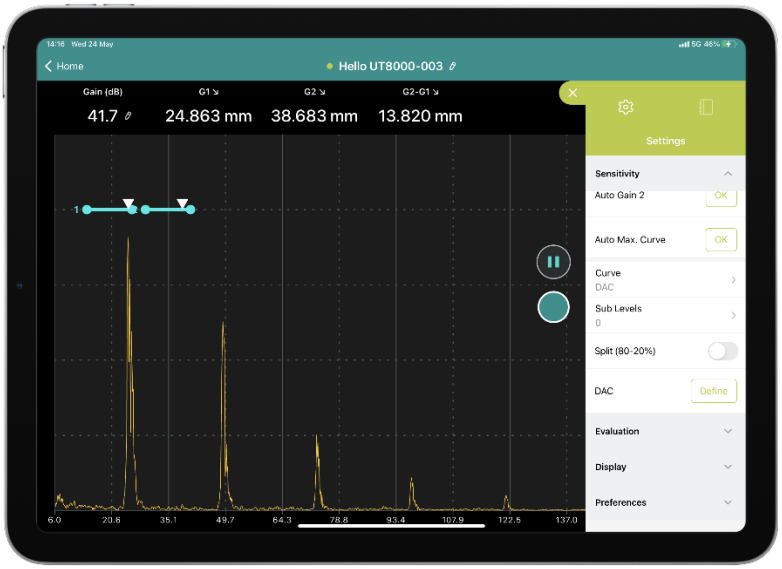


Figure 30: DAC curve definition

You have the possibility to select the number of Sub levels, up to 5, before of after, the DAC curve definition.

To create the DAC curve:

After the calibration of the instrument:

- Select the option DAC from the sensitive Menu
- click on “Define”
- Select the points necessary to create the curve
    - If you are not sure about 1 selected point, just click on it to remove from the curve.
- When the selection is completed press on Done

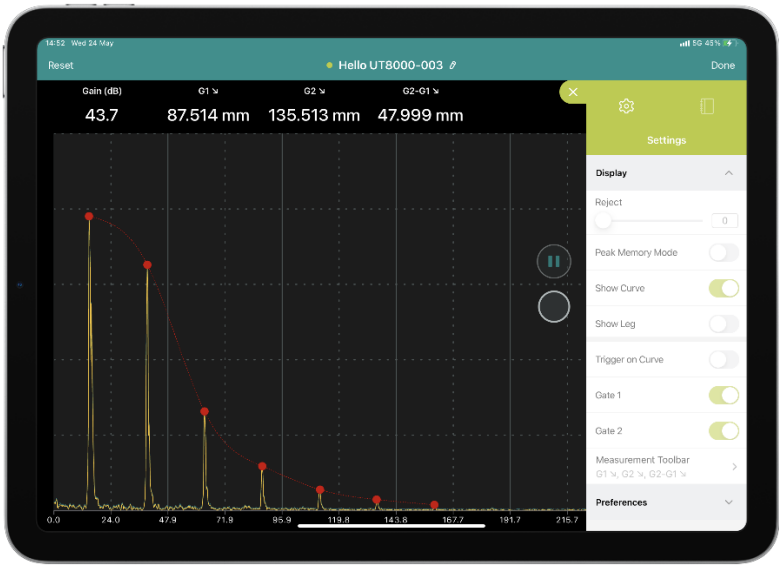


Figure 31: DAC curve creation

In case of some pick is over 100% of the screen, click on reset to cancel it.

The selection of the Sub Level can be done in accordance with:

- %
- dB

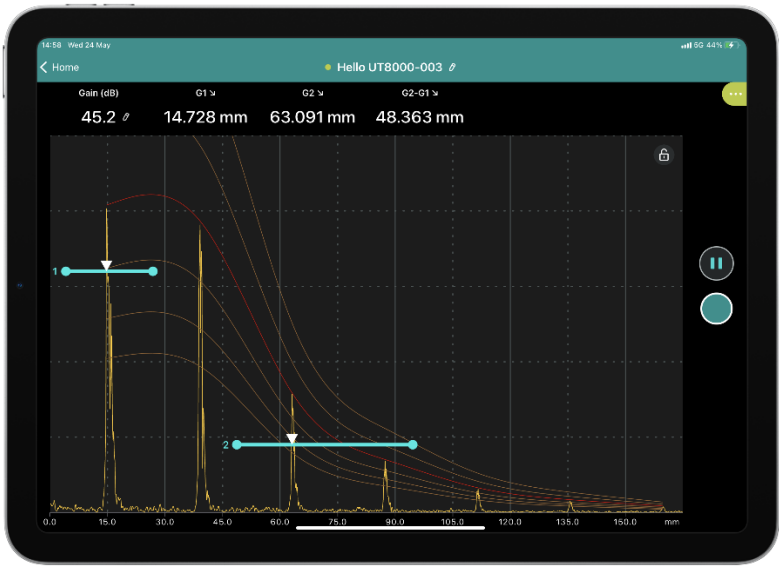


Figure 32: DAC Sub level

5.2.2.7 TCG

The time-corrected gain increases the gain in distance-sensitive mode, all reference echoes will now fill 80% of the screen. Echo indications are assessed for amplitude in respect to the initial reference echo.

To create the curve, once selected, press on the Define button and select the points necessary to create it.

If you want to change the level from 80% to another value, you can use the Level% button. Type the value you want or scroll the bar.

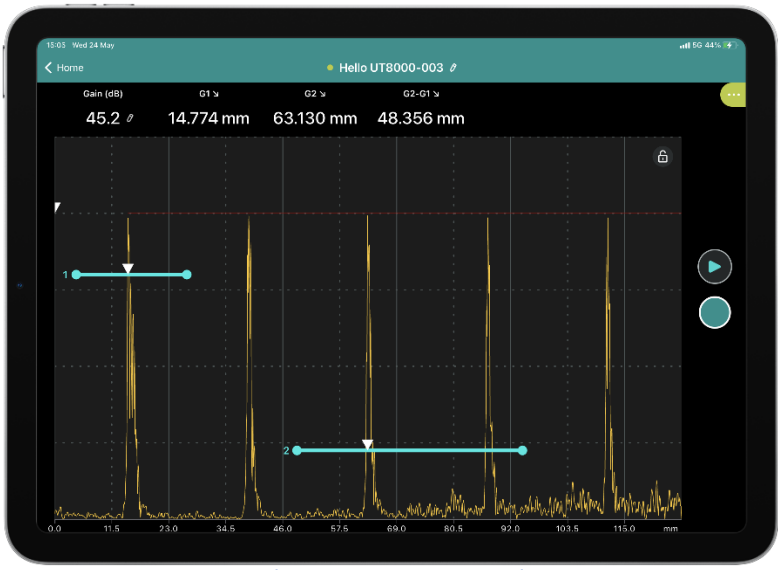


Figure 33: TCG curve creation

5.2.2.8 DGS/AVG

A natural flaw in the test object can be compared to a theoretical imperfection (a circular disk-shaped equivalent reflector) at the same depth using the DGS mode (distance-gain-size).

