HICHANCE

HT-225S Series Digital Concrete Test Hammer

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

Instructions for Use

1 Overview

HT-225S series Digital Concrete Test Hammer is used for non-destructive detection and evaluation of compressive strength of hardened concrete in building structure. It can set parameters such as delegated number, design strength, carbonation depth, bouncing angle, bouncing test surface, testing curve and pumping according to on-site testing conditions. The strength estimation result of the component can be calculated immediately after the detection is completed, and the calculation process is fully in accordance with the provisions of Technical Specification for Inspecting of Concrete Compressive Strength by Rebound Method (JGJ/T23-2011).

Embedded design is adopted to facilitate replacement of mechanical rebound body. The digital display instrument is designed independently, and the induction signal is connected with the rebound warhead through contactless connection. The mechanical rebound body can be maintained or replaced by removing only a few screws that connect the instrument housing to the rebound body. Since there is no connection between the two parts, their removal will not cause damage to the electronic parts. After replacement or maintenance of the mechanical rebound body, the electronic instrument can be installed for further use.

1.1 Performance characteristics

Digitalization: the rebound values are displayed in both numeric and pointer forms with good consistency.

Automation: parameters such as the number of measurement areas, test direction, building surface and pumping can be set and modified. After one measurement area is detected and calculated, the next measurement area

will be detected automatically according to the preset parameters, which eliminates the tedious on-the-spot recording and greatly improves the detection efficiency and timeliness.

Accuracy: the calculation rules are in full compliance with the industry standard of the People's Republic of China, Technical Specification for Inspecting of Concrete Compressive Strength by Rebound Method (JGJ/T23-2011).

Diversification: through the Bluetooth connection with the mobile terminal, the whole upload of the component and the real-time acquisition of the rebound value are satisfied.

Wear-free: the metal plate contactless grating sensor of the electronic instrument has no contact and no wear with the rebound test hammer, and the service life of the sensor is long.

1.2 Reference standards

HT-225S series digital rebound test hammer is manufactured according to the industry standard of the People's Republic of China, Rebound Test Hammer (GB9138-88). It is used for non-destructive detection of compressive strength of ordinary concrete in engineering structures.

1.3 Technical indexes

Nominal kinetic energy: 2.207J;
Recoiling tension spring stiffness: 7.85N/cm;
Recoiling hammer stroke: 75mm;
Average value of rebound value steel anvil rate: 80±2;

Working temperature: -4°C- +40°C;
Dimensions of aluminum box for instrument: 366×216×110(mm) ;
Gross weight of packing case: 4Kg;
Power supply: 3.7V lithium battery;
Digital display error: ≤±1;
Quantity of component storage: 1000 × 100 (component × measurement area) ;
LCD display screen: 240×400 .

2 Operating Instructions

2.1 System structure and panel description

2.1.1Instrument structure

The whole instrument consists of the following two parts:

1. HT-225S Series Rebound Test Hammer
2. Signal cables and other accessories

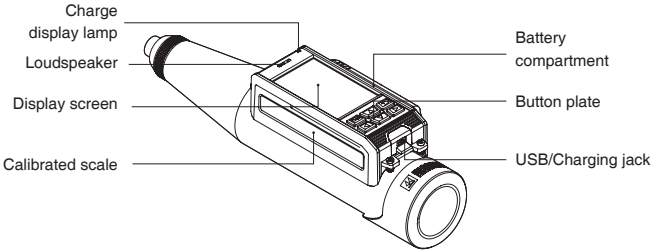


Fig. 2-1

2.1.2 Button plate description

Key name	Function description
⏻/OK	Switching the instrument on/off; OK/Retest.
⮌	Cancel the current operation and return to the previous interface.
▲	Move the cursor up or increase the data;
◀	Move the cursor to the left or decrease the parameter;
▶	Move the cursor to the right or increase the parameter;
▼	Move the cursor down or decrease the data;

2.1.3 External jack

Symbol	Shape	Function
	USB jack	It can connect the computer, transmit data, or be used as a charging jack.

2.2 Charging specification

A dedicated power adapter or USB cable connected to the computer can be used for charging; the charging indicator light is always on when charging; and turns off when charging is complete.

*It is recommended to shut down and charge.

2.3 Software introduction and function description

2.3.1 Startup and function interface

Press [⏻/OK] for a long time to start the instrument. When the instrument starts, the startup interface will be displayed(Fig.2-2). And they will enter the function selection interface automatically after a few seconds (Fig. 2-3).

Fig. 2-2

The top of the interface is the title bar, displaying the date and time, the number of rebounds, and the amount of battery power; the main functions of the instrument are displayed in the middle of the interface; the operation of the button is displayed at the bottom of the interface.

