INSIZE

HLS-B410

HANDHELD LIBS SPECTROMETER OPERATION MANUAL

https://m.insize.com/page-139-978.html

EN -- Please scan the QR code or visit the website for operation manual.

IT --- Scansiona il codice QR oppure visita il sito web per il manuale d'uso.

CZ -- Pro návod prosím naskenujte QR kód nebo navštivte webovou stránku.

ES -- Por favor, escanee el código QR o visite la página web para ver el manual de instrucciones.

FR -- Veuillez scanner le QR Code ou visiter notre site web pour accéder aux manuels d'utilisation.

DE -- Bitte scannen Sie den QR-Code oder besuchen Sie die Website für die Bedienungsanleitung.

PT -- Para aceder ao manual de instruções, por favor, faça a leitura do código QR ou visite o nosso site.

1.presentation

Functional Characteristics

Laser-Induced Breakdown Spectrometer (LIBS) is an efficient and rapid method for elemental analysis that enables real-time analytical detection of solid samples without sample processing.

At the heart of the LIBS technology is the use of laser pulses to instantaneously heat the surface of a sample and generate plasma. And then use the spectral information emitted by the plasma for chemical composition analysis.

Compare to XRF (X-ray Fluorescence Spectrometer), the LIBS technology is one of the most effective means for the direct analysis of Al-Mg alloy in the world, without radio.

LIBS as a rapid analysis technology has been applied for decades. Using advanced miniature high-energy pulsed laser technology and micro spectral analysis technology. Our company provides handheld LIBS analysis instruments, which have the advantages of portability, high efficiency and multi-element analysis, and can adapt to the needs of various complex on-site analysis scenarios.

Caveat

◆ Spectrometer is a precision instrument, the instrument placed in the environment should be kept clean and dry, the temperature is appropriate, otherwise the life of the instrument has a considerable impact.

◆ Please read this manual completely and familiarize yourself with the functions of the instrument before using this equipment. Incorrect operation may cause this product to cause injury to yourself or others, as well as damage to the product and property.

◆ Although this product uses a laser at a wavelength that is safe for the human eye as an excitation source, to avoid any potential hazard, do not under any circumstances direct the laser of this device at a person or animal, especially an area such as the eyes, and press the detection button.

◆ Do not disassemble the unit or attempt to repair the hardware yourself. When the instrument malfunctions, please try to restart the device first, if the problem persists, please contact us for technical support.

◆ When testing alloy materials, if the material grain area exceeds the excitation point, the Mo element test will be unstable, please test several times, thank you!

SPECIFICATION

operating system	android
screen	5", 720×1280,adjustable brightness
Light source type	pulsed laser
wavelength	1535nm
Laser life	1 billion times
laser class	CLASS I (Human Eye Safe Laser)
detection limit	0.05%
repeatable	major element RSD<1%, nonmajor element RSD<5%
detection time	<5S
Working distance	Fit to probe plane
Analyzing the environment	No need for protective gas,
View Window Material	sapphire
memory	16G
Report Output	PDF, xlxs (Photographs can be taken)
data output	USB, flash drive (type C)
protection class	IP54
batteries	Removable lithium battery, 3300mAh
working hours	8h
power	10W
operating temperature	0~40°C
Dimensions (L×W×H)	290×300×90mm
weight	1750g

2. Directions for Hardware

Instruments and Components

Data Inter-
face

Trigger

Snap-on

Lid of Battery

Holes of detection

Wide-angle
camera

（the Obverse Side）

Battery Charging and Dismounting

This product uses a base for charging with a dedicated battery that comes with the instrument, and the battery is plugged into the charging base for charging. When replacing the battery, turn off the instrument first. Press the button on the end of the battery to check the battery level. And the number of lights on the five dots is the battery level.
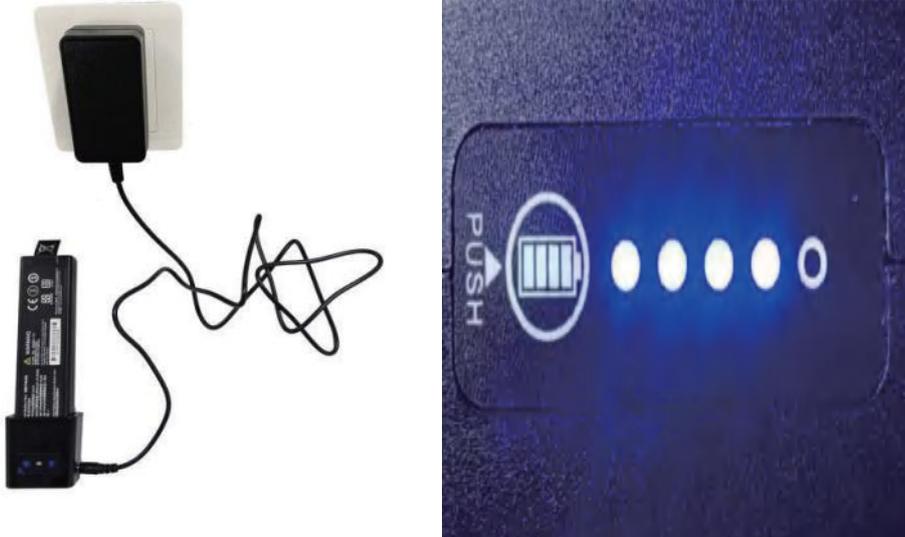

Battery Dismounting：
a)Press the black bayonet switch on the end of the handle to automatically pop open the lid of the battery compartment.
b)Pull the strip on the end of the battery to remove the battery.
c)Install the battery (shown in the figure below). First, insert the uneven port end of the battery into the muzzle direction with a wide notched end (It can only be installed in one direction). And snap the lid tightly until it clicks.

