ECT-S610

PORTABLE EDDY CURRENT FLAW DETECTOR

OPERATATION MANUAL

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To respected users，

Thank you for purchasing our product so that we have an opportunity to provide our services for you. We have made every effort to satisfy your requirements and assure you can enjoy our quality product with pleasure.

Please read the operating manual carefully prior to use of the board in order to operate correctly and effectively. Meanwhile, you can obtain our service at any time through the technical support and service within the manual. Through the appendix, you can also learn more about the use of the instrument, which is conducive to the appropriate use of this product.

We sincerely hope that the operating manual provides you with great help.

We thank again for use of the product and we hope to have more opportunities to provide our services for you.

Attention

In this document, hardware controls that need to activate are referred to as keys, featuring capital letters in bold font with a square bracket (such as the **[POWER]** key).

The term button is reserved for software controls, featuring capitalization in bold font (such as the **Power Off** button).

Contents

1 General Warnings

The general warnings have to be followed by the user to ensure safe operation and to retain the instrument in safe condition.

- Operators must use the power cable provided with the instrument and the specified power source.

- Please make sure the rating value and safety warnings indicated on the instrument to avoid fire or electric shock and read the operating manual to obtain more information about the rating value before connecting the instrument.

- When the instrument supplied by alternating current (charger), the earth terminal of the three line power cord used with the instrument should be connected to the ground well so that to avoid electric shock.

- Turn off the instrument while connecting peripheral equipments such as a printer etc.

- Use the lithium batteries with CE approval provided by us.

- Do not use the instrument in a place with explosion gas.

- Keep the instrument clean and dry.

- If any abnormality occurs, do not operate the instrument, do not open its front and rear covers. We are not responsible for any problem resulting from them. All check and repair work should be made by the professional personnel.

- The battery is a consumption product and needs to be replaced timely. The used up battery should be placed in local recycle bin or sent it back to us for environmental protection.

2 Brief Introduction

We converges the cutting-edge eddy current technique, digital electronic technique and microcomputer technique into one advanced and portable eddy current instrument—the ECT-S610. It utilizes the live impedance plane diagram and timebase display, with the inspection frequency from 50Hz to 10MHz, accommodating different inspection demands of various metal materials. The ECT-S610 is a high-performance and low-power instrument which offers the uninterrupted service for more than 6 hours.

2.1 Key Features

The ECT-S610 counts on the latest digital eddy-current technique, featuring conventional flaw detect function. With easy-operating menus and a functional knob, the ECT-S610 is a streamlined and user-friendly instrument.

The ECT-S610 is designed for the flaw detection of multiple metal components, such as weld cracks; the folding, scarring, pits, cracks, scratching, transverse fission and delamination of the copper pipe, seamless steel pipe and stainless pipe. It shows high sensitivity in the mentioned inspection.

2.2 Main Specifications

Frequency Range: 50Hz-10MHz

Voltage Drive: 8 levels adjustable

Manual Phase Adjustment: 359° (step: 1°)

Gain: 0-90dB (step: 0.1dB)

Sampling Frequency: 40MHz, 12-bit data acquisition

Wave Filter: Digital filter

Alarm Mode: Amplitude and phase alarming (9 Alarming Area, Impedance diagram 1: A/B/C; Impedance diagram 2: D/E/F; Impedance diagram 3: G/H/I)

Probe Type: Bridge or D_P

Display Mode: Impedance ichnography, Timebase sweep mode

Balance Mode: Digital balance

Display Screen: 5.7' 640×480 colorful TFT screen, a fine display of the images to detail

Storage: Store, replay and analyze the signal waveform for the whole inspection

Analysis: Analyze the signal waveform for the whole inspection; auto measurement of phase and amplitude; mixing of the waveforms in Impedance diagram 1 and Impedance diagram 2

Communication: USB communication port (the USB port is for data transmission and update)
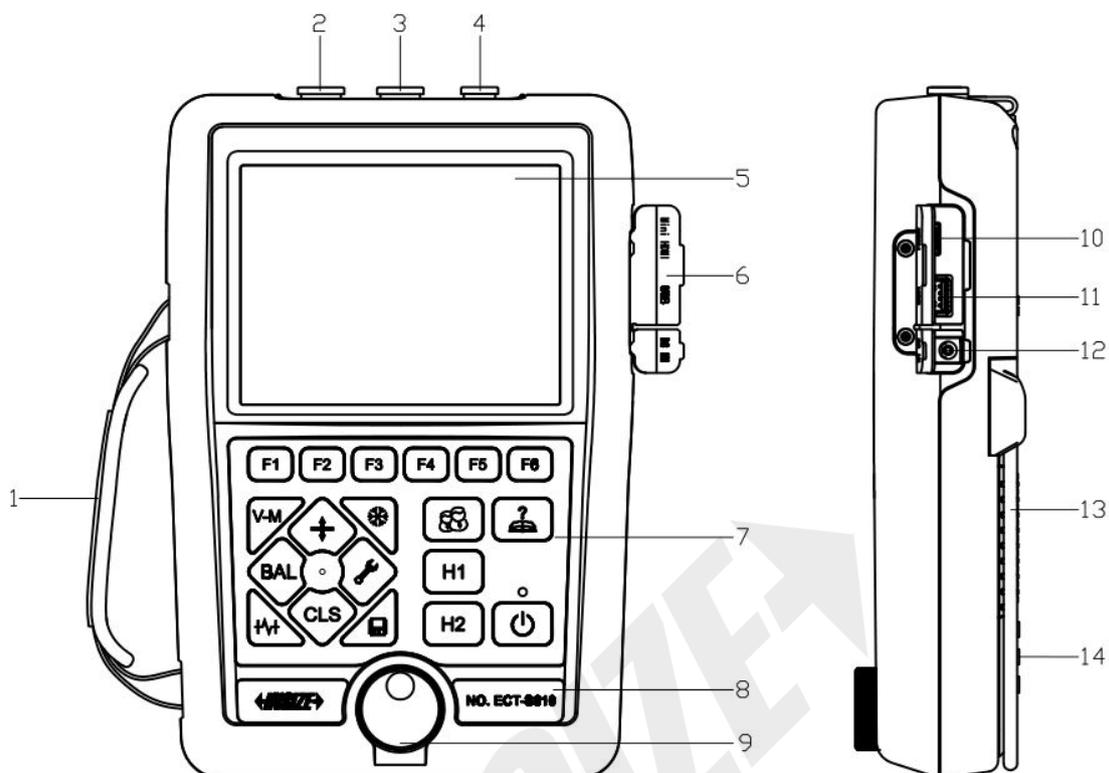
AC: 220V 50Hz; DC: 12V

