HICHANCE

HC-GY Series Rebar Detector

Please use it properly on the basis of full understanding of the instructions.

Instructions for Use

1 Overview

HC-GY Series rebar detector is a portable intelligent detector, which is used to detect the construction quality of reinforced concrete structure. It can detect the cover, position, trend and distribution of rebar cover, and can also detect the magnets and conductors in non-magnetic and non-conductive medium.

1.1 Special functions

The cover mode accurately shows the measured cover. The value is more precise, and the displacement is more accurate.

Add JGJ testing function, which can automatically calculate the average cover of rebar at three positions to meet the requirements of the latest detection procedures.

The stirrup correction function is refined to support the correction of multi-band stirrup spacing, which makes the protection layer cover measurement more accurate.

Hot-plug USB on the instrument side can communicate with PC analysis software only after startup without installing USB driver, which makes it more convenient to use.

It has various calibration methods. Measurement interfaces can be used for instrument calibration to store the calibration values automatically, which makes calibration more convenient.

The instrument body program can be upgraded by the users, which avoids the trouble caused by the depot repair of the instrument.

1.2 General functions

Non-boundary grid / profile scanning function (only HC-GY31 supports this function).

It has the data storage, data viewing, data deletion and other functions.

The USB data transmission can upload the data to the PC through the USB cable.

PC professional data analysis software makes data processing and report generation easy to complete.

5'' high-resolution color LCD screen (854 x 480 pixels).

It has built-in high-capacity lithium battery. The low-power design makes that batteries can work continuously after about 30 hours fully charged.

With compact footprint and light weight, it is easy to carry.

1.3 Precautions

Please read this specification carefully before using the Instructions.
Working environment requirements:

Ambient temperature: - 10°C- 40°C
Relative humidity: < 90%RH
Electromagnetic interference: no strong alternating electromagnetic field
It shall not direct sunlight for long periods.

Storage environment requirements:

Ambient temperature: - 20°C- 50°C
Relative humidity: < 90%RH

Avoid entering water, and avoid using it in a strong magnetic field, such as places near large electromagnets, transformers, frequency converters and so on.
Do not open the instrument enclosure without permission.

1.4 Technical indexes

Measurement ranges of different rebar diameters:

Measurement range / Rebar diameter	Small range mm	Wide range mm
Φ6mm ~ Φ10mm	1 ~ 70	5 ~ 100
Φ12mm ~ Φ18mm	1 ~ 90	5 ~ 130
Φ20mm ~ Φ28mm	1 ~ 100	5 ~ 140
Φ32mm ~ Φ50mm	2 ~ 115	5 ~ 205

Error ranges of different cover:

Measurement range / Error range	Small range mm	Wide range mm
±1	1-59	5-80
±2	60-90	81-120
±4	90-105	121-205

Button instructions:

Logo of the button	Function description
Power button	Long press the button to start up; Long press the button to shut down
Save	Save the collected data after the end of the measurement.
OK	Confirm or edit selected parameters or menu items.
Up	Move the cursor up to toggle the selected parameters; Increase parameter values
Down	Move the cursor down to toggle the selected parameters; Reduce parameter values
Left button	1. In editing the general parameters, toggle the parameter contents; 2. In editing the time and the password, move that cursor to the left;
Right button	1. In editing the general parameters, toggle the parameter contents; 2. In editing the time and the password, move that cursor to the right; 3. In data browsing, delete the components.
Back	Back to previous interface
Toggle	In grid detection, toggle the detection direction.

2 Operating Instructions of the Instrument

2.1 Startup interface

Long press the startup button to start up. With the buzzer ringing, the instrument will enter directly into the home page. (Fig. 2-1) shows the main interface of GY31. (Fig. 2-2) shows the main interface of GY21.

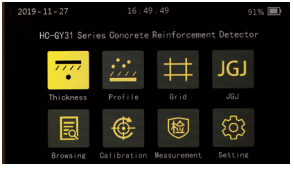

Fig. 2-1

Home page displays the date and time, battery capacity and main functions of the instrument, which support four kinds of detection modes of cover detection, profile scanning, grid scanning and JGJ detection, as well as data browsing, instrument calibration, measurement mode and system setting function.

Fig. 2-2

GY21

Only support cover detection and JGJ detection.

Start up and enter the main interface. The first option is highlighted by default. The arrow button is to toggle highlighted content. OK key is to enter the next interface.