This comparison of reflecting power is based on the DGS diagram. Three influencing variables are connected in this diagram via a series of curves:

D is the distance between the probe coupling face and the equivalent reflector, which is formed like a disk.
Difference in gain G between a reference reflector, such as an endlessly huge backwall, and a circular disk-shaped equivalent reflector
Size S of the corresponding reflector with a circular disk form

Each set of curves contains one curve for which the influencing variable S is constant.
The benefit of using the DGS method is that tiny discontinuities may be evaluated in a repeatable manner. When performing an acceptance test, for instance, this reproducibility is crucial.
The curve's shape is also influenced by the previously listed influencing variables as well as by sound attenuation, transfer losses, amplitude correction value, and probe.

To create the DGS/AVG curve:
After the calibration of the instrument

- Select the option DGS
- click on “Define”
- Select the point for the DGS creation
- The windows in the image 34 will appear on the screen

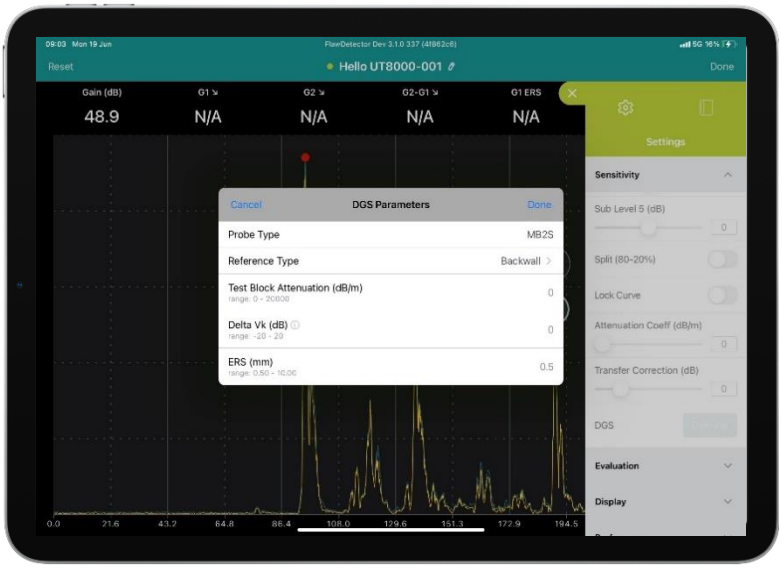


Figure 34: DGS/AVG parameters setup

n the new windows you will have the possibility to decide and setup the parameters necessary for the creation of the DGS.

5.2.2.8.1 Probe type

The first parameter to setup for the creation of a DGS/AVG curve is the probe type.

You have 3 options:

- Defauts
- ISO (16811:2012)
- Custom

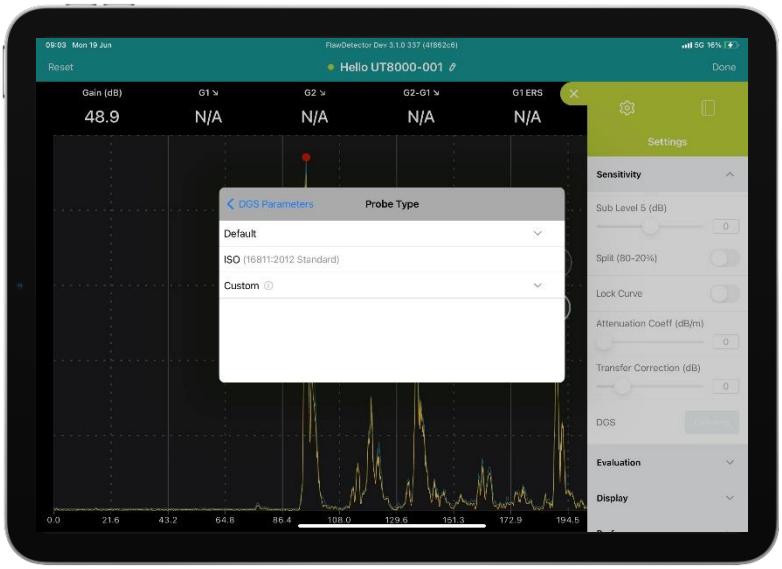


Figure 35: DGS/AVG Probe type selection

With the default selection you will have the opportunity to choose between 34 probes already setup in the instrument.

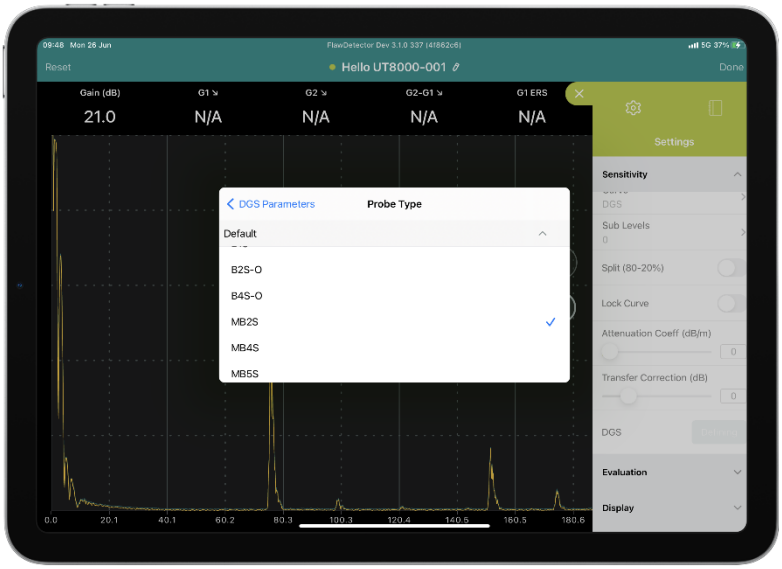


Figure 36: DGS/AVG Default Probe selection

With the ISO option you will create a curve according with the norm ISO 16811:2012. If the parameters setup are not matching the specification of the ISO norm the curve will be not created and a popup message will appear on the screen.