Power: (lithium battery)12V 4.4Ah, 6 hours of uninterrupted service

Dimension: 251.5mm×171 mm×52.5 mm

Weight (with battery): about 1.5kg

2.3 Panels and Main Components

The main components on the panel are shown in Figure 1.

1. Hand Strap	2. Encoder Port	3. Probe Port	4. IO Port
5. Screen	6. Port Cover	7. Key Panel	8. Name and Model
9. Functional Knob	10. Mini HDMI Port	11. USB Port	12. AC Power Port
13. Stand	14. Battery Compartment Cover		

Figure 1   Appearance of the instrument

2.4 Panel Keys

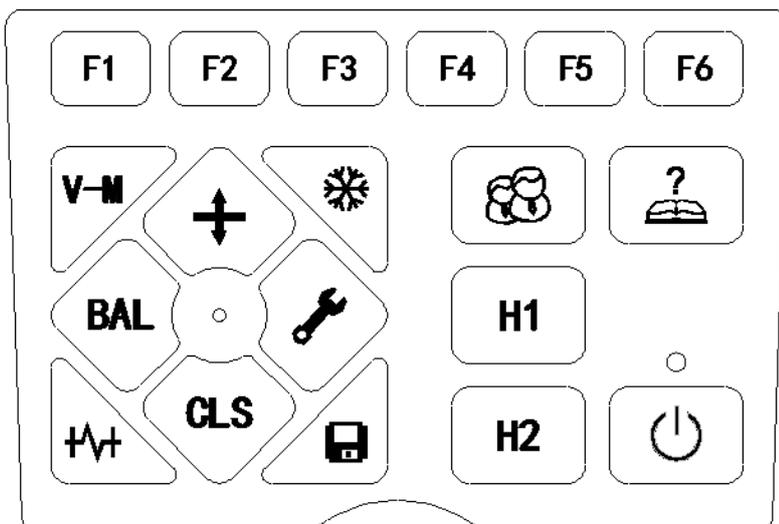The pressing keys of panel are shown in Figure 2

Figure2   Pressing keys on the front panel

Refer to Table 2 for the description of keys.

Table 2   Keys Descriptions

Icon	Name	Illustration
F1 F2 F3 F4 F5 F6	*[Menu] Keys*	Corresponding to the menus on the screen; have different functions in different modes.
CLS	*[Clear] Key*	Used to clear the waveforms in the impedance plane display area. Long press to enter the cache clear selection.
+	*[Detection] Key*	Used to toggle between Inspection and Pause.
BAL	*[Balance] Key*	Used to return the signals to the balance position
⚙	*Spare Key*	
❄	*[PRTSC] Key*	Used to capture the current screen. Press to cause an initial beep, indicating that the screen shot is done.
V-M	*[Mode Switching] Key*	Used to switch waveform display modes which is divided into: Solid Line Mode

		Rainfall Mode
		Dot Mode
	[Analyze] Key	Used to enter the analysis page
	[Save] Key	Used to save the current file
	Spare Key	
H1	*Spare Key*	
H2	*Spare Key*	
	[Help] Key	
	Power indicator & *[Power] Key*	Used to turn on/off the instrument.
	[Functional Knob] Key	Turn right or left to select the parameters in the parameter area, or to adjust the parameter value in; press it down to enter or exit the parameter adjustment.

2.5   Menus and Descriptions

2.5.1   Display Layout

The display layout is shown in Figure 3.
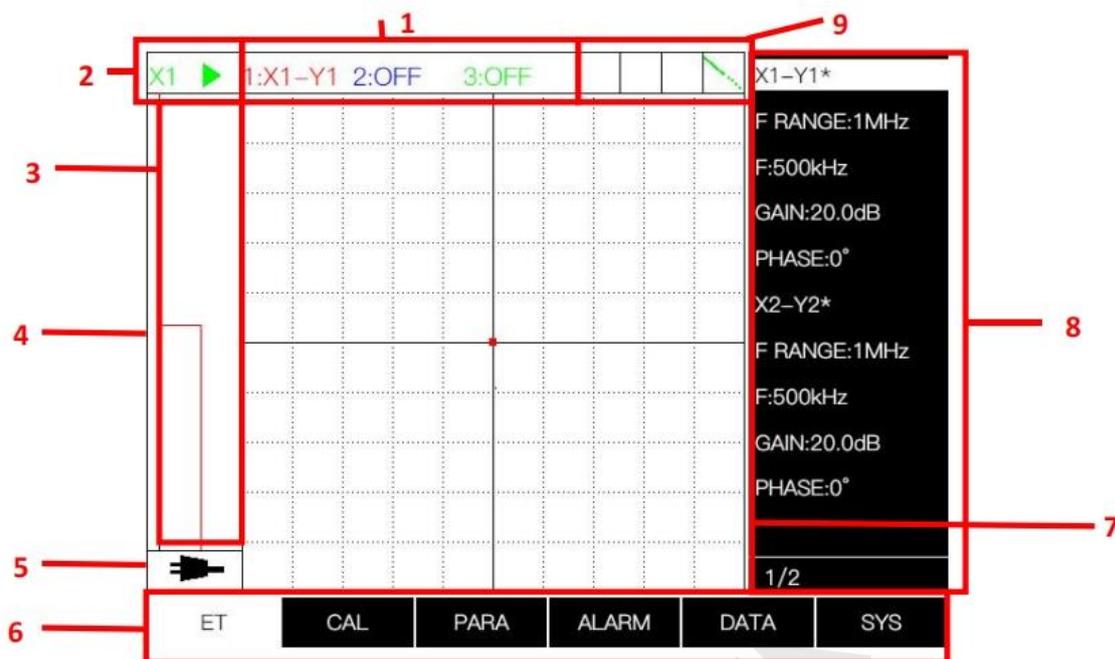
1. Eddy current test information area   2. Timebase information area   3. Timebase waveform area

