LANGRY™

RS350

OPERATING INSTRUCTIONS

Content

Chapter 1 Instrument Functions and Introduction

1.1 Instrument Introduction

RS350 Integrated Rebar Scanner is a portable intelligent Non-destructive testing equipment, mainly used for structural detection of reinforced concrete. It can detect the depth of the rebar protective layer, rebar diameter and rebar spacing, and can accurately analyze the distribution of rebar. It is also suitable for the detection of magnetic body and conductive body in non-magnetic and non-conductive media.

1.2 Main Functions and Features

1. The instrument is equipped with a new high-precision sensor, which enables the display accuracy of the protective layer depth to be accurate to 0.1mm. It supports multi-level reinforcement and main reinforcement correction, making the detection results more accurate;

2. The plug-in battery compartment with dual power supply as standard can be quickly replaced, offering longer battery life;

3. The full-view and high-resolution color touch screen features a large screen-to-body ratio, with a variety of theme styles, enabling better display effects;

4. The optimization of the rebar judgment algorithm in various scan modes improves the identification of dense rebar, enabling more accurate values of protective layer depth;

5. The instrument supports a variety of detection modes under complex conditions, including stirrup avoidance detection, concave surface detection, and convex surface detection;

6. The instrument is equipped with a synchronized display and wirelessly controlled host for synchronization of the detection screen and data, which makes it easy to complete overhead detection;

7. Four-beam laser positioning displays the position of the rebar and the centerline of the neighboring rebar in real time, with multiple reminders from the aiming box and indicators, facilitating rebar positioning, drilling, and coring;、

8. Supports wireless connection with mobile devices, real-time online monitoring, and data upload to the cloud platform;

9.The professional master computer software can generate 3D models, perform intelligent analysis and automatically generate test reports.

1.3 Specifications

Name		Technical Parameters
Maximum Range (mm)	First range	1~120
	Second range	1~210
Applicable Range of Protective Layer depth (mm)		Φ6~Φ50
Applicable Range of Estimated Diameter (mm)		Φ6~Φ50
Maximum Error of Estimated Diameter		±1 specification
Display Precision of Estimated Diameter (mm)		0.1

1.4 Performance Indicators

Performance Indicators of RS350 Integrated Rebar Scanner				
Quick Scan	Procedural Scan	Grid and Image	Wave Scan	Fine Scan
Yes	Yes	Yes	Yes	Yes
Complex Working Conditions	3D Imaging	Data Transfer Mode	Memory Component	Scanning Range
Yes	Yes	USB or Bluetooth	5000	Borderless
Data Correction	Power Supply Mode	Host Weight	Screen Size	Laser Positioning
Yes	Plug-in lithium battery	650g	3.5''	Four-beam
Screen Touch Operation	Charging Time	Battery Life	Host Dimension (mm)	Dot Matrix of the Screen
Yes	6 hours	24 hours	210×95×120mm	640×480pt

1.5 Rebar Detection Scope and Accuracy (for individual rebars with enough spacing)

Maximum Allowable Error of Protective Layer depth	±1 (mm)	1~80
	±2 (mm)	81~120
	±3 (mm)	121~160
	±4 (mm)	161~210
Diameter / Range	S range	L range
6	1 ~ 80	1 ~ 110
8	3 ~ 85	1 ~ 115
10	4 ~ 90	1 ~ 120
12	5 ~ 95	3 ~ 125
14	5 ~ 100	4 ~ 135
16	6 ~ 100	5 ~ 140
18	7 ~ 100	6 ~ 150
20	7 ~ 105	7 ~ 160
22	8 ~ 110	8 ~ 165
25	8 ~ 110	9 ~ 170
28	9 ~ 115	10 ~ 175
32	9 ~ 115	12 ~ 180
36	9 ~ 115	12 ~ 190
40	9 ~ 120	12 ~ 200
50	10 ~ 120	14 ~ 210

1.6 According to the standard

JGJ/T 152-2019 Technical Specification for Testing Steel Reinforcement in Concrete

JJF 1224-2009 "Measurement and Calibration Specification for depth Measuring Instruments of Reinforcement Protection Layer and Floor depth Measuring Instruments"

GB 50010-2010 "Code for Design of Concrete Structures"

GB 50204-2015 "Code for Acceptance of Construction Quality of Concrete Structures"

GB/T50344-2019 "Technical Standard for Inspection of Building Structures"

DB11/T 365-2016 "Technical Specification for Electromagnetic Induction Method for Testing the depth and Diameter of Steel Reinforcement Protective Layer"

DIN 488: Concrete Steel

1.7 Precautions

1. Please read this manual carefully before using the instrument.
2. Requirements for working environment:

① Ambient temperature: -10℃~40℃
② Relative humidity: < 90% RH
③ Electromagnetic interference: no strong alternating electromagnetic field
④ Do not expose to sunlight for a long time
⑤ Corrosion resistance:

When the instrument is used in a humid, dusty and corrosive gas environment, it is important to take the necessary protective measures.

3. To ensure detection result reliability, the following requirements should be satisfied when using the instrument:

① The concrete contains no additives or other magnetic parts, and its surface is smooth and flat.
② The rebar has no welding points and is not corroded.
③ The rebar is parallel to the concrete surface.
④ The angle between the rebar and the scan direction is 90°.
⑤ The diameter of the adjacent rebar is close to the protective layer depth.
⑥ Wheels of the instrument must contact with the object to be detected.
⑦ The wheels are clean and free of small particles like sand.

4. Requirements for storage environment:

① Ambient temperature: -20℃~50℃
② Relative humidity: < 90% RH
③ Please check and charge the instrument on a quick basis if it is not used for a long time. The instrument should be placed in a ventilated, cool, and dry place, and should not be exposed to direct sunlight for a long time.

5. Avoid water ingress, and avoid use in strong magnetic field environments, such as the vicinity with large electromagnets, transformers, frequency converters, etc.
6. Avoid vibration: In the process of use and handling, violent vibration and shock should be prevented.
7. Charging management: This instrument adopts rechargeable lithium battery for power supply, which means that the battery should be charged in time when the power is low to avoid damage to the battery. When charging, you can either charge the host or use the plug-in battery alone. The red indicator is always on when charging, and goes off when the battery is full. The special charger equipped with the instrument should be used for charging. Do not use other types of adapters or chargers to charge this instrument; otherwise, it may cause damage to the battery.