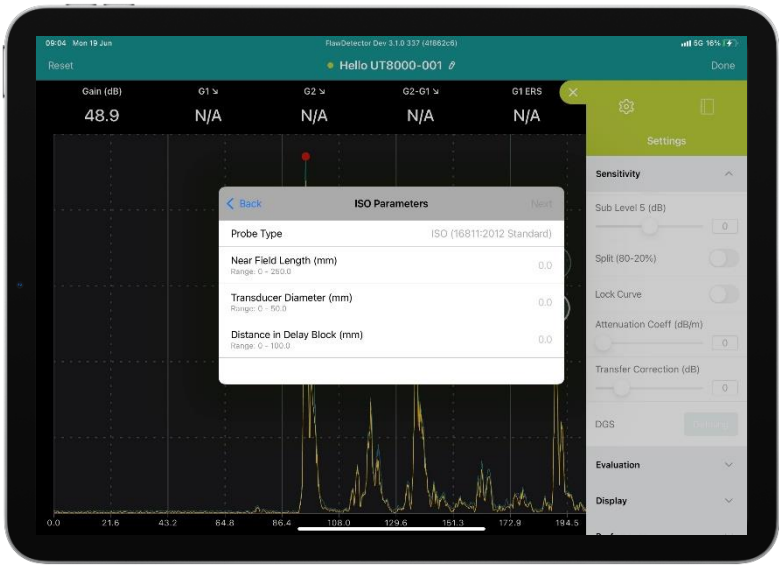


Figure 37: DGS/AVG ISO curve

With the custom curve you are going to recall a curve created via digitalization of a custom probe. It means that if you already have a DGC curve on paper or in a PDF format, you may digitalize it and import into your UT8000. The process is managed directly via workspace, any kind of DGS/AVG diagram can be digitalised and shared on different instruments.

For the digitization process, please, see the video tutorial on Proceq website.

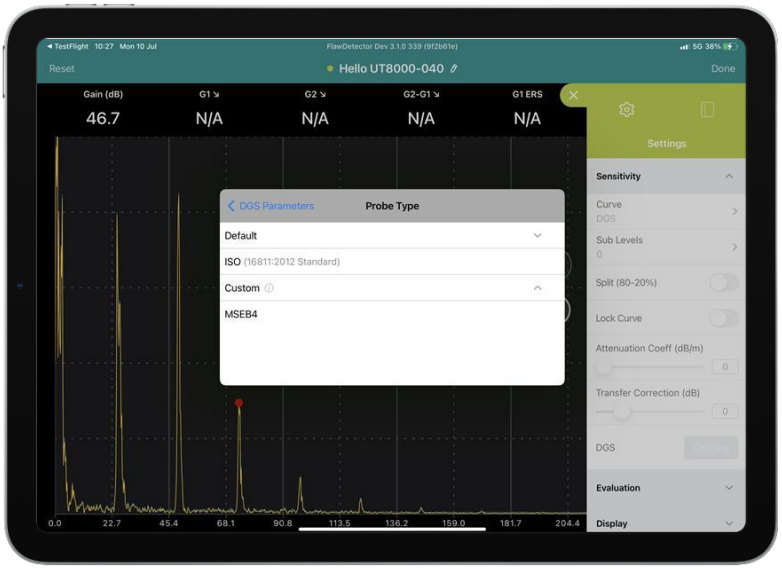


Figure 38: DGS/AVG Custom probe selection

5.2.2.8.2 Reference Type

You have the possibility to choose between three options:

- Backwall (BW)
- Flat bottom hole (FBH)
- Side drilled hole (SDH)

In according with your choose the setup parameter requested to create a curve will change.

Backwall (BW)

With the selection of the reference you need to type the following parameters:

- Test block attenuation
  - In default the value is setup to Zero
- Delta Vk
- ERS
  - Range is changing in according with the probe selection

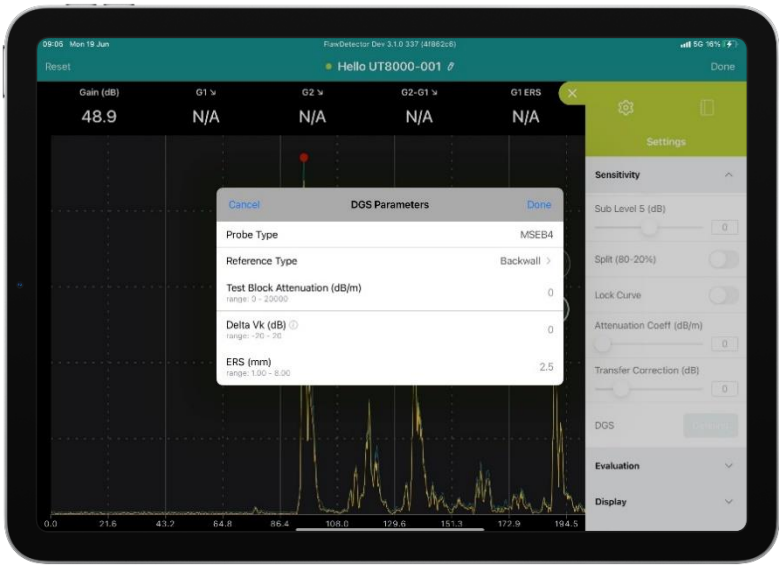


Figure 36: DGS/AVG Backwall option menu

Test block attenuation

The sound attenuation coefficient must be calculated and entered in the DGS database for test objects exhibiting unavoidable sound attenuation features. To do this, the sound attenuation coefficient is measured in the test object or in a reference test block constructed of the same material using standardized reference reflectors at a range of distances in accordance with accepted procedures, and the results are then recorded into the DGS tables. The effective sound attenuation will then be considered, regardless of distance, in the assessment curve that is afterwards displayed.

Flat bottom hole (FBH)

With the selection of this reference, you need to type the following parameters:

- Test block attenuation
  - In default the value is setup to Zero
- FBH Diameter
  - Range is changing in according with the probe selection

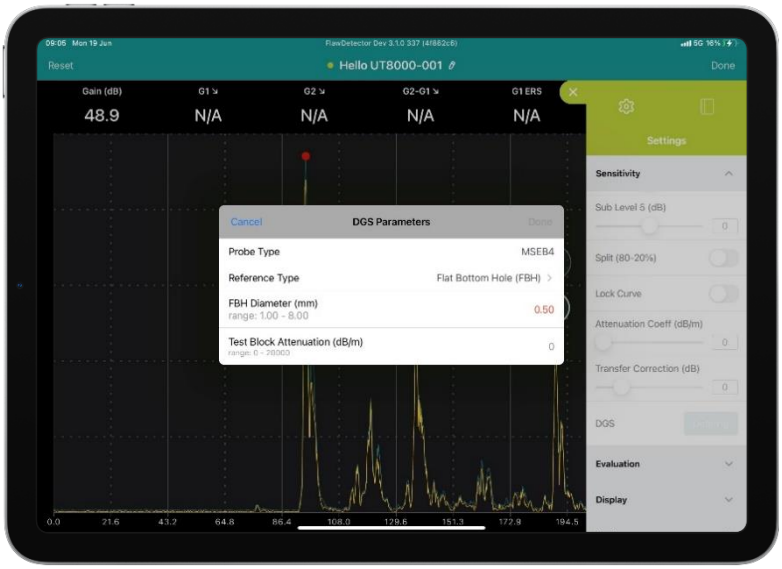


Figure 37: DGS/AVG Flat bottom hole option menu

Side Drilled hole (SDH)