4. Eddy current test recording progress bar

5. Power supply indicator: in this figure, it shows that the instrument is supplied by AC power supply.

6. Menu bar   7. Impedance plane display area   8. Parameter options area

9. Alarm frame and waveform mode

Figure3 Display layout on the conventional test interface

2.5.2 Menus Descriptions

Refer to the following table 1 for menus description.

Table 1 Menus Descriptions

Main menus	Parameters	Descriptions
ET	X1-Y1*	The first channel
	F RANGE (frequency range)	The tunable range of frequency
	F (Frequency Value)	To adjust the current frequency
	GAIN	Gain range: 0dB~90dB (step: 0.1dB)
	PHASE	Phase range: 0°~359° (step:1°)
	X2-Y2*	The second channel

	F RANGE (frequency range)	The tunable range of frequency
	F (Frequency Value)	To adjust the current frequency
	GAIN	Gain range: 0dB~90dB(step: 0.1dB)
	PHASE	Phase range: 0°~359°(step:1°)
	MIX*	The mixing channel
	GAIN	Gain range: 0dB~90dB (step: 0.1dB)
	PHASE	Phase range: 0°~359° (step:1°)
ANALYZE	A1	Calculates the maximum waveform amplitude in the analyzing box of the X1-Y1 channel (the first channel).
	P1	Calculates the phase of the maximum amplitude in the analyzing box of the X1-Y1 channel (the first channel).
	A2	Calculates the maximum waveform amplitude in the analyzing box of the X2-Y2 channel the second channel).
	P2	Calculates the phase of the maximum amplitude in the analyzing box of the X2-Y2 channel (the second channel).
	MIX_A	Calculates the maximum amplitude in the analyzing box of the mixing channel.
	MIX_P	Calculates the phase of the maximum amplitude in the analyzing box of the mixing channel.
	T1/T2	T1: time line 1; T2: time line2,
CAL	DRIVE	1~8 levels
	MATCH	1~4 levels
	PROBE	Probe type: BRIDGE and D-P
PARA	T-DISP (timebase display)	Timebase display the signal X or Y axis component waveforms: X1、Y1、X2、Y2、M_X、M_Y
	CLOCK	Select clock source: internal or external
	COORD	GRID, POLAR or OFF
	LPF (low-pass filter)	LPF is used to filter the high-frequency signal interference with the range of 3Hz ~ 2000Hz.
	HPF (high-pass filter)	HPF is used to filter the low frequency signal interference with the range of 0.5Hz ~ 1950Hz.
	D-FLT (digital filter)	The filter points range: 0/4/8/16/32/64/128.
	G-RATIO (gain ratio)	Used to set the magnification of the signal X and Y components. If set it to 1.0, which indicates that the magnification of the signal X and Y component is the same, if set it to 2.0, which indicates that the magnification of the signal Y component is 2 times than that of the signal X component. Generally set the gain ratio to 1.0 with the range from 0 .1 to 10.The range of the gain ratio is less than 1.0 with the step of 0. 1 and it is more than 1.0 with the step of 1.0.
	T-FACTOR (timebase	Used to set the scanning speed of the timebase. The larger the

	factor)	value, the faster the scanning speed and vice versa. It ranges from 1 to 50.
	V-FACTOR (vanishing factor)	Used to set the signal persistence time on the screen. The smaller the value, the faster the blanking. It ranges from 1 to 50.
	BP-H (balance point-horizontal)	Used to set the horizontal ordinate position of the signal balance point in the impedance waveform area with the range from 2 to 398. You can set the BP-H in three channels.
	BP-V (balance point-vertical)	Used to set the vertical ordinate position of the signal balance point on the impedance waveform area with the range from 2 to 398. You can set the BP-V in three channels.
ALARM	ALM-DIS (alarm display)	Indicator: ON or OFF
	HDW-ALM (hardware alarm)	Buzzer : ON or Off
	MODE	Alarm mode: OFF, FULL, HALF and FRAME.
	WINS (alarm windows)	Impedance diagram 1: A/B/C Impedance diagram 2: D/E/F Impedance diagram 3: G/H/I
	STATE	ON or OFF corresponds to three alarm windows.
	ANGLE 1	Sets the angle on the right boundary of the sector alarm box when the mode is set to FULL and HALF.
	ANGLE 2	Sets the angle on the left boundary of the sector alarm box when the mode is set to FULL and HALF.
	X1 RADIUS	Sets the inside radius of the sector alarm, when the mode is set to FULL and HALF.
	X2 RADIUS	Sets the outside radius of the sector alarm, when the mode is set to FULL and HALF.
	Y	Sets the coordinate of the alarm frame on the Y axis, when the mode is set to the frame alarm.
DATA	STORAGE	Store the graphics recordings or parameter setting.
	REVIEW	Review the graphics recording files.
	CALL	Calls the parameter files.
	U-DISK	Transfer the graphics recordings or parameter files to a USB disk.
SYS	CH 1	Turns on/ off this channel
	CH 2	Turns on/ off this channel
	CH 3	Turns on/ off the mixing channel
	DATE	Sets the date of the system.
	TIME	Sets the time of the system.
	LAN	Chinese or English.
	VER	Displays the software version.
	FPGA	Displays the FPGA version.

