LANGRY®

LR-G200
Integrated Rebar Scanner
Operating Instructions

PREFACE

Your choice of the products made by Jinan Langrui Detection Technology Co., Ltd. (LANGRY) is greatly appreciated. We are committed to deliver you excellent products and satisfied sales services. Please carefully read the instructions prior to use.

1. The instructions are prepared to provide the correct and complete descriptions of related products and data. However, we do not guarantee that there are no errors or omissions. Therefore, we will not bear responsibilities for any resulting consequences.

2. LANGRY keeps the right of updating the instructions without prior notice.

3. LANGRY bears no responsibilities for possible losses from data deviation or incorrect testing conclusion arising from instrument failure and other errors.

4. When the instrument is put into operation, it means that you have carefully read and had full picture of all terms in the instructions, and you have fully agreed to all the terms in the instructions.

5. LANGRY will not bear responsibilities for all the signed agreements violating the statement during the sales and services process not involving LANGRY.

Contents

Chapter 1 Function and Introduction

1.1 Instrument Introduction

LR-G200 Integrated Rebar Scanner is a portable intelligent NDT device, which is mainly used for the structural detection of reinforced concrete， and able to detect the thickness of the protective layer of steel bars and the diameter of rebar on the surface of reinforced concrete, and analyze the distribution of rebar.

1.2 Main Functions and Features

1. The instrument sensor is integrated design in small size，more convenient and quick to use.
2. It adopts the combined detection method of high-power transmitting coil and multiple groups of small coils, which has higher precision and stronger resolution.
3. Using high-precision grating sensor to scan displacement and rebar spacing is more accurate.
4. Provide a variety of scanning modes suitable for different measurement environments
5. Support large and small range detection, the scanning distance has no boundaries, and the data detection is more flexible.
6. Support multi-level stirrup correction, and the detection result is more accurate.

7. It supports USB wired data transmission and Bluetooth wireless data transmission at the same time, making data upload easier.
8. Using a 3.2-inch 65K color LCD screen, the resolution is higher and the display effect is better. At the same time, it is equipped with a capacitive touch screen, which makes human-computer interaction more convenient.

1.3 Technical indicators

Description		Technical indicators
Applicable range of rebar diameter(mm)		Φ6- Φ50
Max. range (mm)	1st range	1~105
	2ndrange	1~205
Max. allowable deviation on concrete cover depth	±1 (mm)	1~80
	±2 (mm)	81~120
	±3 (mm)	121~160
	±4 (mm)	161-205
Applicable range on diameter estimate (mm)		Φ6- Φ50
Max. deviation on diameter estimate		±1spec
Display accuracy on diameter estimate (mm)		0.1

1.4 Performance Indicators

Performance indicators on LR-G200 Integrated Rebar Scanner			
Quick scanning	Fine scanning	Profile scanning	Grid scanning
Yes	Yes	Yes	Yes
Data correction	Way of power supply	Instrument weight	Screen size
Yes	Lithium battery	1KG	3.2"
Image scanning	3-D imaging	Range of scanning	Mode of data transmission
Yes	Yes	Unbounded	Bluetooth or USB
Laser positioning	Touch screen operation	Screen lattice	Instrument size
3-wire	Yes	320x240	235x120x130

1.5 Precaution

1、Please carefully read the instructions prior to use.
2、Expected operating environment:
① Ambient Temperature.: -10℃~40℃
② Relative Humidity: <90%RH
③ Electromagnetic Interference: No Strong Alternating Electromagnetic Field
④ Exposure to direct sunshine for an extended period prohibited
⑤ Corrosion Control: Take necessary measures to ensure proper operation at the humid, dust and corrosive gas environment.
3、Expected storage environment:
①Ambient Temperature: -20℃~50℃
② Relative Humidity: <90%RH
③ In case of out of use for an extended period, please regularly switch on the instrument and recharge it. The instrument shall be placed at a well ventilated, cool and dry location without repeated exposure to direct sunshine.
4. Prevent moisture impact, and operation at the intense magnetic fields, such as in the vicinity of large electrical magnet, transformer, VFD, etc.
5. Vibration control: take measures to prevent violent vibration and impact during operation and handling.

6. Charge management: the instrument is recharged with the rechargeable lithium battery. In case of low battery, recharge the instrument without delay to avoid battery damage. Perform recharge with the recharger specific to the instrument rather than other types of adapter or recharger, which may otherwise lead to battery damage.
7. Maintenance: conduct proper cleaning at the end of operation every time to prevent declined performance or property damage due to dust presence in the instrument or plug connector.
8.  Visiblie laser, avoid beam exposure, 3R class laser.

