HS-6000 Operation Manual for Pulse Underground Metal Detector

Please read this manual carefully before using the instrument and keep it properly for future use.

catalogue

1. Safety statement

To ensure safety, please be sure to read the complete operating manual before using the HS-6000 pulse underground metal detector. In addition, the following tips should be taken into consideration:

Please confirm whether the charging adapter that comes with this product is compatible with the AC mains in your country or region. The charger can work with AC voltages ranging from 90V to 264V.

The connecting cable or detection coil damaged by electric shock cannot be used again.

To avoid dangerous situations such as short circuits or electric shocks, only accessories supplied by the manufacturer of the HS-6000 portable pulse detector can be used.

When using headphones, please reduce the volume to avoid damage to your hearing.

When you detect a metallic target, it may be a remnant of the war. When locating such large objects, please be vigilant to avoid danger.

This product can only be used for personal hobbies or scientific research and teaching. If cultural relics are discovered, please immediately report to the relevant departments. The use of this product should strictly comply with national laws and regulations and relevant local regulations. It is strictly prohibited to use it for illegal tomb exploration, mining and other illegal and criminal activities. The company hereby warns that according to Article 326 and Article 328 of the Criminal Law of the People's Republic of China, the maximum punishment for scalping cultural relics and excavating tombs is death. According to the Measures for the Administration of Mineral Resources Exploration Block Registration promulgated by the State Council, the maximum fine for illegal mining is 100,000 yuan, and the corresponding legal responsibility shall be borne.

Special mines may explode due to the high-intensity DC magnetic field generated by detection.

Special populations implanted with pacemakers or other medical electronic devices should not approach the area being detected, as it may pose a risk to life! As a manufacturer, we cannot accept any responsibility for this, please understand.

We may make changes to the design, parameters, and usability issues without notice.

2. Product introduction

Thank you for choosing the Heisong HS-6000 pulse underground metal detector, the world's first digital portable pulse detection instrument made in China and with complete independent intellectual property rights. In our design, we broke with tradition and integrated the digital pulse system with a portable carbon fiber folding frame for the first time. The instrument is equipped with an automatic matching adjustment function and has a high degree of attention paid to sound. We have adopted a new fully digital tone that allows every user to achieve the best listening experience. At the same time, there is a dual system for switching between silent and audible modes to meet the detection needs of different levels of operation. In addition, up to five levels of digital filter options allow you to adjust fast or slow response as desired, and nine emission frequency options provide you with extremely stable reference audio in any environment.

The product has a rich set of features, including an advanced automatic "sound recovery" function (i.e. automatic tuning), which can still be used in a digital silent mode. When this function is turned on, it can maintain a threshold value, allowing the instrument to always be in a most sensitive state. In addition, the product is equipped with an industrial-grade high-definition LCD display, making the menu parameter values clear at a glance and very easy to operate. The fully digital system design also subverts the previous pulse instruments in the market, abandoning the analog circuit design that requires adjustable devices, greatly improving the reliability and stability of the product.

The product is based on a pulse-type ground balance system (GBS), combined with years of experience in the research, development, and manufacture of pulse-type detectors. Through special electronic circuit design, it can easily achieve deep exploration. The performance of the device is almost unaffected by changes in seawater, most mineralized soil, or ambient temperature, and it can eliminate signals from soil and then receive stable signals from metal targets. Therefore, the reliability of the HS-6000 portable pulse detector is very high, and it can achieve ideal detection depth even in the most harsh environments.

3. Functionality

The HS-6000 pulse underground metal detector uses the latest ground balance system (GBS) technology to accurately and efficiently detect metal objects. The device emits short and intense pulse magnetic fields through the detection coil, which produce eddy currents in conductive materials such as metals. The eddy currents are stored inside the metal object. Even if the detection coil is turned off, these pulse magnetic fields will not quickly disappear. By receiving the same signal and delaying the reception of the signal, the HS-6000 portable pulse detector can accurately detect the eddy currents.

In order to achieve fine detection results, the device needs to detect small voltage changes through complex electronic circuits, and in the case of receiving interference signals, it needs to distinguish areas with specific signals from other signals. This requires using a voltage-controlled oscillator (VCO) to initiate audio, which helps you quickly and accurately detect metal signals.