Note: Do not charge in a high-temperature environment. The recommended charging temperature range is 10-35 ℃,If the instrument is not used for a long time, the battery may suffer a slight power loss, resulting in a reduction in power. Recharge it before use. It is normal for the charger to heat up in the charging process, and the charging environment should be kept well ventilated to facilitate heat dissipation.

8.Maintenance: The instrument should be properly cleaned after each use to prevent dust from entering the instrument or inside the connector, which may lead to performance degradation or damage. As this instrument is not waterproof, do not use a wet cloth to scrub it! Do not use organic solvents to scrub the instrument and its accessories! Please use a clean, soft, and dust-free cloth to wipe the instrument and its accessories.

9. The laser used in this instrument is Class 3R, so please take care during use and do not look directly into the instrument or violate any operation procedure.

1.8 Responsibilities

This instrument is a precision detection instrument, and the Company shall not be responsible for the following actions of the user.

1. Violation of the above working environment requirements or storage environment requirements.
2. Abnormal operations.
3. Opening the housing and disassembling any parts without permission.
4. Serious damage to the instrument caused by man-made or accidental accidents.

Chapter 2 Instrument Composition

2.1 Instrument Composition

The instrument consists of a host, a synchronous display, a charging adapter, a backup battery, and accessories.

2.1.1 Host

The appearance of the RS350 Integrated Rebar Scanner host is shown in Figure 2.1.

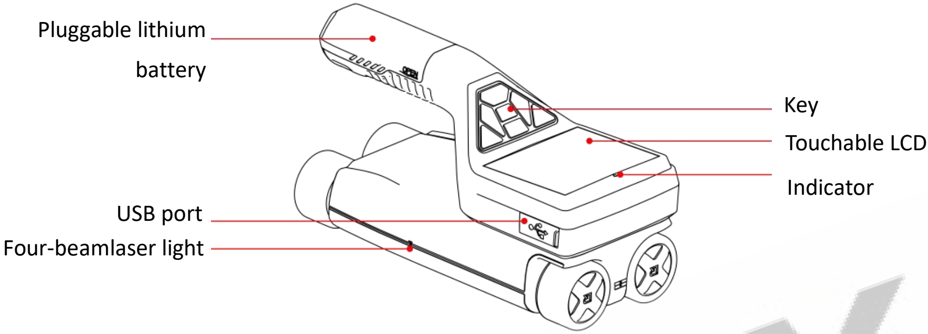


Figure 2.1

2.1.2 External Interface

USB port: It can be used as a data transfer interface or charging interface with the computer.

2.1.3 Key Descriptions

Key Symbol	Function Description
OK	1. Confirm the current selection 2. In grid scanning mode, switch between horizontal and vertical directions 3. Switch between manual and automatic saving in quick scanning mode
↺/⏻	1. Return to the previous menu 2. Long press: Turn the device on or off
▲	1. Select the option upwards or adjust the number to increase 2. Valuation of steel bar diameter 3. After entering the parameter modification state, the functions will be switched.
▼	1. Select options downwards or adjust the number to decrease 2. Equipment self calibration 3. After entering the parameter modification state, the functions will be switched.
◀	1. Select option towards the left 2. Turn the page towards the left
▶	1. Select option to the right 2. Page to the right 3. When no data is saved in any of the scanning modes, the system enters the parameter modification state.
Fn	1. Save the current measurement value in manual save mode of quick scanning mode 2. Save current measurement values in procedural scanning mode 3. Long press in wave scanning mode to enter the manual addition and deletion test point interface 4. Modify parameters on the data viewing interface

Note:

[C]and[↺] keys have exactly the same functions, only the printed patterns are different.

Chapter 3 Instrument Operation Instructions

3.1 Function Introduction

The instrument mainly implements relevant functions such as rebar detection, data viewing, data uploading, data deletion, and system setup. The main interface of the system is shown in Figure 3.1.

Figure 3.1 Main Interface

3.2 Rebar Detection

In the main interface, click [Scanning] to enter the rebar detection interface, as shown in Figure 3.2.

Figure 3.2 Main Interface for Rebar Detection

The main interface for detection includes six scanning modes: quick scanning, procedural scanning, and complex operating conditions scanning.

3.2.1 Parameter Setting

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

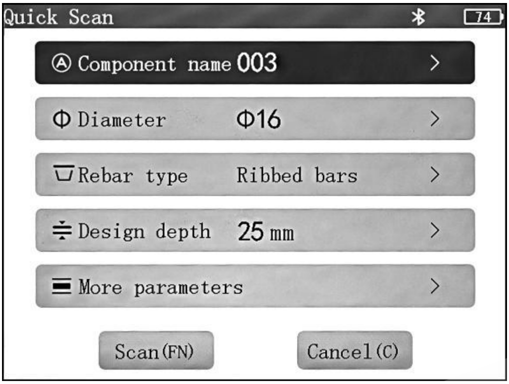


Figure 3.3 Parameter Setting Interface

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 automatically be incremented based on the last stored name. Users can set it as needed. Users can set it to a maximum of 12 characters and at least 1 character.

2) Main rebar diameter

It is used to set the diameter of the rebar to be detected. The diameter can be selected in the range of 6, 8, 10, 12, 14, 16, 18, 20, 22, 25, 28, 32, 36, 40, 50, in total 15 kinds of rebar specifications;

3) Rebar type

It is used to set the type of rebars to be detected. The options include deformed rebar and round rebar.

4) Design depth

The design depth setting interface allows the settings of the design depth. The design depth setting range is 1~210;

5) More parameters

More parameters include component type, main rebar spacing, stirrup diameter, stirrup spacing, and range selection.

① The component type can be selected from [Beam], [Slab], and [Custom].

② Main rebar spacing

It is used to set the main rebar spacing. The main rebar spacing can be set according to the actual situation, and can be set from 30 to >80 in mm.

③ Stirrup diameter

It is used to set the stirrup diameter. The stirrup diameter can be set according to the actual situation, and can be set to 6, 8, 10, 12, and 14 in mm.

④ Stirrup spacing

It is used to set the stirrup spacing. The stirrup spacing can be set according to the actual situation, and can be set to 40, 60, 80, 100, and > 120 in mm.