Turn on and off

a）Press and hold the trigger key for 5 seconds to activate the instrument. After a moment, the instrument screen will light up. Then the instrument will automatically enter the main interface.When the progress bar shows 100% and the instrument prompts "System idle (ready)!", the instrument will automatically warm up the laser heater to around 40 ± 0.5°C and the temperature of the spectrometer to 40 ± 0.5°C (see "System Settings" on the "More" tab of the "Settings" page, about 10 minutes), and then the sample can be analyzed.
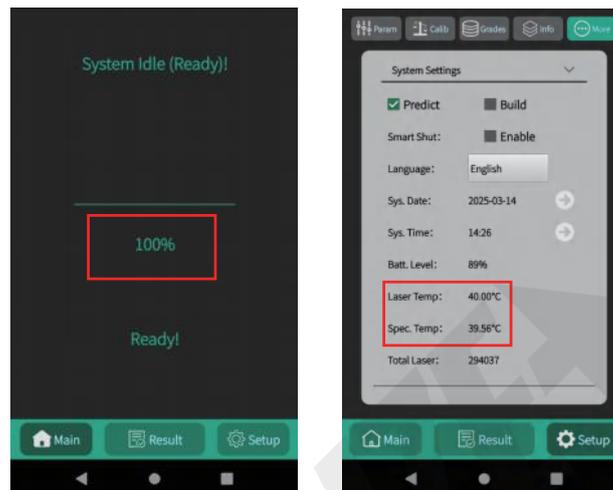
b）b）When the device is turned off, click "Setup" to enter the setting interface, then click the "Shutdown" button and click "Yes" to confirm. The instrument will automatically enter the shutdown process. And the device will be completely powered off after a short wait. Or press and hold the trigger for more than 3 seconds. The instrument interface will pop up a window prompting whether to shut down. Click "Yes" to confirm. And the instrument will automatically enter the shutdown process. When the instrument is not in use for a long time (half a year), please remove the battery from the instrument and store it.
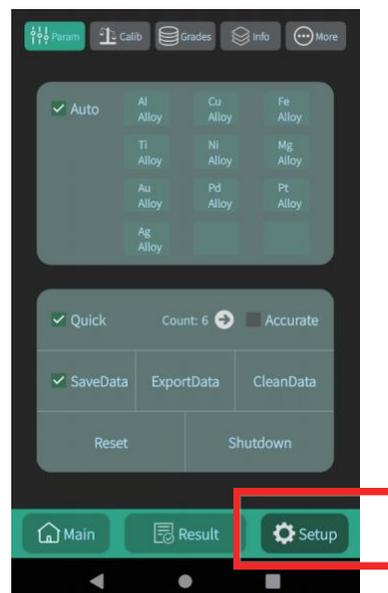
If the instrument has a software error and the touch screen responds. But the trigger is not activated. You can click the "Reset" button on the settings interface and click "Yes" to confirm. And after a short wait. It can return to normal and release the alarm.
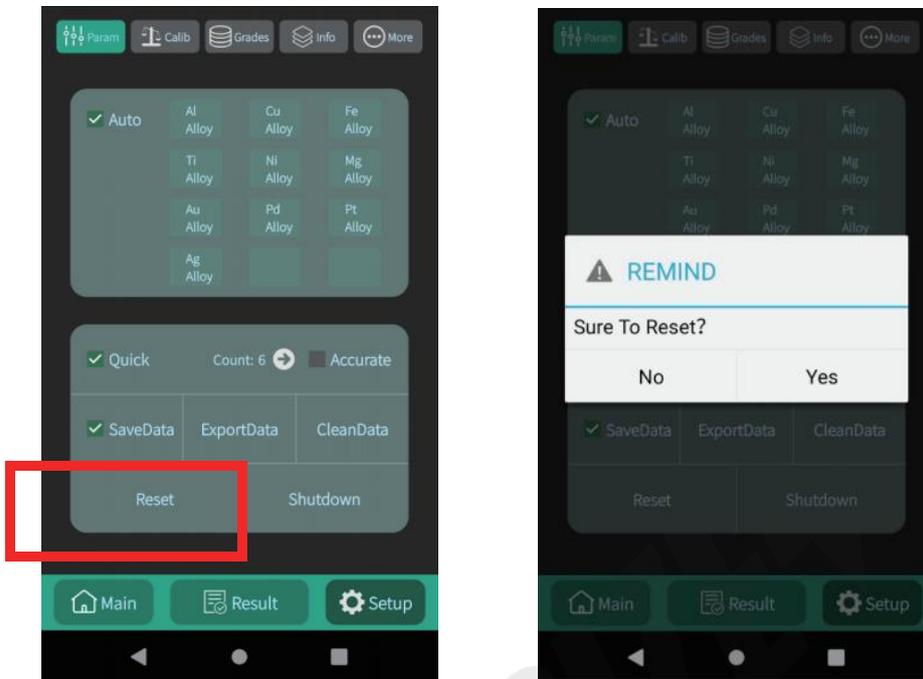
If the instrument has abnormal conditions such as software crash and unresponsive touch screen. Press and hold the switch trigger for 3 seconds to force the analytical instrument to turn off. And the device can be turned on again after a short wait

