

Operating Instructions



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1. Introduction

This manual provides information for the Proceq Flaw Detector 100 instrument. The user guide has been designed considering that users already have a good knowledge of basic ultrasonic non-destructive testing. It is important that users understand the critical nature of ultrasonic non-destructive testing before operating this instrument. The user guide contains procedure on how to use the Proceq Flaw Detector 100, how to care for it, and explains the functionalities and parameters available according to the type of inspection to be made.

2. Disclaimers and Notices

The following information must be read and understood by users of the Proceq Flaw Detector 100. Failure to follow these instructions can lead to serious errors in test results or damage to the unit. Decisions based on erroneous results can lead to property damage, personal injury, or death. Anyone using this instrument should be fully qualified by their organization in the theory and practice of ultrasonic testing, or under the direct supervision of such a person.

All statements, technical information, and recommendations contained in this manual or any other information supplied by Proceq in connection with the use, features, and qualification of the Proceq Flaw Detector 100 are based on tests believed to be reliable, but the accuracy or completeness thereof is not guaranteed. Before using the product you should determine its suitability for your intended use based on your knowledge of ultrasonic testing and the characteristic of materials. You bear all risk in connection with the use of the product.

3. Risks and Hazards

The Proceq Flaw Detector 100 contains a high-energy, precision transmitter allowing optimum testing results to be obtained by matching the pulse width to the probe characteristics. This circuitry may be damaged by voltage spikes. It is recommended that the instrument be turned off, or the transmitter stopped before changing transducers (probes).

This user guide provides instruction in the basic operation of the Proceq Proceq Flaw Detector 100. In addition to the methods included, many other factors can affect the use of this product. Specific information regarding these factors is beyond the scope of this manual. The user should refer to appropriate textbooks on the subject of ultrasonic testing and thickness gauging for more information.

3.1 Operating Conditions

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.



WARNING!

- Do not operate under water
- Do not operate with fans obstructed
- Operating temperature: -10°C to 45°C (14°F to 113°F)
- Storage temperature: -25°C to 60°C (-13°F to 140°F)
- Maximum relative humidity: 5 to 95% non-condensing
- IP rating: IP66

3.2 Disposal

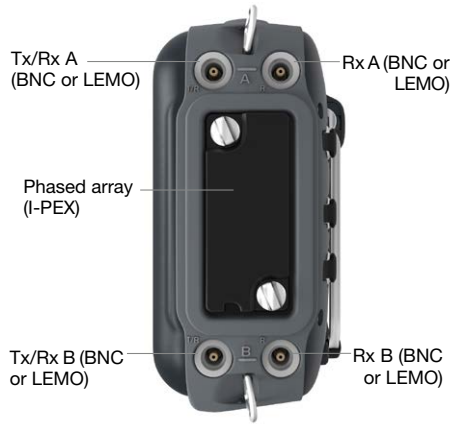


Disposal of electric appliances together with household waste is not permissible. In observance of European Directives 2002/96/EC, 2006/66/EC and 2012/19/EC on waste, electrical and electronic equipment and its implementation, and in accordance with national and local law, electric tools and batteries that have reached the end of their life must be collected separately and returned to an environmentally compatible recycling facility.

4. Hardware Overview

See Proceq Flaw Detector 100 Quick Start Guide for scope of delivery.

4.1 Connectors



Connector ports, side panel right



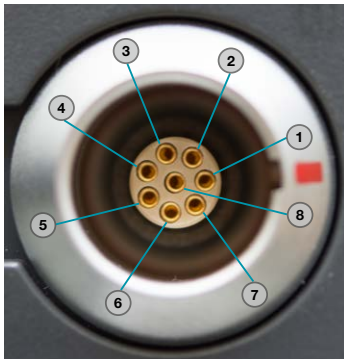
Connector ports, side panel left



Connector ports, back panel

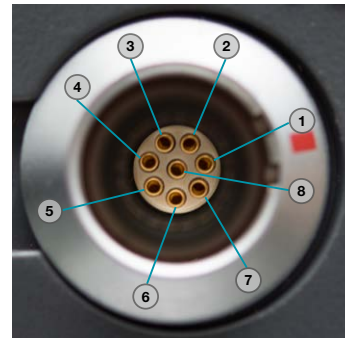
Encoder Connector

Pin #	Signal Name	Description
① (red dot)	VCC	Power 5 V, 300 mA max. Over current protected.
②	ENC1_A	SE input encoder phase A
③	ENC1_B	SE input encoder phase B
④	ENC1_A_P	Differential input positive encoder phase A
⑤	ENC1_A_N	Differential input negative encoder phase A
⑥	ENC1_B_P	Differential input positive encoder phase B
⑦	ENC1_B_N	Differential input negative encoder phase B
⑧ (center pin)	GND	Ground




























I/O (LEMO)

Pin #	Signal Name	Description
① (red dot)	VCC	Power 5 V, 300 mA max.
②	Output 1	Customized by user
③	Output 2	Customized by user
④	Output 3	Customized by user
⑤	Output 4	Customized by user
⑥	Input 1	Cannot be customized
⑦	Input 2	Cannot be customized
⑧ (center pin)	GND	Ground



4.2 Keypad

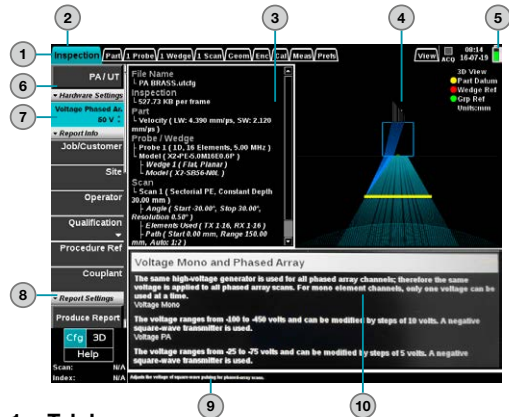
Button	Button Name	USB Keyboard	Short Function Description
	CANCEL	Escape	Cancels an ongoing value change and resets to the previous value. Exit from a popup window.
	Click Wheel	---	Rotate your finger clockwise and counter clockwise to scroll up and down through a menu, to increase/decrease a parameter value, to move cursor in view area or zoom in/out in 3D view. Also acts as LEFT/RIGHT key to move during text entry.
	UP / DOWN ARROWS	Arrows	Moves from one menu item to another. Changes a parameter value. Moves up and down the selected cursor or gate.
	LEFT / RIGHT ARROWS	Arrows	Moves from one menu tab to another. Moves the selected cursor or gate to left and right.
	OK	Enter	Edit and confirm new value or selection.
	MENU	M	Get to the menu and allows menu navigation.
	VIEW	V	Toggles between the various views. Display the Measurements bar (in Live mode).
	CURSOR	C	Toggles between the various cursors of the currently selected view. Also acts as Backspace during text entry.
	dB	D	Changes the gain value of the selected scan. If pressed and held for 3 seconds, it will automatically adjust the gain to 80% of the selected gate (if RefAmplitude is set to 80%).
	WELD	W	Shows or hides the weld overlay for the selected view.
	ZOOM IN/OUT	Z	Zooms in or out of the view, in analysis mode only.
	MAX / MIN	X	Maximizes or minimizes any selected view.
	GATE	G	Focuses or toggles between gates.