⑤ Range selection

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

1) The measurement of rebar protective layer depth requires the pre-setting of rebar parameters. Only if the design parameters are set correctly can the measured protective layer depth values be guaranteed to be accurate; otherwise deviations of varying degrees may occur.

2) The parameter settings of design depth and component type are mainly used for the determination of qualified depth of protective layer at measuring point in the measurement process. Unqualified measuring point values are displayed in red to show the difference.

3) The grid and image mode requires the settings of both the design diameter and the design depth in the X and Y directions.

3.2.2 Signal Reset Calibration

When there is a change in the detection environment or a significant deviation between the measured depth of the steel reinforcement protective layer and the design value, it is necessary to perform signal reset calibration on the instrument.

Note:

When calibrating the instrument, it should be operated in the air and kept away from ferromagnetic materials;

If the calibration signal is abnormal, it will indicate a calibration failure, and a recalibration is required at this time.

3.2.3 Quick Scan

Select the quick scanning icon on the main interface of steel bar detection, and after setting the scanning parameters, enter the quick scanning detection interface, as shown in Figure 3.4. Conventional scanning can be divided into positioning scanning and depth measurement scanning.

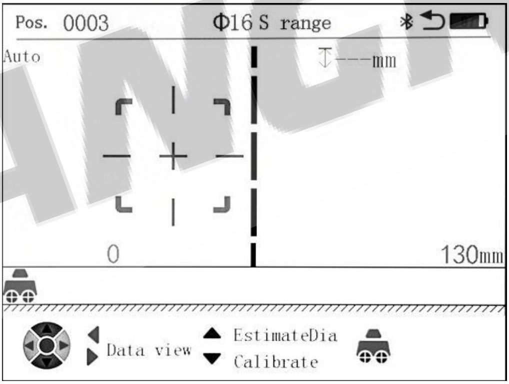


Figure 3.4 Positioning scanning display interface

3.2.3.1 Positioning Scan

This function is applicable to the detection scenarios where the location of reinforcing bars needs to be determined.In the lower left corner of the screen there is a key function prompt, which is automatically hidden when the measurement starts.

In [Quick Scan] interface, move the trolley slowly and evenly to the right to start measurement. When the trolley is close to the rebar, a green aiming box appears, and then you need to move the trolley slowly until the aiming box slowly moves close to the centerline. When the aiming box and the centerline overlap, the aiming box turns red, while the red indicator light lights up, with a buzzer alert. The longitudinal laser light of the instrument emits a red vertical line, which indicates that the instrument detects the rebar at this time, located directly below the red line. If you set to auto storage mode, the depth value of the protective layer is automatically saved. If you set to manual storage mode, it is necessary to press [Fn] key to save the depth value. In ths way, at the bottom of the screen, the depth value appears. As the trolley moves away from the rebar, the aiming box moves away from the centerline. Until the trolley is moved beyond the effective detection range, the aiming box returns to the centerline position and appears in gray. When the trolley is in the middle of two rebars, the aiming box is in blue.

When you continue to move the trolley to the right to detect the next rebar, the instrument also displays the same prompt, at which time it shows both the protective layer depth and the spacing from the previous rebar. As shown in Figure 3.5, the current protective layer depth is 24 mm, the protective layer depth of the previous rebar is 24 mm, and the spacing between the two bars is 105 mm.

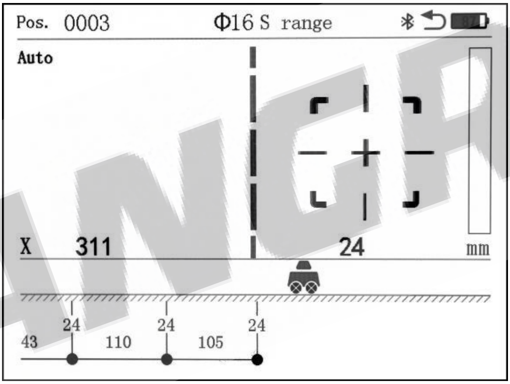


Figure 3.5 Positioning and Scanning Interface

When the scanning distance exceeds the range displayed on the screen, the screen automatically turns the page, or you can press left and right keys to flip through. During the detection process, if it is found that the depth of the rebar protective layer is abnormal, you can retract the trolley to re-measure. When the trolley is retracted to the left of the measurement point, the system automatically eliminates the measured measuring point data.

Note:

At the upper right of the detection interface, there is a detection limit setting to avoid the instrument scanning and identifying deep rebars. This parameter does not affect the detection data.

3.2.3.2 Depth measurement scan

This function is applicable to detection scenarios where the protective layer depth is relatively large. Slowly and uniformly move the small vehicle to the right, as shown in Figure 3.6. The middle of the screen displays the current depth of the steel reinforcement protection layer, while the two blue column charts on both sides represent the current signal quantity. The right side shows the number of stored measurement points. When the red indicator light turns on and there is a beeping sound, it indicates that the instrument has completed the depth measurement.

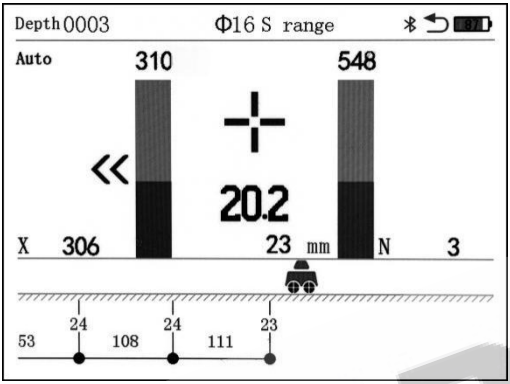


Figure 3.6 Depth measurement scanning interface

3.2.4 Procedural Scan

The procedural scan is a unique type of scanning method established for procedural requirements. The strict accordance with the procedure Technical Standards for the Detection of Rebar in Concrete (JGJ/T 152-2019) can implement a single-point re-testing of a rebar. Or the strict accordance with the Acceptance Specification for the Construction Quality of Concrete Structure Engineering (GB 50204-2015) can implement a three-point testing of a rebar. In addition, the two above-mentioned procedures enable the detection of any combination of measurement methods. The procedural scan is a common scan mode, which can measure the depth and position of the rebar protective layer, rebar diameter, passing rate, and other information more accurately.