With the selection of this reference, you need to type the following parameters:

- Test block attenuation
  - In default the value is setup to Zero
- SDH Diameter
  - Range is changing in according with the probe selection

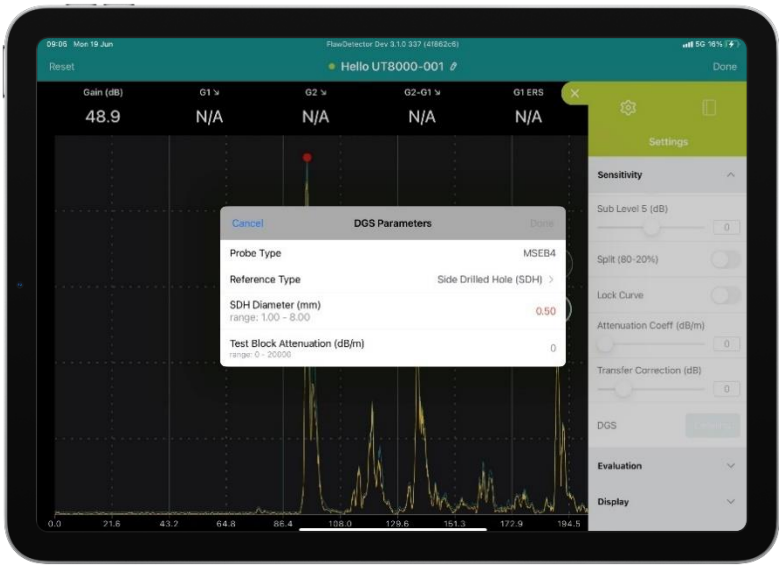


Figure 38: DGS/AVG Side Drilled hole option menu

5.2.3 AWS

AWS 1.1 Mode is present on the UT8000, it means that you can evaluate defects in welds according to the specifications AWS D1.1. According to the AWS D1.1 specification, the signal amplitude is used to rate the presence of flaws in welds. This method compares the defect echo's echo amplitude to the echo amplitude of a recognized reference reflector. In addition, consideration is given to the test object's sound attenuation.

The result is a dB value which is called flaw class. The flaw class D is calculated according to the formula:

D = A - B - C

A =is the defect gain (in dB), maximum defect echo with an absolute instrument gain of 50% (5%) echo height.

B stands for reference gain (in dB). The maximum reference echo, such is the 1.5 mm side-drilled hole from the reference standard K1 or IIW type 1 or 2, is at 50% (5%) echo height with absolute instrument gain.

C is the sound attenuation factor (in dB)

D is the flaw class (in dB). According to AWS, this is the conclusion of the evaluation. Utilizing the afore mentioned formula, the instrument does the calculation.

The first step to use the AWS is to show the AWS value from the Toolbar menu as o the figure XXX

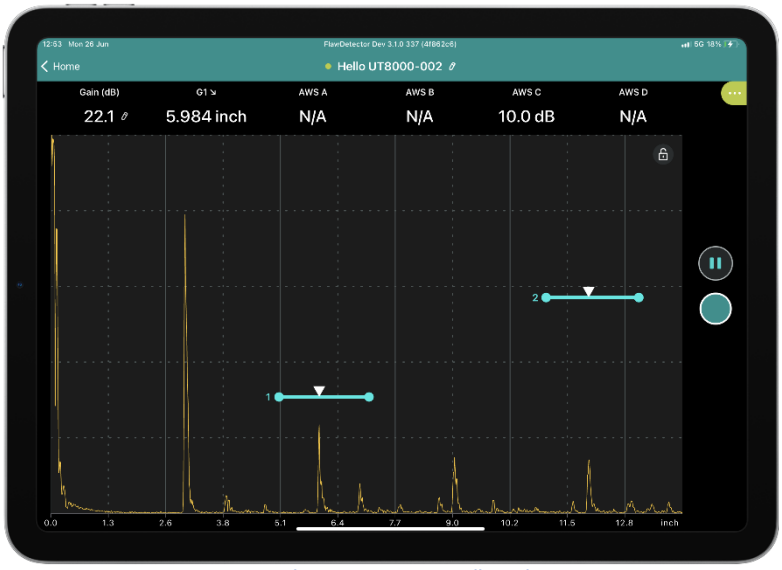


Figure 39: AWS Toolbar view

Set your reference indication (B) level by moving the gate 1 to cover the peak. The option set reference gain is the Sensitivity Menu.

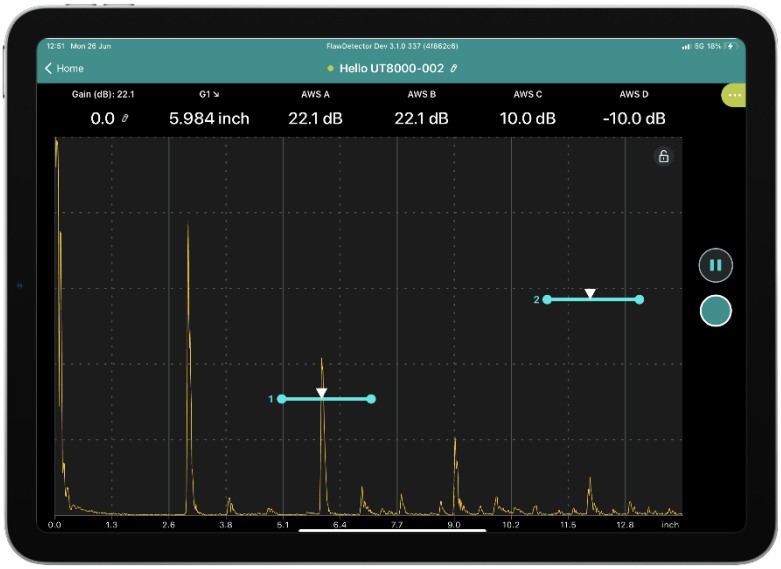


Figure 39: AWS Toolbar view after setup

Then the AWS value will be calculated and showed on the screen

5.3 Grid mode

In Grid mode you have the possibility to generate a Grid up to 10.000 points. The purpose is to have a thickness Map of your component.

You can select this modality before or after the calibration.

If done before calibration use the Double Swipe to pass at the A-Scan view and proceed for the calibration.

Once you have terminated the calibration you can decide the dimension of the grid. Click on the top right corner of the grid  and scroll up to arrive to the matrix dimension needed.

To define the direction of measurement press on  and select the direction you prefer.