Fig. 2-3

Press the [▲] and [▼] key to switch functions.

Long press the [⏻/OK] key to turn off the instrument.

Press the [⏻/OK] button to enter the selected function items and start operating on them.

Press [⮌] to return to the startup interface, which displays for 3 seconds and then it jumps to the system functions page.

2.3.2 Parameter setting

Select "Collect Data" in the function interface to enter the parameter setting interface, as shown in Fig. 2-4.

The top of the interface is the title bar, displaying the date and time, the number of rebounds, and the amount of battery power; the parameter items to be set are displayed in the middle of the interface; at the bottom, there is the carbonation value inputting. You can input

Fig. 2-4

the carbonation value first, then set the parameters, or set the parameters to start collecting data, and then input the carbonation value after the collection is completed.

Press the [▲] and [▼] key to move the cursor to each parameter item, and press the [◀] and [▶] key to modify the parameter according to the requirements of field detection.

When modifying the delegated number and component number, move the cursor to this item, press the [▶] key to pop up the full keyboard, and then press the [▲], [▼], [◀], [▶] and [ ] keys to switch and select the keyboard data of the system.

Press [↩] to complete it after the modification is completed.

In HT-225S, all parameters can be set after the detection is completed, except that the artifact number and the number of measurement area should be set before the test.

After setting the parameters, press the [⏻/OK] key to enter the rebound data collection page.

2.3.3 Data collection

Press the [⏻/OK] key on the parameter setting page to enter the data collection page, as shown in Fig. 2-5.

The top of the interface is the title bar, displaying the date and time, the number of rebounds, and the amount of battery power; the component number, component name, current measurement area, the total number of measurement areas and the rebound value of measurement points are

displayed in the middle of the interface. At the bottom, there are the extreme values (minimum and maximum) of the rebound data, the average values and the strength values of the measurement points.

When the measurement method is "ultrasonic rebound synthesis", it is necessary to measure the 8 measurement points on the front of all the components, and then collect the data of the 8 measurement points on the back of the artifacts after all the data of the measurement points on the front have been collected.

Fig. 2-5

When the measurement method is "rebound" and all the 16 measurement points are measured, it will automatically jump to the next measurement area until the detections of all measurement areas are completed.

When the measurement method is "rebound" and measurements of all the current measurement areas are completed, it will automatically jump to the carbonation value setting page, as shown in Fig. 2-6

When the measurement method is "ultrasonic rebound synthesis" and measurements of all the current measurement areas are completed, it will automatically jump to the data browsing interface, as shown in Fig. 2-7.

Press [⮌] in the collection interface to open the exit prompt, and press the [⏻/OK] key to exit. Press the [⮌] key to continue the measurement.

When the charge is too low, there will be a voice prompt and the access to the measurement interface is not allowed.

2.3.4 Carbonization value input

When the measurement method is "rebound" and measurements of all the current measurement areas are completed, it will automatically jump to the carbonation value setting page, as shown in Fig. 2-6

Fig. 2-6

The top of the interface is the title bar, displaying the date and time, the number of rebounds, and the amount of battery power; In the middle of the interface, the carbonation value and the average value of each measurement area are located; the average carbonation value of the component is shown at the bottom.

Press the [▲] and [▼] keys to switch to the area where you want to modify the carbonation value, and press the [◀] and [▶] keys to modify the carbonation value.

After inputting the carbonation value, press the [⏻/OK] key to confirm and the page jumps to the detection result page of the artifact, as shown in Fig. 2-7

The number of carbonation values inputted into each artifact must satisfy two conditions before the estimated values can be calculated normally. One is that the number of carbonation values inputted is greater than or equal to 30% of the number of measurement areas, and the range is less than 2.0; the other is that the range of carbonation values is greater than 2.0, and the number of carbonation values is equal to the number of measurement areas of the component.

For unfinished carbonation value, users can choose to exit and input the unfinished carbonation value during data browsing, but cannot modify the inputted carbonation values.

Move the cursor to the average value and press [⏻/OK] long to copy the data down.

2.3.5 Data browsing

Select "Data Management" and "Delete Data" in function interface to enter the data deletion interface, as shown in Fig. 2-7.

The top of the interface is the title bar, displaying the date and time, the number of rebounds, and the amount of battery power; The component list is in the middle of the interface; at the bottom, there are the average values, standard deviation, estimated values, and actionable buttons of the current component.

Fig. 2-7

Press the [▲] and [▼] keys to switch the stored component, check the artifact to be viewed, and the details of the lower component change in real time. Press the [⏻/OK] key to enter the measurement area data interface of the component. In the measurement area data interface, you can view the rebound value, carbonation value, strength value, etc. of each measurement area, as shown in Fig. 2-8.