When there is a metal object within the detection range, the detector will emit a sound through the built-in speaker to indicate the detection signal. If there is a metal object in the pulse signal area, the metal object will generate eddy current, which varies depending on different conductivity properties. The classification circuit provides visual time delay reading, classifying the eddy current received within a certain period of time, providing more detailed information on the type of underground metal. In addition, you can quickly determine the exact location and size of the underground metal object by listening to the sound. Therefore, the HS-6000 portable pulse detector is the most ideal choice for detecting metals, with features such as ease of use and high accuracy, effectively meeting various practical needs.

3.1 Advantages

Traditional detectors use cumbersome and complex supports to fix the detection coil, which has a large volume and is inconvenient to carry and store, seriously affecting the efficiency and convenience of detection work. The HS-6000 pulse underground metal detector adopts

The new folding frame structure brings many advantages. Firstly, it uses lightweight carbon fiber materials, resulting in a lighter overall weight and smaller folded size, making it easy to carry and store. Secondly, the quick deployment method is more convenient and simple to operate, requiring only a few minutes to master, making detection work more efficient and convenient, enhancing the user experience for operators.

The HS-6000 has completely upgraded the material and design of the detection frame. Carbon fiber composite materials reduce the number of accessories, allowing for faster and more precise operation. The special properties of carbon fiber also make the detector more durable and stronger, able to withstand harsh working environments, bending, wear, and not easily breaking, allowing you to use it for a long time with confidence. The HS-6000 not only provides a better user experience, but also reduces the risk of repairing and replacing accessories, effectively reducing the cost of use.

In addition, the HS-6000 portable pulse detector uses a new digital solution. When the detection coil detects signals, these signals are transmitted to the high-precision acquisition circuit inside the host, and then the central control system converts the signals into digital signals and transmits them to the host. After receiving the digital signals, the central system of the host will use a specially developed control algorithm to convert them into sound output, ID values, and content to be displayed.

It has high sensitivity to various metals.

Two detection modes.

In mineralized or saline areas, the pulse-balanced system can work stably.

Reliable/simple control and customized LCD display.

Accurate positioning.

More easily and effectively detect in a large area.

Robust mechanical structure.

Automatically adapts to balance.

Fast audio response speed and different audio settings.

Logarithmic audio response and intensity bar graph for easy and accurate positioning.

Audio alarm sound for battery check.

Calibrate metal classification and visual conduction/time delay reading.

Stable static response (auditory and visual).

The globally applicable AC 90-265 V / 50-60Hz charging voltage.

The function of low frequency filtering and exclusion.

Ground automatic calibration adjustment device.

Different delay and sensitivity settings eliminate small objects and can be easily located.

It has good detection depth for large metal objects.

This low conductivity metal enhances the detection effect.

The elimination of low-frequency interference ensures stable operation in various environments.

High dynamic range can exclude extreme ground signals and facilitate accurate positioning.

Multi-sensory detection device (MST).

3.2 Application of

The HS-6000 portable pulse detector is not only suitable for general exploration tasks, but also for complex and specialized detection and positioning work.

In archaeological work, underground metal detectors can help archaeologists quickly and accurately locate historical relics buried underground, thus better protecting and excavating ancient monuments, ruins, etc.

In some industrial fields, it is necessary to use underground metal detectors to detect metal foreign objects in production equipment and prevent safety accidents caused by the presence of metal foreign objects.

In public places such as airports, stations, and campuses, underground metal detectors can be used to check whether dangerous goods or prohibited items such as metal weapons are carried in the packages, luggage, or items being carried, in order to ensure public safety.

In the mining industry, underground metal detectors can be used to explore valuable metals, ores, and other resources within mining areas, thereby enabling the extraction of minerals and improving mining production efficiency.

In the military field, underground metal detectors can be used to search for and clear dangerous items such as landmines and bombs, ensuring the safety of soldiers and civilians.

4. Quick tutorial

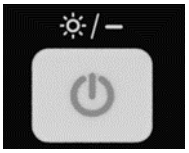
The controller of the HS-6000 portable pulse detector has three buttons, namely the power button, the menu button "MENU", and the zero adjustment button "ZERO".

1. The detection coil and portable frame are installed.
2. Connect the host and the detection coil.
3. After pressing the power button, if the screen displays low battery, please charge the device before using it.
4. When starting the detection, keep the detection coil parallel to the ground, and then press the zero button "ZERO" once, or use the quick zero button to start normal detection.

During operation, it is necessary to press the zero "ZERO" button from time to time to cancel the audio threshold setting. When the detection coil is replaced, it is important to repeat step 4.

5. Key functions

5.1 Power On/Off Button



Power on, power off, backlight switch, value subtraction. This button integrates four functions: first, in the power off state, pressing the button once briefly turns it on; after powering on, the backlight is turned on by default.