After entering the procedural scan mode, there are 6 types of procedural scan modes. You can select the detection mode according to your detection needs, as shown in Figure 3.7 below.

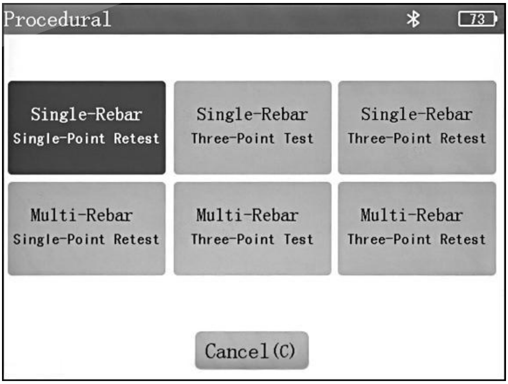


Figure 3.7 Selection Interface for Procedural Scan Detection Mode

After entering the detection interface, in the middle of the screen, the detection step prompt box pops up, where a rebar represents three parts, the line represents a rebar, and the dots on the line represents the part. Each point has three states: The blank point represents the part to be detected; the blue point represents the completion of the first data acquisition for that part; and the green point represents the completion of the second data acquisition for that part. After you enter the scan, the prompt box disappears.
In this chapter, we take single-rebar three-point re-test, and mult-rebar three point re-test as examples to illustrate Figure 3.8 shows the single-rebar three-point re-test interface.

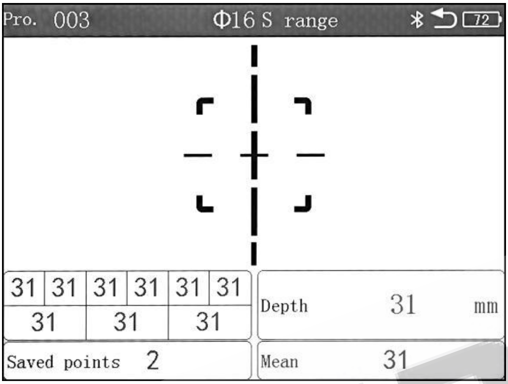


Figure 3.8 Interface for Single-Rebar Three-Point Re-test Scan

Slowly move the car during inspection. When it reaches above the steel bars, the aiming frame turns red, the buzzer sounds, and the red indicator light and laser light turn on. And display the real-time judgment depth value, and save the measurement point. Then perform a second scan of the steel bar at that location, store the values of the two measurement points, and the instrument automatically calculates the average value of that location. Repeat the above steps until all three parts have been measured, and the instrument will automatically calculate the average protective layer depth of the current steel bar.

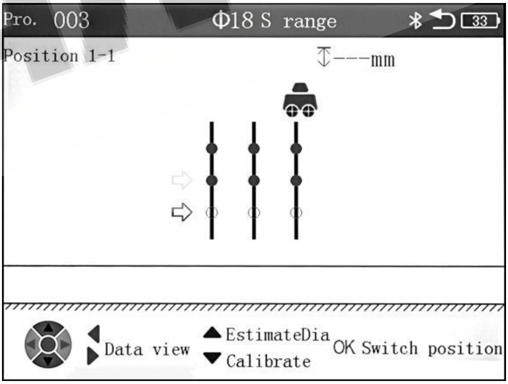


Figure 3.9 Scan Mode for Multi-Rebar Three-Point Re-test

The method of continuous scan is shown in Figure 3.9. The detection sequence is performed in accordance with the sequence of priority rebar, and then in accordance with the detection parts in turn. That is, to complete the first data acquisition of the Part 1 of all rebars in priority sequence, and then to perform the second data acquisition of the Part 1 of all rebars in sequence. In the same way, complete the first and second data acquisition for Part 2, and the first and second data acquisition for Part 3 in turn.

3.2.5 Wave Scan

The wave scan mode displays the wave, position, protective layer depth of the detected rebar, as well as the center distance of the adjacent rebars and estimated diameter in real time in the form of wave graph. Users can also manually add and delete rebar measuring points according to the distribution pattern of the wave. The wave scan interface is shown in Figure 3.10.

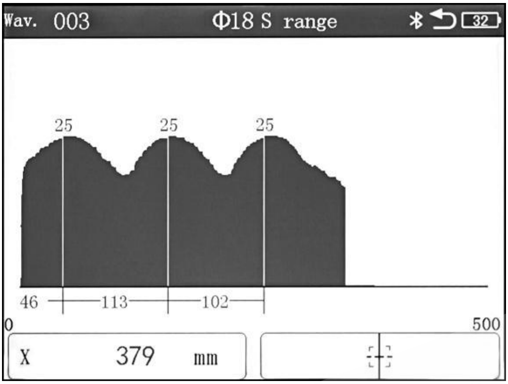


Figure 3.10 Wave Scan Interface

In wave scan interface, place the instrument on the surface of the object to be detected, and move it slowly to the right to start measurement. In this way, the screen displays the signal wave and the real-time displacement value at the bottom left of the screen. When the instrument is close to the rebar, the signal value starts to increase and the wave curve slowly rises. When a wave peak appears, the depth and position of the rebar protective layer are determined simultaneously. At this time, at the peak of the wave, a white line appears to indicate that there is a rebar here. And Above the peak of the wave, the depth of the rebar protective layer appears. In the lower right corner, when the aiming box and centerline overlap, the aiming box turns red, while the red indicator lights on, with a buzzer alert. And the vertical laser light of the instrument emits a red vertical line, which indicates that the instrument detects the rebar at this time, located directly below the red line. When detecting multiple bars, the instrument automatically calculates the rebar spacing, and displays it below the wave.

When the scanning distance exceeds the range of each screen displays, the instrument automatically flips the screen to display, with a maximum support of 10 m scanning range.

During the detection process, if abnormal wave signals or deviations in rebar identification are detected, the wave with the identification deviation can be erased by moving left and rescanning. Alternatively, the manual addition/removal of measurement points interface can be accessed, as shown in Figure 3.11, which allows users to manually add or remove rebar measurement points.

