

ScanView Software



User Manual

Content

1 Introduction 3

2 Purpose and conditions of use 3

3 Preparing for work..... 4

4 Operation description 5

 4.1 ScanView Start 5

 4.2 “A-Scan” Window..... 6

 4.3 “B-Scan” Window 20

 4.4 “C-Scan” Window 22

 4.5 Flaw Detector Mode..... 29

 4.6 Calibration Mode..... 30

 4.7 ScanView Exit..... 32



1 Introduction

This User Manual is a mandatory document for persons who operate and maintain the ScanView Software (hereinafter ScanView) and Electromagnetic Acoustic Thickness Gauges (hereinafter EMAT or Device), with which the ScanView will be used.

This manual provides basic information and instructions for using the ScanView installed on smart glasses.

The ScanView is compatible with the following EMATs: EM4000, EM5000 and EM2210.

Before using the equipment, carefully read this manual, as well as the user manuals of smart glasses and EMAT intended for use with the ScanView.

IMPORTANT

Some components or images in this user manual may differ slightly from your copy of the ScanView. However, the principles remain the same.

2 Purpose and conditions of use

2.1 The ScanView implements the following functions:

- operate in real time with the EMAT, set and display A-scans, B-scans and C-scans;
- use the EMAT as a flaw detector for searching for pitting corrosion;
- save files with measurements in tabular form in “.csv” format or as images in “.png” format;
- calibrate the transducer using a known thickness, test object material or acoustic speed.

2.2 The ScanView communicates with the EMAT via Bluetooth.

3 Preparing for work

The ScanView comes installed on the smart glasses and is ready for use.

During operation, it is recommended to control the smart glasses using the ring (Figure 3.1), which is supplied with the glasses. To do this, you need to switch from the touch mode (touchpads on the temples of the glasses) to the ring control mode.

Before starting the ScanView, press and hold the Return/Cancel button on the ring until the mode selection message (“Key Mode”, “Mouse Mode”, or “Spatial Mode”) appears. When the “Key Mode” or “Spatial Mode” message appears, repeat pressing and holding until the “Mouse Mode” message appears.

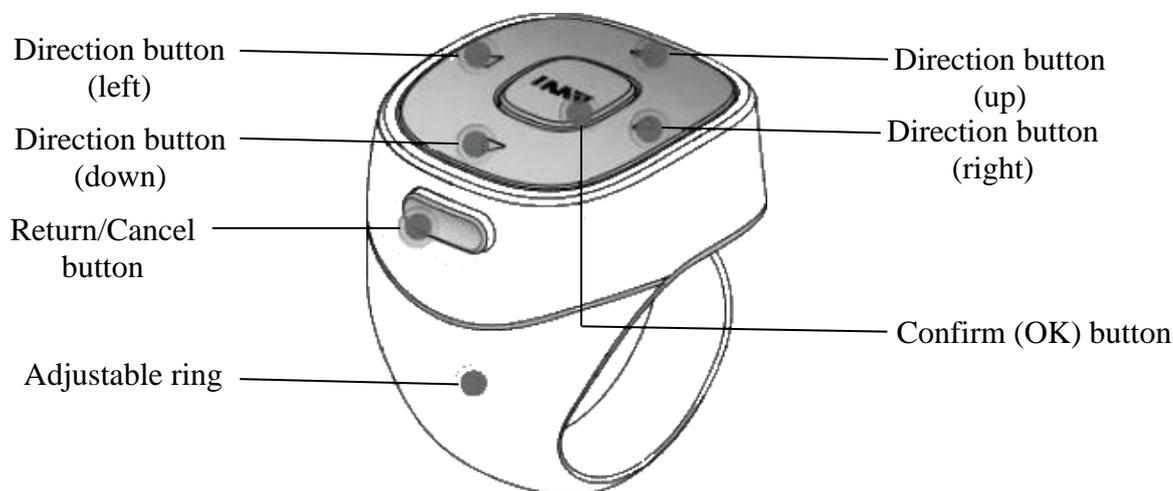


Figure 3.1 – The smart glasses control ring

4 Operation description

4.1 ScanView Start

4.1.1 Before starting operation, prepare the smart glasses for work, turn it on and check the battery charge level.

4.1.2 Switch the EMAT on.

4.1.3 Start the ScanView (the  icon).

4.1.4 When you start the ScanView, the Bluetooth module on the smart glasses turns on automatically. The EMAT connects automatically, no additional search in the Bluetooth settings is required.

4.1.5 During operation, monitor the charge level of the EMAT and smart glasses using the indicators in the upper right corner of the screen.

4.1.6 Switch between ScanView operating modes (A-scan, B-scan, C-scan, flaw detector, calibration) using the buttons on the panel located on the left side of the screen.

4.2 “A-Scan” Window

The A-scan window appearance is shown in Figure 4.1.



Figure 4.1 – A-scan window

4.2.1 Change of Size of Measured Thickness Window

To change the size of the measured thickness display window, move the cursor over this window and press the OK button on the ring. As a result, the window shown in Figure 4.2 opens, and you can select one of two options for displaying the thickness.



Figure 4.2 – Selection of size of measured thickness window

By default, the Small size of the window is set.

4.2.2 Change of Units along Time and Amplitude Axes

To change the units for the time and amplitude axes, move the cursor over the axis, press the OK button on the ring and select the unit in the window that appears.

Figure 4.3 shows appearance of the windows where you can select the units.

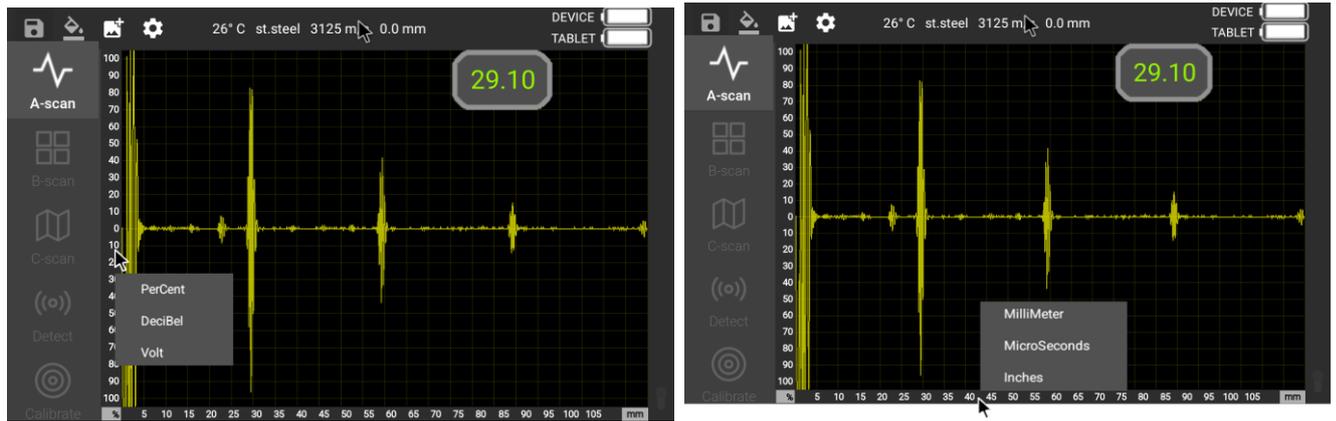


Figure 4.3 – Units selection

The user can set the following units:

- for the horizontal axis: time in microseconds and distance in millimeters or inches;
- for the vertical axis: relative units in percentage form or decibels and absolute units in volts.

4.2.3 Adjustment of Signal Generation, Processing and Display Parameters

You can change such signal generation, processing and display parameters as:

- AGC switching on/off;
- Thickness measurement mode;
- Number of accumulations;
- Signal shape;
- 2D/3D mode.

You can change the above parameters using the settings menu. To open the menu, move the cursor over the gain indicator area on the right side of the screen and, while holding the OK button on the ring, move this area to the left using the direction button, thereby sliding out the settings menu (see Figure 4.4).



Figure 4.4 – Settings menu for signal generation, processing and display parameters

To close the menu, slide it to the right in the same manner.

4.2.3.1 AGC switching on/off

To switch off the automatic gain control (hereinafter AGC), un-check AGC in the settings menu. When the AGC is off, the slider in the gain indication area becomes active. You can control the gain by moving the slider up and down (see Figure 4.5).



Figure 4.5 – Manual gain control

4.2.3.2 Selection of Thickness Measurement Mode and Operation with Strobes

By default, the ScanView has the automatic thickness measurement mode set, i.e. the thickness is calculated according to the Oktanta-developed algorithm and is user-independent. In addition to the automatic mode, the ScanView enables you to use the manual thickness measurement mode which has two options:

- thickness measurement using one strobe;
- thickness measurement using two strobes.

4.2.3.3 Thickness Measurement using One Strobe

In this mode, the operator can set one strobe. For this strobe, the maximum of the signal envelope is detected. The detected maximum is converted into the measured thickness with allowance for the set speed of sound.

To select the mode of thickness measurement using one strobe, click on the Mode button located in the settings menu for signal generation, processing and display parameters. As a result, the window shown in Figure 4.6 opens, where you should select the 1 Strobe mode.