On the measurement area data page, press the [▲] and [▼] keys to view different measurement area data of this artifact up and down.

Press [▲] and [▼] to switch the measurement area on the measurement area data page. Press the [⏻/OK] key to make the rebound value operable. Press the [◀] and [▶] keys to select the data of the measurement area. Press [▲] and [▼] to increase and decrease the measured rebound value.

Fig. 2-8

Press [⮌] on the measurement area data page to return to the data browsing page. Switch the options through [◀] and [▶] of the instrument. Press [⏻/OK] for the continuing test if the measurement point data of the component measurement area have not been collected completely.

* The continuing test button will only be displayed when the measurement point data have not been collected completely.

In the data browsing interface, press [◀] and [▶] to switch options. When switching to the average value, press [⏻/OK] to view the average value. If there is a great number of data, press [▲] and [▼] to turn pages.

In the data browsing interface, press [▲] and [▼] to switch options. When switching to parameters, press [⏻/OK] to modify parameter values, but measurement area and measurement methods cannot be modified.

In the data browsing interface, press [◀] and [▶] to switch options. When switching to carbonation, press [⏻/OK] to input additional carbonation values, and the inputted values cannot be modified.

2.3.6 Data deletion

Select "Data Management" and "Delete Data" in function interface to enter the data deletion interface, as shown in Fig. 2-9.

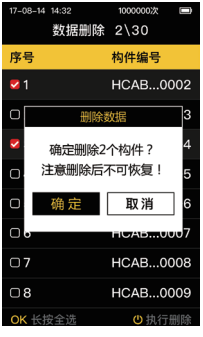


Fig. 2-9

Data deletion is to delete the data in the system file library, the top of the interface is the title bar, displaying the date and time, rebound times, and battery power; The bottom of the interface is the component list, which can be checked.

You can delete an component individually. Press [▲] and [▼] to switch components, Press [◀] or[▶] to check the artifact or cancel the check. Press the [⏻/OK] key to open a prompt for deletion confirmation, at the same time press [◀] or[▶] to select to delete it or not, and then press the [⏻/OK] key.

Components can be deleted in batch. Long press the [⏻/OK] key to select all components, and then press the [⏻/OK] key to open a prompt for deletion confirmation. Press[◀] or [▶] to select whether to delete or not, and then press the [⏻/OK] key.

Deleted data cannot be repaired. Please be careful.

2.3.7 Jiangsu format exporting

Jiangsu format exporting is to upload the component data in the file library to the host computer. The user switches the artifact by pressing [▲] and [▼] , and checks the artifact or cancels the check by pressing [◀] or[▶]. Long press the shutdown key for a long time to check all the components, and then press the [⏻/OK] key to upload the data. A prompt box will pop up for successful upload after uploading successfully.

2.3.8 Bluetooth printing

Bluetooth printing is to print out the component data in the file library in a fixed print format through a Bluetooth printer.

The user switches the components by pressing [▲] and [▼] , and checks the components or cancels the checks by pressing [◀] or[▶]; press the shutdown key for a long time to check all components, and then press the [⏻/OK] key to start connecting to the printer. If the connection is successful, start printing. After printing is completed, a prompt box for printing completion will pop up.

2.3.9 Bluetooth single-point uploading

When the digital rebound test hammer is successfully connected with the Bluetooth of the mobile terminal, the rebound value can be transmitted to the mobile terminal in real time by using the Bluetooth single-point upload function.

2.3.10 System setting

Select "System Setting" in the function interface to enter the system setting interface, as shown in Fig. 2-10.

Fig. 2-10

The top of the interface is the title bar, displaying the date and time, the number of rebounds, and the amount of battery power; at the bottom, there are the parameters of the system setting.

Press [▲] and [▼] to switch the parameters, and press [◀] and [▶] to modify the corresponding parameter values.

If the rebound value of the component exceeds the rebound upper limit, the rebound value is recorded as the upper limit. If the rebound value is lower than the lower limit, a voice prompt will be given, and the rebound value will not be recorded.

When the voice message function is "on", voice messages will be given during the detection.

Backlight time and timing shutdown can be set freely in units of minutes.

The parameter values of date setting and time setting can be displayed in the title bar.

2.3.11 Instrument calibration

Select "Instrument Calibration" in the function interface to enter the instrument calibration interface, as shown in Fig. 2-11.

Fig. 2-11

Instrument calibration refers to the calibration and measurement of rebound test hammers. The top of the interface is the title bar, displaying the date and time, the number of rebounds, and the amount of battery power; The rebound values, average values, and calibration results from different angles are shown at the bottom.