Test Samples

Parameter settings of analyzing (The following are the default parameter settings after the instrument is turned on)
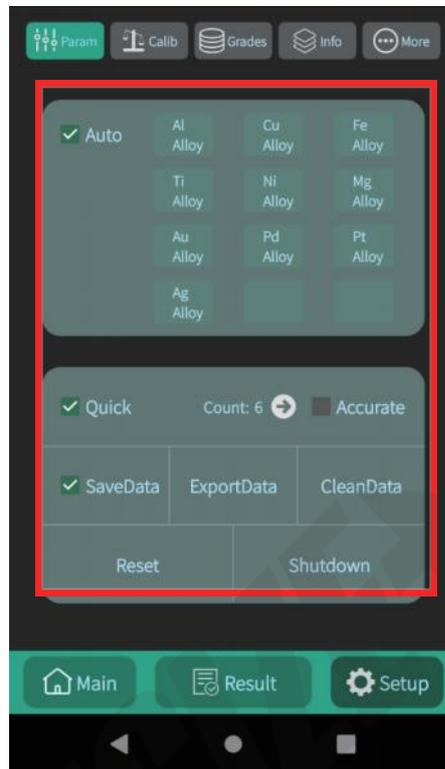
1.In the alloy type column, you can check the alloy type to be analyzed, or check "Auto" to automatically identify and classify the alloy.
2.The test mode can be selected as " Quick " or " Aaccurate", and the number of measurements can be set for accurate measurement.
3.Check "SaveData", the data will be automatically saved after the data test. And the data will not be saved if it is not checked (please be sure to check whether this option is checked before the sample test to avoid losses ,that is caused by the analysis data not being saved).

Quick test

The sample is taken with the sample port pressed against the surface of the alloy (as shown in the figure below).
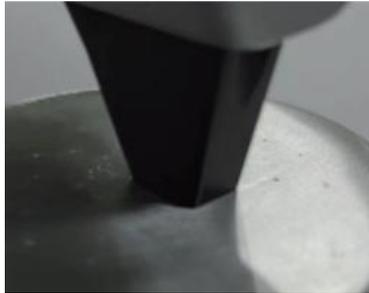
After pressing for 0.1～3 seconds, release the trigger button. The instrument prompts for sample measurement and emits a laser. And hears the crackling sound of the laser breaking through the air, indicating that the sample is being analyzed. Sample test is a fast analysis in just 2 seconds. And the software will automatically switch to the test results page after the test is completed. And the sample type and elemental content will be displayed immediately (displayed on the numerical interface).

Accurate test

The sample port is close to the surface of the alloy. And multiple positions of the same sample are selected for testing until the set number of times is met (the top of the main interface will prompt the number of measured times and the set number of times, which are displayed in the form of fractions. As shown in the red circle in the figure below). Automatically switch to the test result page after the test, and the sample type and element content are displayed immediately. Accurate test is more accurate than quick test.
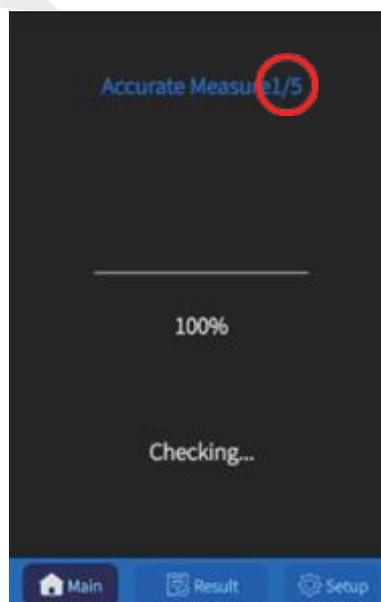
Instrument Networks and Equipment Maintenance

◆ Strong impact is likely to cause irreversible damage to the instrument. And the instrument should be avoided from falling and being hit. After the instrument is used and during transportation. Please be sure to place it in a special protective box and lock the lid of the box.

◆ If the instrument is not used for half a year, please take out the battery and store it separately from the main unit of the instrument to keep the instrument and battery dry to prevent corrosion.

◆ Avoid the temperature change of more than 15 degrees Celsius in the high humidity environment when the instrument is turned on. The sudden drop in temperature in the high humidity environment may cause the water vapor in the ambient gas to condense inside the instrument. Resulting in damage to electronic and optical devices.

◆ To avoid damage to the instrument, do not place it in rain or immerse it in water. Although the instrument is able to withstand a small amount of water splashing for a short period of time. If you find that the device has been wet with water droplets, dry the case immediately and make sure that the inside of the device is not damaged by water before use. Please note that damage caused by water ingress of the device due to improper use may not be supported by warranty service.

◆ Clean the optical window of the instrument's test port regularly or as needed. When significant dust deposits are observed, ear wash balls or canned compressed air can be used to purge the window. If these devices are not available, the window can be gently wiped to remove the deposited dust using tools such as dust-free or dust-free cleaning swabs, mirror cloths, mirror cleaning paper, etc.