2.2 Detection parameters editing

Enter into the four kinds of measurement interfaces from the main interface, and give priority to parameter configuration before starting detection. Parameters include component serial number, rebar diameter,

stirrup spacing, design cover, component types and range setting.

Enter into the detection interface, the parameter of "rebar diameter" is highlighted by default, which can be toggled by the up and down buttons to highlight cycle from serial number to measurement range. Press the left and right buttons to edit the highlighted parameter. Except the parameter of "serial number", other parameter contents can be toggled directly by pressing the left and right buttons.

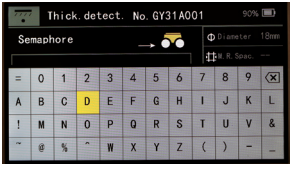

Fig. 2-3

1. Serial number

When highlighting, press the right button to make the serial number enter into the editing status. Meanwhile, the full qwerty will pop up on the screen (Figure 2-3). Press the arrow buttons to toggle the highlighted contents of the keyboard, and press OK key to input. The contents of "serial number" can include digits 0~9, capitalized English letters and individual symbols. The length of serial number supports 1~8 digits, variable length. Support to delete the last character. After editing, press the back key to exit the editing status of "serial number", and highlight to skip to the "rebar diameter".

2. Rebar diameter

Please select the correct rebar specification before detection. When the parameters are highlighted, press the left and right buttons to edit the parameters directly. The diameter specifications include 6/8/10/12/14/16/18/20/22/25/28/32/40/50.

3. Stirrup spacing

In general, stirrups will exist in the working conditions of the components on site. The small stirrup spacing has some certain influence on the cover of the main reinforcement. The instrument can appropriately increase the cover of the protective layer of the main rebar by setting the stirrups spacing. The stirrup spacing includes five gears, which are >125mm/100mm/80mm/60mm/40mm. If the stirrup spacing is more than 125mm when detecting, the coil center of the detection probe should coincide with the midpoint of the adjacent stirrups, and the probe will detect along the centerline direction, where the stirrups have the least influence on the cover of the main reinforcement. When the stirrup spacing is 100/80/60/40, the coil center of the detection probe should coincide with a stirrups position, and the probe will detect along the direction of the stirrups, where the stirrups have the least influence on the main reinforcement.

When the parameter is highlighted, press the left and right buttons to toggle different spacing.

4. Design cover

This parameter is the drawing design cover of detection component. Inputting the correct design cover is helpful to understand the qualification rate of the numerical value in real time in the detection process. Input the design cover according to the actual situation. When the parameter is highlighted, press the left and right buttons to increase and decrease the design cover.

5. Component types

The component types to be detected include beams and plates. It is helpful to calculate the qualification rate. Input according to the actual situation.

When the parameter is highlighted, toggle the component types.

6. Range Setting

The instrument supports large and small two ranges. Different rebar specifications have different detection ranges. In the normal situation that small range is sufficient, it is not recommended to use large range. Due to the large detection range and the large peripheral interference, the corresponding result deviation of large range is large. The small range is recommended for normal measurement. When the parameter is highlighted, toggle the range.

After the parameter editing, press OK key to finish the parameter editing and start the normal measurement in the condition of no full qwerty.

2.3 Cover detection

The cover detection mode is used for the cover detection of the rebar cover of the conventional components. It can display the information of cover and spacing of rebar cover, and automatically count the number of measurement points and the average cover in the detection process.

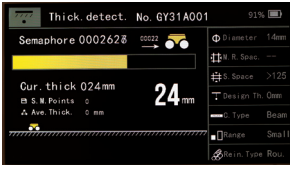

Fig. 2-4

The top of the interface displays the interface name, component number and battery capacity. Right side of the interface displays the component parameter. To learn about parameter editing, please refer to Section 2.2.

Left side of the interface is the measurement interface, including semaphore, signal strength indicator bar, current displacement, current cover, stored measurement points, average cover and judged cover. Bottom side of the interface is the measured point data, showing the cover value and spacing of the rebar cover.

Detection introduction

1. Calibrate the instrument before using (please refer to 2.8 for details).

2. Put the probe trolley to the left of the component surface. Slowly move the probe trolley to the right, and observe the semaphore and signal strength indicator bar. If there is no change in the length of the indicator bar, it indicates that there is no rebar in the detection range of the trolley. As the indicator bar becomes longer and longer, and the semaphore becomes larger and larger, it indicates that the trolley is closing in on the reinforcement.