1.6 Responsibility

The instrument is a precision scanner . We will bear no responsibility in case of the following user operations being identified.
1. Incompliance with the above working environment requirements or storage environment requirements.
2. Non-standard operation.
3. Unauthorized removal of the casing and parts.
4. Serious instrument damage by operator or accident.

Chapter 2 Instrument Composition

2.1 Instrument Composition

The instrument consists of host, specific charger and attachment.

2.1.1 Host

LR-G200 Integrated Rebar Scanner is illustrated below.

Figure 2.1

2.1.2 External Interface

USB interface: It can be used as a data transmission interface or a charging interface with a computer.

2.1.3 Key Description

Key	Function Description
⏻	Long-press：Switch on or off the instrument
...	1、Short-press: The device calibrates itself 2、Long-press：Diameter Estimate
OK	1、Confirm current selection 2、In the grid scan mode, switch between horizontal and vertical directions
C	Back to the previous menu
▲	Option up or digital adjustment up
▼	Option down or digital adjustment down
FN	Muti-function key

Note：Refer to the related chapters for details on function of each key

Chapter 3 Operation Instruction

3.1 Function description

The instrument is designed for rebar detection, data view, data uploading, data deleting, system setting, etc.The main interface of the system is illustrated in Fig.3.1

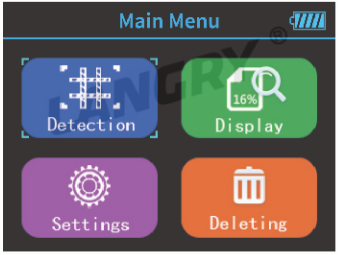

Figure 3.1 Main Interface

3.2 Rebar Detection

Click【Scanning】on the main interface to enter the Rebar Detection interface, as shown in Figure 3.2

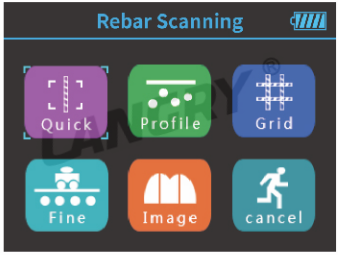

Figure 3.2 Rebar Detection interface

3.2.1 Parameter Setting

The scanning parameter setting is mainly used to set the parameters used in the current scanning mode, the parameter setting interface is shown in Figure 3.3 (take the parameter setting interface of the quick scanning as an example).

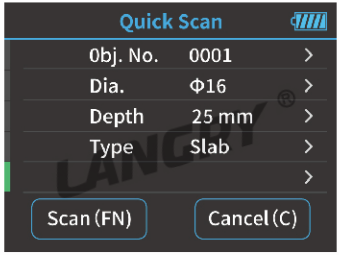

Figure 3.3 Scan parameter setting interface

The parameters that can be modified are as follows:

1) Component Name

The component name is composed of numbers, letters, and symbols. By default, the component name will be automatically extended on the basis of the last saved name. Users can set by themselves according to their needs, the user can set up to 12 digits, at least 1 digit.

The specific operation is as follows:
Press the【OK】key to enter the component name editing state, move the cursor in the soft keyboard area, select a key to be executed, and then press the【OK】key to confirm or enter the multi-character selection column of the key, move the cursor and press the【OK】to select one of the characters.
2) Design Diameter
It is used to set the diameter of the steel bar to be tested. The diameter can be selected from 6, 8, 10, 12, 14, 16, 18, 20, 22, 25, 28, 32, 36, 40, 50, a total of 15 steel bar specifications.
3) Design Thickness
It is used to set the design cover thickness information of the rebar to be tested, and the setting range is 2~210.
4) Component Type
It is used to set the type of steel member to be tested, and two member types of "Beam" and "Slab"can be selected.
Notice:
1) The thickness measurement of steel bar cover needs to set the steel bar diameter in advance. Only when the design diameter is set correctly can the measured cover thickness value be accurate, otherwise there will be different degrees of deviation.

2) The setting of the design thickness and component type parameters is mainly used to determine whether the protective layer thickness of the measuring point is qualified during the measurement process, and the unqualified measuring point values are displayed in red to show the difference.
3) In the grid image mode, the design diameter and design thickness in the X and Y directions need to be set at the same time.