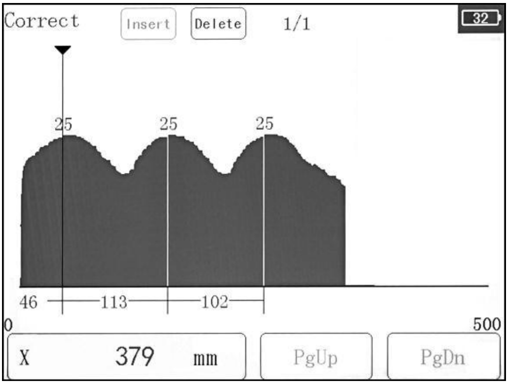


Figure 3.11 Wave Scan Interface for Adding and Deleting Measuring Points Manually

Once the user enters the function of manually adding and deleting measuring points in wave scan mode, the instrument will no longer support to return to continue measuring this component.

3.2.6 Fine Scan

Conventional scanning and wave scanning are not suitable for special scanning scenarios such as high-low reinforcement and dense reinforcement, as they require real-time determination of steel bar positions. Fine scanning is specifically designed for the aforementioned special scenarios. The fine scanning interface is shown in Figure 3.12.

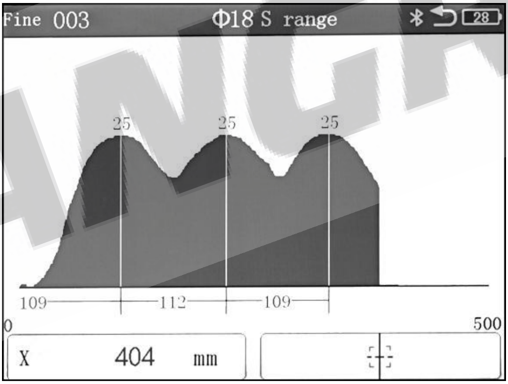


Figure 3.12 Fine Scan Interface

In fine scan interface, place the instrument on the surface of the object to be detected, and move it slowly to the right to start measurement. In this way, the screen displays the signal wave and the real-time displacement value at the bottom left of the screen. When the instrument is close to the rebar, the signal value increases and the wave curve slowly rises. When the instrument is far from the rebar, the wave curve slowly decreases, and a wave peak appears, of which the position is the position of the rebar. Then a white line is displayed at the wave peak to indicate a rebar and the protective layer depth is displayed above the wave peak. When detecting multiple bars, the instrument automatically calculates the rebar spacing, and displays it below the wave.

In the detection process, if there is a distribution of dense rebar spacing, the wave signal becomes smoother and wider than the wave of a single rebar, so the instrument needs to combine the changes in the wave before and after to determine the rebar position, so there may be a delay in interpreting the rebar position. When measuring the dense rebar, the user needs to switch to the dense rebar mode by pressing the right arrow key in the detection interface. In the dense mode, the user must move the trolley slowly at a constant velocity to ensure detection accuracy. Press the right arrow key again to return to the fine mode. When the scanning distance exceeds the range

of each screen displays, the instrument automatically flips the screen to display, with a maximum support of 10 m scanning range.
This mode supports manual addition and deletion of the rebar. Please see the manual addition and deletion introduction in Chapter 3.2.5 for specific operation steps.
Note:
Entering fine scanning defaults to fine mode, which is suitable for special scenarios such as high and low tendons and small dense tendons; It can be switched to dense reinforcement mode, which is suitable for the vast majority of dense reinforcement scenes. The dense reinforcement mode requires a uniform and slower scanning speed to ensure the accuracy of the sampled data.

3.2.7 Grid and Image

After entering the grid and image scan mode, it is divided into grid scan and image scan, as shown in Figure 3.13.

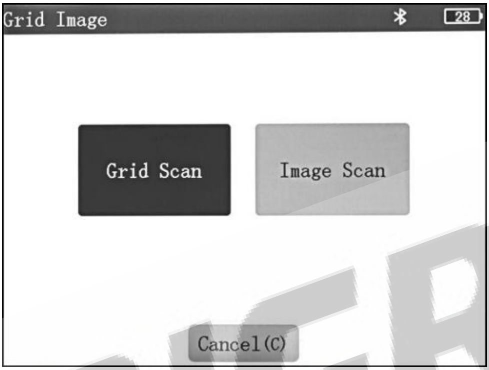


Figure 3.13 Interface of Grid and Image Mode Selection

3.2.7.1 Grid Scan

Grid scan is a measurement mode that displays the position of the measured rebar, the protective layer depth, and the rebar spacing in the form of a grid diagram. Through the grid diagram displayed by the grid scan, the user can see the arrangement of the rebar.
The grid scan interface is shown in Figure 3.14.

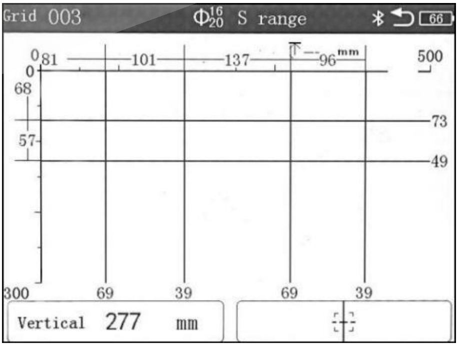


Figure 3.14 Grid Scan Interface

When entering the grid detection, the first step is to perform a "grid horizontal" scan, slowly run the moving cart, and start recording displacement at the bottom left position of the screen. When steel bars are detected, the steel bar measuring points and protective layer depth will be drawn in the corresponding position in the form of grid lines, and the spacing between adjacent steel bars will be calculated and displayed.

3.2.7.2 Image Scan

Image scan mode is a measurement mode that combines fine scan and grid scan to perform comprehensive analysis by scanning horizontally and vertically in a specific area, which is suitable for the measuring environment with irquickly distributed rebar.

In the image scan, the user can scan in a maximum of 5x5 grid (also 2x2, 3x3, 4x4 grids), i.e., five horizontal scans and five vertical scans, of which the scan position can be selected arbitrarily, as shown in Figure 3.15.