3. As that length of the indicator bar gradually increases, slowly move the trolley. When the buzzer ring with the led red light coming on and the judgment value being displayed on the screen lower right button, the current position is the position of the reinforcement, and the current judgment value is the effective value of the rebar cover.

4. The data is automatically stored and displayed in the bottom of the screen data area. Automatically calculate and display the spacing with the previous reinforcement. The spacing of the first rebar is the distance from the starting point. When the display data exceeds the current display area, automatically turn the page to display. The left and right buttons can turn pages to view multi-page data.

5. Continue to move the trolley and detect the next reinforcement.

6. After component detection, press the storage button to store the current component. If the interface does not exit after storage, the serial number will be automatically added 1, and the interface re-enters the parameter highlight state, when the detection of the next component can go on.

Other operating instructions

1. Calibration: During the detection process, press the up key to open the calibration reminder interface. Press OK key while staying away from metals to start calibration. Automatic exit will be launched when the calibration ends.

2. Diameter estimation: move the probe trolley on the surface of the component, and stop the trolley when data of the rebar cover are detected. Keep trolley stationary and press the down key to open the Diameter Estimation dialog box. The estimation starts automatically. The interface, displays the estimated diameter and the measured cover after the estimation, and stays for 2 second before its automatic disappearance. Diameter estimation data will not be saved.

3. Left and right keys: during the detection, if the data area already has more than one page of data, press the left and right keys to turn the pages to view the data.

After the measurement, press return key to exit the current interface and return to the main interface.

Note: HC-GY21 has no displacement information and do not store rebar spacing data.

2.4 Profile detection (only HC-GY31 supports this function)

Select the profile scanning in the main interface and press OK key to enter the section scanning interface. The top of the interface displays the interface name, component number and battery capacity. Right side of the interface displays the component parameter. To learn about parameter editing, please refer to section 2.2. Left side of the screen is the measurement area. The basic information displayed in the measurement area includes the stored measurement points, the current cover, the semaphore and the current displacement, and the determination value of the rebar cover.

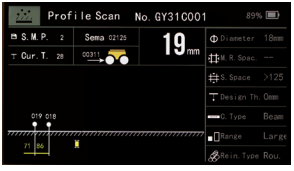

Fig. 2-5

Below the basic information is the section data display area, showing the rebar value and the steel bar spacing.

Measurement can be started after editing the component parameters. Slowly move the trolley to the right on the surface of the component during detection. When a valid data is detected, the buzzer ring and the cover determination value are displayed, and the value is automatically displayed in the cross-sectional display area. If the display data covers more than one page, the interface page is automatically turned to the next page. During the detection, turn the page by pressing the left and right keys to browse the data. Press the storage key to complete the storage of the component after the measurement. At the same time, the component number is automatically added with 1, and the instrument enters the parameter editing state of the next component.

2.5 Grid detection (only HC-GY31 supports this function)

Select grid scanning in the main interface and press OK key to enter the grid scanning interface. The top of the interface displays the interface name, component number, scanning direction and battery capacity. Right side of the interface displays the component parameter. To learn about parameter editing, please refer to section 2.2. The middle part of the interface displays the measurement information, and the left side displays the grid display area. The measurement information includes stored x-direction measurement points, y-direction measurement points, current cover, semaphore, current displacement, and rebar cover values. The grid display area displays data according to the actual position of the rebar in the grid, and intuitively reflects the distribution of the steel bar.

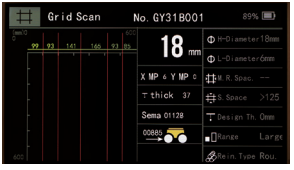

Fig. 2-6

Start measurement after editing the component parameter. During detection, slowly move the trolley from left to right in the horizontal direction; when the valid data is detected, the buzzer ring and the judgment value of the rebar cover is displayed at the same time. The value is automatically stored and displayed in the grid area; when the display data in the horizontal direction covers more than one page, the screen is automatically refreshed and turned to the next page. When the horizontal direction detection is completed, press the switch key, and the detection direction is switched to the vertical mode with the buzzer ringing. Move the trolley slowly and vertically (top down) from the start position for detection.

Press the storage key to complete the storage after the measurement. At the same time, the component number is automatically added with 1, and the instrument enters the parameter editing state of the next component.

When browsing the data during the measurement process, press left and right keys to flip through the horizontal data, press up and down keys to flip through the vertical data.