Figure 4.6 – Thickness measurement mode selection

Upon selection of this mode, the screen displays one strobe. You can move this strobe across the A-scan and change its length. Figure 4.7 shows the strobe appearance.

To move the strobe, move the cursor to the center of the strobe and, holding the OK button on the ring pressed, move the strobe to the desired position. To change the strobe length, move the cursor to the edge of the strobe and, holding the OK button on the ring pressed, increase/decrease the strobe length.

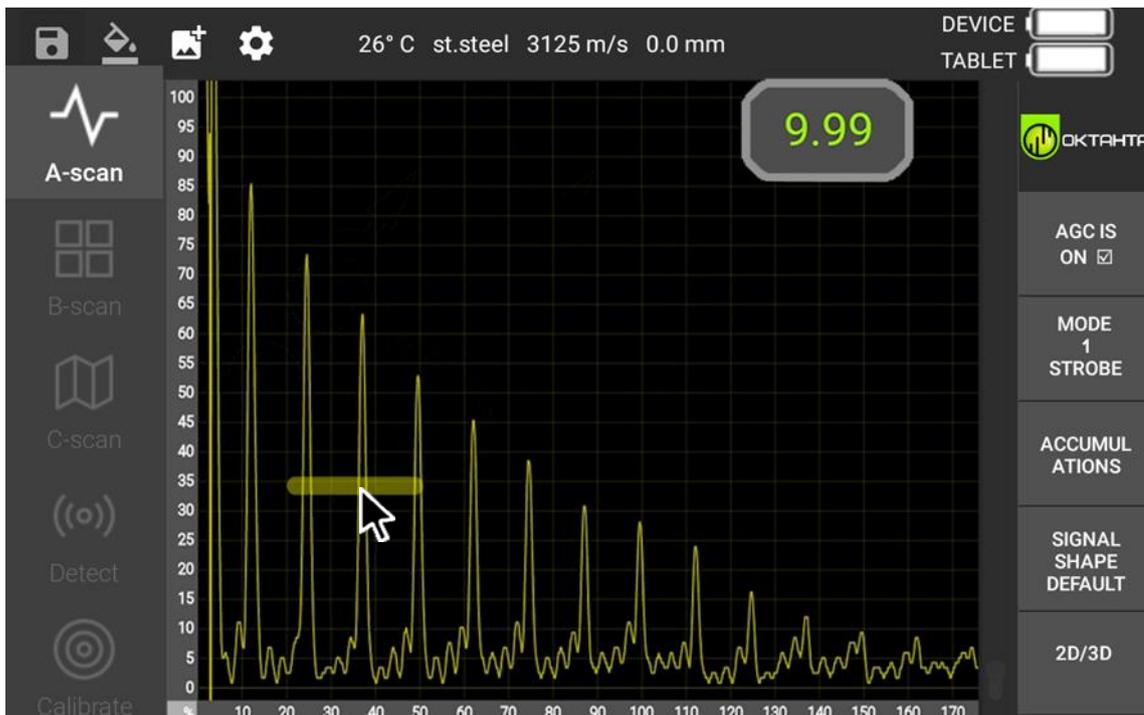


Figure 4.7 – Strobe operations (1 strobe)

The strobe coordinates are displayed at the screen bottom, and the maximum detected in the strobe is displayed at the screen top (see Figure 4.8).

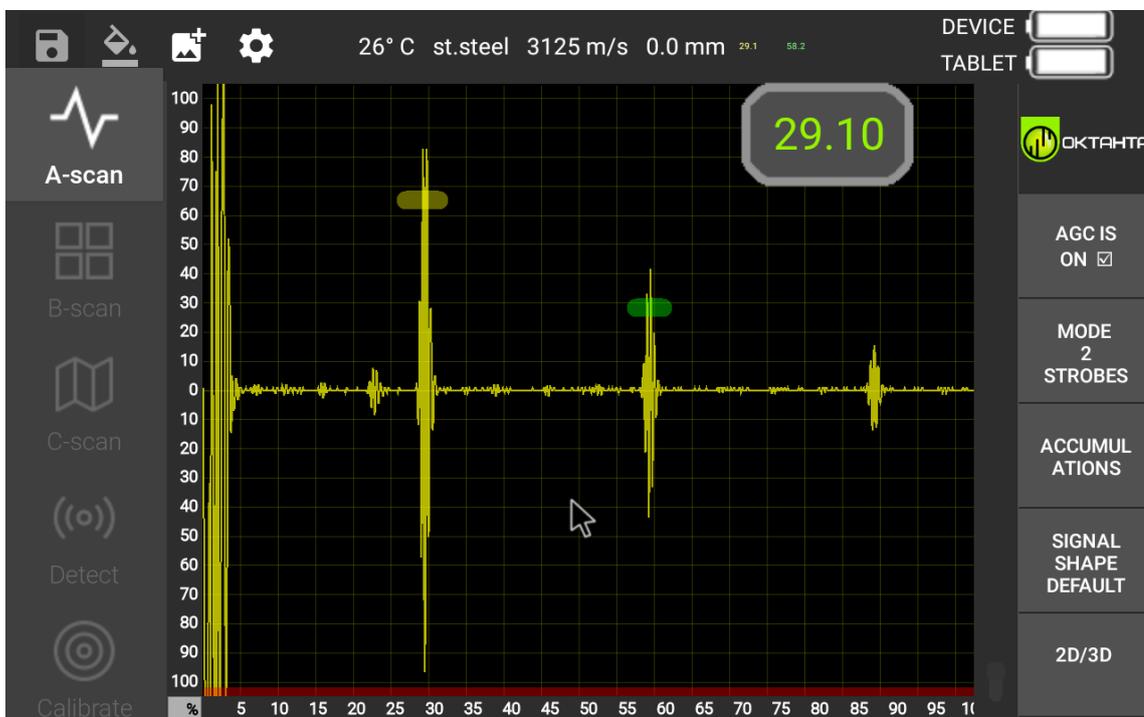


Figure 4.8 – Coordinates of maximum detected in the strobes (2 strobes)

4.2.3.4 Thickness Measurement using Two Strobes

In this mode, you can operate with two strobes on the A-scan (see Figure 4.8). The measured thickness can be calculated by the time difference of the maximum position in strobe 1 and maximum position in strobe 2. The detected difference is converted into the thickness using the set speed of sound.

Similarly to the one strobe mode, the maximum coordinates detected for each strobe are displayed at the screen top. During strobe movement on the screen, the time coordinates of the beginning and end are displayed for each strobe.

The strobe operations are the same as above described.

4.2.3.5 Change of Accumulation Number

By default, the EMAT uses 128 accumulations of the useful signal, i.e. it calculates the thickness using the average values. During operation with a wide gap or poor surface quality, it is recommended to increase the number of accumulations and, thereby, to increase the reliability and accuracy of the measurements.

To change the number of accumulations, click on the Accumulations button located in the settings menu for signal generation, processing and display parameters. As a result, a menu opens in the right area of the screen, in which you need to select the required number of savings.

Note that increase of the number of accumulations increases the measurement time.

4.2.3.6 Selection of A-Scan View

You can display the EMAT time sweep in three ways: the original signal, the detected signal and the filtered signal (using matched filter). To change the A-scan view, click on the Signal Shape button located in the settings menu for signal generation, processing and display parameters. Figure 4.9 shows all three views.

The original signal



The filtered signal (using matched filter)



The detected signal



Figure 4.9 – A-scan views

4.2.3.7 2D/3D Mode

The 2D/3D mode enables displaying the measurement signal as the 3D model on the screen. A curve obtained as the 3D model can be moved/rotated. Figure 4.10 shows the 3D model appearance.



Figure 4.10 – Signal displayed as 3D model

4.2.4 A-Scan Zoom and Movement

You can easy and quickly zoom the diagrams. To zoom the diagrams along the vertical axis, use the up and down direction buttons, along the horizontal axis – right and left direction buttons.

To return to normal display, double-press the OK button on the ring at any point of the area with the diagram.

To move the viewing area, move the cursor over the area with the diagram and, while holding the OK button on the ring, move the area using the direction buttons (up, right, left, down).

4.2.5 Results Saving

You can save the A-scan and thickness window as an image and as a data text file at any time of operation. To save the data, click on the  button (see Figure 4.11).



Figure 4.11 – Data saving

As a result, the window shown in Figure 4.12 opens, where you should enter the name and format of the file to be saved (text file “*.csv”, image “*.png” or both options). To select the file format, check the appropriate box.