3   Basic Operation and Application

3.1   Switching On

Press and hold the ⎡⏻⎤ key for several seconds, until the red indicator illuminates. After the system's self-check is done, you can press the F1-F6 to enter.

3.1.1   Switching Off

Press and hold ⎡⏻⎤ key at any situation. A sign writing "***Attention! Shouting down…***" will appear on the display screen and the red indicator will extinguish. Then the instrument is off.

3.1.2   Charging

You should ensure that the instrument is off first. Then you can charge the instrument with the SPQ-1002 adapter (in DC IN port). If there is an internal battery inside the instrument, the green indicator will illuminate and blink. After the charging, the green indicator will extinguish. The charging time of one battery is 5 hours.

Note: Once you turn on the instrument for inspection while in its charging state, the instrument will automatically toggle the mode of adapter power supply.

3.2   Eddy Current Inspection

3.2.1   Eddy Current Inspection Menu

Press the **[F1]** key to select the **ET** in the main menu to enter the eddy current inspection page as shown in Figure 4. After entering, the eddy current inspection is working.
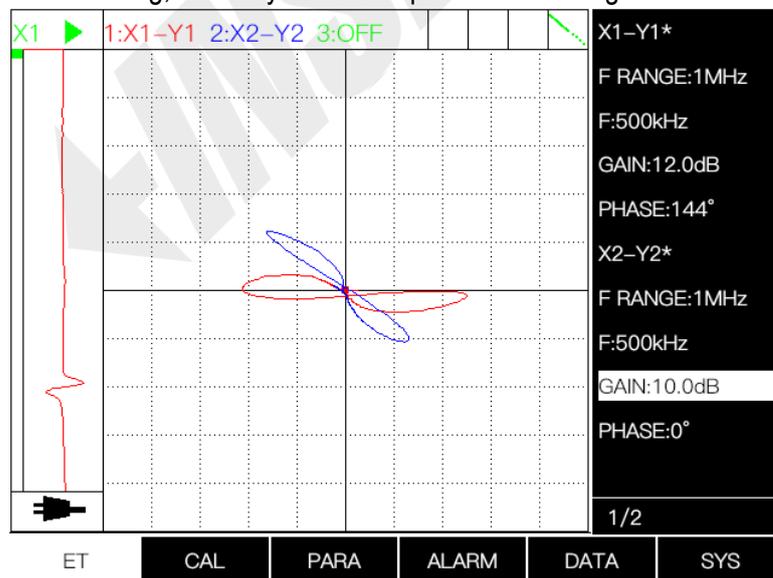

Figure 4   Eddy current test menu

● ***Timebase Information Area***

The timebase information area is the upper left corner.

X1 represents the waveform of the IMP 1 in the X axis in the X1-Y1 channel in the current timebase

area. The icon ▮▮ indicates that the inspection is paused right now, and you can press the ⊕

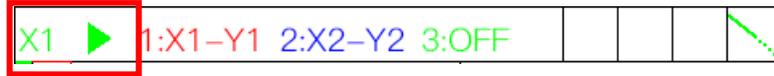key to start the inspection. Meanwhile, the icon ❚❚ will turn to ▶.

Figure 4-1   Timebase information area
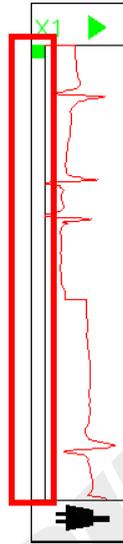
● *ET Recording Progress Bar*

Figure 4-2   ET Recording Progress Bar

The left sidebar is the ET recording progress bar, used for displaying the current recording time and the maximum recording time is approximately 40 minutes. When it turns red, it indicates that the storage buffer of the inspection data is full, and no more data will be recorded.

To solve this problem, you can press the ⊕ key to stop the inspection after recording for a period of time. Then press the 🖫 key to save the recorded images or parameters as required. (Please refer to the latter sections for more detailed about storage)

● *Timebase Waveform Area*

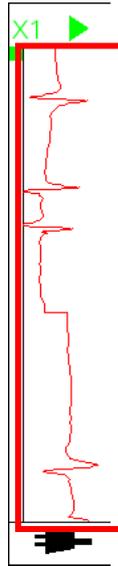This area displays the waveforms of the selected inspection waveform..

Figure 4-3   Timebase waveform area

● *Impedance Area*

As shown in Figure 4, the red waveform represents the IMP 1 and the blue one represents the IMP 2. Once the mixing channel is on, the mixing waveform is in color green.

3.2.2   Analyzing Page

In the ET page, you can press the ⬦+⬦ key to pause the inspection, and then press the ⬦ key to enter the analyzing page, as shown in Figure 5.

