

ZBL-R800
Multifunctional Rebar Detector
ZBL-R630A
Rebar Scanner
ZBL-C310A
Rebar Rust Detector

Operation Manual

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Conventions in This Manual

1. Word with gray background and black box is a button on the interface, e.g. .
2. The keys on the instrument panel are represented by **【】**, e.g. **【SAVE】**.
3. Word with white background and black box represent software menu command in Windows, and “→” is a separator between different menu levels. e.g. → means the command of selecting “Open” under the “File” menu.
4. Word with gray background but without box indicates the name of the control (choice box, input box, etc.) of the popup window on the screen, such as the input box of  in the open-file window.
5. The sign  means special attention is needed here.
6. Besides the descriptions in the manual, some prompt messages may show automatically in the use of the software. Please operate accordingly.
7. The software interfaces and photos in manual are only for reference. There will be changes with software upgrade and improvement of products. No further notice is provided.

 **Attention:** This manual is the one for ZBL-R800 Multifunctional Rebar Detector. The operation manual of ZBL-R630A Rebar Scanner can be seen in the section of rebar test. ZBL-C310A Rebar Rust Detector can be seen in the section of rust test.

Chapter 1 General introduction

1.1 Brief introduction

ZBL-R630A tests the thickness of concrete cover, rebar diameter, location and space.

ZBL-C310A tests the degree of rebar corrosion and distribution.

ZBL-R800 Multifunctional Rebar Detector –a portable, integrative and multifunctional one combines the functions of both ZBL-R630A scanner for rebar test and ZBL-C310A detector for rebar rust test.

1.2 Major functions and characteristics

1.2.1 Major functions

1. Double function of rebar and rust test.
2. Identify rebar location, direction and distribution.
3. Test the thickness of concrete cover.
4. Test rebar diameter.
5. Qualify the thickness of concrete cover automatically.
6. Single-electrode testing of concrete rebar corrosion.
7. Double-electrode testing of concrete rebar corrosion.
8. Divide rebar corrosion in maximal 10 gray shades or color graphs.
9. Test data storage, check and transmission.
10. Analyze professionally with Test Data Processing Software.

1.2.2 Major characteristics

1. Store data in U-disk.
2. Place brief introduction of functions and operation manual inside, handy for check.
3. Draw contour map of corrosion potential
4. Soft backlight.

1.3 Major technical indexes

Figure 1.1 Major technical indexes

Item	Index
Measurement range of cover(rebar diameter Φ 6mm- Φ 50mm)	First range: 3mm~98mm Second range:3mm~196mm
Detection range of corrosion voltage	-1000mv~+1000mv
Detection precision of corrosion voltage	0.1mv
Power supply mode	lithium battery Inside (charge with standard configured charger)
Working time	38 hours
Weight	0.9kg
Volume	212mm×134mm×50mm
Display	160*128, LCD
USB port	Transmit with U-disk, with capacity <=2G is suggested.

1.4 Attentions

1. For a better usage, please read operation manual carefully before using the instrument.
2. Requirements for working environment:

Environmental temperature: $0^{\circ}\text{C} \sim 40^{\circ}\text{C}$;

Relative humidity : $< 90\%\text{RH}$;

Long time sunlight perpendicular incidence is avoided.

Anti-corrosion: when used under damp, dusty and full of corrosive gas conditions, protective measures are necessary.

3. Requirements for storage environment:

Environmental temperature: $-20^{\circ}\text{C} \sim +60^{\circ}\text{C}$.

Relative humidity: $< 90\%\text{RH}$;

Out of use, please place instrument into package, store in a ventilated, cool and dry place, Long time sunlight perpendicular incidence is avoided.

If long time out of use, please charge and start up for a check regularly.

4. Avoid water.

5. Avoid usage under strong magnetic field, such as the nearby of large electromagnet or transformer.

6. Shock-proof: During the process of usage or handling, avoid severe vibration or shock.

1.5 Maintenance

1. Power supply: instrument charges with inside specific chargeable lithium battery, after full charge, it can work last for nearly 26 hours. When used, please pay attention to left of electricity. If lack of electricity, close instrument quickly and charge in time. Or it can lead to lost of testing data as a result of sudden blackout even damage to instrument. Avoid using other batteries or power supplies.

2. Charge:

When charged, plug the power supply into $\text{AC}220 \pm 10\% \text{V}$

socket and plug charger into the instrument's power supply .when the charge indicator is red, it is charging to the inside battery. When turning to yellow, it is completed. At that time, unplug the charger in time lest overcharge affects the battery service life.