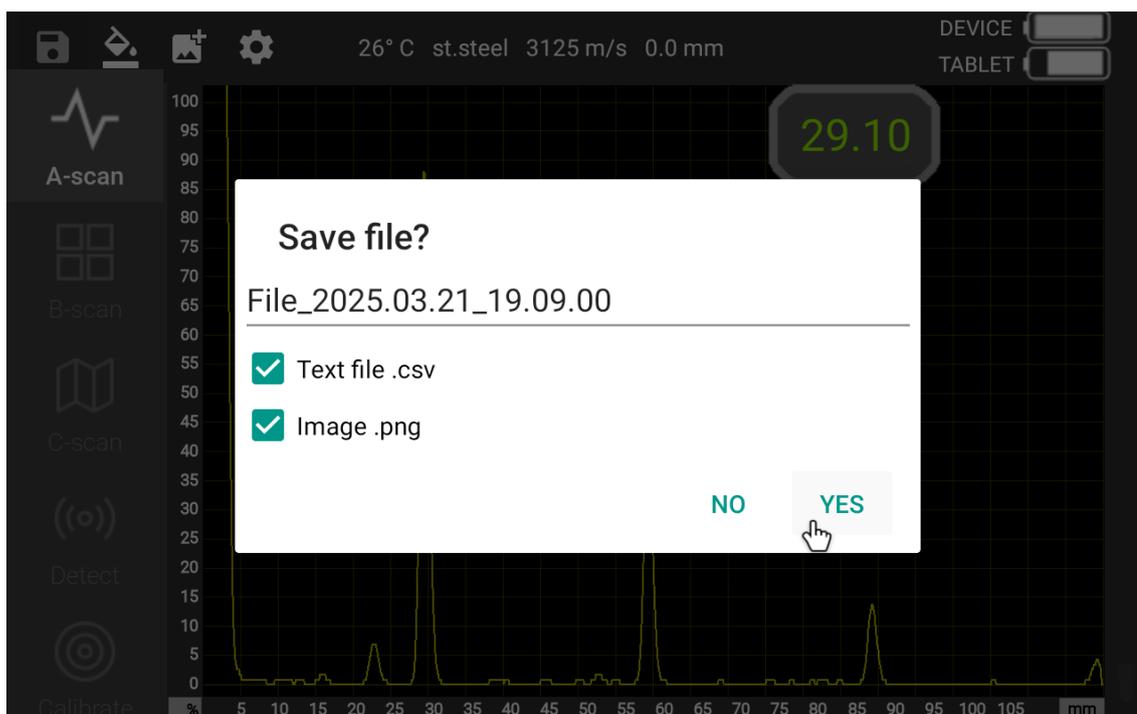


Figure 4.12 – Data saving

The files will be saved in the “Documents/ScanView” folder where the sub-folder with the operator’s name will be created. The operator’s name and the working folder can be changed in the ScanView settings.

4.2.6 Temperature, Metal and Speed of Sound windows

By clicking on the temperature value at the top of the screen, you can enter the test object temperature value (see Figure 4.13). When you enter a temperature value, an on-screen numeric keypad opens at the bottom of the screen.

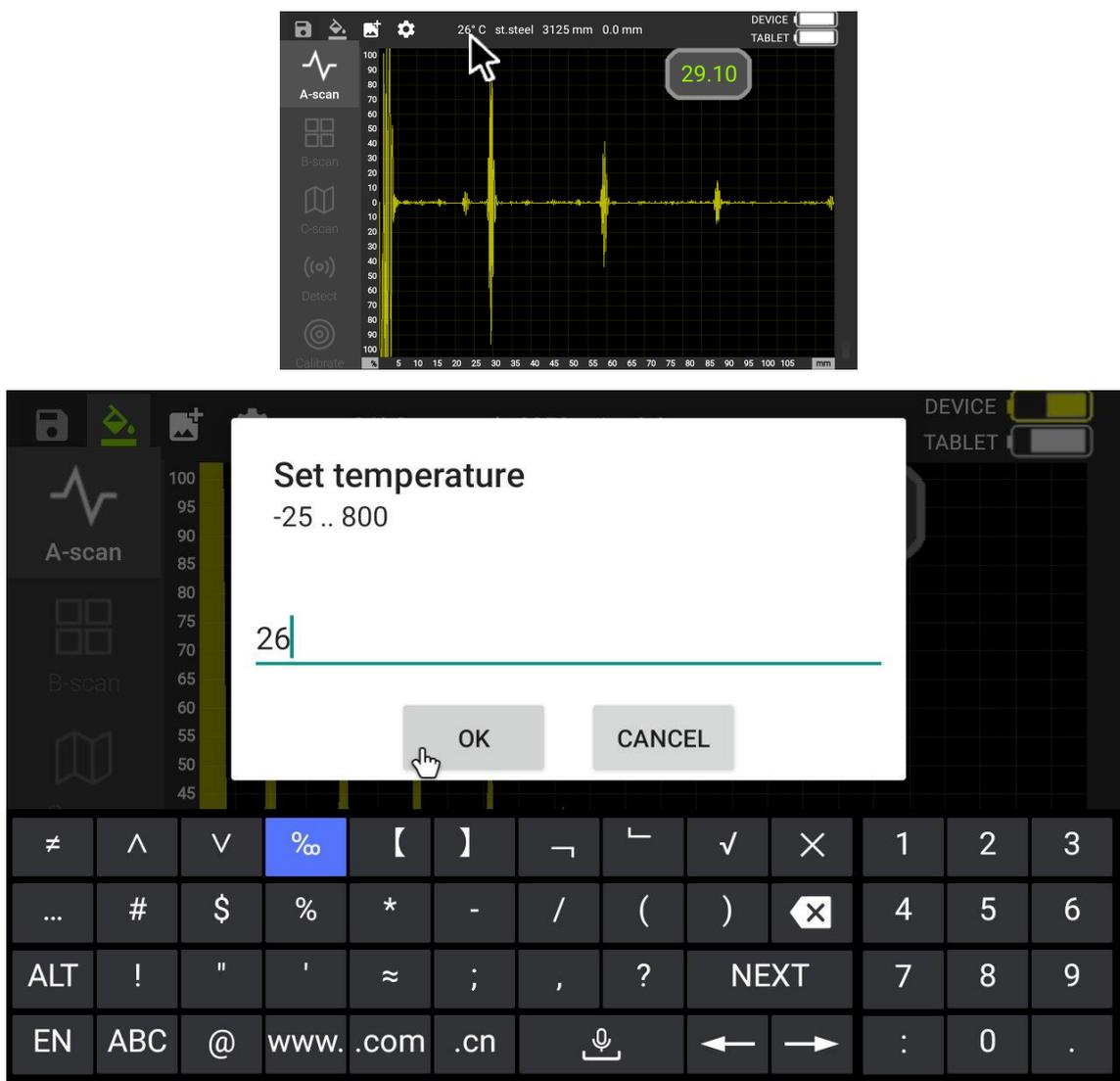


Figure 4.13 – Temperature setting

By clicking on the metal type at the top of the screen, you can select the metal type in the drop-down list (see Figure 4.14).

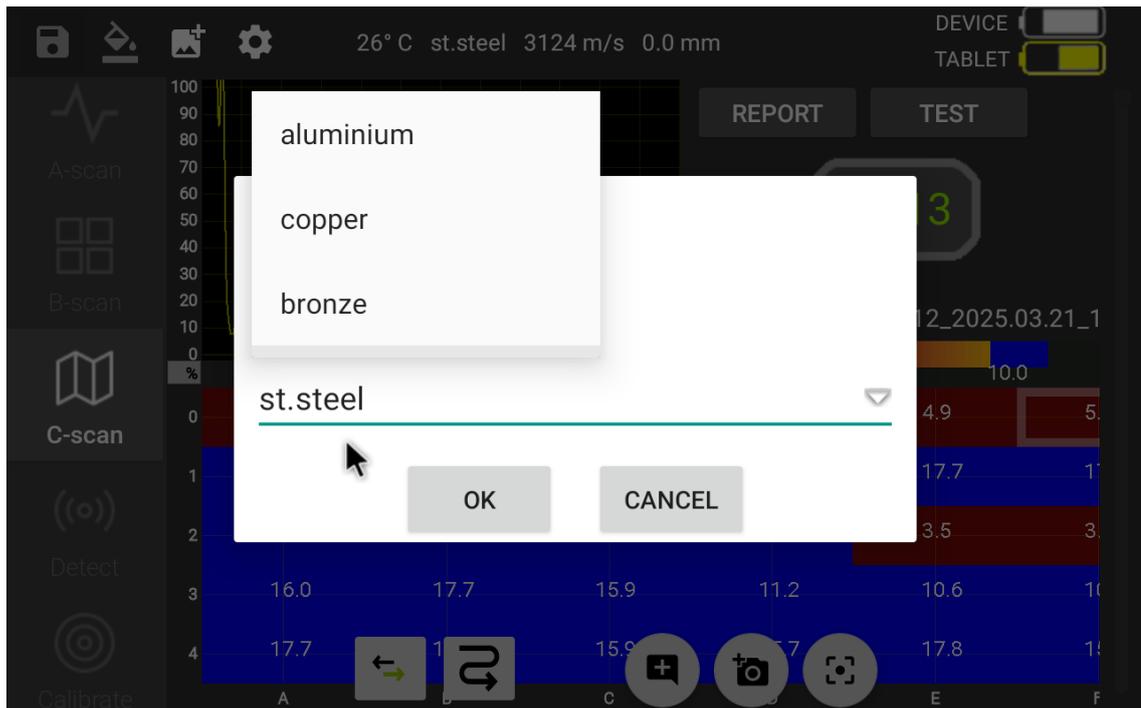
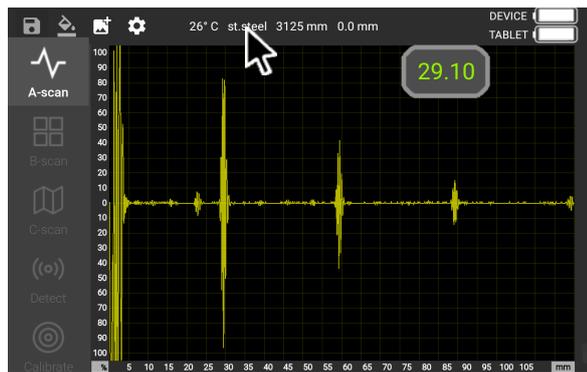


Figure 4.14 – Metal selection

By clicking on the sound speed value at the top of the screen, you can enter the desired sound speed value in the window that opens (see Figure 4.15).