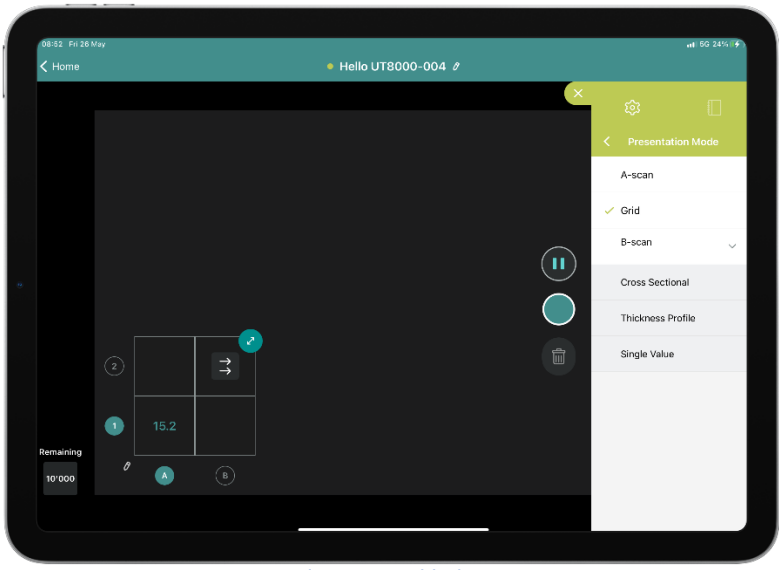


Figure 40: Grid View

In case the dimension of the grid is exciding the screen you simply need to scroll, with one finger, up/down or left/right to move it. Once you select a cell, the equivalent letter and number are highlighted on the screen to better identify the position inside the grid. In the figure 41 you see the number 1 and the letter A marked in blue.

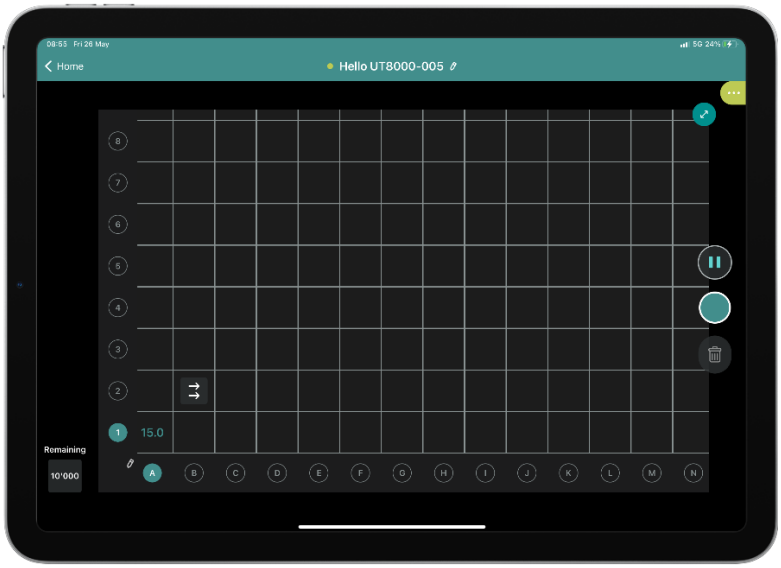


Figure 41: Grid sizing

5.3.1.1 Heat Map

To activate the heat map, select the menu display and activate the option heat Map.

To modify the heat map range, you need simply scroll the bar or keep a long press on the value to change them.

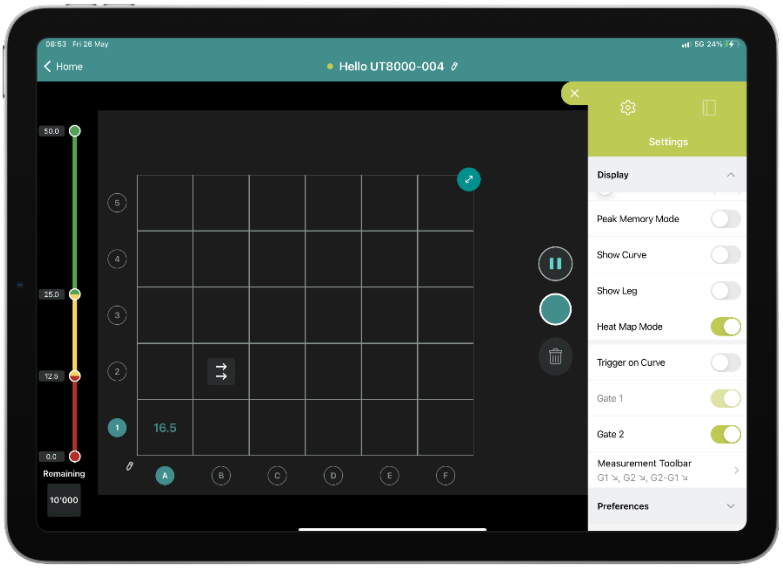


Figure 42: Grid Mode-Heat Map

5.3.1.2 Toolbar available

On the grid mode you have the possibility to decide if you want to visualize:

- G1 ↘
- G1%FSH
- G2-G1 ↘

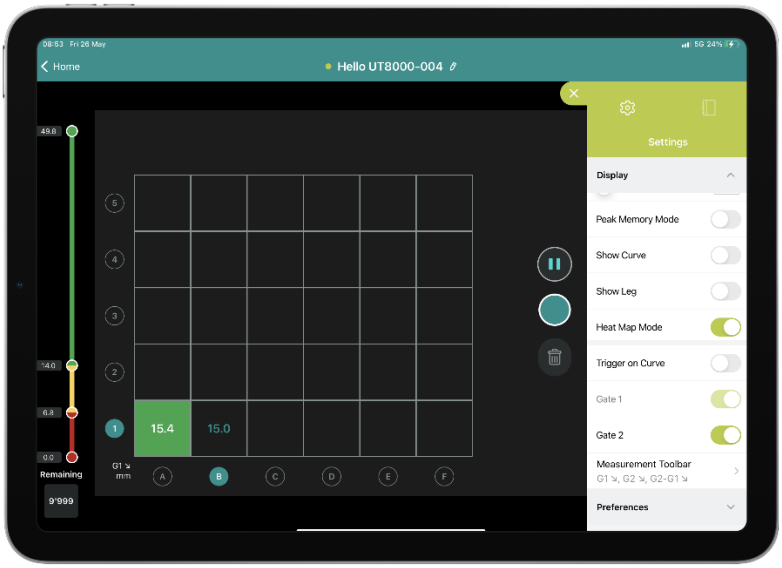


Figure 43: Grid Mode-Value Selection

This opportunity appears after the record of the first cell. Then you can setup the heat Map in according with your needs.

5.3.1.3 Matrix Modification

In case of needs you have the possibility to modify one cell, you just need to click on the cell and click on the “bin” icon. After you can record again the cell.

5.4 B Scan

Selecting, from the Measurement Presets menu, the option B-Scan you have the possibility to choose between 3 visualizations:

- Cross Sectional
- Thickness profile
- Single value

So you have the possibility to choose the best visualization according to your needs: training, corrosion, defect research.