Press the [⏻/OK] key to clear the last calibration result and reset it. The calibration timing requires rebound of the bouncing rod after rotation. Each rotation needs to be measured three times (N1/N2/N3). The rotation angle includes 0 degrees, 90 degrees, 180 degrees and 270 degrees. The system calculates the average based on the value of three rebounds, and the average value is qualified if it is between 78 and 82.

Calibration result: the system will add up the average values of the four rebounds and average them again, and the result will be qualified if it is between 78 and 82.

2.3.12 About native

Select "About Native" in the function interface to enter "About Native" interface, as shown in Fig. 2-12. The top of the interface is the title bar, displaying the date and time, the number of rebounds, and the amount of battery power; The parameters and parameter values for this machine are shown at the bottom.

Fig. 2-12

3 Analysis software for strength measurement by rebound method

3.1 Introduction

Rebound strength analysis software is multifunctional analysis software developed by Beijing Haichuang High-Tech Technology Co., Ltd for non-destructive detection data processing of compressive strength of hardened concrete in building structures, which can be used for later processing of detection data of the digital rebound test hammer. Rebound data under the corresponding account on the cloud server can be remotely viewed.

The software can run on computers with Windows operating system installed and resolution 1024*768 (and above).

3.2 Installation

This software can run on Windows operating system, the installation process is divided into program installation and driver installation:

Installation steps are as follows:

double-click the ".EXE" file icon on the U disk to open the installation interface as shown in Fig. 3-1. Click [Next (N) >] to start the installation, and the installation progress interface shown in Fig. 3-3 will be displayed.

To change the installation path, click [Browse (R)...] to open the path selection interface as shown in Fig. 3-2; after selecting the path, click [Next (N) >] to enter Fig. 3-3. After the progress bar reaches 100%, the driver installation interface will be entered automatically as shown in

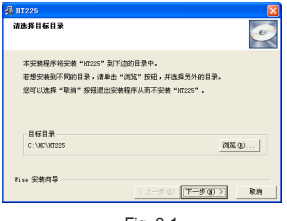


Fig. 3-1

Fig. 3-4. Select whether to install and click [Next (N) >] to install the driver. The installation completion interface will pop up as shown in Fig. 3-5. Click [Fig. (F) >] to exit the installation.

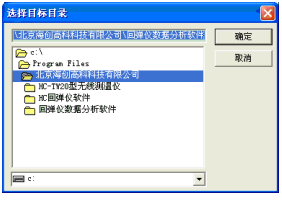


Fig. 3-2

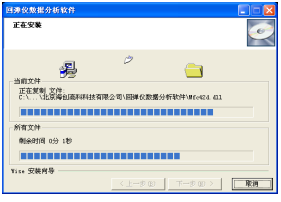


Fig. 3-3

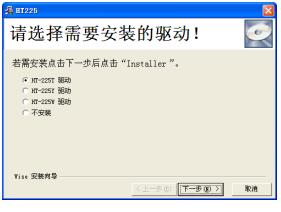


Fig. 3-4

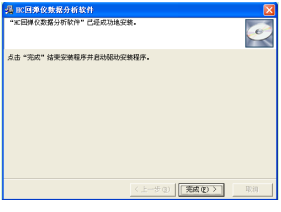


Fig. 3-5

3.3 Instructions of software

The operation method and interface form of the analysis software for strength measurement by rebound method is fully conform to the Windows style. Users who are familiar with the operation of Windows will easily master the operation method of the software.

3.3.1 Software interface introduction

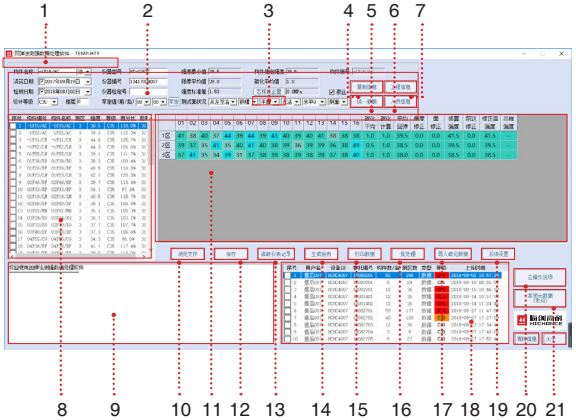


Fig. 3-6

1. Title bar: display the current system type and currently open files;

2. Component information: display and set the current component information;

3. Core sample correction: set the type and size of core sample correction;

4. Copy information: copy the information of the current component to subsequent components;

5. Engineering information: set component information;

6. Personnel information: set the inspector information;

7. Procedure selection: display and set the procedure curve of the current component;

8. Component list display the component list of the currently open file;
9. Operating information: display real-time uploaded data information and software operation information of registered instruments, recording up to 500 lines;
10. File viewing: open the rebound test hammer data file;
11. Data list: display and edit the data information of the current component;
12. Conservation: save the current component to the currently open data file;
13. Instrument record reading: read the measurement data of the lower computer;
14. Report generating: generate a report file;
15. Data printing: print the original rebound value and estimated value of the selected component;
16. Batch processing: process component information in batch;
17. Carbonization data input: carbonization data can be imported both in batch and manually;
18. Local query results displaying;
19. System setting: set the software model of the corresponding rebound test hammer;
20. Cloud operation options: instrument registration management and cloud data operation;
21. Local cloud data (this month): button for querying the local cloud data for this month.