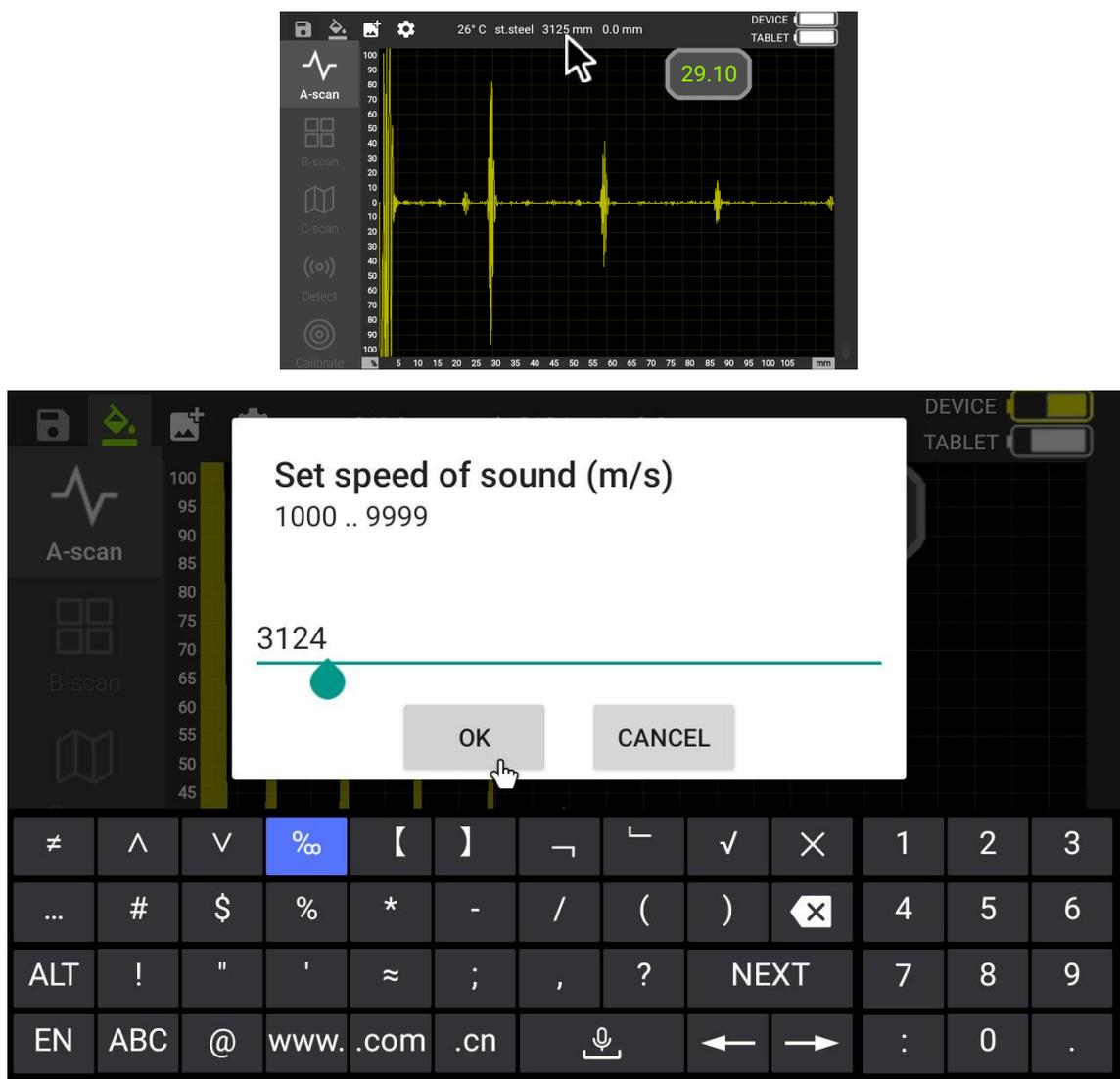


Figure 4.15 – “Set speed of sound (m/s)” window

4.3 “B-Scan” Window

The B-scan window appearance is shown in Figure 4.16.



Figure 4.16 – B-scan window

At the top of this window, the A-scan with two thresholds (yellow and red) is displayed. At the bottom, the B-scan is displayed. All A-scan points which values are lower than the yellow threshold position are displayed on the B-scan in light-blue. All A-scan points which values are higher than the red threshold position are displayed on the B-scan in black. All A-scan points which values are between two thresholds are displayed with gradient.

Zooming and moving of the B-scan is performed in the same way as zooming and moving of the A-scan (see paragraph 4.2.4).

You can set the parameters of the B-scan using the settings menu. To open the menu, move the cursor over the gain indicator area on the right side of the screen and, while holding the OK button on the ring, move this area to the left using the direction button, thereby sliding out the settings menu (see Figure 4.17).

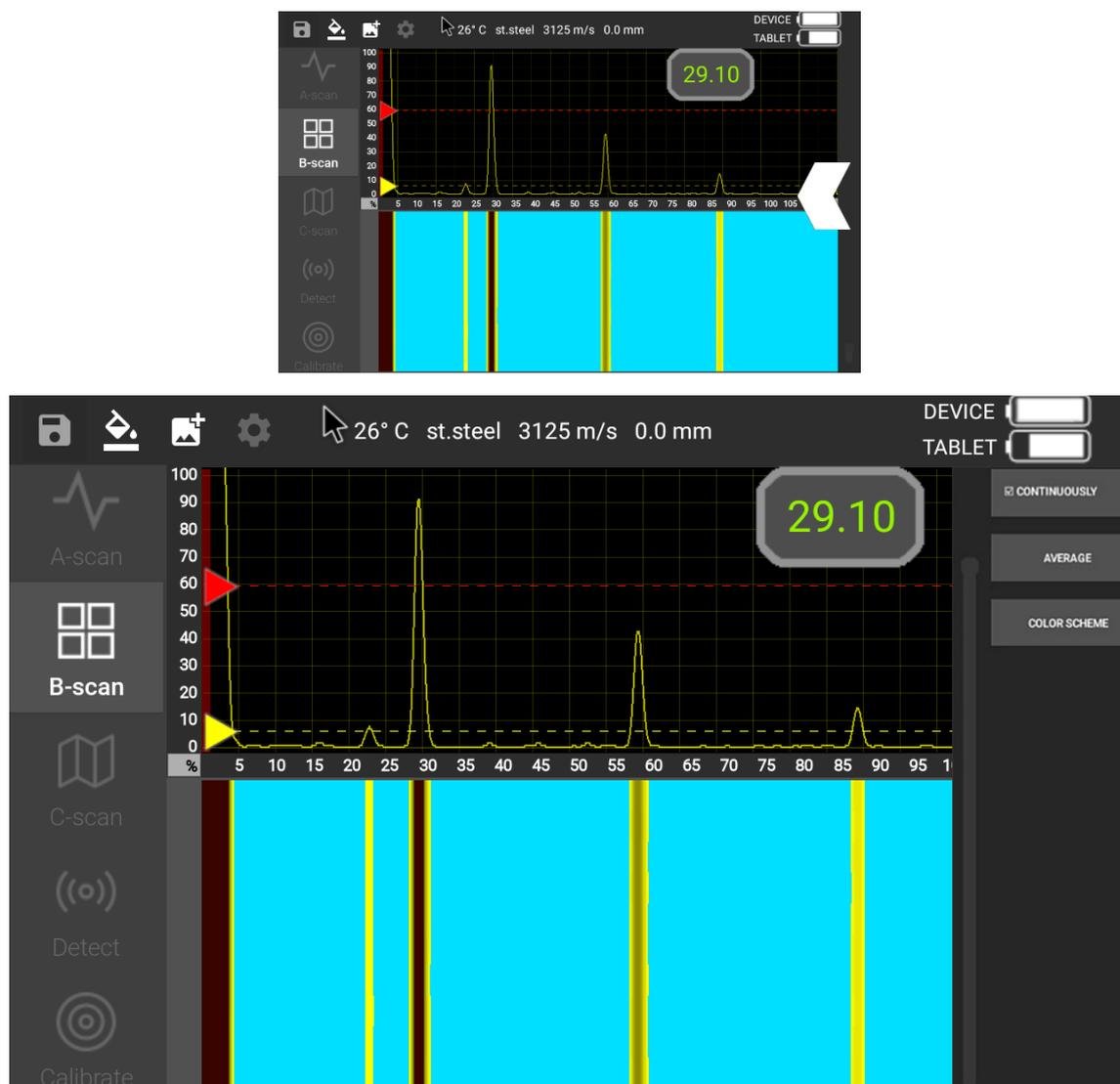


Figure 4.17 – B-scan settings menu

In the Continuously item you can select one of two options: the stand-by mode (un-check Continuously) and the continuous mode (check Continuously). If you select the stand-by mode, the B-scan will not be updated automatically, you need to click the **V** button at the bottom right part of the screen to update it. If you select the continuous mode, the B-scan will be filled and updated continuously.