3.2.2 Signal Reset Calibration

When the detection environment changes or there is a large deviation between the measured rebar cover thickness and the design value, it is necessary to reset the signal for calibration of the instrument. In any measurement mode, you can press【…】key to activate the signal calibration function.

Notice：

When the instrument is calibrated, it should be operated in the air and away from ferromagnetic substances. Press the【OK】key to start the calibration process according to the interface prompts, and wait for the instrument to exit after self-calibration.

If the calibration signal is abnormal, it will indicate that the calibration has failed, and it needs to be re-calibrated.

3.2.3 Quick Scanning

In the quick scanning interface, move the trolley slowly to the right at a constant

speed to start measurement. When the trolley is close to the rebar, a green aiming frame appears. At this time, you need to move the trolley slowly, and the aiming frame slowly moves close to the center line. When the aiming frame coincides with the center line, the aiming frame becomes At the same time when it turns red, the red indicator light turns on, and there is a beep sound to prompt, and the laser light in front of the instrument will make a red vertical line to indicate that the instrument detects the steel bar at this time, which is directly below the red line. If it is set to the automatic storage mode, it will automatically save the determined protective layer thickness value. If it is the manual storage mode, you need to press the [FN] key to save the thickness value, and the thickness value will be displayed at the bottom of the screen. When the trolley is far away from the steel bar, the aiming frame is also away from the centerline, until it moves beyond the effective detection range, the aiming frame returns to the centerline position and is displayed in gray. When the car is in the middle of the two steel bars, the aiming frame is blue.

When the trolley continues to move to the right and detects the next steel bar, the instrument will give the same prompt, and at this time it will simultaneously display the thickness of the protective layer and the distance from the previous steel bar. As shown in Figure 3.4, the current protective layer thickness is 46mm, the protective layer thickness of the last steel bar is 26mm, and the distance between the two steel bars is 35mm.

When the scanning distance exceeds the range displayed on the screen, the screen will turn pages, which can be viewed by pressing the left and right keys. During the detection process, if the thickness of the detected steel protection layer is found to be abnormal, the trolley can be retracted and re-measured. When retracting to the left of the measurement point, the system will automatically delete the measured measurement point data.

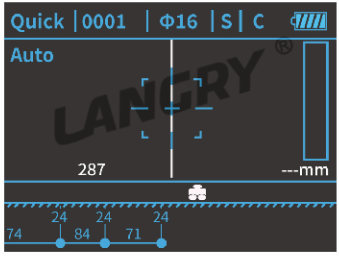

Fig.3.4 Quick scanning interface

3.2.4 Profile scanning

Profile scanning is a scanning mode that displays information such as the position of the steel bar to be tested, the thickness of the protective layer, the distance between adjacent steel bars, and the measured diameter in the form of

a longitudinal section distribution map. This scanning method is similar to the conventional scanning method. The section scanning method is shown in Figure 3.5.

Slowly move the trolley to the right in the profile scan mode, when it moves above the rebar, the aiming frame at the lower right will turn red, and the display mode is the same as that of the quick scan mode, see relevant chapters for details. The current displacement value will be displayed in real time at the bottom left of the screen. When the rebar is scanned, it will be displayed in the form of section points on the screen, and the thickness value of the protective layer will be marked, and the distance between adjacent rebars will be calculated.

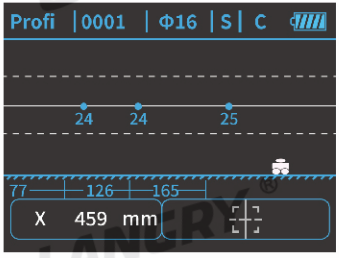

Figure 3.5 Profile scanning interface

3.2.5 Fine Scanning

The fine scanning mode displays information such as the waveform of the measured steel bar, steel bar position, cover thickness, center distance between adjacent steel bars, and estimated diameter in real time in the form of a waveform diagram. Users can also manually add or delete steel bar measurement points according to the distribution of the waveform.

The quick scanning method is not suitable for the scanning of dense bars because it needs to determine the position of steel bars in real time. Fine scanning is specially designed for dense bars. The fine scan interface is shown in Figure 3.6.