	RANGE	A	Changes the range path value of the selected scan.
	F1 / HELP	F1	Access the Contextual Help, Quick Start Guide and User Guide Documentation.
	F2 / INFO	F2	Displays the view information menu or for wizards returns to previous step or page.
	F3 / SET REF	F3	Resets the encoders position to the origin, or for wizards advances to the next step or page.
	PLAY/PAUSE	P	Starts or pauses live acquisition of ultrasound images.
	STOP	T	Stops live acquisition or recording or goes a step in configuration mode.
	RECORD	R	Starts the recording mode permitting data to be saved on completion or termination of the scan.
	SAVE	S	Saves a file (configuration, screenshot or report).
	LOAD	O	Loads a configuration file, displaying afile list to choose from.
	REJECT	---	Illuminated when “reject” mode is activated.
	ALARM1 &2	---	Illuminated when any configured gates are triggered.
	ON/OFF & Battery indicator	---	Powers the instrument on (Hold down) or shuts it down. Light is green when the device is ON.

5. User Interface

The user interface presents two displays; one in for the Configuration mode and one for the Live mode.

5.1 Configuration mode



1. Tab bar

Shows the list of tabs that open the corresponding menu on the left of the screen. Tabs are placed in a logical sequence that should be followed when doing a new inspection configuration. When a tab is selected it is highlighted.

2. Menu bar

Presents all categories and parameters accessible from the selected tab.

3. Summary view

Shows a quick summary of the current configuration settings. Gives an overview of the configuration in one glance.

4. 3D view

Shows the representation of probes, wedges, scans, and part in 3D.

8

5. Battery status

Displays various information about the instrument state, such as the Instrument State, the Time/Date indicator and the Battery Status indicator.

6. Menu items

Displays the list of parameters (numerical, text, lists or action items) that are accessible from the selected tab. The list is scrollable with the \uparrow and \downarrow keys, or by rotating your finger around the Click Wheel. The list can contain more than 10 parameters (going up or down reveals new parameters).

7. Selected item

This item is highlighted when it is selected. The Help view displays the help related to this item. The selected item is green when working in conventional UT only and blue when working in PA or PA and UT combined.

8. Category

When menus contain many parameters, they are grouped in categories. When a category is selected, the Help view displays the list of parameters contained in this category. To open or close a category, click the OK key when the category is selected.

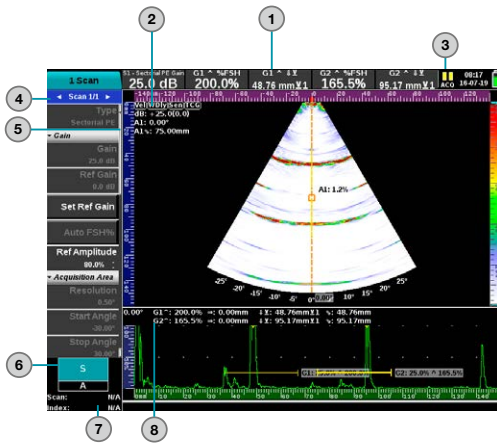
9. Information bar

Displays a short help message related to the selected parameter in the main menu, or displays error messages.

10. Help view

Displays more detailed help text related to the selected parameter in the main menu. It can be maximized to display the entire help text or large images.

5.2 Live mode



1. Measurements bar

Displays various numerical measures extracted from the ultrasonic data. The measures to display can be selected in Measures> Select Measures, in the Acquisition mode. It is displayed only when the **VIEW** key has been pressed, or when the Keep Meas. Bar item has been enabled on the Prefs tab under Display.

2. Calibration indicators

Gives color coded information about calibrations that were performed. Black = not calibrated, green = calibrated, yellow = partial calibration, red = invalid calibration.

3. Instrument state

This area indicates the current device state. Possible states are Play, Stop, Pause, and Record. The label **ACQ** is displayed when a .utcfg configuration file is loaded and ready for acquisition, or **FILE** when a .udata file has been loaded for post-analysis.

4. Item selection

When multiple probes, wedges or scans are configured, their menus are stacked together. This indicator shows which probe, wedge, or scan properties is currently being displayed in the menu.

5. Scrollbar

Use to scroll with a USB mouse.

6. View layout

Shows the selected screen layout. The active view is always shown in blue, and the properties of the active view are located in the View menu.

7. Encoder position

When an encoder is plugged in and configured, the encoder position is shown here, in mm or inches. This value is updated in Acquisition mode only.

8. View measures

This area shows various measures automatically selected depending on the context. They can be hidden by using the **View> Show Measures** option to increase the viewable area.

6. Menus

This section presents the parameters and functionalities for both Configuration and Live modes including all optional features. Depending on the type of inspection, the available categories and items will differ. Menu tree (menu items vary according to the inspection setup)

Inspection
▼ Hardware Settings
<ul style="list-style-type: none"> Voltage Phased Array Voltage Mono Mono Pulse Damping
▼ Report Info
<ul style="list-style-type: none"> Job/Customer Site Operator Qualification Procedure Ref Couplant
▼ Report Settings
<ul style="list-style-type: none"> Procedure Report Report Type Cursors Info Inspection Info Probe Info Wedge Info Scan Info Encoder Info DAC Info DGS Info 3D Views Info Warnings Info Logo Change Logo File Clear Logo File

▼ Menus
<ul style="list-style-type: none"> Lock Setup Short Menu

Part
▼ Properties
<ul style="list-style-type: none"> Material Part Geometry Thickness Velocity LW Velocity SW
▼ Identifiers
<ul style="list-style-type: none"> Component Serial # Location Ref
▼ Weld Geometry
<ul style="list-style-type: none"> Weld HAZ Root Gap (Weld geometry)
▼ Calibration Block
<ul style="list-style-type: none"> Cal. Block Type Cal. Block Serial #

Probe
<ul style="list-style-type: none"> Add... Delete... Load... Probe Type
▼ Identifiers
<ul style="list-style-type: none"> Manufacturer Model Serial
▼ Settings
<ul style="list-style-type: none"> Frequency Pulse Width Connected To
▶ Advanced Settings

Wedge
<ul style="list-style-type: none"> Load... Wedge Type
▼ Identifiers
<ul style="list-style-type: none"> Manufacturer Model Serial
▼ Settings
<ul style="list-style-type: none"> X Offset Contact Surface Cut Angle
▶ Advanced Settings

Scan
<ul style="list-style-type: none"> Add... Delete... Scan Type
▼ Gain
<ul style="list-style-type: none"> Gain Reference Gain Set Reference Gain Software Gain Auto FSH% Reference Amplitude
▶ Acquisition Area
▶ Focusing
▼ TOFD
<ul style="list-style-type: none"> Ruler Lateral Wave Position Theo Time Lateral Wave Theoretical Time Backwall PCS Beam inter Pct Straightening LW Removal