3.3.2 Procedure selection

Click OK to have the current component calculated according to the selected procedure curve; click Special Curve Editor to start the Special Curve Edit and Download program.

Fig. 3-7

3.3.3 Engineering information

Click Save to save the entered project information to the currently open data file;

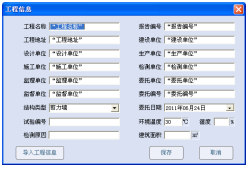


Fig. 3-8

3.3.4 Special curve editing and viewing

This program (as shown in Fig. 3-9) is used to edit and view special curves. Open any curve as a template, and then switch between different table types and add, modify and delete data in different tables.

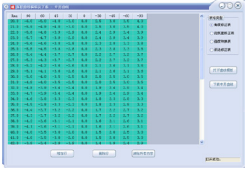


Fig. 3-9

3.3.5 Information replication

Copy the component information specified by the current component to a subsequent measurement area (as shown in Fig. 3-10);

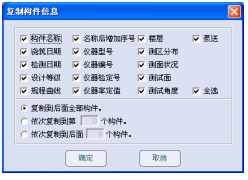


Fig. 3-10

3.3.6 Component list action

Right-click in the component list area to pop up the menu as shown in Fig. 3-11; select all: select all components; add components: add an component with a measurement area of 1 and a data of 0; delete selection artifact: delete all selected components; save selected component: save the selected data to other rebound test hammer data file; import file: import saved local data files; process selection component in batch: process selected component in batch; move selected files: move selected components here.

Fig. 3-11

"Add Component" or "Remove Selected Component" cannot be performed under ordinary permissions. Please consult the after-sales service for elevation of permissions.

3.3.7 Data list

Right-click in the data list area to pop up the menu as shown in Fig. 3-12: add a measurement area with a rebound data of 0 in the last row of the current component; delete the last measurement area to delete a measurement area; this operation is a function of high-level permissions. Please consult the after-sales service for elevation of permissions.

Fig. 3-12

3.3.8 Save

Save the modified component information and data to the currently open data file. In the case of change in component information, procedure curve, data information and the number of measurement areas of the current component, click this button to save, otherwise the modified content will not be saved.

3.3.9 Instrument record reading

The lower computer is connected to the computer through the data line, click [Instrument Record Reading] to open the interface as shown in Fig. 3-13, select the path and enter the file name, then click Save to read out and save all the data in the lower computer to the specified data file.

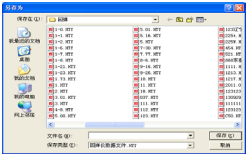


Fig. 3-13

3.3.10 Report generating

Generate a report on the currently open data file. Select the format of the report, and then select the save path for the report document.

*Open the data file before doing this.

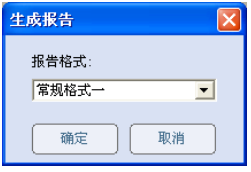


Fig. 3-14

3.3.11 System setting

Set the software type of the corresponding lower computer. This operation mainly determines the data transmission method when reading the instrument record. If the selected type does not conform to the lower computer, the data transmission cannot be performed.

There is no need to set the software type of the lower computer when using the HT-225S series rebound test hammer.

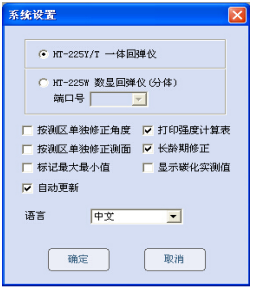


Fig. 3-15

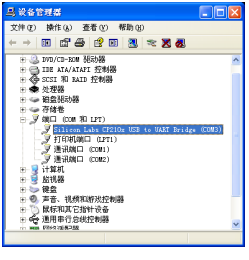


Fig. 3-16

3.3.12 Local cloud data query

The local data list displays data for registered instruments downloaded locally from the cloud. Data is grouped by delegated number, and information such as user name, device ID, number of components, number of measurement areas, type and grade, upload time and so on is displayed when double-clicking a row to view detailed data.

There can be multiple components under the same "Delegated Number" in the local data list. The strength of each component is separately calculated and compared with the design level of the component. The unqualified are highlighted in the level column, as shown in Fig. 3-17.