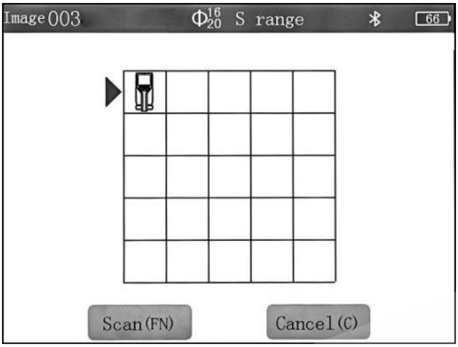


Figure 3.15 Interface of Image Scan Position Selection

The single-scan measurement of image scan also displays the measurement results in the form of wave graphs. The detailed functions and operations are introduced in the chapter on the fine scan.

After completing all data collection, users can import the data into the computer for data analysis. At the same time, 3D graphics can be generated to display the distribution of rebar more visually.

Note:

The maximum distance for a single scan of the image scan mode is one meter;

The single scan of image scan mode does not support manually adding and deleting rebar measuring points.

3.2.8 Complex Working Conditions

Complex working conditions are a detection mode developed for the site's special environment, including detection for stirrup avoidance, convex surface, concave surface, etc. Later, other special conditions can be added to the complex working conditions detection.

3.2.8.1 Stirrup Avoidance Detection

Stirrup avoidance detection should be used for the case of the main rebar with a stirrup at the site. According to the site, enter the diameter of the rebar, the type of rebar, design depth, component type, main rebar spacing, stirrup diameter, and stirrup spacing, as well as select the size range. After the parameters are set, next is the detection, of which the steps are the same as the quick scan.

3.2.8.2 Convex Surface Detection

Convex surface detection is appropriate for longitudinal rebar detection outside the pipe of cylindrical components. Entering the diameter and basic parameters of the cylindrical component, in turn, can start the measurement, with the instrument automatically correcting the error caused by the surface arc. The diameter of cylindrical components can be set to a minimum of 130 mm.

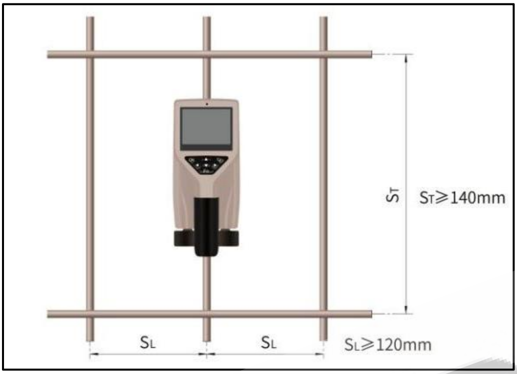
3.2.8.3 Concave Surface Detection

Concave surface detection is appropriate for longitudinal rebar detection inside the pipe of cylindrical components. Entering the diameter and basic parameters of the cylindrical component, in turn, can start the measurement, with the instrument automatically correcting the error caused by the surface arc. The diameter of cylindrical components can be set to a minimum of 100 mm.

3.2.9 Diameter Estimation

Each scan mode can be used to estimate the diameter of the rebar. When the diameter of the rebar needs to be estimated, move the trolley to the top of the rebar and press the [▲] key to estimate the diameter. Three seconds later, the measurement is completed. The interface of the instrument displays the estimated diameter and the estimated protective layer depth. The display exits automatically in three seconds.

Note:



When estimating the diameter, the spacing S_L between two adjacent rebars in the longitudinal direction can be no less than 120 mm, and the spacing S_T between two adjacent rebars in the transverse direction can be no less than 140 mm. The estimated diameter can satisfy the requirement of maximum error only when the protective layer depth is no greater than 60 mm.

The diameter measurement should keep the instrument position constant. Otherwise, it causes deviation in measurement results.

Diameter measurement results are only for display and not for storage.

3.3 Data View

The instrument provides two viewing modes: component list and component detailed view. The detailed view of the components can be viewed in graphs and lists, which the user can select according to their needs. The default is in the form of graphs.

3.3.1 Component List Display

Entering the data view interface, the first level of data, i.e., the component list, is displayed as shown in Figure 3.16, which mainly displays component list information and data statistics of specified components.

Parameter modification: Modify the design depth, recalculate the pass rate according to the new design depth, and this operation does not affect the detection of the protective layer depth.

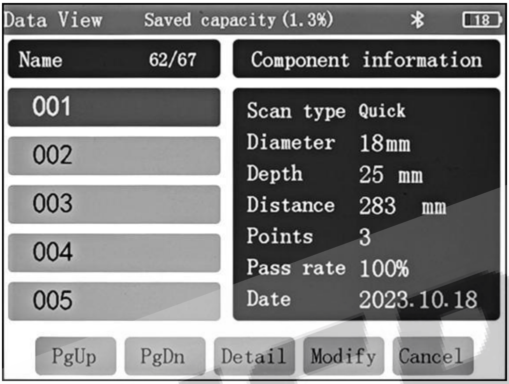


Figure 3.16 Data View Interface

Note: In accordance with the different scan modes of the components, the data statistics of the components show different contents:

Quick scan, wave scan, and fine scan display scan type, design diameter, and design depth， distance, number of measuring points, passing rate, and test date.

Procedural scan displays the scan type, design diameter, design depth, number of measuring points, passing rate, and test date.

Grid scan displays the scan type, design diameter X and Y, design depth X and Y, scan distance X and Y, number of measuring points X and Y, passing rate X and Y, and test date.

Image scan displays scan type, design diameter X and Y, design depth X and Y, and test date.

3.3.2 Graphic Display of Detailed View Data

Click [OK] to view the data of the selected component in detail.

The graphical interface display of the detailed view data mainly shows the measurement data of the current component utilizing graphics, which is clear and intuitive, and the graphical display interface of each scan mode is shown in the figure below.