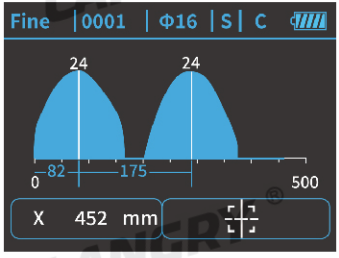

Figure 3.6 Fine Scanning Interface

In the fine scan interface, place the instrument on the surface of the object to be measured, move slowly to the right to start measurement, the screen will display the signal waveform, and the real-time displacement value will be displayed on the lower left of the screen. When the instrument is close to the steel bar, the signal value starts to increase, and the wave curve rises slowly. When the instrument is far away from the steel bar, the wave curve slowly decreases. At this time, there will be a peak, and the position of the peak is the position of the steel bar. A white line will be displayed at the crest, indicating that there is a rebar, and the cover thickness of the rebar will be displayed above the crest. When multiple rebars are detected, the instrument will automatically calculate the rebar spacing and display it below the waveform.

During the detection process, if there is a dense distribution of steel bars, the waveform signal will become gentler and wider than the waveform of a single steel bar. At this time, the instrument needs to combine the changes of the front and rear waveforms to judge the position of the steel bar, so it may There is a phenomenon that the judgment of the position of the reinforcement is delayed.

When the rebars to be measured are unevenly distributed, you need to switch to the high-low reinforcement mode. Press the down key on the detection interface to switch to the high-low reinforcement mode.

When the scanning distance exceeds the range displayed on each screen, the instrument will automatically turn the screen to display, and the maximum scanning range is 10m.

During the detection process, if the waveform signal is found to be abnormal or the judgment of the steel bar is deviated, you can go back to the left to erase the waveform with the judgment deviation, and scan again, or press and hold the【FN】key or touch the screen to display the waveform after the scan is complete. The area enters the interface of manually adding and deleting measuring points, as shown in Figure 3.7. This interface allows users to manually add and delete reinforcing bar measuring points.

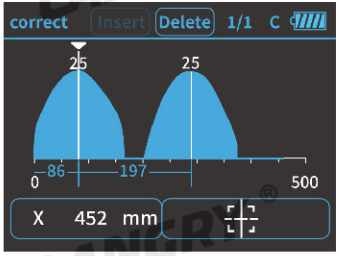

Figure 3.7 Fine scanning interface for manually adding and deleting measuring points

Notice: The fine scan mode supports a scan distance of up to 10 meters.
Once entering the function of manually adding or deleting measuring points in fine scan mode, the instrument will no longer support returning to continue measuring this component.
The fine scan mode defaults to dense-reinforced mode, which can satisfy most dense-reinforced measurement environments. For extremely densely-reinforced environments, press the down arrow key to switch to the extremely densely-reinforced mode. This mode requires correct setting of the steel bar diameter value.
The scanning process requires a constant and slow speed to ensure the accuracy of the sampling data.

3.2.6 Grid Scanning

Grid scanning is a measurement mode that displays the position of the steel bar to be tested, the thickness of the cover layer, and the spacing between steel bars in the form of a grid diagram. Through the grid schematic diagram displayed by grid scanning, users can clearly see the arrangement of steel bars. The grid scanning interface is shown in Figure 3.8.

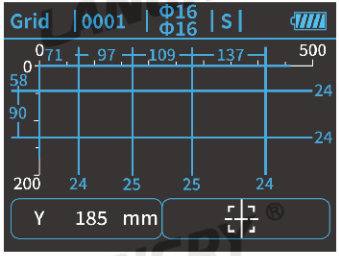

Figure 3.8 Grid scanning interface

When entering the grid detection, first perform a "grid level" scan, and slowly run the moving car at the lower left of the screen to start recording the displacement. When the steel bar is detected, it will draw the steel bar measurement points and protective layer in the form of grid lines at the corresponding position Thickness, calculates and displays the spacing of adjacent bars. When the steel bars in the horizontal direction are scanned, press the【OK】key to switch to the "grid vertical" scanning mode to continue detection. After all the inspections are completed, press the【C】key to save the data and exit the grid inspection.

3.2.7 Image Scanning

The image scanning mode is a measurement mode that conducts comprehensive analysis by performing multiple scans in the horizontal and vertical directions in a specific area on the basis of combining fine scanning and grid scanning. It is suitable for the measurement environment of irregularly distributed steel bars.

In the image scanning, the user can scan in the way of 5x5 grids at most (2x2, 3x3, 4x4 grids can also be used), that is, horizontal scan 5 times, vertical scan 5 times, and the scanning position can be selected arbitrarily, as shown in Figure 3.9 Image Scanning The location selection interface is shown.