1 unqualified component is shown in yellow, 2 is shown in orange, and more than 3 is shown in red.

Fig. 3-17

Right-click on the user name list to query, save, and delete local data by user name, device ID and delegated number; the query interface is as shown in Fig. 3-18. Check before the required contents if detailed data is needed after querying the statistical results. Click OK to refresh the results to the list in the main interface.

Click [Local Cloud Data (This Month)] to display local cloud data of this month.

Fig. 3-18

3.3.13 Cloud operation options

Fig. 3-19

Click [Cloud Operation Options] to open the following dialog box.

It is stated in [Instrument Registration] that each instrument must be registered in software to obtain real-time cloud data from the server. Click the Instrument Registration button to open the Fig. 3-20 dialog box and enter the 11-digit number and cloud registration code in the instrument header. The cloud registration code is marked on the instrument certificate.

It is described in [Instrument Management] that managing registered instruments gains access to view registered instruments and corresponding user names. Registration, modification of user name, deletion of registered instruments can be performed as show in Fig. 3- 21.

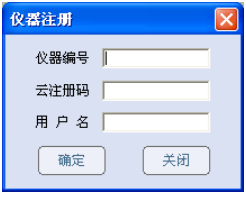


图 3-20

图 3-21

It is noted in [Query] that querying cloud data by upload time, device ID, or delegated number can be performed in the software. The data can be downloaded and deleted.

4 Calibration and maintenance of instruments

In order to keep the consistency and stability of the rebound test hammer and improve the precision of rebound strength measurement, the performance of the instrument should be checked regularly. The calibration of rebound test hammer can be divided into general calibration and standard calibration. The former shall be conducted regularly and the latter shall not.

4.1 General calibration

The calibration of the rebound test hammer is carried out on a special tool - standard steel anvil. For rebound test hammers with nominal kinetic energy $\leq$2.207J, the GZ16 steel anvil is used for general inspection of the technical conditions of the whole instrument. During calibration, steel anvil shall be placed steadily on the basis of good rigidity, and then rebound test hammer on the steel anvil shall be placed vertically downward for bouncing calibration, and the way of holding instruments shall be consistent with testing on concrete component. The steel anvil can also be pressed on the press machine to calibrate the rebound test hammer. The hardness of steel anvil is HRC58-62, and the calibration rebound value is Rm=80±2. Generic calibration can be performed after about 2000 bouncing or once every three months. For frequent detection or one-time detection with large amount of work and continuous detection for several days, the calibration can be carried out before and after use every day. If there are doubts about the rebound value during testing, calibrate the rebound test hammer on the steel anvil.

During the test, verify whether the pointer reading of the mechanical rebound test hammer is consistent with the screen reading of the

instrument. If the deviation is greater than 2, stop using the instrument and contact the manufacturer.

4.2 Standard status check

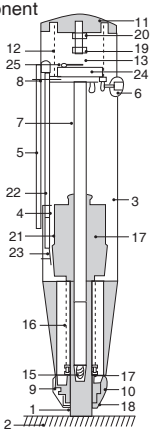
The calibration and inspection of the standard state usually involves the change of the internal assembly or performance of the rebound test hammer and the overall inspection and adjustment of the instrument shall be carried out. This verification should be performed in one of the following cases.

1. The change of the internal assembly dimensions of the instrument due to the replacement of parts (parts replacement of the bouncing system and the indicating value system).
2. After long-term use (generally about one year), the parameters and performance of the instrument parts have changed, and the technical performance indexes of the whole machine cannot be guaranteed.
3. The cumulative number of bouncing tests exceeds 6,000.
4. The instrument is subject to severe impact (such as falling from a height) or other damage.

For those units or personnel who are not familiar with or lack the knowledge to the performance and standard state of the rebound test hammer, the instrument can be sent to the detection center (station) for calibration and standard state verification every six months.
Personnel without special training normally shall not calibrate the standard state of the rebound test hammer by themselves. Therefore, the operation steps of calibration standard state will not be introduced in detail in this manual, so as to avoid adverse effects.

Fig. 4-1 Mechanical parts of rebound test hammer

1. Bouncing rod
2. Test surface of concrete component
3. Casing
4. Pointer slider
5. Calibrated scale
6. Button
7. Center guide bar
8. Guide flange
9. Cap
10. Snap ring
11. Tail cover
12. Pressure spring
13. Hook
14. Impact hammer
15. Buffer spring
16. Recoiling tension spring
17. Spring seat
18. Sealed felt collar
19. Adjust bolt
20. Fastening nut
21. Leaf spring
22. Pointer axis
23. Fixed block
24. Hook pin
25. Hook spring



4.3 Maintenance and servicing

To improve the testing precision of rebound method, it is important to keep the instrument in a good standard state besides operating and using the instrument correctly and mastering the testing technology.