◆ Do not disassemble or attempt to repair the hardware by yourself. When the instrument fails, try restarting the device first. If the problem persists, contact INSIZE for technical support.
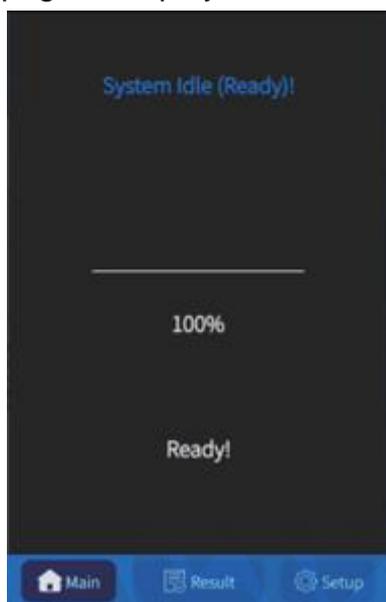
3.Instructions of Software

The instrument software starts automatically when it is turned on. And you can view three main pages including Main, Result and Setup after startup.

a) Main Page

Main page displays the current instrument readiness status, and when the instrument is in the ready state. Main page is displayed as follow.


If the progress bar is not 100%, it means that the instrument self-test has not been completed, or the component is faulty. In this case, restart the instrument, and if it still does not enter the ready state, contact INSIZE for technical support.

b) Result Page

Result page enters the default display of the analysis result value, including the sample test time information, the content of each element in the sample (in percentage form) and its corresponding alloy matrix type and grade, each sample identifies 2 grades, by clicking the ">" button next to the grade, view the element content range of different grades (the alloy grade is not included in the alloy library, the number of recognized grades is 1 or no adaptation). The historical data can be viewed through the left and right arrows of the touch interface.
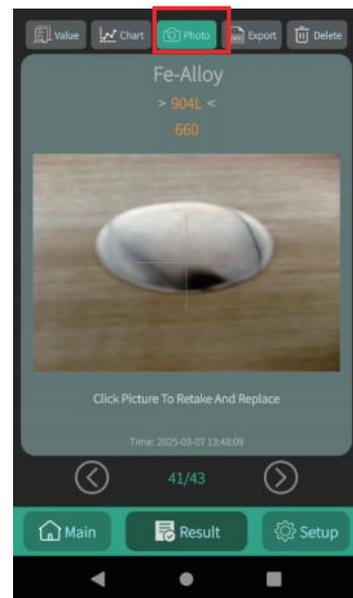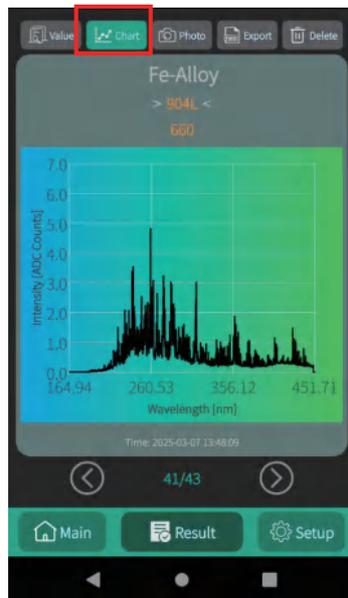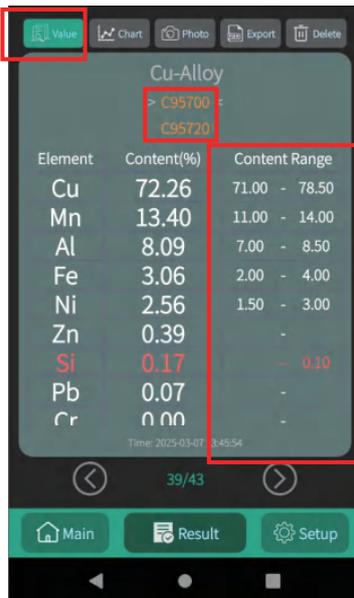
Functional options	explain
Value	Check the elemental content tested and the corresponding grade（Elements outside the grade value range are shown in red）
Chart	View Spectrum
Photo	Take an image of the wide-angle camera and save the photo (on the current page, press the trigger to take a picture, and the picture will be automatically saved in the sample test document)
Export	Export detecting record
Delete	Delete detecting record
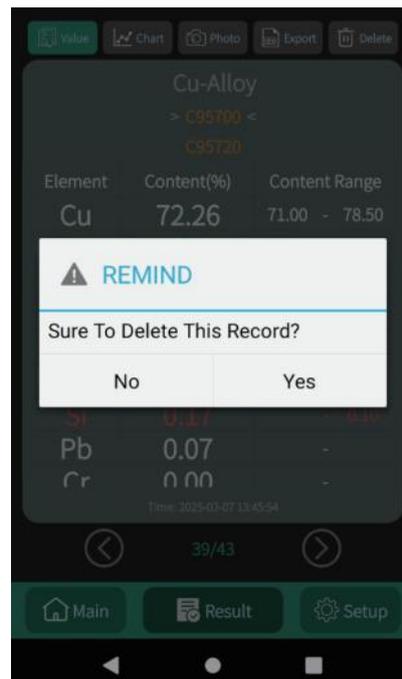
c）Setup Page

The instrument analysis parameters are displayed by default on the setup page, and each function is described below.