The Deceleration item enables changing the B-scan filling time. To set the filling time, select value from 1 (quick filling) to 5 (slow filling).

The Color Scheme item shall be used to select a color for displaying of the filled B-scan.

4.4 “C-Scan” Window

The ScanView can save data as the C-scan. The C-scan window is shown in Figure 4.18.

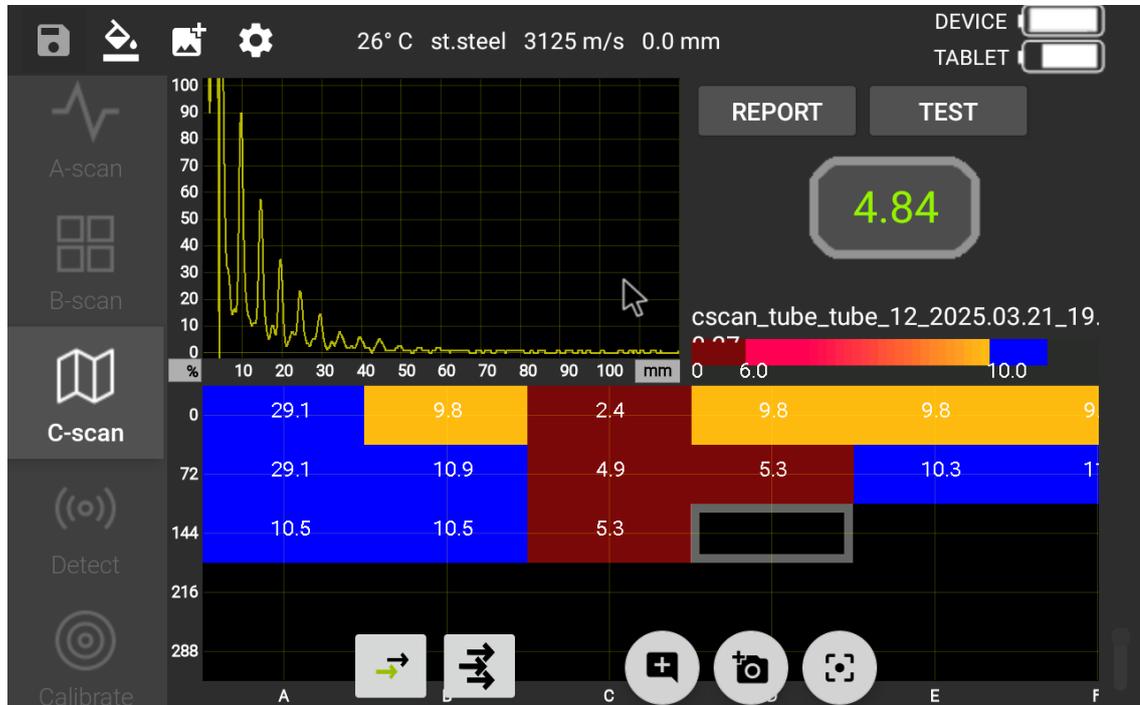


Figure 4.18 – C-scan window

This window consists of the following:

- A-scan window;
- C-scan window;
- Service information window:
 - Report is used to create a report file (Word or PDF);
 - Test is used for inspection operations;
 - Actual thickness measurement data window;
 - Window with X-axis and Y-axis coordinates, thickness measurement data for a specified point. The current position is shown by the rectangle outlined in grey on the C-scan. Prior to the inspection start, this rectangle is at the point with coordinate (0.0);

- Color bar with the specified minimum and nominal thicknesses, the color enables visual assessment of the permissible measurement limits for any object selected;

- The active  or  button enables you to select measurement direction along X-axis or Y-axis;

- The active  or  button enables you to select the direction of control of rows/columns: each row/column from left to right or sequentially changing the direction of control (left to right, then right to left, etc.);

- The  button enables you to add any comment for the selected point;

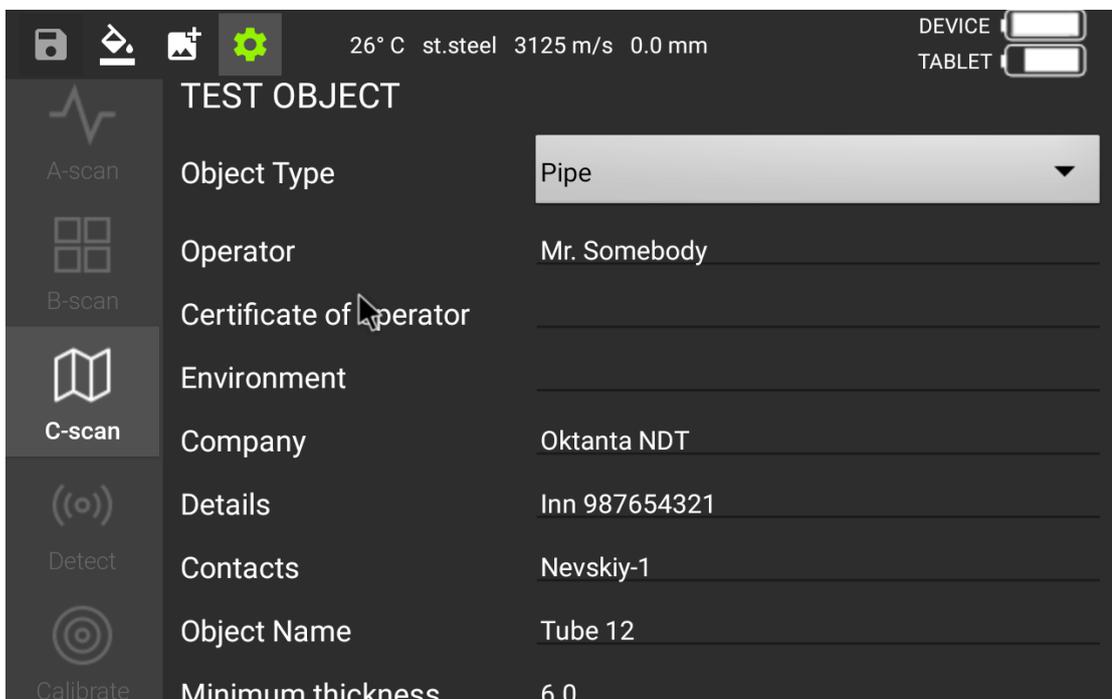
- The  button enables you to add any photo for the selected point;

- The  button enables you to save the current readings of the EMAT in the C-scan area.

4.4.1 Settings

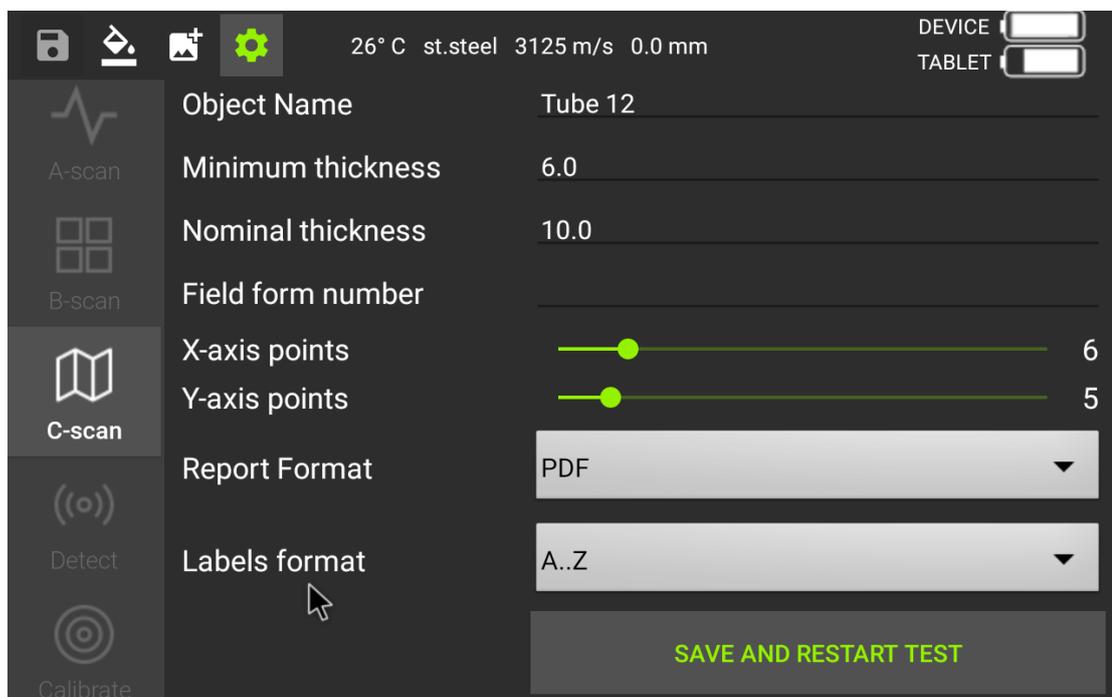
When you click on the  button, the Settings window opens. The window appearance is shown in Figure 4.19, Figure 4.20.