Scan (continued)
▼ TX
<ul style="list-style-type: none"> PRF
▼ RX
<ul style="list-style-type: none"> Signal Rectification Digital Filter Analog filter Sub-Sampling

• Rejection
• Reject Threshold
• Smoothing
• Contouring
• Cont. Decay Rate
• Averaging
• IFT Active
• Acq. Freq
▼ Probe Connect
• Probe TX/RX
▼ Elements
• First Element TX/RX
• Last Element TX/RX
▼ Statistics
• Beams Quantity
• Samples Quantity
• Path Resolution

Geometry
▼ Probe/Wedge 1
• W1 Index Offset
• W1 Scan Offset
• W1 Rotation
▼ Encoding Area
• Enc. Area CL Pos
• Enc. Area CL Offset
• Enc. Area Rotation

Encoding
• Encoding Setup
• Encoders Name
• Reset All Position
▼ Scan Axis
• Scan Axis Name
• Scan Enc Type
• Scan Enc Resolution
• Scan Start Position
• Scan Stop Position
• Scan Distance
• Scan Step
• Scan Invert Direction
▼ Statistics
• Data File Size
• Max Phys. Enc. Speed

Calibrate
• Velocity & Zero Wizard...
• Wedge Delay Wizard...
• Sensitivity/ACG Wizard...
• TCG/DAC/DGS Wizard...
• Encoder Wizard...
• Element Activation Wizard...
• Clear Calibrations
▼ Measures
• Select Measures...
• Encoded Axis Reference

Prefs
• Media Browser
▼ Display
• Auto-Hide Menus
• Default Amplitude Palette
• Default Depth Palette
• Keep Measurements Bar
• Activate VGA Port
• Background Color
• Screen Brightness
▼ System
• Language
• Unit System
• Name Generation
• Date Format
• System Date and Time
▶ Network
▼ Support
• Last Calibration
• Set Calibration Date
• Add Option
• System Update
• Support Console
• About

Cursor
• Name
• Type
• Color
▼ Position
• Level/Threshold
• Surface Dist (Start/Stop)
• Depth (Start/Stop)
• True Depth (Start/Stop)
• Encoding Scan/Index Axis
• Focal Law
• Angle
• Sound Path
• Gate Start/Stop
• Gate Width
▼ Measures
• Gate Follow Peak
• Triggered By
• Dual Polarity
▼ Alarm
• Gate Alarm
• Delete Cursor


View
• Select Layout...
• View Orientation
• Add Cursor...
▶ Palette Properties
▼ Reference A-Scan
• Reference A-Scan (list)
• Save Reference A-Scan
• Save Reference to CSV File
• Import Reference from CSV File
• Save Envelope to Reference List
• Clear Reference List
▶ Data Extraction
▼ Graph Options
• Show B-Scan
• Line Colors
▼ Overlays
• Envelope
• Show Measures
• Show DAC, DGS, and TCC
• Part Overlay
• Half Skip

View (continued)
▶ Rulers & Grids
▶ Scroll & Zoom
▶ 3D View
▶ Select Layout
▶ Display Mode
▶ Orientation
▼ Display
• Part
• HAZ
• Wedge
• XYZ Axis
• Elements
• Wire Frame Display
• Scan Axis
• Stream Direction
▼ Beams (3D view)
• Half Skip
• Beams
• Focal Law
• Beam Divergence
• Scan Area
• Near Field
• Delay
▼ Measurements (3D view)
• Legend

7. Configuration and Operation Workflow




7.1 Loading and Saving Files

To load a file:

1. Press the **LOAD** key and use the Click Wheel  to select one of the file options (configuration, data, report, and recent) and press **OK**.
2. Press the **VIEW** key to select the file list and use the Click Wheel to select the desired file.


File Extension	Description
.utcfg	Contains the entire configuration for an inspection (probe, wedge, type of scan, position of each cursor, layout, color palette to use, etc.).
.utdata	Contains everything a .utcfg file contains plus all the recorded data.
.pdf	Reports created with the Proceq Flaw Detector 100 PDF file. Any other PDF file can be displayed by the Proceq Flaw Detector 100.
.png	Screen captures created with the Proceq Proceq Flaw Detector 100 PNG image standard (PNG: portable network graphics).

3. If there are too many items to choose from in the list, press the **MENU** key to select the left-side menu and use the **Sort By** item to filter the selection.
4. If necessary, press the **LOAD** key to swap media.

Files can be loaded from or saved to the internal solid state drive  or an external USB drive . The Proceq Flaw Detector 100 comes with an extensive list of sample configurations stored on the internal solid state drive . These files start with “Example_...”. They are read only files. Once a file is selected, the configuration summary is displayed in the lower area of the window.

5. Press  to open the selected file.




To save a file:

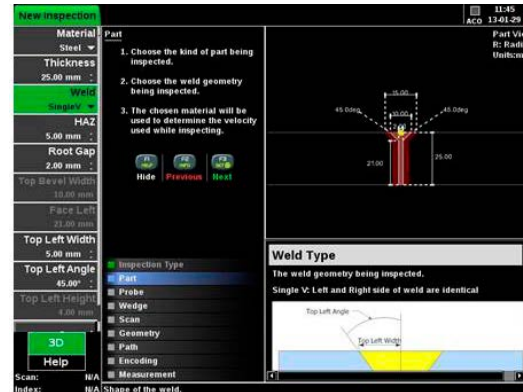
1. To save a configuration (.utcfg), a screenshot, or a report, press the  key.
2. Type the file name using the keypad as you would do with a portable phone.





7.2 Creating a New Configuration

If none of the already existing configuration applies to your inspection setting, you can create a new one from scratch using the New Inspection Wizard.

To create a new configuration:

1. Press the key and, using the Click Wheel , select **Start New Inspection Wizard**.
2. Select the inspection type and press .
3. For the next steps, follow the instructions appearing on the left of the screen and press the  key to move to the next step.



NOTE! To maximize a view, pressing the  key to select the desired view and press the  key. Press the  key to toggle between views. Press the  key to return to the normal display.

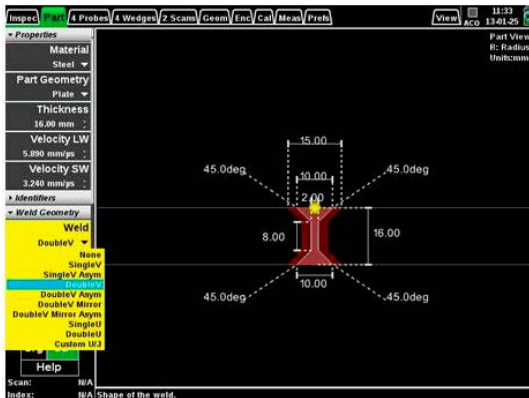
7.3 Defining the Part to Inspect

The part identification and its physical characteristics are entered on the **Part** tab under **Properties** and **Identifiers**. Under **Properties**, you define the longitudinal and/or shear wave velocities. Velocities can be manually entered if they are known or the Velocity Wizard can be used to find them. However, when performing a shear wave (SW) inspection, the longitudinal wave (LW) velocity can be ignored as you will set the wave mode to **SW** on the **Scan** tab under **Acquisition Area> Wave Mode**.