In time base waveform area, the waveforms between T1 and T2 are the selected range for analyzing. As shown in Figure 5, T1 is displayed as a green line and T2 is displayed as a blue line. Twist the functional knob to move the time lines. Press the functional knob to toggle to another time line. The time line information will be displayed in the right sidebar.
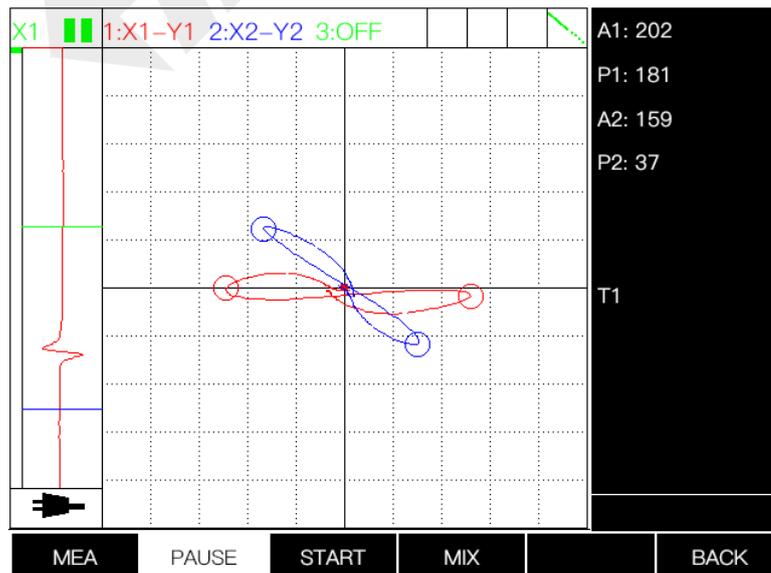

Figure 5   Timebase waveform area

The illustration of the footer menu:

MEA: to display the waveform in the range of T1/T2 in the Impedance Area and calculate the maximum waveform amplitude and the corresponding phase.

PAUSE: to play/stop the recorded data. When paused, it will automatically calculate the maximum waveform amplitude and the corresponding phase.

START: to set the start point in the timebase waveform area as the start point of the first group of data. In this time, the timebase waveform area shares the same start point with the recording progress bar.

MIX: to calculate the waveform data of the mixing channel by combining the data of IMP 1 and IMP 2.

FINISH: to stop the recorded data.

BACK: to back to the main menu.

3.3 Calibration Menu

Press the **[F2]** key to enter the **CAL** page as shown in Figure 6. You need to calibrate the parameters in the parameter bar (the right sidebar) so that the sine wave in the waveform area is not be distorted and be within the screen.
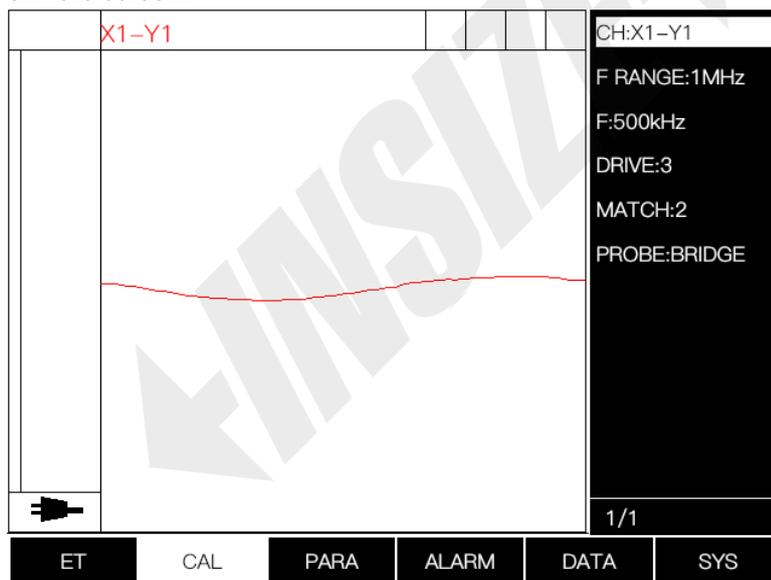

Figure 6   Calibration page

Illustration of the parameters on the right side of the screen:

- *F RANGE***: t**he a wide range of selectable frequencies between 50Hz to 10MHz, which is divided into 5 levels:

   Between 50Hz to 1000Hz, with the step of 5Hz steps;

   Between 1kHz to 10kHz, with the step of 0.05kHz steps

   Between 10kHz to 100kHz, with the step of 0.5kHz steps

   Between 100kHz to 1MHz, with the step of 5kHz steps

   Between 1MHz to 10MHz, with the step of 0.05MHz steps.

- *DRIVE***:** used to adjust the drive voltage of the instrument with the range from 1 to 8.

- **MATCH:** used to match the different probes with the range from 1 to 4.
- **PROBE:** BRIDGE or D-P.

3.4　Parameter Menu

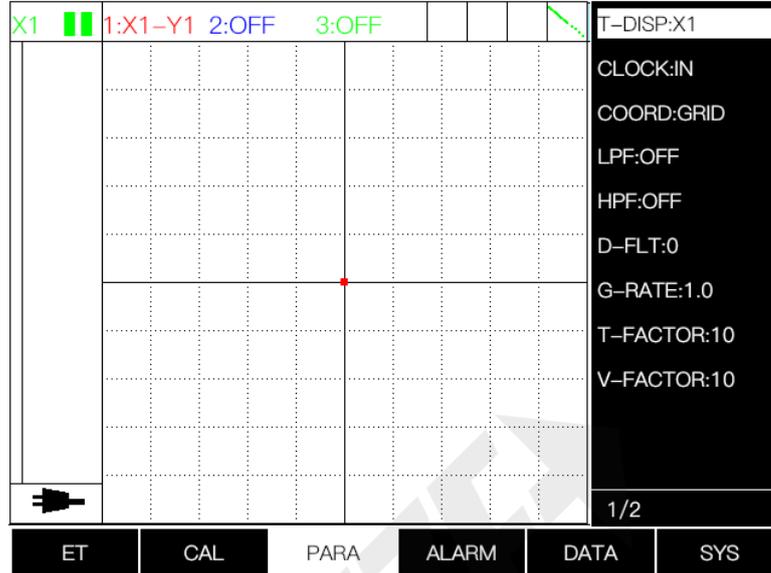The parameter page is shown in Figure 7.

Figure 7　　Parameter page

Illustration of the parameter list on the right sidebar:

- **T-DISP (Timebase display):** X1、Y1、X2、Y2、M_X、M_Y.