Functional options	explain
Param	Analyzing setting（Alloy type、test mode、data processing）；Data management；shutdown switch；reset switch
Calib	Wavelength Calibration、Strength Calibration of Al-alloy、Strength Calibration of Cu-alloy、Strength Calibration of Fe-alloy
Grades	Manage grades
Info	View the information about Software Version、Marque and Software Version
More	System settings、PhotoCamera settings

Instrument Operation Parameter Setting and Optimization

The instrument operation parameter settings are mainly changed on the "Setup" page, and the pre-analysis settings are prioritized in the setup page.

a) Parameter Setting

Parameter setting before Analyzing:

Automatic identification	Automatic identify alloy type	Alloy type	The type of alloy which will be tested
Quick test	Analyzing once to get the result	Accurate test	Analyzing times to get the result
SaveData	Save data	Data Setting	Export and Clear all the testing datas
Reset	Dismiss the instrument error	Shutdown	Turn off the instrument

Calibration

The instrument is portable, and timely correction is required during environmental conversion and long-term use aging. It is recommended to do it once every 1～2 months.
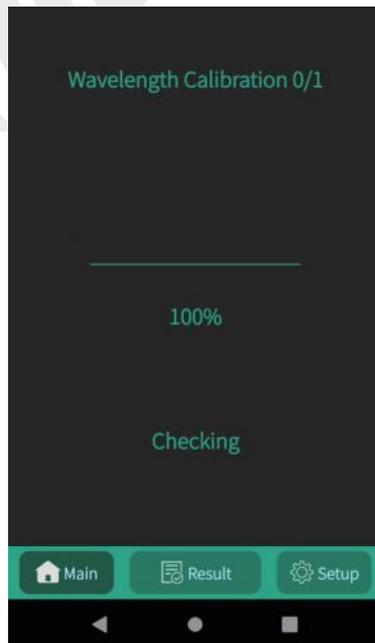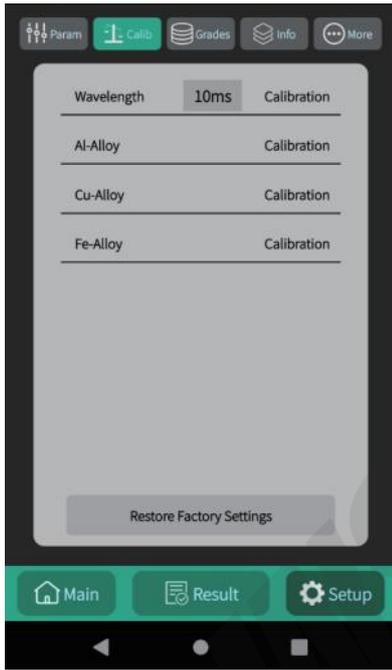
a) Wavelength Calibration

（Wavelength Calibration : Spectral wavelengths specifically corrected for instrument testing）

The instrument is turned on normally. After the warm-up is completed. The laser of the instrument reaches 40±0.5°C, and the spectrometer reaches 40±0.5°C (the "More" tab of the "Setup" page, see in "System Settings").

In the "Wavelength Calibration " column of " Calibration ", click "Yes", no need to change the set the laser integration time (the default is 20ms, some instruments will have parameter differences). Enter the main interface of wavelength correction. Put the calibration sample at the test port for one test. And automatically perform wavelength correction after completing the number of test tests. The correction sheet is shown in the figure below.

Polishing the sheet metal of Wavelength Calibration：When the surface of the sheet metal of Wavelength Calibration has been tested one time and is covered with test marks. The sheet metal of Wavelength Calibration need to polish with supporting sandpaper until the test marks are not visible to the naked eye (pay attention to the smoothness of the test surface, do not only polish a single position, which is easy to cause the test surface to be dented).

校 正
calibration

After calibrating of wavelength, the test sample spectrum, which is in the chart view on the result page, is on the wavelength axis of the wavelength-intensity coordinate. The start and end of wavelength values (shown in red, in the left figure) is same as before the wavelength calibration.

If the deviation of the wavelength calibration is large, the instrument will report an error during calibrating. And it is better to re-calibrate it, or restore factory setting. (Setup →Calib →Restore Factory Settings →Wavelength/Al-Alloy/ Cu-Alloy / Fe-Alloy [The alloy is about the Strength Calibration. It can be used if strength calibrating is incorrect multiple times.] →Confirm, shown in the figure below)


b) Strength Calibration

The instrument completes the warm-up phase. Then take the Strength Calibration（Strength Calibration is specially modified to calibrate the elemental analysis curve of the alloy library, and the correction analysis curve makes the instrument analysis more accurate）。

Setup→ Calib→ Al-Alloy（or "Cu-Alloy"、 "Fe-Alloy"）+ Calibration. Go to the selection page of "Al-Alloy Calibration ".

Tick the sheet metal of Wavelength Calibration which is named 7022（or AlSi5Cu8）with the corresponding numbers. The content of the standard sample on the screen is not an accurate value, the actual content is subject to the "standard" form, click the "confirm" button at the bottom, and confirm the corrector number again in the pop-up window, click "confirm" to collect the spectrum (proofing in the center of the 2/3 radius length of the standard sample. 10 times in different positions), and

then collect the spectrum of another calibrator of the alloy according to the same path and method again, and finally the instrument automatically corrects the strength of the aluminum alloy. The calibration standards of aluminum alloy, copper alloy and ferroalloy in the instrument are two Strength Calibration tablets, the number and label are shown in the following table, and the two standard samples must be calibrated to achieve the strength correction of an alloy library. Please operate according to the specification for Strength Calibration, otherwise you will be responsible for the data error.