If you are performing a weld inspection, you can specify all weld characteristics on the **Part** tab under the **Weld Geometry** item. Select the appropriate weld type and adjust the bevel sizes and angles.



NOTE! Maximize the 3D view while defining the weld geometry by selecting the 3D view using the **VIEW** key and the press the key.



The calibration block used is defined under **Calibration Block**. There is a list of blocks to choose from or you can enter one manually.

7.4 Loading and Defining Probes

Once the number of probes to be used has been decided, you can load them from the probe database or define them manually.

To load a probe:

1. On the Probe tab, select the Load item and press **OK**. The probe database is displayed.
2. Press **VIEW** to move to the top of the list and use the Click Wheel to select the probe file.

3. Click **OK** to load the file.

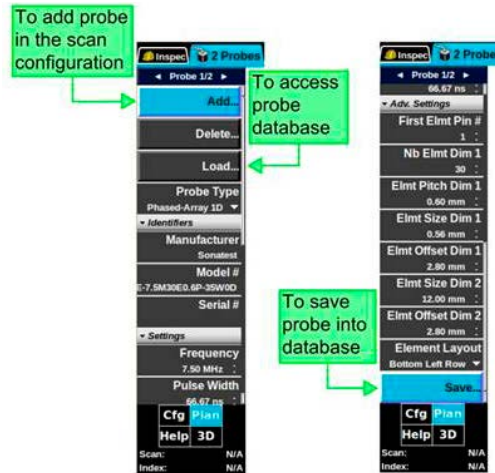
To define a new probe:

1. On the **Probe** tab, select **Add**.
2. In the **Create new probe** dialog box, select the type of new probe to configure or use an existing probe to modify it and press **OK**.



NOTE! Maximize the help view to access the complete instructions by pressing the **F1 HELP** key. Pressing the **VIEW** key while the help view is maximized switches from view to view. Press the key to return to the normal display.

3. Save the probe into the database using the Save item at the bottom of the menu.

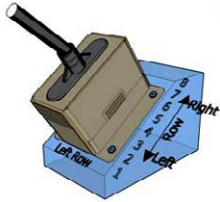


7.4.1. Element Layout (PA only)

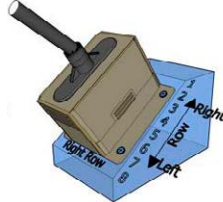
The **Element Layout** item refers to the position of element number 1 when attached to a wedge. Element number 1 is the element where the first delay is triggered and its position is usually engraved on the probe casing. The available element layouts for 1D probes are listed below.

For 1D array probe

LR Left row

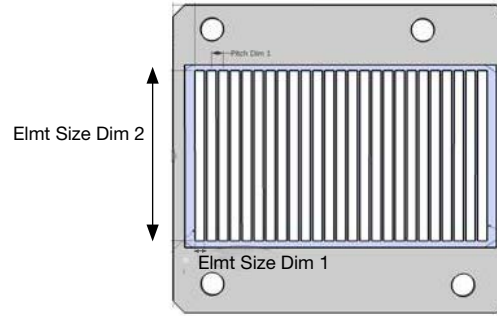


RR Right row



The Proceq Flaw Detector 100 only supports 1D Linear PA probes at this time.

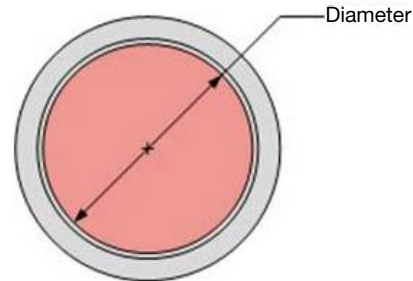
For phased array probes, the **Elmt Size Dim 1** and **Elmt Size Dim 2** items refer to the size of individual elements along a dimension, either dimension 1 (X-axis) or dimension 2 (Y-axis).



Element size dimension 1 and element size dimension 2

7.4.2. Conventional Diameter

For round conventional probes, the **Diameter** item replaces both dimensions 1 and 2.



7.5 Loading and Defining Wedges

For each probe, a wedge is automatically created. This means that probe 1 is automatically linked with wedge 1 and probe 2 with wedge 2, etc.

When no wedge is attached to the probe, the wedge type has to be set to **None**.

To load and define a wedge:

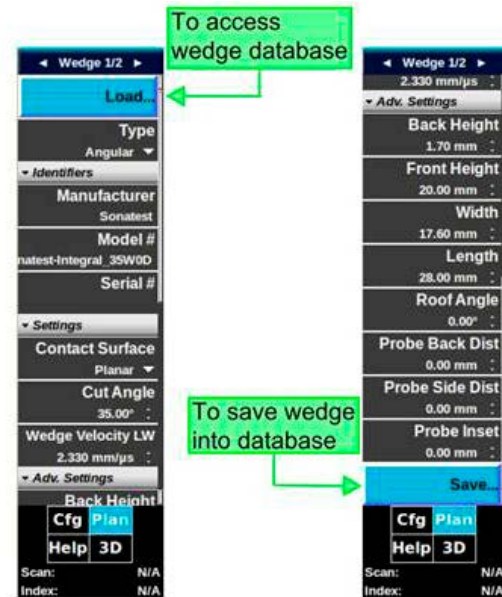
1. On the **Wedge** tab, select the **Load** item and press **OK**. The wedge database is displayed.
2. Press **VIEW** to move to the top of the list and use the Click Wheel to select the probe file.



3. Press **OK** to load the file.

If you need help to define the wedge parameters, you can open the help view by pressing the **F1 HELP** key.

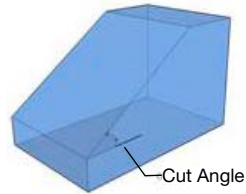
4. Save the wedge into the database using the **Save** item at the bottom of the menu.



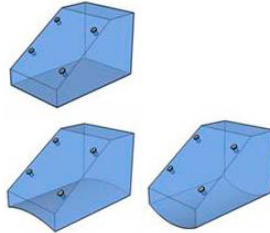
The **Wedge Type** item allows you to specify the type of wedge used if any. Select either **Angular** or **Flat**.

The **Contact Surface** item allows you to select the wedge surface. If the surface is not a planar one, a list of shapes is available for curved surfaces such as pipes, tubes, nozzles, axles, billets, etc.

The **Cut Angle** item refers to the angle of the wedge. Unlike for conventional testing, where the refracted angle is usually used, phased array uses the actual wedge angle. To convert the refracted angle in steel to the wedge cut angle, the Snell's law is used. In the formula, the incident angle correspond to the wedge cut angle.