2.6 JGJ Detection

JGJ detection is a unique scanning method specially designed towards the requirements of the procedures. Follow the detection method provided by the procedure strictly, It shall realize the measurement of 3 positions of a steel bar and calculate the average value automatically.

Fig. 2-7

Select "JGJ detection" in the main interface and press OK key to entry the interface. The top of the interface displays the interface name, component number and battery capacity. Right side of the interface displays the component parameter. To learn about parameter editing, please refer to section 2.2. Left side of the interface is measurement area. It displays the semaphore, signal strength indicator, current cover, stored measurement point, average cover and determined cover. Downward side of the interface is the data storage area.

During the detection, preferably select three positions of the steel bar. Move the trolley slowly from left to right in the first position. The length of the strength indicator bar will gradually become longer with the trolley

approaching the steel bar. When it reaches the top of the steel bar, the buzzer rings and the interface display the determined cover. Press OK key to store the determined value. After that, the first point measurement in Position I completes. Then move the trolley to the start position, measure again, and store the second value, so that the measurement of the two measuring points' data is finished. The instrument automatically calculates the average value of the points. The calculation follows the rule of SQL Function. The result is displayed right below the two measurement points. Repeat the measurement twice by moving the instrument to Position II, and then perform the measurement twice at Position III. After the measurement of the three positions is completed, the instrument automatically calculates the average value of the results of the three positions. The value is the cover of the effective protective layer of the steel bar.

If the measurement of a steel bar' three positions does not finish, there won't be the effective protection layer cover value for the steel bar. If there is only one data to a position, the data won't be saved. When the measurement is completed, press the storage key to store the component and switch to the next one.

2.7 Data browsing

Right side of the data browsing interface displays the list of components. All stored components are indistinguishable from the type of detection, arranged in chronological order, and the component with the latest measurement time is in the

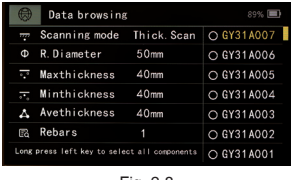

Fig. 2-8

first position. The first component is highlighted by default, and the basic information and data statistics of the highlighted component are displayed on the left side. The information displayed on the left side includes scanning mode, steel bar diameter, maximum cover, minimum cover, average cover, and number of measurement point.

Press left and right keys to switch the highlighting components, press OK key to view the measurement data of the highlighting component. The data display interfaces of each mode are different and similar to the measurement interfaces of the respective modes. The JGJ schema supports both graphical and raw data list formats.

The data browsing interface supports deleting components. Left-press to select the highlighted component, and then a green check mark will be displayed on the left side of the component name. Press and hold the left button to select all options, and press the button to select single option. For batch selected components, right-press to open delete data dialog box which prompts the option of whether to delete the selected components. Press OK key to delete the data. The deleted data cannot be recovered.

2.8 Instrument calibration

Select the "Instrument calibration" in the system interface to enter the calibration interface. The calibration can be completed by following the prompt information on the interface. While calibrating, the signal sensor should be kept far away from metal.

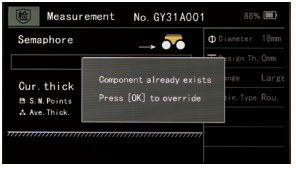

Fig. 2-9

If not so, a calibration error will be prompted and the calibration will be required to restart. After a normal calibration is completed, the instrument will prompt the option of whether to enter the cover detection or not. Press OK key to jump directly to the cover detection interface and start a normal measurement.

In the mode of cover measurement, profile measurement and JGJ measurement, press the UP key to pop up the instrument calibration dialog box, and finish the calibration by following the prompt information.

2.9 Measurement mode

In order to prevent instrument metering failure caused by correcting parameter input, the main interface is specially added with measurement mode. Enter the interface of this mode to measure instrument when the instrument is submitted for inspection. Select the measurement mode on the instrument body. The operation of measurement mode is completely consistent with the cover detection interface, and the numbering setting and diameter setting can be performed in this mode. After editing the parameters, press OK key to start the normal measurement.

Fig. 2-10

2.10 System setting

Use the interface for setting the basic parameters of the instrument, including:

1. Spacing between main reinforcements

During on-site construction, the measurement data often have a large deviation because the spacings between main reinforcements are too small. In order to solve the problem, the instrument sets five grades of the main rebar spacing -/100mm/80mm/60mm/40mm. Select different gears according to the actual situation, the instrument will make different corrections to the measurement results so the measurement data will be more accurate.