Alloy type	number	Using/Calibrating elements	Label
Al-alloy	7022	Strength Calibration of Al-alloy **Fe、Mn、Zn、Mg**	Al 7022
	AlSi5Cu8	Strength Calibration of Al-alloy **Si、Cu**	Al AlSi5Cu8
Cu-alloy	CuAl8Mn14Fe3Ni2	Strength Calibration of Cu-alloy **Al、Fe、Mn、Ni**	Cu CuAl8Mn 14Fe3Ni2
	ZQSn5-5-5	Strength Calibration of Cu-alloy **Zn、Pb、Sn**	Cu ZQSn5-5-5
Fe-alloy	904L	Strength Calibration of Fe-alloy **Cu、Cr、Ni、Mo**	Fe 904L
	Ni4Mn3Si3V	Strength Calibration of Fe-alloy **Mn、Si**	Fe MQTMH7
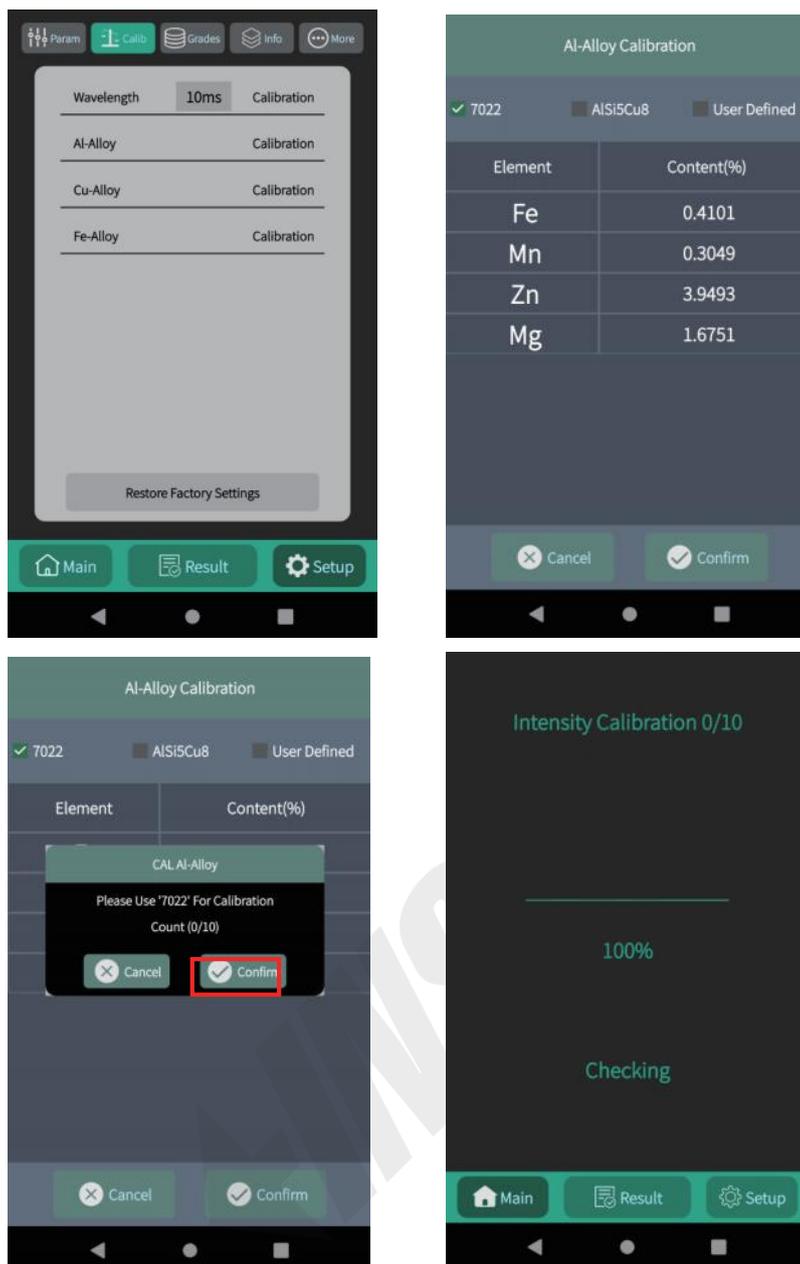
If you need to use other reference materials for calibration, use "User Defined" calibration, the supporting standard calibration and other standard materials used for custom calibration can be calibrated at the same time, or can be calibrated separately, the final standard of the intensity correction element is based on the latest calibration intensity of the standard (the element displayed on the screen of the calibration is the corresponding element of the calibration of the calibration film) or the content of the reference material. Suggestion: It is best to use a custom intensity calibration standard that is close to the material and content of the sample to be analyzed, so that the analysis is more accurate after calibration.