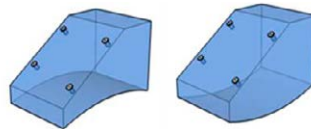


The **Radius** item refers to the wedge curvature when a curved surface is selected in the **Contact Surface** item under **Settings**.

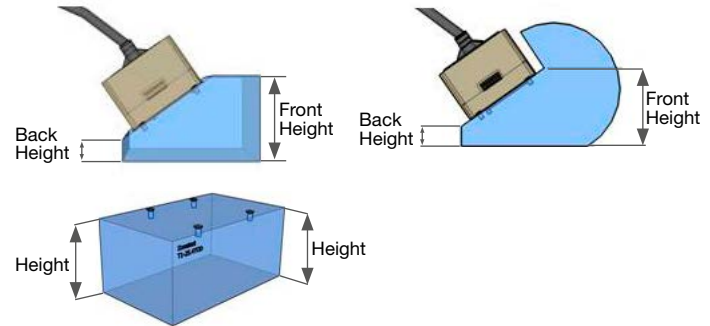


Planar, Axial concave and Axial convex are supported in the software.

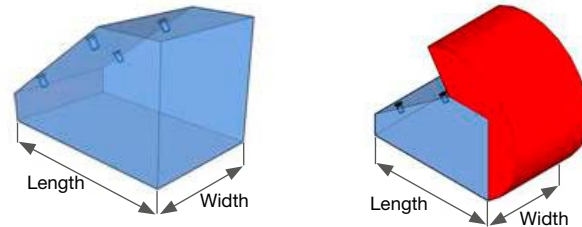
Circumferential concave and Circumference convex are unsupported in the software.



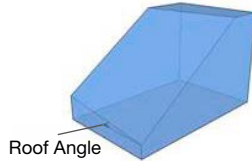
The **Back Height** and **Front Height** items allow you to define the back and front height of an angular wedge. The back height is crucial to the exit points calculation. If you are using a special wedge, such as a snail wedge, you need to measure the front height where the slope stops.



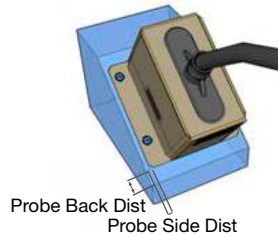
The **Width** and **Length** items allow you to define the area of the wedge in contact with the inspection surface. If you are using a special wedge, like a snail wedge or a wedge with extra parts, you have to exclude these parts when you measure those values. See the examples below, the red part is not included in the length measurement.



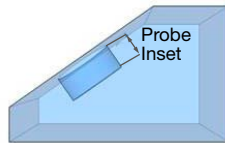
The **Roof Angle** item allows you to define a complementary angle for the wedge. Wedges with roof angle are usually used in pitch-and-catch setups.



The **Probe Back Dist** and **Probe Side Dist** items allow you to set the distance between the corner of the probe housing and the edge of the wedge.



The **Probe Inset** item allows you to define the depth the transducer is recessed into the wedge, which is the actual depth of the hole inside the wedge.



7.6 Positioning the Probe on the Part

The **Geometry** tab defines the scan plan; that is defining the location of each probe/wedge on the part to be scanned.

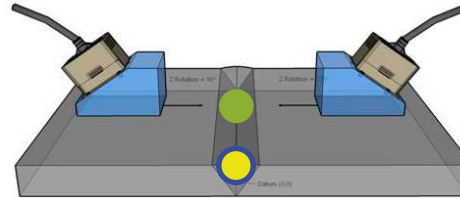
As required by many codes, the position of the probe relative to the weld needs to be known and recorded.

The index and scan offsets allow you to translate the probe/wedge while

the **Rotation** item allows you to rotate it around the reference point. The **Follows** item defines probe position with the probe center spacing (PCS).



NOTE! Set the rotation to 90° and 270° to have two probes facing each other. The Proceq Flaw Detector 100 only supports conventional UT and TOFD multi-probe setups at this time.



Probes rotated at 90 and 270 degrees relative to the scan axis

In a multi-probe scenario, the probes/wedges are defined relative to a group reference (**Grp Ref**) mark represented by a green dot on the plan view. The group reference point can be positioned anywhere, but a good practice is to align it with the weld center line and the probe/wedge center.




Once the group reference ● point has been defined, the last step is to properly define the reference system in relation to the **Part Datum** ●; an arbitrary point on the part under test. All ultrasonic data collected shall be traceable to this point called datum; which, is the (0,0) reference. When possible, it is recommended to superpose the group reference and the part datum points when using simple scan patterns. Otherwise, the items **Enc. Area** can be used to move the group reference point.

7.7 Setting up the Encoder or Time Based Scan


There are 2 types of inspections:

- Manual (free running) with time based recording.
- Encoded (encoder triggered) with ultrasound pulses emitted at specific positions provided by the encoder.

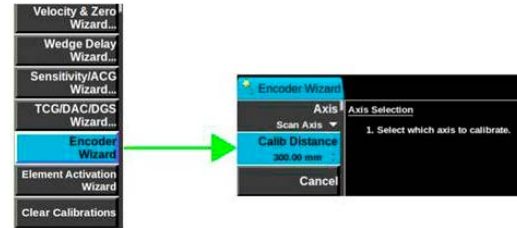
To set the encoder:

1. Press the  key on the Click Wheel  to select the Encoding tab.
2. Press  to edit the **Encoding Setup** item.
3. Select one of the following parameters:
 - **None** for manual (free running) inspection
 - **Scan Axis Only** for a one-axis encoded inspection
 - **Scan & Index Axes** for a two-axis encoded inspection

Set the rest of the parameters according to your encoder setup, especially the **Encoder Resolution** item for each axis.

4. Press play  and select appropriate layout.
If you have selected **Scan Axis Only**, try moving your encoder/scanner.

If the encoder resolution is unknown, use the Encoder Wizard on the **Calibrate** tab.



- The **Scan Start Pos** item defines the position from where the acquisition will be starting relative to the reference point.
- The **Scan Distance** item defines the distance over which data will be collected.
- The **Scan Step** item defines the distance between each data collection position.
- Under **Statistics**, the **Max Phys. Enc. Speed** item indicates what will be the maximum scanning speed with the current setup. Increasing the pulse repetition frequency (**PRF** item on the **Scan** tab under **Tx**) will increase this number since more data frames will be acquired per second.

The encoder position is displayed at the bottom left corner and is active in Acquisition mode only.

7.8 Defining Inspection Parameters

The **Inspection** tab is where you define the inspection strategy. **Hardware Settings** contains items that are common to all scans, like the voltage and the acquisition frequency. This is also where general information relative to the inspection can be entered for further reference in reports and examination records (under **Report Info** and **Report Settings**).

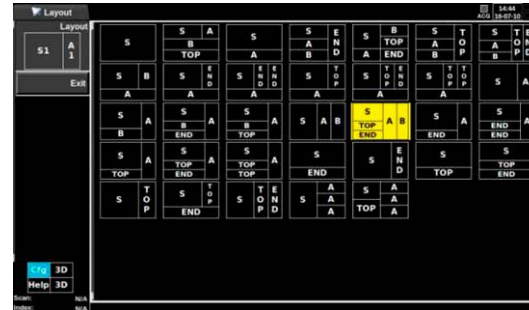
7.9 Selecting a View Layout

Layouts available at a given time vary according to the number and the types of scans selected. When these parameters change, an appropriate layout is always selected automatically.