Объект контроля «Труба»



TEST OBJECT	
Object Type	Pipe
Operator	Mr. Somebody
Certificate of Operator	
Environment	
Company	Oktanta NDT
Details	Inn 987654321
Contacts	Nevskiy-1
Object Name	Tube 12
Minimum thickness	6.0

Figure 4.19 – C-scan settings (top of window)



Object Name	Tube 12
Minimum thickness	6.0
Nominal thickness	10.0
Field form number	
X-axis points	6
Y-axis points	5
Report Format	PDF
Labels format	A..Z
SAVE AND RESTART TEST	

Figure 4.20 – Setting up C-scan (bottom of window)

In this window, you can:

4.4.1.1 Set the object type: Pipe or Matrix:

- for the pipe-type object, set the necessary number of the measured points in one ring as well as number of rings along the pipe;

- for the matrix-type object, set the number of the measured points in horizontal plane and the same in the vertical plane.

4.4.1.2 Set the operator's name.

4.4.1.3 Set the Company name, details and contacts.

4.4.1.4 Set the test object name.

4.4.1.5 Set the nominal and minimum thicknesses of the test object. The operator should enter the nominal thickness of the test object and the minimum permissible thickness of the test object. In the course of the C-scan filling, all points with thicknesses less than the minimum permissible thickness will be displayed in dark-red. Such points are visible very well on the background. The points with thicknesses larger than the nominal thickness will be displayed in blue. The points with thicknesses between the minimum and nominal values are displayed on the C-scan with gradient.

4.4.1.6 Set the field form number.

4.4.1.7 Set the number of X-axis and Y-axis points (C-scan).

4.4.1.8 Set the format of the future report (Word or PDF).

4.4.1.9 Select the axes labels option.



4.4.2 Test

Figure 4.21 shows the window appearance.

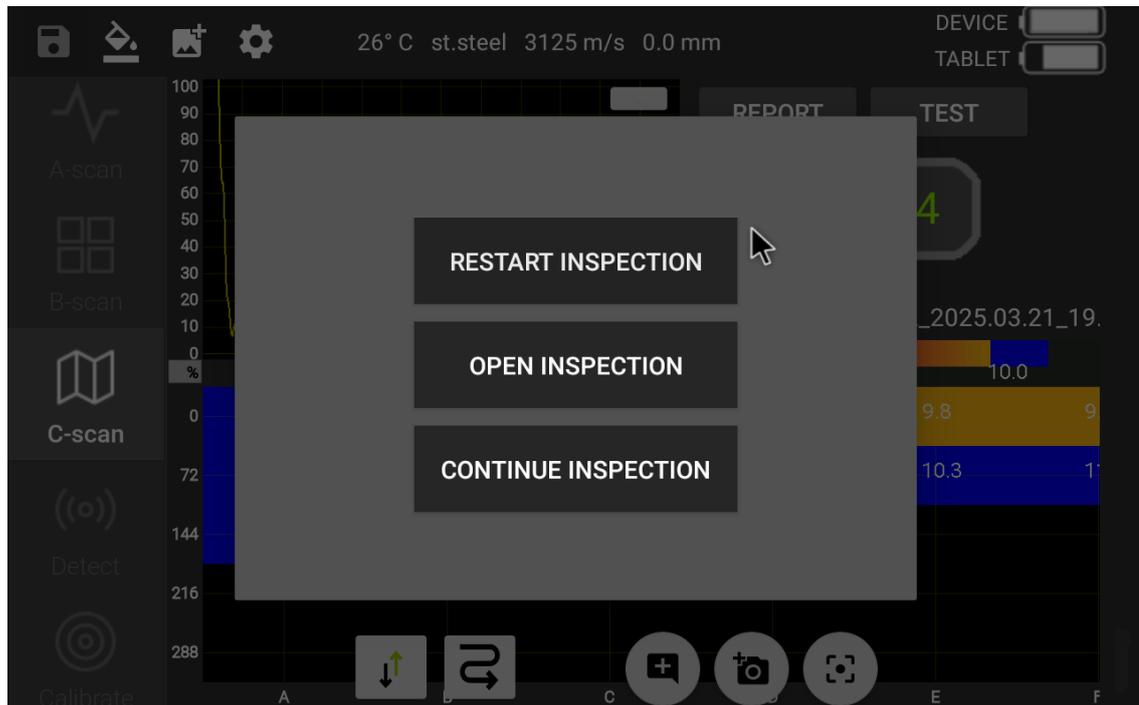


Figure 4.21 – Test window

- Restart Inspection: this menu item becomes active when the user has started the inspection earlier and has terminated it by switching to the other windows of the ScanView. When this item is selected, the EMAT returns to the previously started inspection. The thickness measurement mode is set by default and is designed for measuring thickness of the test object.

- Open Inspection: this item enables you to open the previously saved inspection results. If necessary, the user can repeat measurements for any point in the previously saved archive.

- Continue Inspection: this menu item becomes active when the user has started the inspection earlier and has terminated it by switching to the other windows of the ScanView. When this item is selected, the Device returns to the previously started inspection.

4.4.3 C-Scan Start

Upon entering all parameters, select the Start Inspection item in the Test window to start the C-scan filling.

To fill the C-scan, install the EMAT transducer in the required point and click on the  button; the cursor coordinate increases by one increment and the procedure repeats.

This window (Figure 4.22) shows the A-scan, C-scan, current value of the measured thickness, current coordinate, as well as the minimum thickness which was detected during the whole time of C-scan filling.

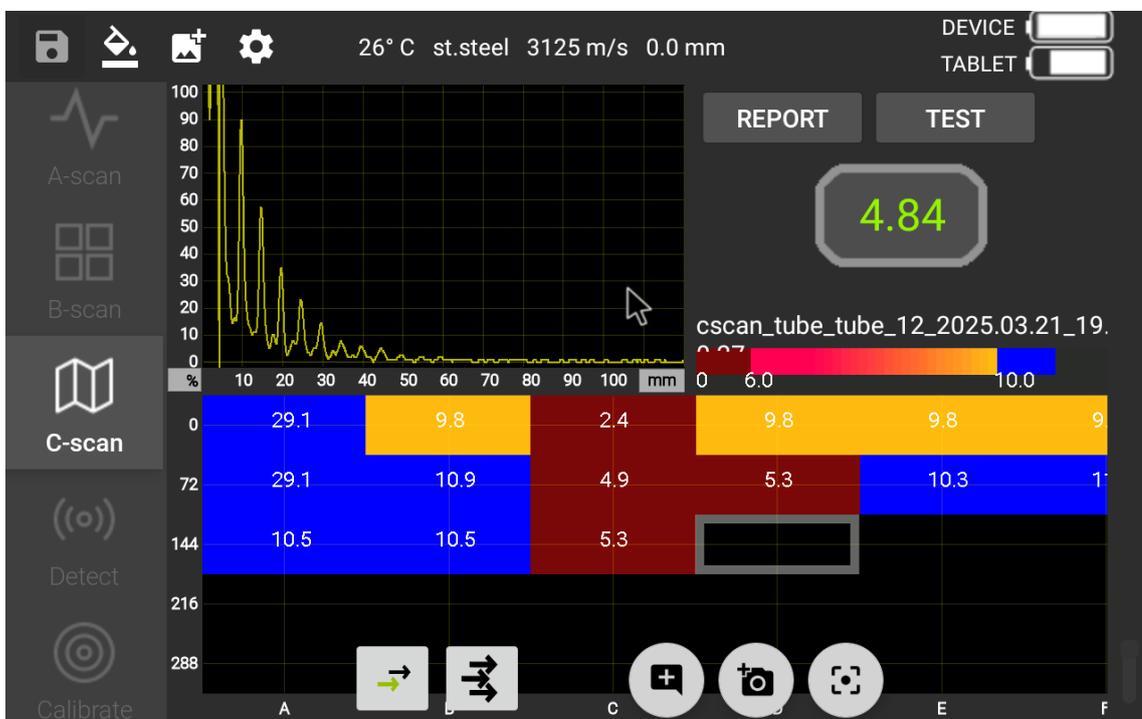


Figure 4.22 – C-scan filling mode

4.4.4 2D/3D Mode

For the matrix-type object, the 3D mode enables visualization of the thickness measurements performed (see Figure 4.23).