In addition to being used and kept by special personnel, the following shall also be done:

1. After use, the rebound test hammer shall be put into the packing sleeve or instrument box in time to prevent dust from entering the instrument interior.

2. The instrument shall not be disassembled and tested willfully to avoid affecting service life and decline in accuracy.
3. The instrument shall be maintained regularly. After a period of use, the instrument shall be wiped clean, but the assembly between each part of the instrument and the whole machine shall not be changed.
4. The indicator system of the instrument, especially the pointer slider, shall not be disassembled in general, and the pointer shaft shall not be allowed to be greased to keep the frictional force constant.

Procedure for disassembling the rebound test hammer

1. Decomposition of the whole machine

Press the bouncing rod 1 against the ground, and press tail cover 11 slightly. Disengage the push button 6 from the guide flange 8 so that the spring rod 1 extends out of the housing 3; then unscrew front cap 9 and remove felt ring 18 and snap ring 10; then unscrew tail cap 11, take out the pressure spring 12, push the ejection lever 1 by hand, and take out the ejection system (i.e., machine core) from the rear of the instrument housing. Attention! If the machine core cannot be removed, it can be done by lightly touching hook 13 with a finger to disengage hook 13 from hammer 14.

2. Decomposition of the bouncing system

By lightly striking bouncing rod 1 with bouncing hammer 14, the bouncing rod can be disconnected from the center guide bar 7, and damping spring 15 can also be taken out of the rod. The three-piece (recoiling tension spring 16, spring seat 17 and spring hammer 14) can also be disengaged from center guide bar 7. If recoiling tension spring 16 won't be replaced, it is generally not permitted to remove recoiling tension spring 16 from spring seat 17 or spring hammer 14 so as not to cause deformation of the spring.

The bouncing system is the essential part of the rebound test hammer. Great attention shall be attached to the cleanness of the impact surface when cleaning. No dirt or grease is allowed on the impact surface of bouncing hammer 14 and bouncing rod 1. After cleaning, the center guide bar 7 can be evenly coated with a thin layer of watch oil or wiped with a fine cotton yarn dipped in watch oil.

The inner wall of housing 3 shall be cleaned without dust, grease or other dirt.

Restoration assembly of the instrument: after cleaning, it shall be checked whether the parts and components of the instrument, such as the bouncing system and the indicating value system, comply with the specified requirements of the standard state. If not, the parts shall be replaced.

Sequence for restoration assembly of rebound test hammer is the opposite for disassembly, that is to say it needs to be disassembled and then installed. After the ejection system is installed, hook 13 and ejection hammer 14 shall be disconnected from each other, and then they shall be loaded into the casing. Finally, snap ring, felt ring, cap, pressure spring and tail cap shall be installed respectively. The caps must be tightened.

The restored rebound test hammer shall be calibrated on the steel anvil, and the average rebound value shall be Rm rate=80±2.

After the instrument has been used for a period of time or has had more than 8,000 bouncing times, recoiling tension spring 16 shall firstly be checked for plastic deformation or change that exceeds the specified value. If any, it shall be replaced.

Apart from necessary calibration on steel anvil, it shall be avoided to put

rebound test hammer on objects harder than concrete for calibration. Replace damaged instrument parts with self-made parts is strictly prohibited.

Common faults and troubleshooting methods (see Schedule).

4.4 Rebound body replacement

The unique design of the HT-225S family makes it easy to replace.

When the rebound body is damaged, remove the measuring assembly. As shown in Fig. 4-2, fix the lower shell on the new rebound body with six screws, adjust the rebound body slider and the measuring assembly slider to the installation mark. Align the two sliders, fasten the upper and lower shells, and tighten the nuts to align and verify. (Before checking, make sure that the two sliders match well to avoid damaging the instrument.)