The type of inspection determines the views that are available. Table 9 lists the different view types.

View	Description
A	A-scan view
B	B-scan view
C	C-scan view
D	D-scan view
S	S-scan view
TOP	Top view
END	End view
TOFD	TOFD view
MTOP	Merged Top view
MC	Merged C-scan
B-LOG	Thickness B-Scan view

Select the View tab and press  to open the list of available views.



Use the Click Wheel  to select the desired layout.

7.10 TOFD

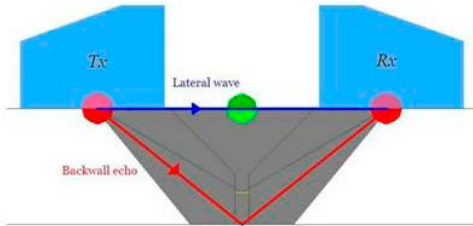
The **TOFD** category is only available when making inspection using the time-of-flight diffraction method.

1. Ruler Lateral Wave Position

The **Ruler LW Position** item allows the user to set an offset (in μs) from the start of the acquisition of the A-scan to the position of the lateral wave (first positive peak). This offset is always positive and is shown as a white line in the A-scan view. Changing this parameter will not affect the A-scan signal. This offset is used to correct or fine tune the position of the TOFD depth ruler. It is also used as straightening and lateral wave removal tools.

2. Theoretical Time Lateral Wave

The **Theo. Time LW** item is a read only parameter that indicates the time distance that represents the position of the lateral wave (theoretical). This parameter corresponds to the shortest sound path of the scan.



Theoretical time lateral wave and backwall

If the relative error on the theoretical time of the lateral wave position is more than 10% with the experimental time, at least one of the following parameters might be incorrect: the material thickness, the material speed, the wedge angle, or the distance between the two TOFD probes.

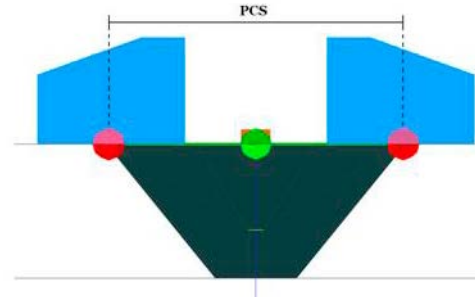
3. Theoretical Time Backwall

The **Theo. Time BW** item is a read only parameter that indicates the distance that represents the position of the backwall (theoretical). This parameter corresponds to the longest sound path of the scan.

If the relative error on the theoretical time of the backwall position is more than 10% with the experimental time, at least one of the following parameters might be incorrect: the material thickness, the material speed, the wedge angle, or the distance between the two TOFD probes.

4. Probe Center Spacing PCS

The **PCS** item is a read only parameter that, in TOFD inspections, indicates the distance between the beam exit point of each probe (PCS). This is the result of the distance entered on the **Geometry** tab for the **Spacing/PCS** item when two probes are linked by the **Follows** item on that same tab.



PCS is the distance between the two exit points (red dots)

5. Beam Intersection Percentage

The **Beam Inter Pct** item is a read only parameter that indicates the depth of the nominal beam at the PCS location (in % of part thickness). This depth is shown in the 3D view as a small yellow line and should ideally be 66.6% of the part thickness.

6. Straightening

Straightening is an analysis tool to help define the lateral wave position and align all A-scans on a common lateral wave. This counteracts the effect of unwanted signals at the front wall (such as surface breaking cracks) that disturb the lateral wave produced by the sound propagation just below the part surface.

7. Activate Straightening

When set to **Yes**, the **Activate Straightening** item enables the straightening of the lateral wave in the TOFD view. Before activating the straightening feature, the lateral wave position must be configured on the **Scan** tab, under **TOFD**, in the **Ruler LW Pos.** item.

8. Lateral Wave Trigger Tolerance

The **LW Trig. Tolerance** item allows the user to define the time interval (in μs) used to make the straightening correction. To view the changes made to this parameter, the **Straightening Indicators** item must be set to **Yes**.

9. Lateral Wave Removal

The **LW Removal** category allows the detection of defects near the surface by removing the box that has been defined in the straightening procedure. If the box width is set properly, only the lateral wave will be hidden in the TOFD view. Removing the lateral wave is a visual effect of the TOFD view, no data will be erased from the data file.




10. Activate Lateral Wave Removal


The **Activate LW Removal** item, when set to **Yes**, enables the removal of the lateral wave. The **LW Removal Indicator** item is then automatically set to **Yes**.

7.11 Starting Data Acquisition

The Proceq Flaw Detector 100 has 3 operation modes:

- Configuration
- Acquisition/Recording
- Analysis


These modes use ordinary controls: stop , play , and record .

After opening a file, the Proceq Flaw Detector 100 always starts in Configuration mode. Before starting the data acquisition, it is a good practice to review your setup. At any time, you can press the stop  to return to the Configuration mode.

8. Calibration Wizards

This chapter presents the wizards available to help you calibrate the unit for the inspection to be made.

8.1 Available Calibrations

Once the Proceq Flaw Detector 100 is in Acquisition mode (the  key having been pressed), the **Calibrate** tab allows access to calibration wizards. If you are using a multi-scan setup, each scan must be calibrated independently.

Wizard description and applicability to each scan type

Wizard Type	Wizard Description	Scan Type		
		PA	Conventional	TOFD
Velocity and Zero Wizard	Guides you in a step by step fashion to calibrate the material velocity and zero point.	•	•	*
Wedge Delay Wizard	Guides you in a step by step fashion to calibrate the wedge delay (compensates for wedge wear).	•	**	
Sensitivity/ACG Wizard	Guides you in a step by step fashion to calibrate the sensitivity (also known as ACG (angular corrected gain). It is used to compensate for the sound attenuation variation in the S-scan	•		

TCG/DAC/ DGS Wizard	Guides you in a step by step fashion to calibrate the TCG, DAC or DGS curves (time corrected gain, distance amplitude correction, distance gain sizing).	• TCG/ DAC	•	
Encoder Wizard	Guides you in a step by step fashion to calibrate the encoder resolution.	•	•	•
Element Activation Wizard	Guides you in a step by step fashion to evaluate the probe elements sensitivity and find defective elements.	•		

Conventional UT, wedge and reference type applicability

Conventional UT Wizard Type	Wedge		
	None	Flat	Angular
Velocity and Zero Wizard	SDH reference (IIW, Navship) Thickness reference	SDH reference (IIW, Navship) Thickness reference	SDH reference (IIW, Navship) Radius refer- ence (IIW) Notch refer- ence
TCG/DAC/DGS Wizard	SDH reference (IIW, Navship) Thickness reference	SDH reference (IIW, Navship) Thickness reference	SDH reference (IIW, Navship) Radius refer- ence (IIW) Notch reference

* It is not achieved within a wizard, it is done by calibrating the non-linear ruler (“Scan: LW Offset” and “Scan:BW Offset” parameters).