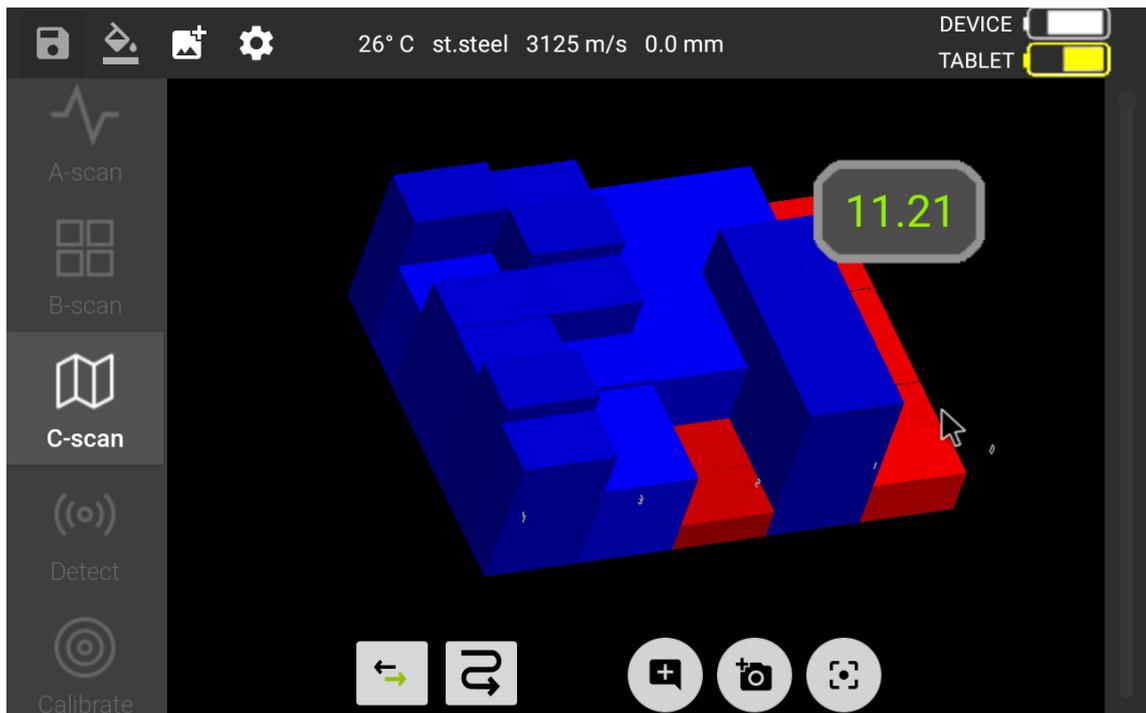


Figure 4.23 – 3D mode for the matrix-type object

For the pipe-type object, the 3D mode enables to obtain the pipe model with the areas where measurements have been performed and see the areas with deviation from normal values (see Figure 4.24).

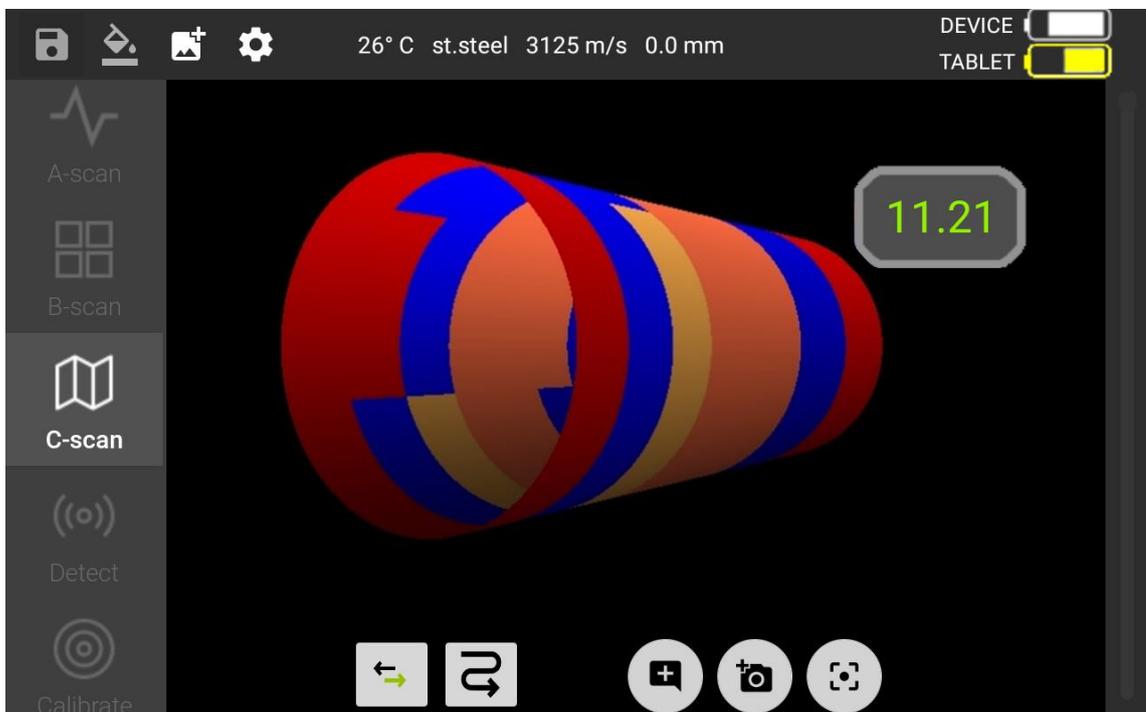


Figure 4.24 – 3D mode for the pipe-type object

4.5 Flaw Detector Mode

You can use the EMAT as a flaw detector to search for pitting corrosion.

The ScanView appearance in the flaw detector mode is shown in Figure 4.25.

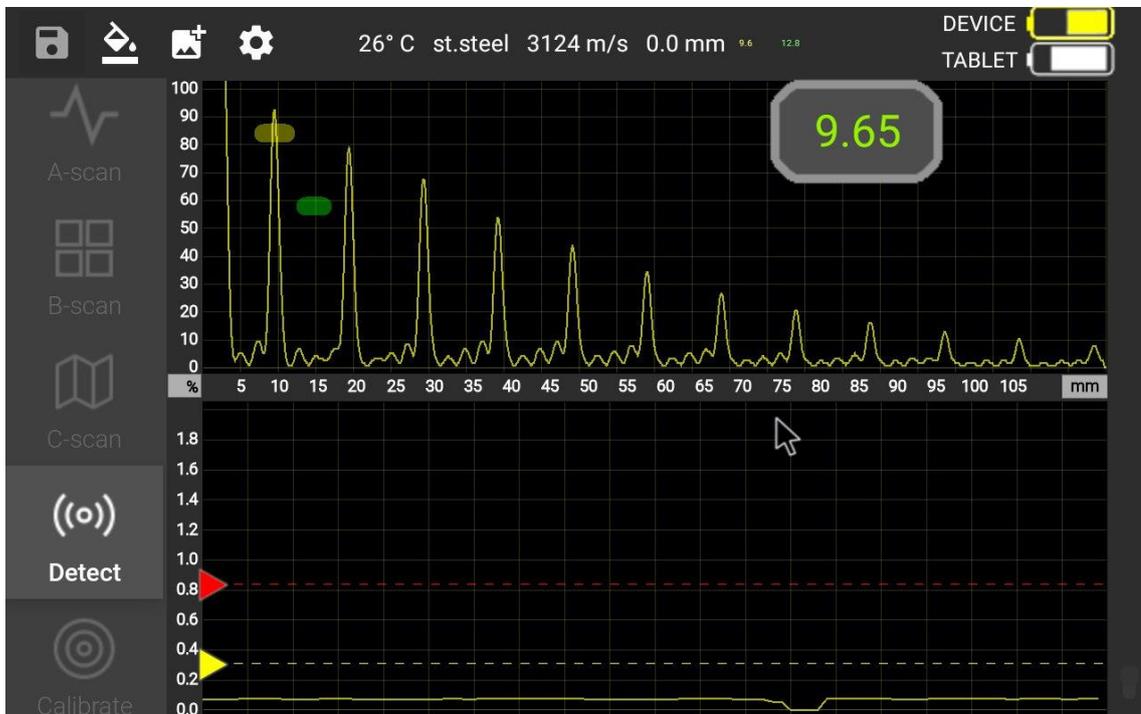


Figure 4.25 – Flaw detector mode

In this mode, the screen is divided into two windows located one below the other:

- the top window includes images of the A-scan and two strobes;
- the bottom window displays the P-parameter.

The pitting corrosion test is performed on the test object with fixed thickness. The first strobe shall be located so that it captures the first bottom signal. The second strobe shall be located between the first and the second bottom signals so that it does not overlap them.

The P-parameter is the ratio of the amplitude of maximum in strobe 2 to the amplitude of maximum in strobe 1. Without defects, this ration is close to “0” as there are no echoes between bottom signals. With the pitting corrosion defects, the amplitude of the first bottom signal drops and, at the same time, weak signals appear between the bottom signals due to reflection from the defect. In this case, the value of the P-parameter increases.

In the lower window, there are two thresholds that can be set by the user (red and yellow triangle). Exceeding the threshold due to the defect presence is accompanied by a sound signal. The sound signals for two thresholds can be set in the application settings.

4.6 Calibration Mode

The ScanView appearance in the calibration mode is shown in Figure 4.26.