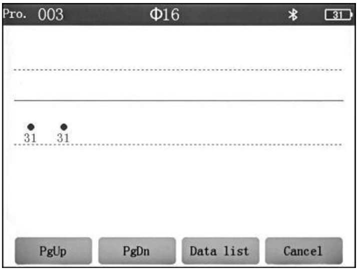


Figure 3.17 Procedural Scan

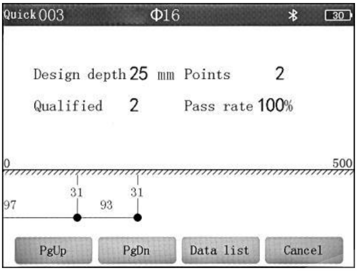


Figure 3.18 Quick Scan

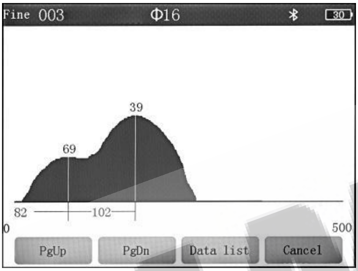


Figure 3.19 Fine Scan

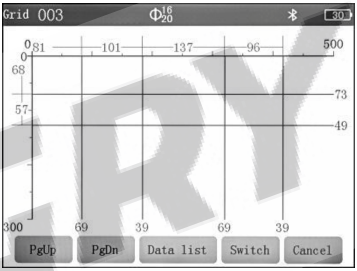


Figure 3.20 Grid Scan

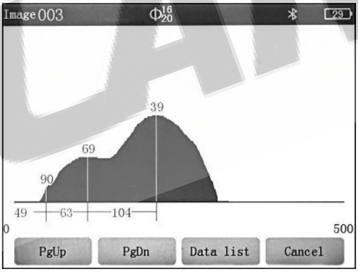


Figure 3.21 Image Scan

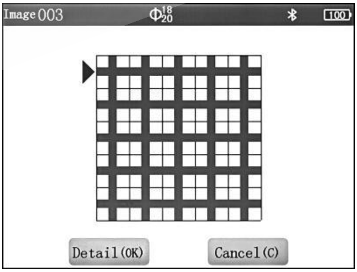


Figure 3.22 Image Scan to View Scan Position Interface

Note:

1. The title bar of the graphical display interface of the detailed view data mainly shows the scan type, component name, and design diameter of the current component. The graphical display area shows the measurement data in the form of graphical information such as position, depth, and spacing of measuring points.
2. Entering the graphic display interface of the image scan data, it first displays the summary of all current measurements. The interface is shown in Figure 3.21. The user must first select the scan position to be viewed by pressing the direction key, then press [OK] to enter the graphic data viewing interface of the selected scan position.

3.3.3 List Display of Detailed Data

The list display interface of detailed view data mainly shows the measuring data of the current component by way of the data list. The list display interface of each scan mode is shown in the Figure.

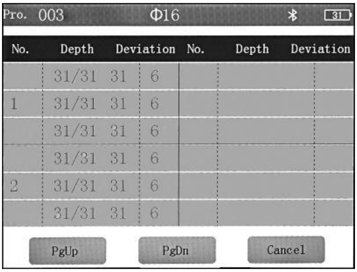


Figure 3.23 Procedural Scan

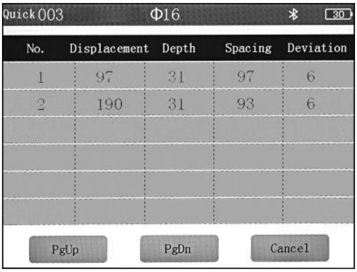


Figure 3.24 Quick Scan

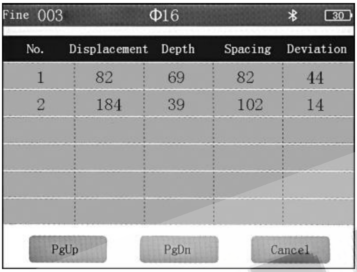


Figure 3.25 Fine Scan

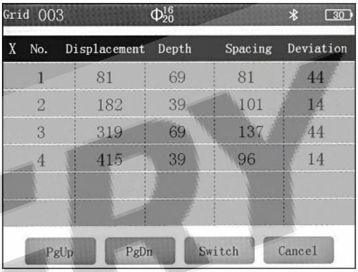


Figure3.26 Grid Scan in Horizontal Direction

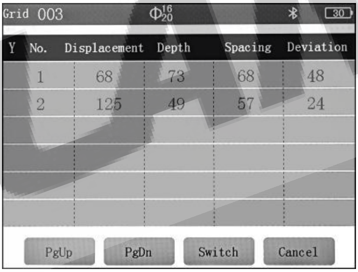


Figure 3.27 Grid Scan in Vertical Direction

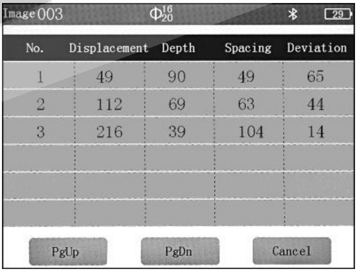


Figure 3.28 Image Scan

Note: The meanings of the symbols in the detailed view data list display interface are explained as follows:

Serial number—the serial number of the current measuring point

depth—the measured depth of the current measuring point

depth X—the measured depth of the current measuring point in the X direction of the grid

depth Y—the measured depth of the current measuring point in the Y direction of the grid

Displacement—the measured displacement of the current measuring point

Displacement X—the displacement of the current measuring point in the X direction of the grid

Displacement Y—the displacement of the current measuring point in the Y direction of the grid

Deviation—the difference between the depth of the current measuring point and the design depth

Spacing—Displacement difference between the current measuring point and the previous one

3.4 Data Deletion

The data deletion function mainly implements manual data deletion operations, and the data deletion interface is shown in Figure 3.29.

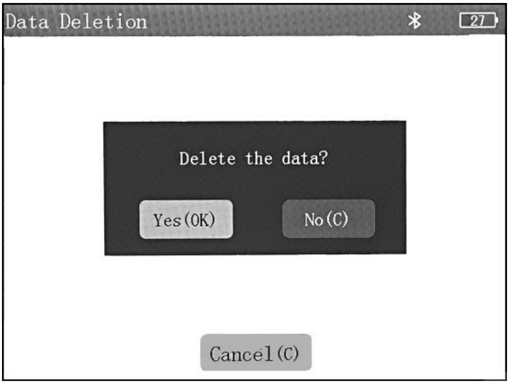


Figure 3.29 Interface of Data Deletion Confirmation

Note:

1. Confirm whether the data has been uploaded to the computer before deleting the data. The data cannot be recovered after deletion.
2. The instrument does not support cancellation through key or touch operation during the data deletion.

3.5 System Setting

The system setting menu interface is used to realize the user's modification of system configuration parameters, mainly including power saving settings, sound settings, time settings, theme settings, display accuracy, and Regional Settings. It is shown in Figure 3.30.