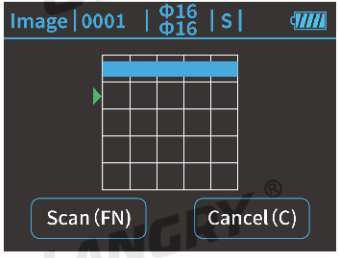

Figure 3.9 Image scanning position selection interface

The single-scan measurement process of the image scan also displays the measurement results in the form of a waveform diagram. For detailed functions and operations, refer to the introduction of the fine scan chapter.
After all the data collection is completed, the user can import the data into the computer for data analysis, and at the same time generate 3D graphics to view the distribution of steel bars more vividly.

Notice:

The maximum distance for a single scan in image scan mode is 1 meter;
The single scan in the image scan mode does not support the function of manually adding or deleting steel bar measuring points.

3.2.8 Diameter Estimation

The estimated diameter value can be displayed in each scanning mode. When it is necessary to estimate the diameter of the steel bar, the trolley needs to be moved directly above the steel bar. Press and hold the【...】key to enter the diameter estimation function, and wait for 3 seconds to measure After completion, the instrument interface will display the estimated diameter value and estimated protective layer thickness value, which will automatically exit after 3 seconds.

Notice:

During the diameter measurement process, the position of the instrument should be kept constant, otherwise the measurement results will be deviated.
The diameter measurement results are only displayed but not stored.

3.3 Data view

The instrument provides two viewing modes: component list and component detailed view. The component detailed view can be viewed in the form of graph and list respectively. Users can choose according to their needs, and the default is in graph form.

3.3.1 Component List Display

Entering the data viewing interface first displays the component list, as shown in Figure 3.10, which mainly displays the following contents:

Component list information and data statistics of specified components.

Correction: You can press【FN】key to implement the correction function to modify the design thickness, and the pass rate will be recalculated according to the new design thickness. This operation will not affect the detection of the protective layer thickness.

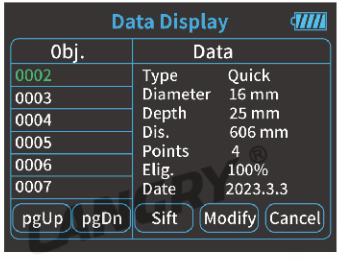

Figure 3.10 Data View Interface

Notice:
The data statistics of the component display different content according to the component scanning mode:
1.Quick, Profile, Fine scanning display content: scanning type, design diameter, design thickness, scanning distance, number of measuring points, pass rate and detection time and other information.
2.Grid scanning display content: Information such as scanning type, design diameter X and Y, design thickness X and Y, scanning distance X and Y, number of measuring points X and Y, pass rate X and Y, and detection time.
3.Image scanning display content:Information such as scanning type, design diameter X and Y, design thickness X and Y, number of measuring points, pass rate and detection time.

3.3.2.1 Graphical display of detailed data

Press【OK】to check the data of the selected component in detail.
The graphical interface display of detailed data mainly displays the measurement data of the current component graphically, which is clear and intuitive. The graphical display interface of each scanning mode is shown in the figure below.

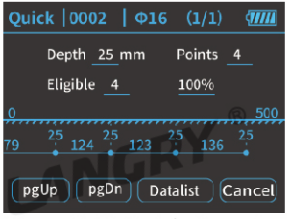

Figure 3.11 Quick Scanning

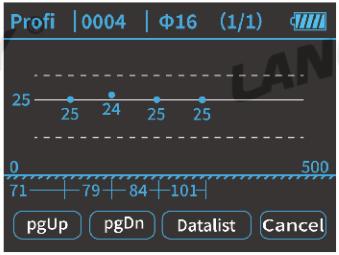

Figure 3.12 Profile Scanning

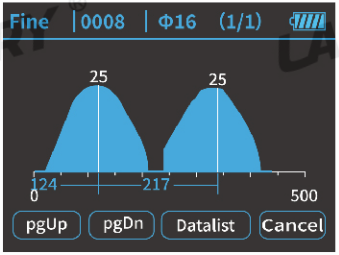

Figure 3.13 Fine Scanning

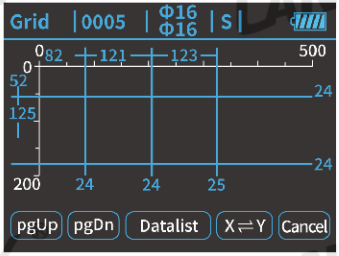

Figure 3.14 Grid scanning

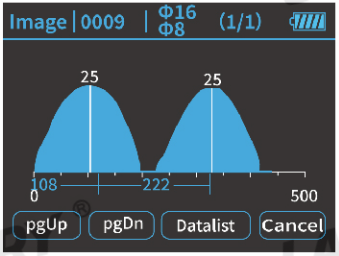

Figure 3.15 Image Scanning

Notice:

1、The title bar of the graphic display interface of the detailed data mainly displays the scan type, component name, and design diameter information of the current component, and the graphic display area mainly displays the measurement point position, thickness, spacing and other information in the measurement data in a graphical way.

2、Entering the graphic display interface of image scanning detailed data, the summary information of all current measurements will be displayed first, the interface is shown in Figure 3.16, the user needs to press the arrow keys to select the scanning position to be viewed, and then press【OK】key to enter the graphical data viewing interface for selecting the scanning position.

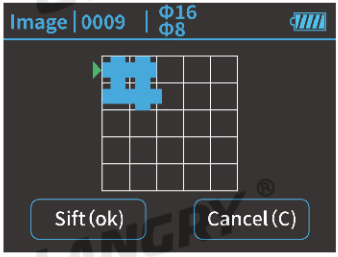

Figure 3.16 Image scanning view scanning position interface

3.3.2.2 Detailed Data List Display

The list display interface of the detailed data mainly displays the measurement data of the current component in the form of a data list, and the list display interface of each scanning mode is shown in the figure.

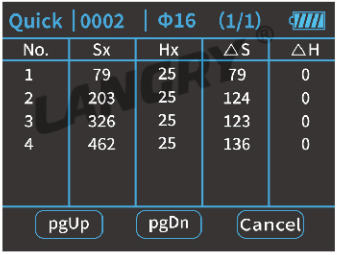

Figure 3.17 Quick Scanning

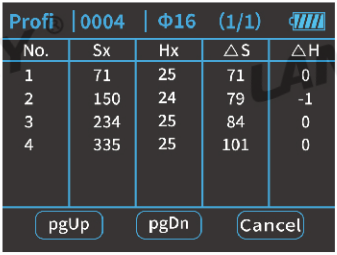

Figure 3.18 Profile Scanning

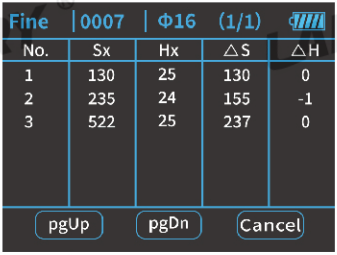

Figure 3.19 Fine Scanning

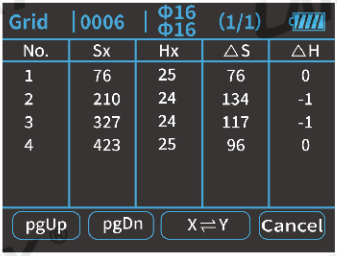

Figure 3.20 Grid Scanning horizontal direction

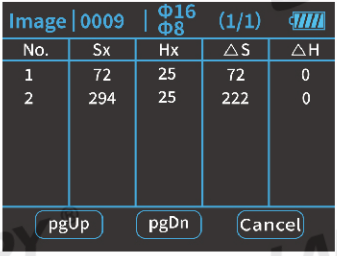

Figure 3.21 Image Scanning

Notice:

The meanings of the symbols on the component data list display interface are as follows:

No.—— No. of current measuring point

Hx——The measured thickness value corresponding to the current measuring point in the X direction in Quick, Profile, Fine, Grid, Image scanning modes

Hy——The measured thickness value corresponding to the current measuring point in the Y direction of the grid scanning mode

Sx——The displacement value corresponding to the current measuring point in the X direction of Quick, Profile, Fine, Grid, Image scanning modes

Sy——The displacement value corresponding to the current measurement point in the Y direction of the grid scan mode

△H —— The difference between the thickness of the current measuring point and the design thickness

△S —— The displacement difference between the current measuring point and the previous measuring point

3.4 Data Deletion

The data deletion function mainly implements the manual data deletion operation. When entering the data deletion interface, the instrument will prompt "Do you want to delete the data? (Y/N)", at this time press the【OK】key or touch the corresponding button on the screen to delete data, press the【C】key or touch the corresponding button on the screen to cancel the deletion of the data. The data deletion interface is shown in Figure 3.22.