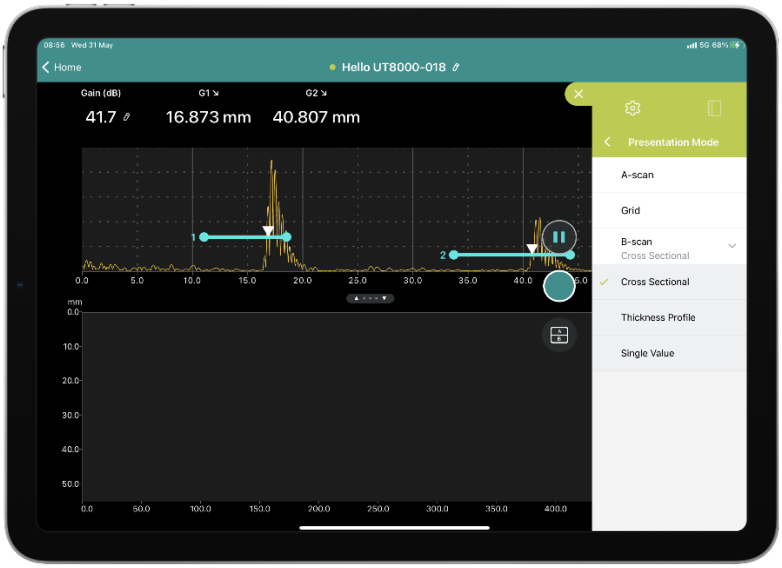


Figure 44: B-Scan view Selection

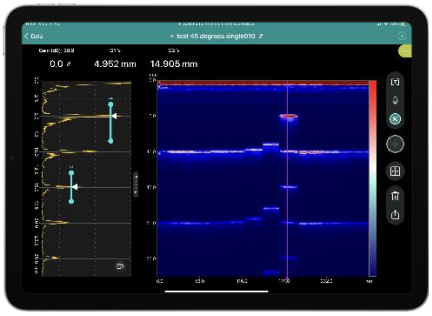


Figure 45 A: Cross Sectional

Figure 45 B: Thickness Profile

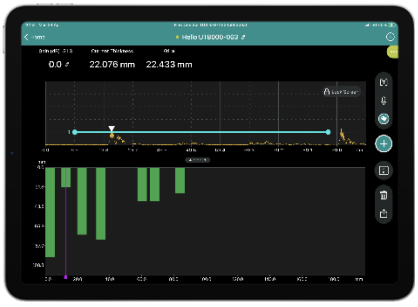


Figure 45 C: Single Value

5.4.1 B scan display option

In B-scan mode you can decide to visualize the information in different way:

- A Scan + B Scan in horizontal view
- A scan + B Scan in vertical view
- Only B Scan

You just need to press the button 

and you can change the visualization also during the recording of the inspection.

In post processing, some options are available only in full B-scan view.

The B-Scan visualization and recording will start only after you click on the record button. Figure 46

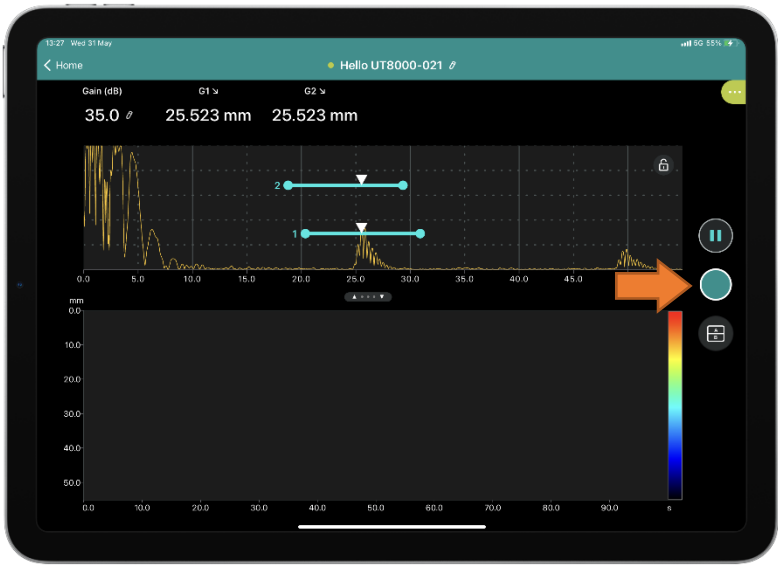


Figure 46: B-Scan recording button

Once you start the recording you have two options:

- Pause
- Stop

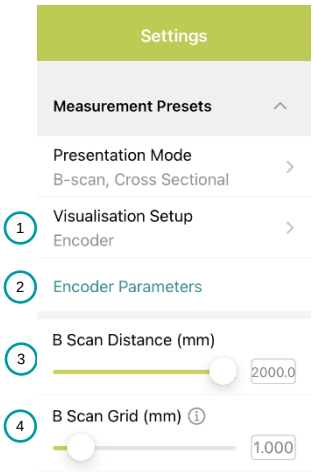
With pause you have the possibility to restart and continue with the existing recording file.

If you choose “stop” the file is closed and automatically stored on your iPad. You need to create a new file to continues your inspection.

5.4.2 B scan setup

Once you have desired witch visualization utilize you can proceed with the calibration. The calibration of the probe is like the A-Scan visualization, see the chapter 5.2.1 about calibration. The same is for the other standard parameters like: Testing technique, Angle, frequency, Energy, etc

Now you can proceed with the setup of the B-Scan parameters.



The parameters to setup a B-Scan view are 4, highlighted on the left table.

1) Visualization Setup
2) Encoder Parameter
3) B Scan Distance
4) B-Scan Grid

5.4.2.1 Visualization Setup

In this menu you have the possibility to choose to perform the B-Scan control with the Encoder or time based. If you select time based, the variables 2,3 and 4 will disappear from the menu.

In case of Time-based option, you just need to press the button record and start to inspect. All the data will be recorded and saved on the iPad, The maximum recording time is 20 minutes.

5.4.2.2 Encoder Parameters

Once you have selected the encoder option you need to select which encoder you want to use for the inspection.