** Not applicable, achieved by the Velocity and Zero Wizard.





Phased array, wedge and reference type applicability (optional)

Phased Array Wizard Type	Wedge		
	None	Flat	Angular
Velocity and Zero Wizard	SDH reference (IIW, Navship) Thickness reference	SDH reference (IIW, Navship) Thickness reference	SDH reference (IIW, Navship) Radius reference (IIW) Notch reference
Wedge Delay Wizard	Not applicable	SDH reference (IIW, Navship) Thickness reference	SDH reference (IIW, Navship) Radius reference (IIW) Notch reference
Sensitivity/ACG Wizard	SDH reference (IIW, Navship)	SDH reference (IIW, Navship)	SDH reference (IIW, Navship) Radius reference (IIW) Notch reference
TCG/DAC/DGS Wizard	SDH reference (IIW, Navship) Thickness reference	SDH reference (IIW, Navship) Thickness reference	SDH reference (IIW, Navship) Radius reference (IIW) Notch reference
Element Activation Wizard	SDH reference (IIW, Navship) Thickness reference	SDH reference (IIW, Navship) Thickness reference	SDH reference (IIW, Navship) Radius reference (IIW) Notch reference

8.2 Cursors

Depending on the selected view, different cursors will be available. The following table presents the available cursors.


Type	Description	Drawing
Gate	<p>The gates are used to make flank and peak measurements in A-scan views. When the gate is triggered by a signal, the peak amplitude level is displayed as well as its absolute position in true depth ↓, surface distance ⇒, and sound path ⇩. All sound path measurements use the setting of the Travel Mode item on the Scan tab; therefore, measurements can either represent the full or half sound path in the part (in mm or inches), or the full or half sound time spent in the part (in μs). When the rectification is set to None, the values range from -100% to 100% and when set to Full, from 0 to 100%.</p> <p>Quick access key: </p>	
Extractor	<p>The Extractor cursors are used to extract A-scans from the L/S-scan.</p>	

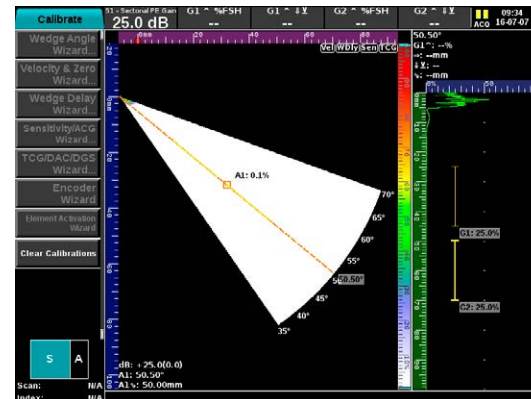
Cartesian	The Cartesian cursors, also called crosshair cursors, are used to make surface distance and depth measurements in S/L/A-scan.	
Angular	The Angular cursors are used to perform sound path measurements in S/L- scan.	
Extractor Box	The Extractor Box is used to extract Top/End views from the L/S-scan.	
Hyperbolic	The Hyperbolic cursors are used to evaluate surface distance and depth in a TOFD (time of flight diffraction) scan. The TOFD view is a B-scan type view with a pitch-and-catch probe configuration. The TOFD view uses a non-rectified color palette (black: -100%, white: +100%).	

8.3 Using the Extractor Cursor

Sectorial scan (S-scan) and Linear scan (L-scan) are made of stacked A-scans. It is possible to look at each individual A-scan (focal law) composing them by moving the Extractor cursor. The Extractor is represented as a dashed line.

To use the Extractor cursor:


1. Select a view layout that contains at least one A-scan.
2. In Acquisition mode, press the **VIEW** key (once or multiple times) to select the view S-Scan or L-Scan view.
3. Press the **CURSOR** key (once or multiple times) to select the Extractor cursor.
4. Use the Click Wheel  to move the cursor and, on the A-scan view, look at the resulting display.

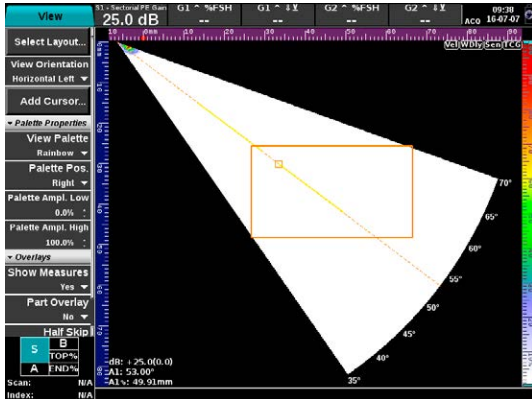


8.4 Using the Extractor Box

The extraction box, also referred as the square box, is used to generate Top and End views.

To use the Extractor box:

1. In Acquisition mode, press the VIEW (once or multiple times) to select the S-Scan or L-Scan view.
2. Press the CURSOR key (once or multiple times) to select the Extraction box.
3. Use the Click Wheel  to move the box.
4. Press OK to modify the box size, then use the Click Wheel to change the box size.
5. Press OK again to accept the changes.




9. Customizing the Measurement Bar

The Measurements bar is displayed at the top of the screen in the Acquisition mode when an inspection view is selected (press the VIEW key). It can also be displayed permanently in Acquisition mode by enabling the **Keep Meas. Bar** item under **Display** on the **Prefs** tab.



Measurement bar at the top of the screen

To select measures for cursors:

1. Press  if you're not in the Acquisition mode.
2. Select the **Measures** tab and, on the menu bar, select **Select Measures** and press OK.
3. In the list, select one of the measurements (1 through 5), and press OK to modify it.

The following table presents the description of each type of measurements.

Identifier	Cursor Type
A	Angular/Extractor
C	Cartesian
E	Frame Extractor
G	Gate
H	Hyperbolic (TOFD)
I	IFT Gate (interface)
SQ	Extractor Box
FH	Freehand
DAC	Distance amplitude curve
DAC	Distance Gain Size curve

Ref	Reference Point
^	Peak (or point)
/	Flank
Start	Start point of a gate
Stop	End point of a gate
-X	Surface distance minus X offset

Meas	Measurement Type
%FSH	Amplitude in percent
%REF	Amplitude referenced to the reference gain, or to the curve (DAC or DGS)
⇓	Depth
⇓∇	True depth (considering half-skip)
⇒	Sound path (from exit point)
⇒⇒	Surface distance (from wedge reference)
AWS-A	Indication Level (IL)
AWS-B	Reference Gain (RG)
AWS-C	Attenuation Factor (AF)
AWS-D	Indication Rating (IR)

10. Taking Screen Captures and Creating Reports

You can produce screen captures and reports from the unit.

To save a screen capture or a report:

1. To save a screen capture or a report, press the **SAVE** key.
2. Type the file name using the keypad as you would do with a portable phone.