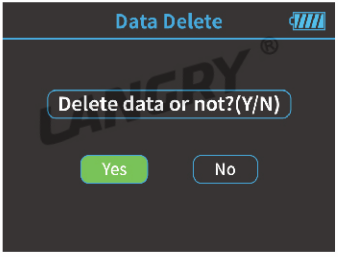

Figure 3.22 Data deletion confirmation interface

Notice:

1、Before deleting the data, be sure to confirm whether the data has been uploaded to the computer, and the data cannot be recovered after deletion.

2、The instrument does not support button or touch operation cancellation during the process of deleting data.

3.5 System Setting

The system setting menu interface is used to enable users to adjust the system configuration parameter information by themselves, mainly including the following categories: power saving setting, sound setting, time setting, stirrup spacing, wireless management. As shown in Figure 3.23.

Figure.3.23 System setting interface

3.5.1 Power Saving Setting

In the power saving setting, the user can set the backlight brightness, standby time, automatic shutdown time, and horizontal laser light switch. When leaving the factory, the backlight brightness is set to 50% brightness, the standby time is 5 minutes, the automatic shutdown time is 30 minutes, and the horizontal laser light is turned on. Users can set it by themselves according to their needs.

3.5.2 Sound Setting

The sound setting includes key button sound and prompt sound, which can be set by users according to their needs.

3.5.3 Time Setting

Set the system time, including year, month, day, hour and minute.

3.5.4 Stirrup spacing

The Stirrup Spacing menu includes Stirrup Spacing, Main Bar Spacing, Range Selection and Reinforcement Type.

1.Stirrup spacing: It is used to set the stirrup spacing, which can be set according to the actual situation. It can be set to [60], [80], [100], [>120], and the unit is mm.

2. Main rebar spacing: used to set the main rebar spacing, which can be set according to the actual situation, and can be set from 40 to >80, the unit is mm.

3. Range selection: It is used to set the range, which can be set according to the actual situation. The range is divided into small range and large range.

4. Reinforcement type: used to set the type of rebar to be tested, the rebar types are threaded steel and cold drawn round steel and hot rolled round steel.

3.5.5 wireless Management

Bluetooth upload as an extended function of the instrument needs to be used with a dedicated mobile phone software.

3.5.6 About device

About this machine is mainly used to display the relevant information of this machine, including the following items: instrument model and name, firmware version number, instrument number, company contact number, and company official website.

3.5.7 Firmware Upgrading

The instrument has a built-in firmware online upgrade program, and users can upgrade the instrument's firmware by connecting to a computer through a data cable. For details, see Chapter 4 "Online System Software"

Chapter 4 Online System Software

4.1 Introduction

The rebar detection data analysis software is a multi-function analysis software developed by Jinan Langrui Detection Technology Co., Ltd. for processing the rebar detection data. The software can run in XP/win7/win10 OS, presenting friendly interface

4.2 Software Installation

For the first use, open the official website of www.langryndt.com，find the corresponding model of rebar scanner in the【Product】and enter its product details page, click the【Download Center】, enter the download center page to download and install the online system software, then you can start using.

4.3 Data Transmission

Data transfer can be transferred via USB. When using USB to transfer data to the computer, please connect the USB data cable that comes with the instrument in advance, and turn on the rebar scanner. Start the online system software, select the【Rebar Measurement】, click【Import from Device】, the software will automatically read the memory data of the rebar scanner, and import the data that needs to be transferred to the computer.

4.4 Data Processing

Online system software can process all components and data.

4.4.1 Detect Component Data

Right-click the【Components】on the left and you can import from device

After selecting one of the component data, right-click or select the data processing menu to delete the selected component.

4.4.2 Data Deletion

Select the data to be deleted, right-click or select the data processing menu to delete the selected data.

The deleted component data can be viewed and restored in the deleted component

4.4.3 Component information export:

Select the component you want to export, right click and select【Export Component】then export and save to desktop.

4.5 Version Upgrade

4.5.1 Rebar Scanner Version Upgrade

After connecting the rebar scanner, select the menu of the【Rebar Measurement】, click【Update Firmware】, download and upgrade the version of the rebar scanner.

4.5.2 Software Version Upgrade

Select the【Help】menu and click【Check for Updates】to check or upgrade the online system software version.

V1.2

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