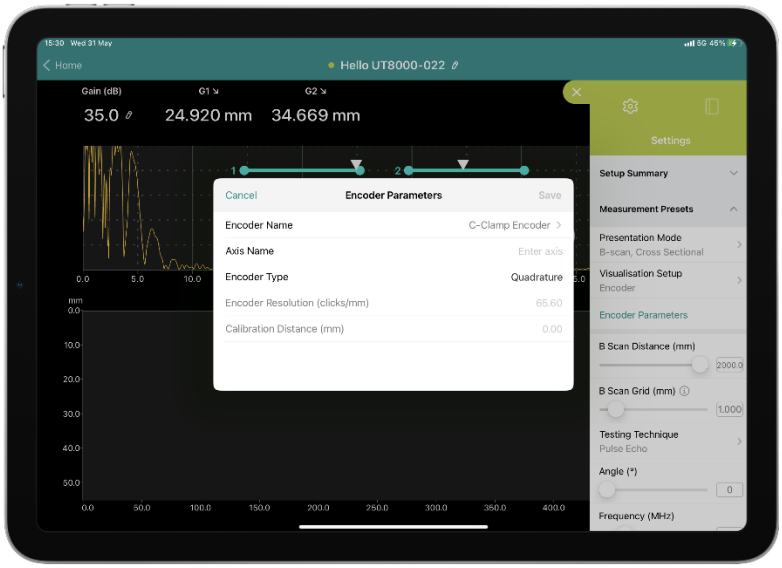


Figure 47: Encoder Setup

After the selection of the encoder, you need to nominate the axis direction then you can save the setup.

5.4.2.2.1 Manual encoder

You have the possibility to use any kind of encoder, compatible with UT8000 I/O door.

In this case you have two possibilities:

- You know the encoder resolution
- You perform manual calibration

If you know the encoder resolution and you want to add a custom encoder to the UT8000 you just need to:

- Give a name to the encoder
- Type the encoder resolution

Then save it, in this way you will free to recall it next time.

If you don't know the encoder resolution you can perform a manual calibration.

- Give a name to the encoder
- Type the calibration distance you want to use (minimum is 100 mm, 4 inches)
- Move the encoder for the distance selected. On your screen you will see the encoder icons (see figure 41)
- At the end click on STOP and the encoder will be saved on your instrument and available for future control too.

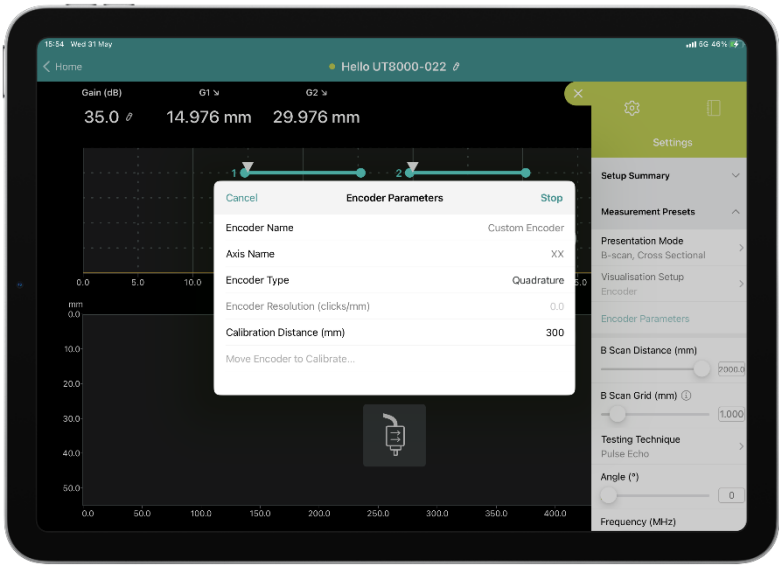


Figure 48 Encoder manual calibration

5.4.2.3 B-Scan Distance

With the encoder option selected you have the possibility to setup the distance for your B-Scan inspection. The maximum distance you can run for single file is 2000 mm, 78 inches.

The default value is 2000 mm but you can easily change it typing your value.

The minimum distance is 100mm.

Due to different configuration of inspection, you have the possibility to select the direction of movement of the encoder:

- Clockwise
- Counterclockwise

The selection can be modified also during the recording of the file but it will reset the information recorder before the new option.

5.4.2.4 B-Scan Grid

In accordance with your need you have the possibility on increase/decrease the sensibility of your B-Scan. It allows you to define the distance between each acquisition point on an axis. It is the acquisition resolution of that axis.

The scan step directly affects the final data size and the scanning speed.

The range of the B-scan Grid is influenced by the Encoder resolution.

5.4.3 B-Scan Cross sectional

The B-scan presentations is a profile (cross-sectional) view of the test specimen. It is a coloured visualization of several A-scan data.

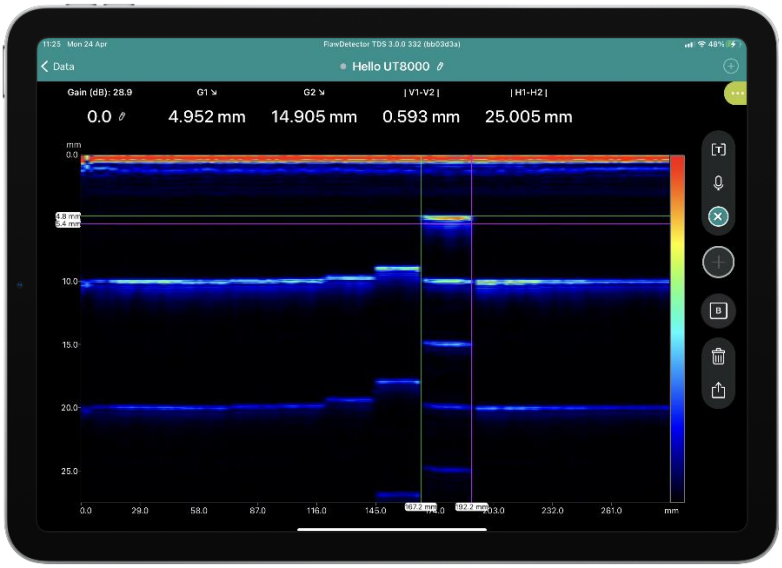


Figure 49: B-Scan post processing, cross sectional

For this visualization you can select different kinds of colour pallet, the options are in the sub menu preferences.

In default the B-Scan view is taking in consideration the full range of the A-Scan.

You have the possibility to visualize only the A-scan in the area of the A or B gate just selecting this option under the menu.

5.4.3.1 *Post processing*

In post processing you have the possibility to review the whole file and check the full inspection.

Visualizing only the B-scan, with long press option, you can activate the V2-V1 and H2-H1 toolbar option that will support you I the definition and I the decision process. You can have an estimation of the echo reported on the screen (figure 42)

5.4.4 B-Scan Thickness Profile

This second B-Scan visualization, Thickness profile, has the purpose to provide a mapping of the thickness profile.

Figure 50: B-Scan post processing, thickness profile

In default the B-scan visualization is showing only the result of the A-Scan related to the A-Gate.

The change of the A-gate position will have influence of it, you have then the possibility to calibrate the visualization in according with your needs.

You have the possibility to change it selecting whole scan area or B gate.

With the heat map bar, you can define your criticality parameters.

The values are automatically setup as default, but you change them just clicking on them.

You can decide to differentiate your thickness status in according with some parameters, as for example: healthy, low severity, high severity.