Figure 3.30 System Setting Interface

3.5.1 Power Saving Setting

Users can set the backlight brightness, standby time, auto shutdown, and laser setting in the power saving setting. The factory setting of backlight brightness is 50% brightness; standby time is 10 minutes; auto shutdown time is 25 minutes; the horizontal and vertical laser is on; users can set them as needed.

3.5.2 Sound Setting

Sound settings include key sound, prompt sound, and touchscreen sound, which users can set as needed.

3.5.3 Time Setting

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

3.5.4 Theme Setting

In the theme setting, the user can set the theme of the screen display according to the user's preference.

3.5.5 Display Accuracy

The user can change the display accuracy of the results in all detection modes, which shows in an integer by default.

3.5.6 Region Settings

In the region settings, you can adjust language settings, steel bar standards, and date formats.

The steel bar standards can be switched to different standards applicable in different countries.

The date format can be modified according to your preference.

3.6 About the Device

The main purpose of this device is to display relevant information, including the following: instrument model and name, firmware version number, instrument number, remaining storage capacity, internal temperature, company contact phone number, and official company website.

Chapter 4 Synchronous Display

4.1 Instrument Composition

The instrument is composed of the synchronous displays' host, extension rods, and other accessories. It is shown in Figure 4.1

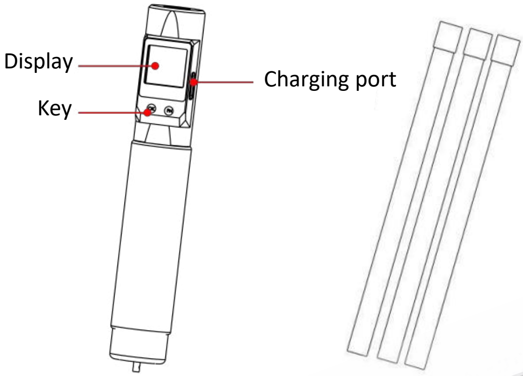


Figure 4.1 Synchronous Displays

4.2 Key Descriptions

Key	Function Description
⏻ OK	1. Press and hold to turn on/off; 2. Determine options, save detection data on the detection page, and scan and save the current measurement point according to the procedural; 3. Short press on the main interface to enter the function selection interface.
Fn	1. Move the cursor down; 2. Long press on the detection page to not save data and return to the upper level.

4.3 Instrument Operation Instructions

4.3.1 Synchronous Display Boot

Press and hold [OK] to turn on the synchronous display; the rebar scanner is automatically connected to the synchronous display. It is shown in Figure 4.2.

Automatic connection requires the rebar scanner to turn Bluetooth on. If Bluetooth is off, the synchronous display shows "Connecting..." It is shown in Figure 4.3. Turn on the Bluetooth of the host; the synchronous display will be connected automatically.

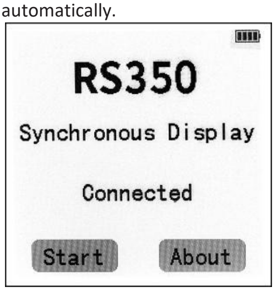


Figure 4.2

Figure 4.3

4.3.2 Function Selection

The function selection interface, as shown in Figure 4.4, includes quick scanning, procedural scanning, fine scanning, dense wave, and grid scanning in sequence.

Figure 4.4

Note:

1. Detection parameter settings can only be set on the host side; the synchronous display does not support parameter settings.
2. Synchronous display does not support image scans.

4.3.3 Synchronous display

The data displayed on the synchronous display is consistent with the data detected by the host. During the detection, the host detection data is synchronously displayed in the synchronous display, which is shown in Figure 4.5 and Figure 4.6.

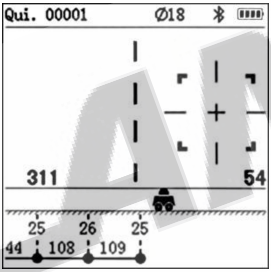


Figure 4.5

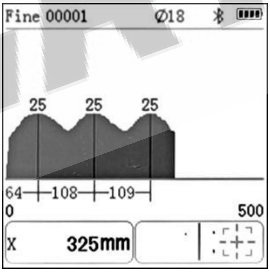


Figure 4.6

Chapter 5 Online System Software

5.1 Introduction

The rebar scanner online system software, introduced by Langry Technology Pte. Ltd. is a multi-functional analysis software for rebar protective layer data processing, which has a friendly interface and easy operation and is designed for engineering inspectors.

5.2 Software Installation

To use it for the first time, open www.langryndt.com,Locate the corresponding model in "Products," enter its product details page, click Downloads, and download and install the online system software.

5.3 Data Transfer

Data transfer can be done via USB. When using USB to transfer data to the computer, please connect the USB data cable supporting the instrument in advance and turn on the rebar scanner. Start the online system software, select the menu of the rebar scanner, and click [Auto Import], so the software will automatically read the memory data of the rebar scanner, and the data to be transferred can be imported into the computer.

5.4 Data Processing

The online system software can process all the components and data.

5.4.1 Detection of Component Data

Right-click the "Detect component data" node in the tree diagram and select [Auto Import].

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

5.4.2 Test Report

This function is used to generate a report document for the currently opened data file.

Right-click Test Report from the node tree or select the data processing menu to create a new test report.

After a test report is selected, right-click, or select the data processing menu to delete the selected test report. You can also change the composition of the test report.

5.4.3 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.

5.5 Print and Preview

Select the test report that needs to be previewed and printed, right-click, select the data processing menu, or select the file menu to preview the test report. You can also perform printing operations on the print preview interface.

5.6 Data Saving

Select the File menu, and click [Save] or [Save As] to save the current data file with the file extension: .rba.

5.7 Version Upgrade

5.7.1 Version Upgrade of Rebar Scanner

After connecting the rebar scanner, select the rebar scanner menu and click [Upgrade Rebar Scanner] to download and upgrade the rebar scanner version.

5.7.2 Software Version Upgrade

Select the Help menu and click [Check New Version] to check or upgrade the version of the online system software.

V1.2

LANGRY TECHNOLOGY PTE. LTD.

langry@langryndt.com www.langryndt.com