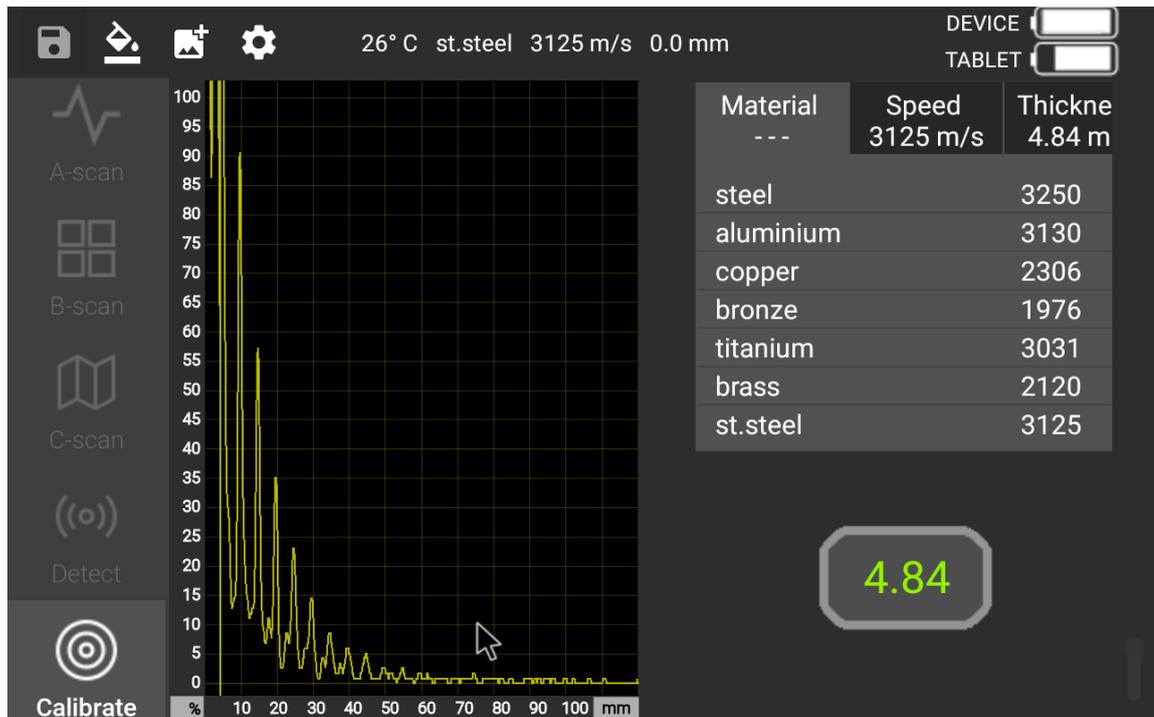


Figure 4.26 – Calibration mode (material selection)

The ScanView has three calibration modes:

- Test object material selection from the list;
- Calibration with entering known thickness of the test object;
- Calibration with entering speed of sound.

4.6.1 Material Selection from List

To select the material of the test object from the list, open the “Material” tab (see Figure 4.26) and select the material from the list.

4.6.2 Calibration with Entering Known Thickness of Test Object

To calibrate the speed of sound according to the known thickness of the test object, install the EMAT on the test sample with the known thickness. Then, open the Thickness tab (see Figure 4.27).

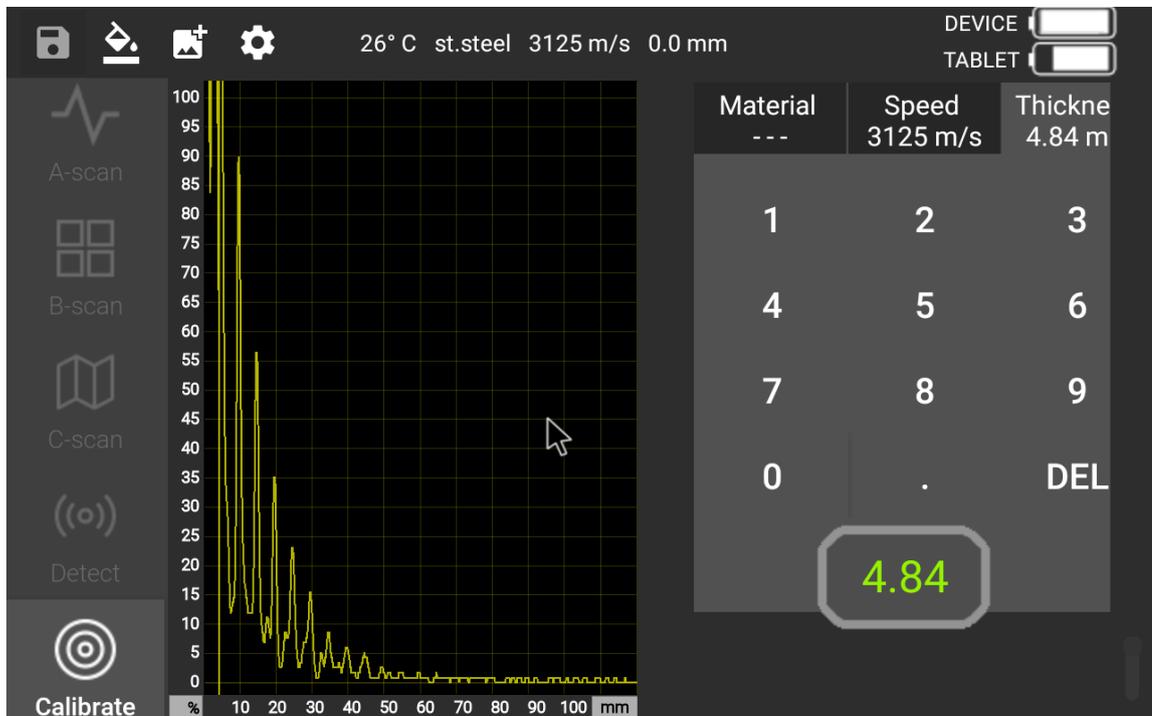


Figure 4.27 – Calibration with entering known thickness of test object

In this tab, use the on-screen numeric keypad to enter the known thickness of the test object and click the OK button. The ScanView calculates the speed of sound in the material and records this value in the EMAT memory.

4.6.3 Calibration with Entering Speed of Sound

To calibrate the EMAT according to the known speed of sound, open the “Speed” tab (see Figure 4.28).

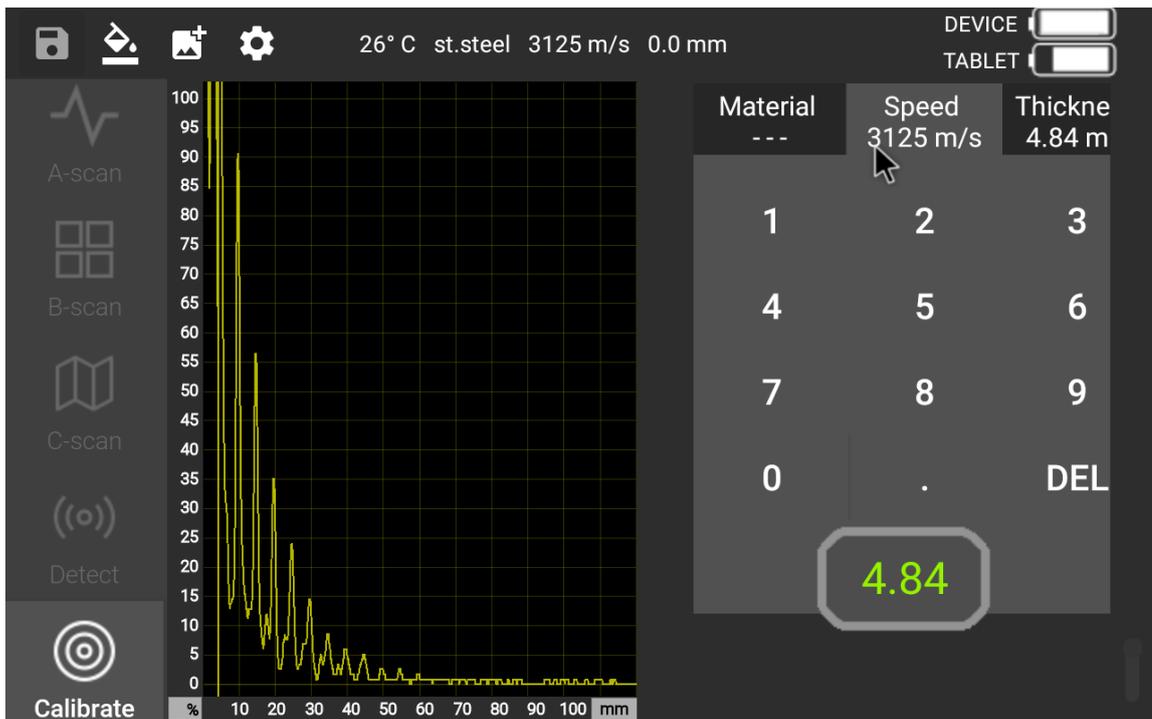


Figure 4.28 – Calibration with entering speed of sound

In this window, use the on-screen numeric keypad to enter the known speed of sound for the test object material and touch the OK button. The software writes the obtained value into the Device memory.

In this tab, use the on-screen numeric keypad to enter the known speed of sound for the test object material. The ScanView records this value in the EMAT memory.

WARNING!

The EMAT uses a transverse wave, not a longitudinal one. The average speed of the transverse wave propagation in steel is 3250 m/s.

4.7 ScanView Exit

4.7.1 Press and hold the Return/Cancel button on the ring until the mode selection message (“Key Mode”, “Mouse Mode”, or “Spatial Mode”) appears.

4.7.2 When the “Key Mode” or “Mouse Mode” message appears, repeat pressing and holding until the “Spatial Mode” message appears.

4.7.3 Double press Return/Cancel button on the ring.