 Attention: To guarantee full charge, please charge 6-8 hours consecutively, at the same time, avoid charge under the environment of over 60℃.

Long time out of use, charged battery will discharge and lead to decrease of electricity. Recharge before usage. While charged, a common phenomenon is instrument and charger will be heated in some extent. Good ventilation is necessary for heat dissipation.

 Attention: Avoid charge with other power adapters, or it will cause damage to instrument.

3. Rechargeable battery: when battery is near the end of service life after frequent charges and discharges, if the battery works abnormally (cannot charge with electricity, cannot charge full or short time is used after full charge), it is probable that rechargeable battery has been damaged or reaches its end. At that time, please contact with our company, change a new one. Avoid short circuit of battery or approaching high source temperature.
4. Every time when used, proper cleaning for host and sensors etc is necessary against water or dirty into plug in or instrument, or it will lead to low performance even damage of instrument.

 Attention: Avoid placing instrument and fittings in water or cleaning with wet cloth.

Avoid scrubbing instrument and fittings with organic solvent.

Please wipe host and socket with clean and soft dry cloth.

1.6 Responsibilities

The instrument is sophisticated testing equipment. When user has one of the following actions or the other man-made destruction, the company does not undertake related responsibilities:

1. Violate the above requirements for working and storage environment;
2. Improper operation;
3. Open case arbitrarily or disassemble any components without permission;
4. Man-made or accident-caused severe damage to instrument.

Chapter 2 Instrument description

2.1 Components

ZBL-R800 consists of host, rebar sensor, copper sulfate electrode, double electrode handle, rebar signal wire, rust signal wire, U-disk and charger.

ZBL-630A consists of host, rebar sensor, rebar signal wire, U-disk and charger.

ZBL-C310A consists of host, copper sulfate electrode, double electrode handle, rust signal wire, U-disk and charger.

2.1.1 Host

Following is the illustration of the host of R800 multifunctional rebar detector, only for reference.



(A) Detector

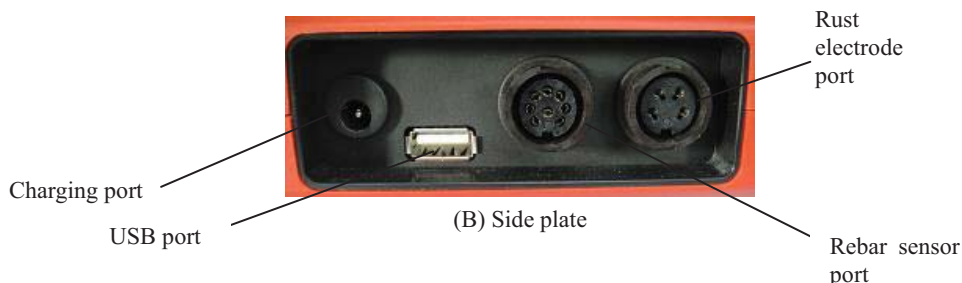


Figure2.1 Outward appearance of host

2.1.1.1 Keyboard

Keyboard is on the panel of host, function of each key is as follows.

Figure2.1 Table of functional key

Key name	Function description
【MENU】	To go back to upper menu in the operating menu
【BACK】	To go back to previous menu
【▲、▼、 ◀、▶】	Up, down, left, right direction, shift to the target menus and options, parameter change, increase or decrease etc.
【SAVE】	To save the test data, time, number and parameter, etc.
【ENTER】	Parameter choice and determination, or change of testing direction.
【  】	Power key, opening and closing of instrument

2.1.1.2 Display screen

Display screen is installed on instrument panel to present operating interface, test data and exchange information etc.

2.1.1.3 Charging port

To charge instrument with battery charger attached with the instrument, 6~8 hours is suggested in order to have a full charge.

2.1.1.4 USB port

Port for connection with U-disk is on the left side of instrument baffle. Plug specific U-disk into USB port, testing data will be transmitted to

U-disk through **Data Output** and then analyze the data in U-disk with computer software.

2.1.1.5 Sensor port

It is used for connecting with sensor signal wire.

2.1.1.6 Nameplate

On the back of instrument and sensor, nameplate consists of company name, manufacture date, instrument serial number etc.

2.1.2 Sensor and electrode

2.1.2.1 Rebar sensor

With an integrative design, rebar sensor as shown in fig.2-2 can scan rebar and record displacement of sensor in real time accurately. While going forward, sensor scans rebar and backward, scrubs it.



Figure2.2 Rebar sensor

Sensor is directive. When sensor axis parallels with the direction of rebar, it is most sensitive, conversely, when sensor axis is perpendicular to the direction of rebar, the signal is weakest. Therefore, while measuring, sensor axis should be parallel with the direction of rebar and scans in the vertical direction.