First check " User Defined ", click on the blank space of the "Content(%)" column of each element, enter the content, and click " ✔" to confirm the input content, after entering the content of the element to be corrected, click the "Confirm" button at the bottom, and confirm the standard sample again in the pop-up window, click "Confirm" to collect the spectrum, and finally the instrument automatically corrects the strength of the matrix alloy.
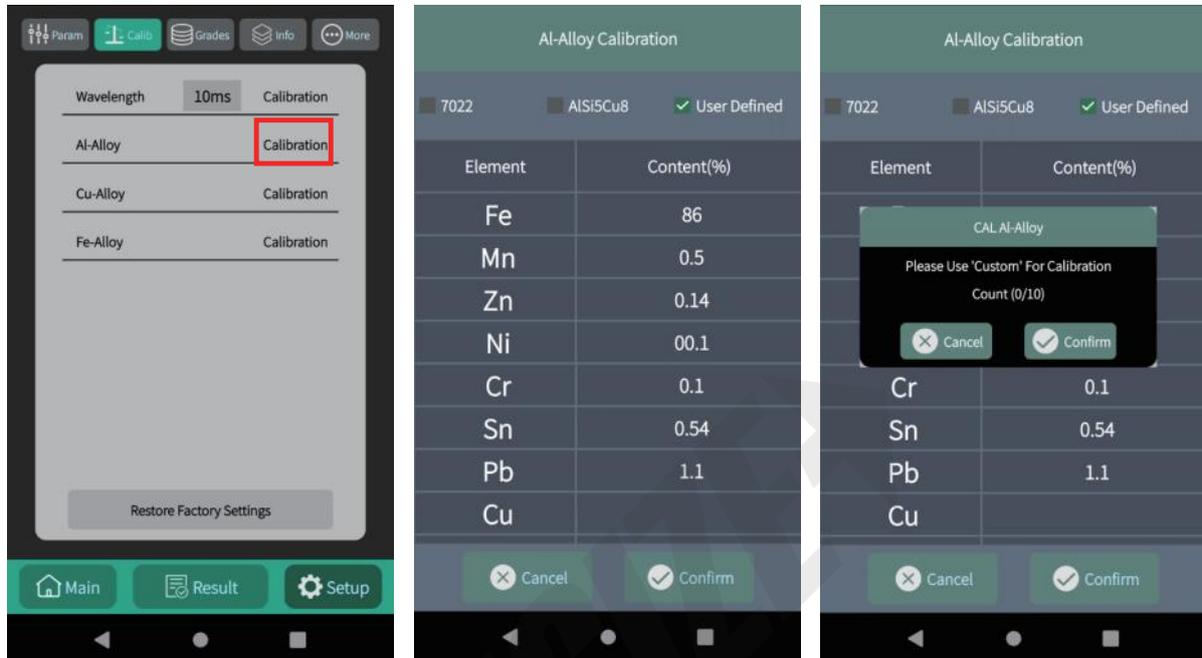
After the strength calibration, the instrument uses the "Accurate" mode, the number is set to 5 times, the sample is retested. And the relative deviation between the retested content and the element content set by the calibration is calculated. The relative deviation between the remeasured content value of the corrected element and the element content set by the calibration shall meet the requirements of the following table:

Content range of calibration/%	Relative deviation
0.1=1.0	≤25%
1.0=5.0	≤15%
5.0=10	≤10%
10=50	≤ 5%

If the retest continues to be high or low after calibrating times, please click "Restore Factory Settings", check the alloy type that has failed to be calibrated many times, and click "Comfirm" to restore the factory calibrate parameters of the alloy type. The calibration element is then re-tested or a specific element in the alloy type is recalibrated until the calibration is qualified.

Saving and Exporting Testing Datas

This device supports exporting data to an external storage device, pull the seal on the right side of the instrument, connect it using the type-c USB interface, Micro USB interface, or insert SD card or TF card (Micro SD card).

After the export is finished, you need to pull down the upper menu and push out the USB stick before the export is successful.

a) Individual data export file

On the "Test Results" page, you can view current and historical data. Connect an external storage device (such as a USB drive or SD card) to the instrument, click the "Export" button as shown in the figure below, and the device will prompt you to input the export test information for the sample, which includes: order number, company name, material, batch number, inspector, inspection point, instrument number (default is the equipment number of the instrument), testing method, location. You can choose to check "Load last test information" as the input version for this information. If there is no need to export the information, you can also uncheck the checkbox in front of it. Finally, click "Confirm" to complete the export. If you do not need to enter the test information, click the "Skip" button. The instrument will store the data displayed on the current page in PDF document format on the external storage device. The document is named "ExportData", and the file name is defaulted to the test time of the sample.

Click "Export", select "Yes" in the pop-up window, automatically select the external storage device as the save path, and the export end pop-up window prompts "Export record successful", click "OK" to end the single data export.

b) Exporting all testing datas

Connect an external storage device, click the "Param" interface on the "Setup" page, click the "ExportData" button, select "Yes" in the pop-up window, automatically select the external storage device as the save path, and the export end pop-up window prompts "Data export successful", and click "OK" to end the data export. The default folder name is ExportData, the Average folder in the Data folder of the file contains all the test data, which is saved in xlsx format, the name of the xlsx file is the time when the sample was tested, the average spectral data of each data is in the Data_Sheet subtable, and the test results and test condition information are in the Information_Sheet subtable; A separate Raw folder contains all the test data, except that the raw spectral data for each sample is stored in Data_Sheet subtable.
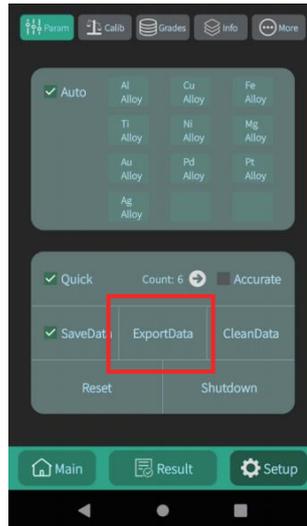
In the ExportData/Data:

c) Clearing all historical datas
Click the "Setup" ➜"Param" ➜"CleanData ". In the data erasure
column, click the "Yes" button in the data erasure confirmation
column to clear all the historical data in the instrument.
WARNING: This wipe function cannot be restored, so make sure that
the historical data is properly saved and backed up before data
cleanup

Add the alloy grade

At the bottom of the "Grades", click the "+" button to enter the
alloy grades Database. At the bottom of the brand library, click
the "+" button to enter the addition page of the alloy grade. And
fill in the name of the alloy grade. The upper and lower limits
of the content of each element (the sum of the content of the
upper and lower limits of the element does not exceed 200, other-
wise an error will be reported: the content input is WRONG. Click
the "OK" button to modify it again). Then click the "Yes" button
to complete the addition of the grade.