    It displays the waveform of the impedance diagrams in the selected axis (X1 represents the waveform of the IMP 1 in the X axis in the X1-Y1 channel) of the signal on the Timebase Display Area. The selected information will appear on the Timebase information area.

- **CLOCK:** IN or EXT.

- **COORD:** GRID, POLAR or OFF.

- **LPF (low pass filter):** ON or OFF

    It is mainly used to filter the signals higher than the setting frequencies so that to filter the high frequency interference waves. It can be turned OFF or ON and the range can be selected from 3Hz to 2000Hz when it is ON.

- **HPF (high pass filter):** ON or OFF

    It is used to filter the signals lower than the setting frequencies so that to filter the low frequency interference waves. It can be turned OFF or ON and the range can be selected from 0.5Hz to 1950Hz when it is ON.

- **D-FLT (digital filter):** 0,4,8,16,32,64,128

    The digital filter is used to process the sampled waveforms into a regular and smooth one. When the 0 level is selected, the digital filter cannot be activated.

- **G-RATE (gain rate):** 0.1~10.0

    The gain ration is used to adjust the amplification of X and Y components for necessary

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without changing the gain. When its' value is lower than 1.0, the step is 0.1 and when its' value is higher than 1.0, the step is 1.0.

● *T-FACTOR:* 1~50

The timebase factor is the variation of the timebase sweeping speed. When you select the higher value, the scanning speed will be faster and vice versa.

● *V-FACTOR (visual factor)*: 1~50

The visual factor is used to set the signal persistence time on the screen. The smaller the value, the faster the blanking is.

● *BP-H (balance position H)*: 2~398

The balance position H is used to set the horizontal ordinate position of the signal balance point in the Impedance Area of the screen. Its range is from 2 to 398.

● *BP-V (balance position V):* 2~398

The balance position V is used to set the vertical ordinate position of the signal balance point in the impedance waveform area of the screen. Its range is from 2 to 398.

The red point in the middle of the impedance area is the balance point as shown in Figure 7, and can be moved to left / right or up / down with the changes of the balance position H and V.

Attention：The system will automatically clear the data in buffer while adjusting the parameters in PARA, it is recommended to save the required graphic data before adjusting the parameters.

3.5 Alarm Menu

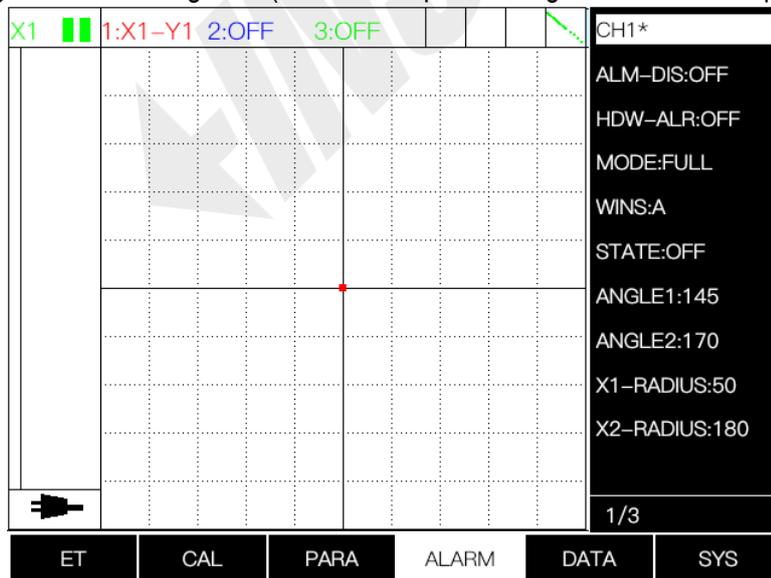The alarm page is shown in Figure 8.(Take the impedance figure 1 as an example)

Figure 8   Alarm page

● *ALM-DIS (alarm display)*: ON or OFF

The alarm display is used to set the alarm indicator. When the alarm display is ON and the waveform in the Impedance Area triggers the alarm, the alarm indicator will display the name of the alarm window (A,B or C) on the Timebase Information Area.

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Figure 8-1   Alarm indicator

When the vector points of eddy current inspection fall into the corresponding alarm window, the first alarm indicator will display the name of the alarm window in the IMP 1 and the second one is for the IMP 2, the third one is for IMP 3.

● *HDW (hardware window):* ON or OFF

The hardware window is the hardware alarm (buzzer alarm).

● *MODE (alarm window mode):* FULL, HALF or FRAME

When it is FULL and HALF, the alarm window is a sector; When it is FRAME, the alarm window is a box with two alarm lines on the Y axis.

● *WINS (windows):* A,B,C

The alarm window is divided into A, B and C, which should be selected first if you need to adjust the parameter in the alarm frame.

● *STATE:* OFF or ON

The state is used to set the state of the selected alarm window.

● *ANGLE 1:* FULL or HALF

It is used to adjust the angle of the sectorial alarm window on the right boundary. This parameter will be activated when the mode is set to FULL and HALF. The tunable range $\geqslant$ 3° and $\leqslant$ *ANGLE 2*.

● *ANGLE 2:* FULL or HALF

It is used to adjust the angle of the sectorial alarm window on the left boundary. This parameter will be activated when the mode is set as FULL and HALF. The tunable range $\geqslant$*ANGLE 1* and $\leqslant$ 177°.

● *X1 RADII:*

It is used to adjust the inside radius of the sectorial alarm window. This parameter will be activated when the mode is set to FULL and HALF. The tunable range $\geqslant$ 49 and $\leqslant$ *X2 RADII*.

● *X2 RADII :*

It is used to adjust the outside radius of the sectorial alarm window. This parameter will be activated when the mode is set to FULL and HALF. The tunable range $\geqslant$ *X1 RADII* and $\leqslant$ 200.