2.1.2.2 Copper sulfate electrode

Copper sulfate electrode as shown in fig.2-3 has following features: stable electrode potential, under standard conditions, potential to calomel electrode is $70\pm 3\text{mV}$ satisfying with theoretical results and potential difference below $\pm 1\text{mV}$. Electrode is difficult for polarization. If copper sulfate crystal dissolves completely, the internal resistance of electrode is below $3\text{k}\Omega$. Electrode has a long service life. If there is no damage to cavity, it can be used for a long time once irrigated and follow-up irrigation is allowed.



Figure 2.3 Copper sulfate electrode

2.1.3 Fittings

2.1.3.1 Power supply charger

Entry plug connects with 100~240V AC power supply and exit plug into charging plug of host for charging of inside lithium battery.

2.1.3.2 Double-electrode handle

When testing rebar rust with double-electrode, two copper sulfate electrodes should be installed on the handle (as shown in fig.2.4) which is used with stable space 20cm.

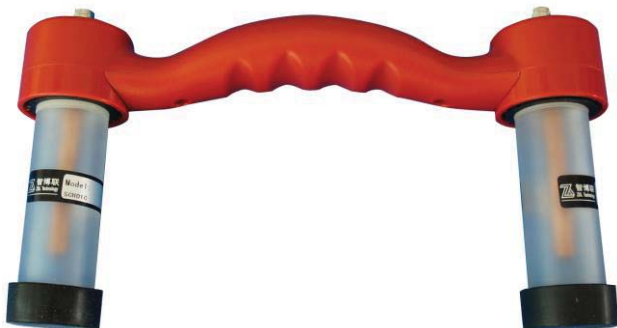


Figure 2.4 Double-electrode handle

2.1.3.3 Signal wire

Instrument signal wire consists of rebar sensor signal wire and rust electrode signal wire. Ports of these two signal wire are on the left of baffle. Please install according to chapter 4.

2.1.3.4 U-disk

It is used to copy the testing data which saved in the detector into computer for further analysis.

2.1.3.5 Other fittings

Please see the packing list.

2.2 Testing principles

1. Magnetic testing principle of rebar

The sensor emits magnetic field to part of tested structure, at the same time, receives induced magnetic field produced by iron-like medium (rebar) in the scope of magnetic field and then converting to electrical signals. The host analyzes digitalized signal timely and shows with various ways such as graphs, data and sound etc to identify rebar location, cover thickness and diameter precisely, such as figure 2.5.

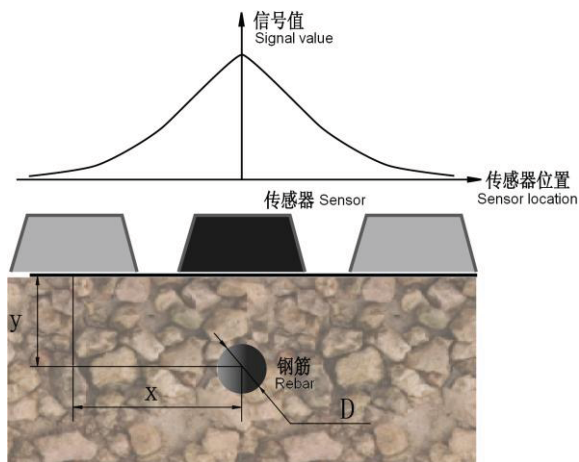


Figure 2.5 Magnetic testing principle of rebar

2. Single-electrode and double-electrode method of rust test

Single-electrode method (as shown in fig.2.6) applies testing principle of half-cell self-potential method, the rebar under ionic environment can be seen as an electrode, after corrosion, electrode potential changed, therefore, potential reflects corrosion directly. As it is well-known, battery consists of cathode and anode. Since rebar electrode has only half feature of the battery, therefore it is called half-cell.

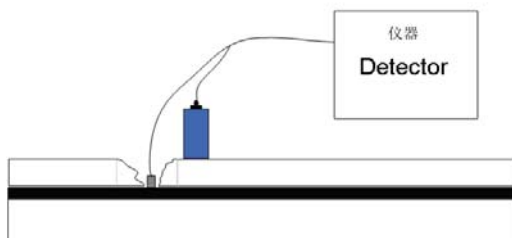


Figure 2.6 Single-electrode method

Double-electrode method (as shown in fig.2.7) also applies self-potential method. The difference only lies in that single-electrode method applies to outside exposed structure of rebar end, while double-electrode method applies to non-outside structure.