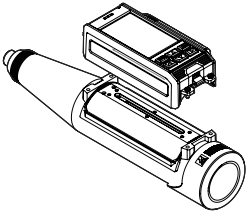


图 4-2

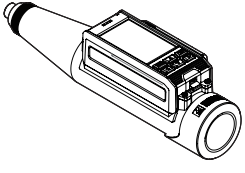


图 4-3

Common troubles of rebound test hammer and troubleshooting methods

S/N	Troubles	Reason analysis	Overhauling method
I	During bouncing detection, the pointer slider 4 of the rebound test hammer stops at the start position	1. The angle of extension of spring plate 22 on pointer slider 4 is too small compared with the pointer shaft 23; 2. Break of spring plate 22	1. Remove pointer slider 4 and properly expand the tension angle of spring plate 22; 2. Replace spring plate 22
II	The pointer slider 4 is brought up without being bounced and cannot be read	Angle of extension of spring plate 22 on the pointer slider 4 is too large.	Remove pointer slider 4 to properly reduce the tension angle of spring plate 22.
III	The pointer slider 4 steps up to a certain position without moving during the bounce.	The angle of extension of spring plate 22 on the pointer slider 4 is slightly reduced; 2. The engagement of pointer slider 4 with pointer shaft 23 is too loose; pointer slider 4 rubs against housing 3 or scale 5.	1. Remove pointer slider 4 and properly expand the angle of reed 22; 2. Remove pointer slider 4 and gently stab the coil inside with a fine wire (Attention! Do not exert too much force); 3. Use a small file to properly file the pointer onto the upper plane or shoulders of the special 4.
IV	The projectile hammer 14 is fired prematurely to impact the housing 3.	1. The hook end of hook 13 has been ground to a large obtuse angle. 2. The rear end of the impact hammer 14 is partially broken.	1. Use a file to file hook end of hook 13 to a right angle. 2. Replace impact hammer 14.

V	The rebound test hammer is no longer capable of bouncing, and the bouncing hammer 14 cannot be lifted.	1. Hook spring 25 on hook 13 has fallen off or is inoperative; 2. Hook end of hook 13 has been broken; 3. The hook end of hook 13 has been ground to a large obtuse angle.	1. Install hook spring 25 or adjust its elastic force and working position; 2. Replace hook 13; 3. File hook end of hook 13 to a right angle.
VI	Projectile hammer 14 is not easy to fire or cannot be fired	1. The hook end projection of hook 13 is in contact with the plane of spring hammer 14; 2. The hook end of hook 13 is at an acute angle.	1. File off the raised part of hook end of hook 13 by about 1mm; 2. File hook end of hook 13 to a right angle.
VII	Bounce rod 1 does not extend out and cannot be used.	Button 6 is loose and the small spring inside does not function.	Slowly unscrew tail cap 11 by holding it by hand and applying pressure (beware that pressure spring 12 ejects the tail cap off and hurts!) Move guide flange 8 downwards, adjust button spring and tighten button 6.
VIII	The rebound value system is high.	1. Work length of recoiling tension spring 16 is longer than 61.5mm; 2. The firing position of bouncing hammer 14 is high (bouncing position of spring 16 is stretched too long); 3. Too much oil on the center guide bar 7.	1. Adjust the fixed position of recoiling tension spring 16 on the spring seat 17 (with a screwdriver); 2. Screw out adjusting screw 20 on tail cap 11; 3. Remove the bouncing system and wipe it with cotton yarn.

IX	The rebound value system is low.	1. Work length of recoiling tension spring 16 is shorter than 61.5mm; 2. The firing position of projectile hammer 14 is low; 3. The maximum static friction force of pointer slider 4 is slightly high; 4. There is dirt on the impact surface of flick hammer 14 and the flick rod 1; 5. The frictional force between spring hammer 14 and center guide bar 7 increases.	1. Adjust the fixed position of recoiling tension spring 16 on the spring seat 17; 2. Screw adjusting screw 20 on tail cap 11 inwards and calibrate 100 decoupling point; 3. Adjust the tightness of the spring coil in the pointer slider 4 and the pointer shaft 23 so that the maximum static friction force is about 0.49-0.78N; 4. Remove the dirt on the impact surface; 5. Apply an appropriate amount of watch oil or sewing machine oil to the center guide bar 7.
X	Abnormality of the digital display instrument on rebound test hammer.	1. Failure to start; 2. Crash due to incorrect operation of keyboard; 3. Program abnormality;	1. Verify battery is full or not; 2. If there is an abnormality in the case of power supply, press the reset key first, and then press [⏻/OK] to start the machine.

XI	The rebound value is unstable and varies from high to low.	1. The contact surface between the impact hammer 14 and the impact rod 1 is uneven; 2. Dirt on that impact surface, or dirt on the center guide bar; 3. That center guide bar is not straight; 4. That friction force between the point slider 4 and the point shaft 23 is uneven; 5. Poor contact between the spring plate 22 and the impact hammer 14; 6. That point slider 4 rubs against the housing 3 or the scale 5; 7. That point shaft 23 is bent.	1. Replace the bouncing rod 1; 2. Clean dirt or perform routine maintenance; 3. Replace center guide bar 7; 4. Adjust the friction force between the pointer slider 4 and the pointer shaft 23; or let the finger slider to run back and forth multiple times on the pointer shaft; 5. Adjust the extension angle of the spring plate 22 properly; 6. File the upper surface or shoulder surface of the pointer slider 4; or file the long grooves of the housing 3; 7. Replace the pointer shaft.

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