● *Y :* 1 to 200

It is used to set the coordinates of Y axis alarm frame. It is activated when the mode is set to FRAME.

3.6   Data Menu

3.6.1   Data Menu Introduction

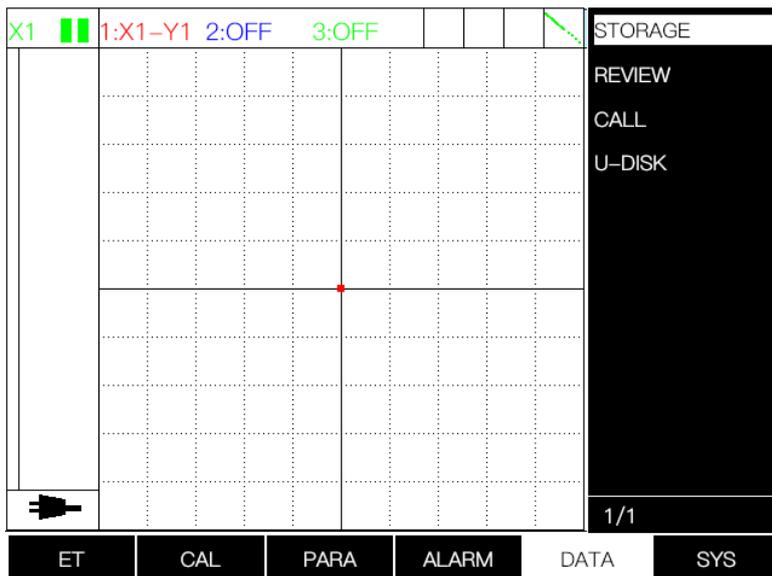There are 4 options in the data menu as shown in Figure 9.

Figure 9   Data menu

*STORAGE***:** stores the recorded images or parameters. See the section 3.6.2 for more details.

*REVIEW***:** reviews the graphics recordings. See the section 3.6.3 for more details.

*CALL***:** calls the parameter files. See the section 3.6.4 for more details.

*U-DISK***:** transfers the image files or parameter files stored in the instrument to a USB disk. See the section 3.6.5 for more details.

3.6.2   Storage Page

You can press the ⌷ key or the **STORAGE** key (in the DATA page) to enter the storage page, as shown in Figure 10.

Figure 10   Storage page

● *FILE TYPE***:** PARA or PIXMAP

Selected by the functional knob.

● **FILE TITLE:**

You can press the **CAPITAL/LOWERCASE/NUMBER** key to choose one input method and name the file, and then twist the functional knob to choose the letter/number you want and press to confirm.

● **OPERATOR:** its operation is the same with the **FILE TITLE**.

● **DATE:** displays the current stored date, which cannot be operated.

Operation of storage submenu is shown below (Figure 10).

● **NEXT:** presses to toggle through the **FILETYPE**, **FILE TITLE**, **OPERATOR** and **DATE.**

● **CAPITAL/LOWERCASE/NUMBER**

Toggles through four input methods—capital letters, small letters and numbers.

● **DEL:** Cancels the previously input character.

● **SAVE:** Saves the files.

● **BACK:** Returns to the main page.

3.6.3 REVIEW Submenu

You can enter the REVIEW file page (see Figure 11) through selecting the **REVIEW** key in the **DATA** menu. The REVIEW file page mainly saves recorded graphic files. You can twist the knob to select the desired file and select the **LAST** and **NEXT** keys to turn pages. Then you can enter the review page (see Figure 12) by pressing the **REVIEW** key on the footer menu.

ID	TITLE	OPERATOR	DATETIME
1	temp1		2024–06–13 14:28:42
2	temp2		2024–06–14 09:25:53
3	temp3		2024–06–14 10:35:53
4	temp15		2024–06–18 08:24:29
5	temp5		2024–06–18 15:09:37

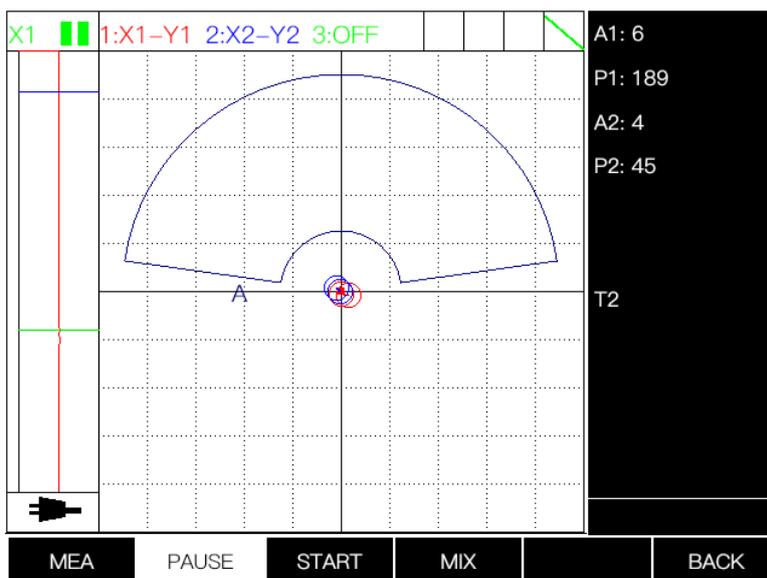| LAST | NEXT | DEL | DEL ALL | REVIEW | BACK |

Figure 11   Review file page

Figure 12   Review page

For details about how to use the function buttons of the playback menu, see 3.2.2 Analysis Function.

3.6.4   CALL Submenu

The CALL file page stores parameter files, as shown in Figure 13. You can select the **CALL** key in the **DATA** menu to enter the CALL file page and use the functional knob to call the files.