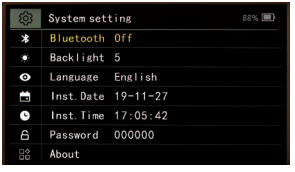

Fig. 2-11

2. Switch of Bluetooth

The Bluetooth can be switched on and off. When Bluetooth is switched on, the Bluetooth mark will be displayed on the upward side of the interface. The mark is gray in unlinked state and green in linked state. The instrument supports both real-time and non-real-time upload modes. In the process of non-real-time upload, the instrument interface needs to be kept in the main interface. A communication exception will occur if another interface is. Only real-time upload is supported in each measurement interface, and app needs to be kept in the interface of component list. Press the storage key after the completion of component measurement on the instrument side. The component will be automatically uploaded to the app.

3. Backlight brightness

In order to save battery power, the instrument sets a low power consumption function. If the instrument is not operated within a fixed time, the backlight will be turned off automatically. After the backlight is turned off for half an hour, the instrument will be turned off automatically.

4. Instrument date

Set the date displayed on the instrument.

5. Instrument time

Set the time displayed on the instrument.

6. Operating password

Internal parameters are out of the user's concern.

7. About the instrument

Basic information, number, model, remaining storage space, etc.

3 Upper-computer Data Analysis Software

3.1 Introduction

The software for steel bar inspection data is a multi-functional analysis software developed by Beijing Hichance Technology Co., Ltd. It is designed for steel bar detection data processing. The software can perform post-processing, report generation and data printing operations on the inspection data.

3.2 Installation

This software can be installed and run on Windows 9X/Me/NT/2000/XP.

3.2.1 Installation procedure

The installation procedure is as follows:

1. Double-clicks the "Steel bar detection data processing software" icon in the USB flash disk to open the window to set installation path.
2. Choose the path for installation.
3. Click [Next] and wait for the software installation to finish. Then a window will pop up to prompt the end of the installation. Click [Finish] on the page to close the pop-up window.

3.2.2 Introduction to software interface

1. Title bar: display the current system and the currently opened file;
2. Component information: display and set the information of current component;
3. Limit value setting: Display and set the upper and lower limits of the protective layer of steel bar;
4. Type selection: Select the component type;

5. Data schematic diagram: Schematic diagram of component data information;
6. Components list: Display the list of components of the current type of the opened file;
7. Data list: Display and edit the data information of the current component;
8. Open file: Open local steel bar data file;
9. Save: Save the data as a local file;
10. Save as: Perform a save operation on an opened data file;
11. Read the instrument record: Reading measurement data of the instrument;
12. Save image: Generates a picture of the current displayed graph and save it;
13. Generate report: Generate a report file;
Print preview: Display the print schematic diagram of the selected component;
15. Downloaded cloud data: Data stored in the cloud of a registered instrument;
16. Cloud operation option: Like instrument registration, management, data query and deletion operation, etc.;
17. System setting: Language setting, evaluation rule setting, etc.;
18. Operating information: Display up to 200 lines of information about the software operation.
19. Clear information: Clear the contents in the operating information bar.
20. About: Query the version of the software or update the software.

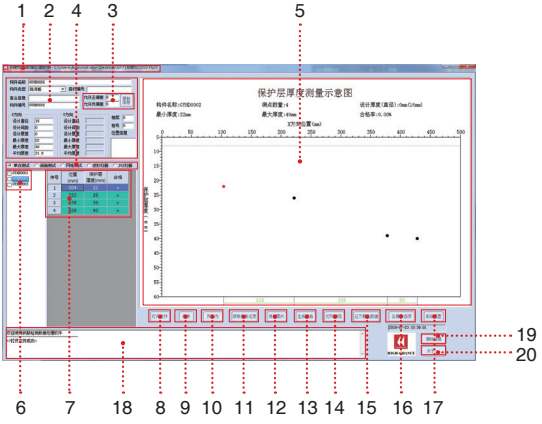

Fig. 3-1

3.2.3 Read the record file

Operating Instructions:

1. Start up the instrument, connect the instrument to the computer with USB cable, and click [Read instrument record].

2. The system will automatically pop up the list of the instrument's components. Check the components that need to be read. Click "OK" and the data storage path will pop-up.

Fig. 3-2

3. Select the storage path, type in the name of the storage file and click [OK]. The operation information bar displays "Read Instrument Record Successful" after successful reading.
4. The data is automatically displayed in the data display area.