You may get the necessary information about the thickness status by clicking the info icon in the post-processing stage.

5.4.5 B-Scan Single Value

The B scan Single value visualization is providing you the depth of a reflector present in your component.

The visualization is based, in default, to the A-Scan part related to the gate A. it means that, in according with your calibration, you can define which kind of reflector you want to show I the B-Scan mode. You have also the possibility to visualize the Back wall echo if requested.

Figure 51: B-Scan post processing, single value

6 Data Exporting and sharing

During your calibration and inspection, the following information are automatically saved on your logbook:

- Operator name
- S/N of the unit used
- Hardware version
- Firmware version
- Application version
- GPS position (if activated and allowed)
- All the parameters and their changes during the setup or during the inspection like
    - Filters
    - Gain
    - Curve creation
    - Probe configuration
    - Energy

All the information are saved in chronological way and it is not possible to modify or cancel.

In additional to the automatic save information the operator is able to save and then share:

- Save and A-scan indication and its raw data information in CSV format
- Save a snapshot
- Export a snapshot
- Export as Raw data
- Export as HTML (setup info and A-Scan indication)
- Share via URL (setup info and A-Scan indication)
- Record a vocal message, in the logbook
- Make and save pictures, in the logbook

In accordance with the type of contract some of the options will be not available.

6.1 Exporting

With the Pro version APP the information will be synchronized with our cloud once you will connected the table to a Wi-Fi network. The information will be then visible via browser to you and, in case of access approval, to other people inside your company or with the customer. The data present on the cloud can not be modify but they can be used for the generation of a report.

6.2 Sharing

With the UT8000 you have the possibility to share Setup information or a complete inspection file directly from your tablet or via browser.

This allows you to optimize inspection process repeating a control with the same setup file.

You can also share the file with anyone worldwide, the person just needs to download, for free, the APP on his tablet and visualize the data.

UT8000 instrument is not needed to visualize the data, you just need the APP.The files can be shared directly from the browser of your PC/MAC.

6.3 Real time support

Thanks to the table/APP connectivity approach you have the possibility to share, in real time, your inspection.

Having the tablet connected in Wi-Fi or 4G to the network and using any standard video conference application like team, Skype, Zoom you can share the screen of your table with a person located in remote.

With some application like Zoom, you can also share at the same time the video of your camera.

It means that the person, in remote, will see at the same time your tablet screen and the component you are inspecting.

7 Technical Specification

Measurement Principle	Ultrasound
Configuration	
Pulse Voltage	100 to 400 V (Square pulse)
PRF	2000 Hz
Gain Range	0-110 dB
Bandwidth	0.2- 20 MHz
Display and Memory	8.3 to 12.9 Inches Up to 2 TB
Digitizing Frequency	125 MHz
Visualization	A-Scan, Grid, B-Scan
I/O	2 USB C door 1 - 6 pin Lemo for encoder
Connection	Encrypted Wi-Fi Cable USB C
Battery	6 x AA (NiMH) rechargeable batteries
	Alternative: power bank

Appendix A

Ultrasound velocity table

Material	Longitudinal -Wave velocity in/ms	Longitudinal -Wave m/s	Share-Wave Velocity in/ms	Share-Wave Velocity m/s
ALUMINUM	0.2510	6375	.1240	3130
BERYLLIUM	0.5080	12903	.3500	8880
BRASS	0.1730	4394	.0830	2120
BRONZE	0.1390	3531	.0880	2235
CADMIUM	0.1090	2769	.0590	1500
COLUMBIUM	0.1940	4928	.0830	2100
COPPER	0.1830	4648	.0890	2260
GLASS (PLATE)	0.2270	5766	.1350	3430
GLYCERINE	0.0760	1930	–	–
GOLD	0.1280	3251	.0470	1194
INCONEL	0.2290	5817	.1190	3020
IRON	0.2320	5893	.1270	3230
CAST IRON	0.1800	4572	.0870 – .1260	2200 – 3220
LEAD	0.0850	2159	.0280	700
MAGNESIUM	0.2300	5842	.1200	3050
MERCURY	0.0570	1448	–	–
MOLYBDENUM	0.2460	6248	.1320	3350
MONEL	0.2110	5359	.1070	2720
NICKEL	0.2220	5639	.1170	2970
NYLON	0.1060	2692	.0430	1090
PLATINUM	0.1560	3962	.0660	1670
PLEXIGLAS	0.1060	2692	.0500	1270
POLYSTYRENE	0.0920	2337	–	–
PVC	0.0940	2388	.0420	1060
QUARTZ GLASS	0.2260	5740	.0870	2210
RUBBER,	0.0910	2311	–	–
SILVER	0.1420	3607	.0360	1590
STEEL (1020)	0.2320	5893	.1280	3240
STEEL (4340)	0.2330	5918	.1280	3240
STAINLESS STEEL	0.2230	5664	.1230	3120
TEFLON	0.0540	1372	.2500	6350
TIN	0.1310	3327	.0660	1670
TITANIUM	0.2400	6096	.1230	3120
TUNGSTEN	0.2040	5182	.1130	2870
URANIUM	0.1330	3378	.0780	1980
WATER	0.0580	1473	–	–
ZINC	0.1660	4216	.0950	2410
ZIRCONIUM	0.1830	4648	.0890	2250

The English version of the content remains the official version. All translated content should bear an appropriate notice to this effect.

For safety and liability information, please download at

www.screeningeagle.com/safety-and-liability

PROCEQ EUROPE

Ringstrasse 2
CH-8603 Schwerzenbach
Switzerland

+41 43 355 38 00

EUROPE

Screening Eagle UK Limited
Bedford i-lab,
Stannard Way Priory Business Park MK44 3RZ
Bedford London
United Kingdom

T +44 12 3483 4645

USA, CANADA & CENTRAL AMERICA

Screening Eagle USA Inc.
14205 N Mopac Expressway Suite 533
Austin, TX 78728
United States

Screening Eagle USA Inc.
117 Corporation Drive
Aliquippa, PA 15001
United States

T +1 724 512 0330

SOUTH AMERICA

Proceq SAO Equipamentos de Mediçao Ltda.
Rua Paes Leme 136
Pinheiros,
Sao Paulo SP 05424-010
Brasil

T +55 11 3083 3889

PROCEQ MIDDLE EAST

Sharjah Airport
International Free Zone
P.O.Box: 8365
United Arab Emirates

T +971 6 5578505

ASIA-PACIFIC

Proceq Asia Pte Ltd. 1
Fusionopolis Way Connexis South Tower #20-02
Singapore 138632

T +65 6382 3966

CHINA

Proceq Trading Shanghai Co.,
Limited Room 701, 7th Floor,
Golden Block 407-1
Yishan Road,
Xuhui District
200032 Shanghai | China

T +86 21 6317 7479