ID	TITLE	OPERATOR	DATETIME
1	ABC	CC	2024-03-24 21:04:39

| DEL | DEL ALL | CALL | | | BACK |

Figure 13   CALL file page

3.6.5   U-DISK Submenu

For transferring the file to the USB disk, you can insert a USB disk to the U-DISK port on the instrument and then select the **PARA** key to choose the file types (***PARA/PIXMAP/SCREENSHOT***). After doing this, you can twist the functional knob to select the files.

ID	TITLE	OPERATOR	DATETIME
1	ABC	CC	2024-03-24 21:04:39

PARA	DEL	DEL ALL	SAVE	SAVE ALL	BACK

Figure 14　U-DISK file page

3.7　System Menu

You can twist and press the functional knob to adjust different parameters on the system menu, as shown in Figure 15.

Those with a * are unadjustable.

Figure 15　System menu

4　Care and Maintenance

4.1　Care of the Lithium Battery

● Fully charge the lithium battery and turn off the instrument if the instrument will not be used for a long time .

● Turn on the instrument at least 1 hour or 2 hours and charge the battery per month to keep the

components and the battery from moisture so that to extend their useful life.

● When the instrument operates with battery, turn the power switch off while stopping operation so that to reduce the power consumption, and the battery should be removed from the instrument for not being used for a long time.

Safety Tips for Lithium Battery:

a) Do not put it into or near fire, keep it away from heat.

b) Please keep it away from water, splash and coupling agent.

c) Do not crash the battery's output port with metal objects to prevent it from short circuit.

d) Do not dismantle, throw and beat the battery.

e) Please use the battery charger matched with the instrument.

4.2 Care and Maintenance of the Instrument

4.2.1 Care of the Instrument

a) Switch the instrument off before connecting a communication cable or a printer cable.

b) The instrument is manufactured according to state-of-the-art methods using high quality components, care should be paid to ensure proper operation of the instrument.

c) When the instrument operates with battery, turn the power switch off and remove the battery from the real cover of the instrument in situations when the instrument is not in constant use so that to reduce the power consumption.

d) Hold the moving metal cover of the plug while plugging the probe cable. Do not plug and drag the cable forcibly.

e) Clean the instrument and accessories after being used.

f) Put the instrument in the dry place and keep it away from water, machine oil and heavy shock.

4.2.2 Maintenance of the Instrument

a) Test to be performed on every instrument prior to the supply of the instrument by the manufacturer. For a new instrument, if any abnormality occurs under the normal operating conditions, please contact the manufacturer, and all check and repair work should be made by the professional personnel.

b) If any abnormality occurs during operation, firstly check the battery voltage, which should be above 12.0V with no-load, otherwise, the battery should be charged.

c) The instrument indicates the real time clock error due to be used for a long time, in this case, the lithium battery should be replaced and the rear cover of the instrument should be firmly fixed after replacing.

5 Accessories and Optional Components

Please refer to *The* ECT-S610 *Eddy Current Flaw Detector Packing List* for more details.

Appendix A   The Common Functional Failures and The Troubleshooting

Refer to the table A for common failures and resolutions.

Table A   The Common Functional Failures and The Troubleshooting

Symptoms	Caused by	Processing methods
After installing the battery and switching on the instrument, the display screen disappears within a short time.	Low battery.	Charge the battery.
No signal occurs when go to the detection status.	a) The probe or probe cable is damaged. b) Improper parameters setting	a) Change the probe or probe cable. b) Check the parameters settings.
Signals can not be balanced	Inappropriate frequency or probe	Select the proper frequency and probe
Graphics distraction or parameters abnormal during operation	Memory error	Restart the instrument and press and hold the 【CLS】 key, until the warning -- "*Note: data will be deleted!"* appears on the screen (Press F1-F3 to confirm , Press F4-F6 to turn back). Then the instrument will return to the initialization state.
"NOT FOUND USB DISK" appears on the screen with the USB disk inserted.	a) Bad connection. b) USB disk can not be identified by the program.	Insert the USB disk again or replace it.

Appendix B   Software Updating and Initialization

B.1   Software Updating

a) Copy the .bin file to a USB disk and insert a USB disk to the USB port.

b) Switching on the instrument.

c) Wait for 10 seconds until the LED on the USB disk flashes (if it has one).

d) Press and hold the ⬡BAL key, and the warning-- "**Confirm to upgrade**?" will appear on the display screen. (Press F1-F3 to confirm , Press F4-F6 to turn back)

Note: If USB disk reading error occurs, the warning-- *"Please check up u-disk"* will appear on the display screen; in this case, repeat the above procedures.

e) After completing the updating software, the instrument will turn off automatically.

Note: After the upgrade, the instrument parameters and the data stored in the instrument are still retained.

Supplementary explanation of USB disk upgrade:

a) Please make sure that the USB disk has only one software upgrade version.

b) If " *Please check up u-disk* " appears on the display screen continuously, the USB disk may not be recognized by the system in addition to its bad connection. It is recommended to use the USB disk manufactured by Kingston, dynamic Express, SanDisk, Netac.

c) Please contact us directly by phone if there is anything special that you would like to know about the upgrade.

B.2   Software Initialization

a) Turn on the instrument to enter the main page.

b) Press and hold the ❄ key, until the warning—"**Note: Init the setting!**" appears on the screen. (Press F1-F3 to confirm , Press F4-F6 to turn back)

c) After the initialization is finished, the " *Initialization Finished"* will appear on the screen.

Note: After initialization, the system parameters will be reset to the factory state, and the data saved in the instrument will still be retained!

B.3   Software Formatting

a) Turn on the instrument to enter the main page.

b) Press and hold the ⬡CLS key, until the warning—"**Note: data will be deleted!**" appears on the screen. (Press F1-F3 to confirm , Press F4-F6 to turn back)

c) After the formatting is finished, the "**Formatting Finished**" will appear on the screen.

Note: After formatting, the system parameters will be reset to the factory state, and the data saved in the instrument will be lost!

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