A screen capture is a picture of what is currently displayed on the unit screen. It is saved as a PNG file.

The content of the report can be customized. You access the report information on the Inspection tab, under Report Info and Report Settings items. The Proceq Flaw Detector 100 allows you to produce defect reports. These reports are produced in PDF format (see www.adobe.com to get a free PDF reader).


To produce a report:

1. Press the **SAVE** key.
2. In the **Save Option** dialog box, select **Report** and, on the keypad, press **OK**.
3. Press the **LOAD** key to select the media (internal drive or external USB key).
4. Type report file name using the keypad as you would do with a portable phone.
5. Press **OK**.



NOTE! The report can be produced from a configuration or an acquisition.

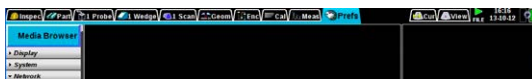
To customize a report:

1. Press the **MENU** key and use the Click Wheel  to select the **Inspection** tab.
2. On the **Inspection** menu, select **Report Settings** and press **OK**.
3. Set the items according to your requirements:
 - **Report Type** (short or long)
 - **Cursor Info** (yes or no)
 - **Inspection Info** (yes or no)
 - **Probe Info** (yes or no)
 - **Wedge Info** (yes or no)
 - **Scan Info** (yes or no)
 - **Encoder Info** (yes or no)
 - **DAC Info** (yes or no)
 - **DGS Info** (yes or no)
 - **3D Views Info** (yes or no)
 - **Warnings Info** (yes or no)
 - **Logo File** (yes or no)

11. Managing Files Using the Media Browser

The role of the media browser is to allow for local file management and file transfers. Although it was made for keypad operation, mouse interaction provides a lot more productivity. The media browser is only accessible when the unit is in Configuration mode and with a file already loaded.

Select the Prefs tab and, on the menu, select Media Browser and press **OK**.



Many filters can be used to look for a specific file more easily:

- **All files, utcfg** (configuration), **utdata** (data), **Report**, **All Probe**, **UT Probe**, **PA Probe**, **Wedge**, **Screenshot**, **Image files**, Reference A-Scan.

Four choices of listing order are available:

- **File Type**, **Date modified**, **File name**, **File path**.

The following functions can be achieved when you press **OK** twice for the selected file:


- **Rename**
- **Delete**
- **Move To**
- **Copy To**

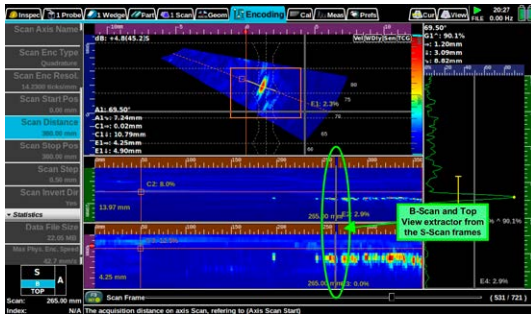


12. Data File Analysis

You can review all recorded data files (.utdata) directly on the unit. Once the file is loaded, it is displayed in Configuration mode with most items unavailable (grayed out) to ensure data integrity.

To look at the recorded data, press . There are various ways to sift through the data:

- You can use the scroll bar located at the bottom of the views; press **F3**  to access it and then use the arrows on the Click Wheel to move it.
- You can select a layout that includes a view showing the scan axis. Moving the Extractor cursor allows you to look at each point of the S-scan.



13. Troubleshooting and Support

This chapter presents troubleshooting tips, how to go about updates and our contact information.

13.1 Troubleshooting Tips

The Proceq Flaw Detector 100 unit does not start when pressing the POWER button.

- Make sure that a charged battery is in the unit or that the power cord is connected.

The Proceq Flaw Detector 100 appears to have “frozen”. How do I shut it down?

- In the rare event that an emergency shutdown is required, hold the POWER button for 5 seconds to hard-shutdown the unit. Do not do this in normal situations, since this shutdown method might result in file data loss.

13.2 Update Procedure

The internal software of the Proceq Flaw Detector 100 can be updated as new versions become available. The new software can be loaded onto a USB key to transfer it to the unit. Refer to the instructions provided with the new software for details.

Updates are available at www.Proceq.com; select **Downloads > Proceq Flaw Detector 100**.

13.3 Service and Warranty Information

Proceq is committed to providing complete support for each testing instrument by means of our global service and support facilities. Furthermore, each instrument is backed by the standard Proceq 2-year warranty.

Standard warranty

Electronic portion of the instrument: 24 months

Mechanical portion of the instrument: 24 months

Supporting accessories: 3 months

Extended warranty

When acquiring a new instrument, max. 3 additional warranty years including yearly calibration can be purchased for the electronic portion of the instrument. The additional warranty must be requested at time of purchase or within 90 days of purchase.

14. Ordering Information

14.1 Units

Part No.	Description
792 10 000	Proceq Flaw Detector 100 (Lemo)
792 20 000	Proceq Flaw Detector 100 (BNC)

14.2 Software upgrades

Part No.	Description
792 50 001	Software Upgrade to TOFD
792 50 002	Software Upgrade to PA 16:16
792 50 003	Software Upgrade to TOFD and PA 16:64
793 50 007	Software Upgrade CSV Output
792 50 008	Software Upgrade Proceq FD Link Software

14.3 Software upgrades after purchase of the main unit

Part No.	Description
792 50 004	Software Upgrade to TOFD (after purchase)
792 50 005	Software Upgrade to PA 16:16 (after purchase)
792 50 006	Software Upgrade to PA 16:64 (after purchase)

14.4 Accessories

Part No.	Description
792 30 011	Battery Pack
792 30 010	Battery Charger
792 30 022	Anti Glare Screenprotector

14.5 Conventional weld inspection

Part No.	Description
792 91 200	PSLM1025 2.25 Single Crystal Transducer 3/4"
792 91 201	PSS 2.25MHz 5/8" AWS Probe
792 91 202	SNW6245 45 Deg Snail Wedge
792 91 203	SNW6260 60 Deg Snail Wedge
792 91 204	SNW6270 70 Deg Snail Wedge
792 90 101	GE MWB 45-4 EN
792 90 102	GE MWB 60-4 EN
792 90 103	GE MWB 70-4 EN
792 90 104	GE MSEB 4-0° EN
792 31 050	Single Transducer Cable Lemo 1: Lemo 00 2m
792 31 051	Twin Transducer Cable Lemo 1: Lemo 00 2m

14.6 Phased array inspection

Part No.	Description
792 91 157	X2PE5.0M16E0.6PIX250 PA Probe
792 91 158	X2-SB56-N45S Wedge
792 90 272	X3PE5.0M64E0.6PIX250 PA Probe
792 90 273	X3 SB57 N0L Wedge

14.7 Adaptors

Part No.	Description
792 90 652	Encoder Y Cable
792 90 751	IPEX to GE Phasor PA Probe Adaptor
792 90 653	Omniscan Encoder Adaptor