Modify and Delete the Alloy Grade

In the alloy grade Database, click on a single grade, double-click on the grade to prompt immediately. Delete and modify the pop-up window of the grade, click "Delete" to delete the grade immediately, click "Updata" to correct the element content.

System Settings and Photocamera Settings

In the "More" column of the setup page, click the "<" button of "System Settings" to pop up the system settings page. The mode of testing can be the conventional "Predict" or the "Build" of establishing a new alloy test model. With the activation of "Smart Shut", the temperature control of the laser will be turned off after 10 minutes of standby. The device will automatically shut down after another 10 minutes. Language setting can choose English or Chinese . Instrument time need set "Sys.Date" and "Sys.Time", by clicking the following "→" after the "Sys.Date" and "Sys.Time". View the instrument's battery level, laser temperature, spectrometer temperature, using sum total of laser in the red frame.

In the "More" column of the setup page, click the "<" button of "PhotoCamera Settings" to pop up the photo settings page.
You can choose to turn the camera on and off, and set the camera resolution, exposure compensation, lens rotation angle, image flip, full angle of view, and crop angle of view. The crop angle can be set to determine the size and position of the display screen of the shooting lens according to the set starting point coordinates and the length (height and width) of the crop.
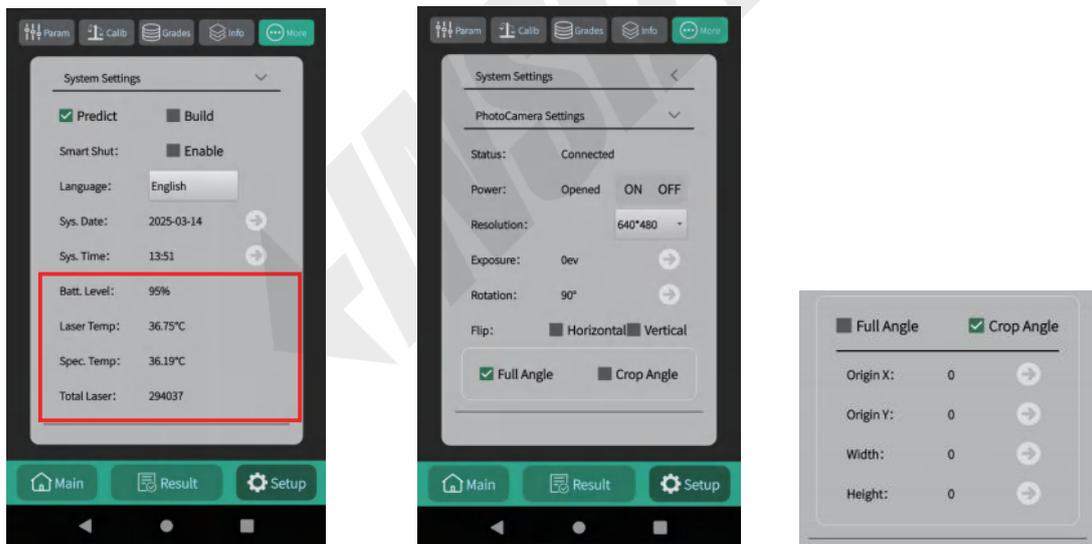
4.Troubleshooting

The test process does not start after pressing the detection trigger

In routine use, the instrument will enter the data processing phase at the end of the analysis. During which the detection trigger will be pressed more than once to remind the excitation not to repeat. And after a delay of a few seconds, the data of the analysis results will be displayed. If the trigger is pulled continuously, the instrument will report the error "Equipment Abnormal". Click the "Reset" button on the setup page and confirm, and it can be recovered.

In normal use, the test process does not start after pressing the detection trigger, you can press the detection trigger again after an interval of 1 second, after two attempts to no avail, click the "ShutDown" button on the settings page, then press and hold the trigger to restart the device. When the software completes the self-test and enters the ready state, try the test again and confirm whether the trigger is pressed correctly. If the test process still cannot be started. Or the instrument cannot complete the self-test. Please contact INSIZE for technical support.

The instrument automatically shuts down during use

Check that the battery is installed correctly and try to replace the battery. If the machine fails to turn on or the automatic shutdown phenomenon persists, please contact the manufacturer or engineer for technical support.

The results of the analysis differed greatly from the standard values

First of all, confirm whether the optical window in the front of the instrument is seriously polluted. Clean the optical window according to the hardware use of this manual - the daily maintenance part of the instrument hardware.

Secondly, to confirm whether the alloy type of the sample matches the selected quantitative model. The automatic identification mode can be used as much as possible to avoid the error. If the type of alloy sample tested is not included in the instrument analysis type, you can view the spectrum data. The test data of the alloy sample is only used for reference.

If the difference in results cannot be eliminated, it can be corrected according to the "Instructions of Software - Calibration" section of this manual.

5.Abbreviation Search

Abbreviation	Full name
Batt. Level	Battery level
Total Laser	Using sum total of laser
Sys. Date	System data
Sys. Time	System time
Con. Status	Connection status
Run. Status	Run status
Laser Temp	Laser temperature
Spec. Temp	Spectrometer temperature
RT	Real time
PCB	Printed Circuit Board
Der. Time	Derivative time
TCM	Temperature control module
Info	Information
Param	Parameters
Calib	Calibration
SW Version	Software Version
Sys. Number	System serial number
HW Version	Hardware version
HW Number	Hardware number

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