3.2.4 Open files

Operating Instructions:

1. To open a file on the system page, click [Open File] on the page.
2. To select a file in the computer, find the file with the format of "*.YGJY", which is a software-specific file format.

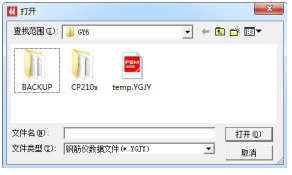

Fig. 3-3

3.2.5 Data browsing

In the data browsing area, the components are divided according to their detection modes. The modes including single-point detection (cover detection), profile detection, grid detection, waveform detection and JGJ scan. When detection modes are switched, the detection data of corresponding mode is automatically displayed on the interface.

Fig. 3-4

Left-click the component to be browsed, and the basic information of the component is displayed in the component information box. Component data are displayed in the data list, including measurement point position, the cover of the protective layer and whether it is qualified or not. Data

modification is not supported. Component data are graphically displayed in the "Data Schematic Diagram".

"Deviation setting" can be inputted with data that is qualified in the positive and negative limit values (Fig. 3-5), The software automatically determines whether the cover of the protective layer at the measurement point is qualified or not.

Fig. 3-5

"Copy Info" copies the inputted parameter information to another component. Click the button to open the "Copy component information dialog box" and select the corresponding parameters to copy. Softens the scope of components copied with selected parameters, including "Copy to all components" and "Copy to selected components." Click "OK" to perform the copy operation.

Fig. 3-6

3.2.6 Save picture

Save the "Graph Schematic Diagram" of the current component data in the format of ".bmp". Click "Save picture", type in the picture name, and click "OK" to generate a picture.

3.2.7 Generate report

Check the component you want in the "Component list" to generate the report, as shown in the figure.

Click "Generate report" to open the "Generate report basic info" dialog box, where you can type in the report project information (see Fig. 3-8). Click "OK" after inputting parameter to pop up the storage path of the report. Type in the file name and click "OK" to generate the report.

Fig. 3-7

Fig. 3-8

3.2.8 Print preview

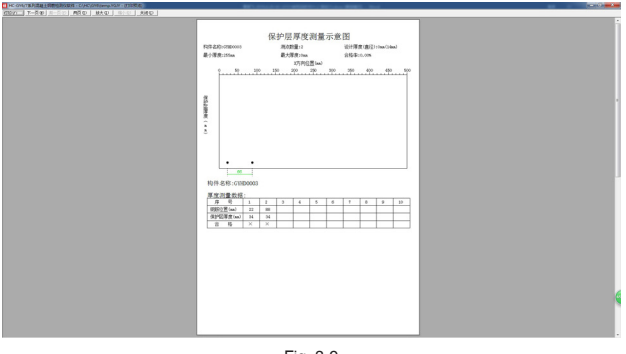

Fig. 3-9

Operating Instructions:

1. Click [Print preview] to open the report preview interface.
2. The report interface can be zoomed in, zoomed out, printed, or closed.

3.2.9 Downloaded cloud data

Fig. 3-10

Click "Downloaded cloud data" in the main interface to open the list of downloaded cloud data. The data include components and pictures. Displays statistics for the local cloud data and basic information of the single data sets.

Filtering: Filter local cloud data for time, instrument number, and delegated number.

Analysis: Performs data viewing, manipulation, and report generation to batch-selected components.

Deletion: Delete batch-selected data.

Save data as: Save the batch selection data as local files with format of "*.YGJY".

Export database: Output locally selected cloud data as a local database file.

Input database: Input a local database file.

3.2.10 Cloud options

1. Instrument registration. To register the instrument, enter the instrument number and instrument registration code. The data uploaded to the cloud by the instrument can only be queried and downloaded after registration.

Fig. 3-11

2. Instrument management. Adding and deleting the registered instruments.

3. Data viewing. The cloud data of a registered instrument can be queried according to the time, instrument number and delegated number.

4. The queried data can be downloaded or deleted. After downloading, the data will be added to the local cloud data.

Note: Delete operation is to delete the data on the cloud server. After deleting, the data cannot be restored.

3.2.11 System setting

1. Select the language displayed in the software, including Chinese and English.
2. Set the automatic update of the software.
3. "Evaluation Rules" is used to set the allowable positive and negative deviations of the qualified protective layer's cover of various component types.

Fig. 3-12

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