Press the button once to turn off the backlight, and press it again to turn it on (cycle); in the power-on state, long press the button to turn it off; in the menu to adjust the parameter interface, press the button once to decrease the corresponding parameter value.

5.2 Menu button

Press the button once, the first menu item flashes and enters the adjustment state. Press the plus or minus button to change the parameters. If no adjustment is needed or the adjustment is complete, press the button again to jump to the next

One menu item, and so on.

5.3 Zero key

It is also a commonly used reset button. Pressing the + sign can increase the corresponding parameters in the menu.

5.4 Quick zero key

The quick zero button is located on the handle of the main unit, and can be easily pressed with a finger during operation to quickly return to zero

6. Software function

6.1 sensitivity

Adjustment range of sensitivity parameter 1-5

Sensitivity is a key indicator of detector performance, which can directly affect the depth and accuracy of detection. Generally speaking, the higher the sensitivity, the more responsive the detector is to target objects, and theoretically the deeper the detection depth. However, in practical use, the higher the sensitivity adjustment, the greater the detector's response to interference signals in the environment, thereby reducing the accuracy of the detector.

At the same time, the stability of the instrument is also an important factor affecting sensitivity. Stability refers to the ability of an instrument to maintain its performance characteristics unchanged over a certain period of time, including both long-term and short-term stability. If the stability of the instrument is poor, it will affect the accuracy of sensitivity and lead to distortion of detection data.

Therefore, in practical use, it is necessary to adjust the sensitivity appropriately according to the detection scenario and requirements to achieve the best detection effect. To improve sensitivity, it is necessary to weigh the relationship between detection depth and interference signal volume, and adjust it in combination with the stability of the instrument to obtain more accurate detection data.

The sensitivity under different modes is divided into two cases:

In the audio mode, sensitivity is related to depth, and the higher the sensitivity, the higher the gear.

In the digital silent mode, sensitivity determines the strength of the output audio, and the threshold determines the depth.

6.2 threshold value

Threshold parameter adjustment range 0-9

Threshold is an important parameter in detector equipment, and its simple and intuitive concept is that the detector sends out

The threshold or control point of the critical sound. The direct purpose of the detector is to make the coil sound an alarm after sensing an object, while the critical sound is the reference sound when the induction coil does not sense a metal target, which can be used to determine whether there is a detection target. Therefore, the setting of the threshold is crucial for the accuracy and stability of the detector.

Typically, the detector adjusts the threshold value based on different detection requirements and scenarios to achieve the best detection effect. If the threshold value is too high, it means that the detector is difficult to emit critical sound, which may lead to the failure to detect the target object or even misjudgment; if the threshold value is too low, it will cause false alarms and increase the burden and unnecessary trouble of users.

Therefore, when using a detector, setting the appropriate threshold can improve detection efficiency, reduce false positives, and reduce user stress and improve work experience.

The threshold value under different modes is divided into two cases:

In the audio mode (3rd menu, mode 1): According to some common practical experience, it is recommended to set the threshold value between 4-6, which is within the range where a relatively dense critical sound of tada can be heard. As long as there is a slight metal induction, the sound changes can be detected in the speaker or headphones. Setting the threshold value within this range is a safe and stable choice.

However, for experienced users such as professional archaeologists or metal detector enthusiasts, they can try adjusting the threshold value to the range of 7-9 to obtain a higher critical sound. With this threshold setting, the detector will emit a higher critical sound, making it easier to capture subtle signal changes. However, it is important to note that this setting may increase the influence of interference signals and distort the detector's data.

In the digital silent mode, the threshold parameter is different from that in the audible mode. In the silent mode, the threshold parameter is a sound start control point parameter, which corresponds to the small signal output of the metal detector. When the threshold is set to 1, the sound start control point is very high, and a large signal is required to trigger the output of sound, which means that only relatively large metal targets can be detected. Although the sensitivity is higher than that in the audible mode, it requires a higher input signal to achieve a certain output signal.

Lower, but the stability of the instrument is relatively good.

As the threshold parameter gradually increases, the sensitivity also increases accordingly. When the threshold is set to 2, small metal targets can be detected. The higher the threshold, the smaller the metal target required for detection, and the higher the sensitivity. In the highest case, the threshold is 9, and as long as there is a slight metal induction, the sound output can be heard. Therefore, in the digital silent mode, it is generally recommended to set the threshold between 7-9 to obtain higher sensitivity and more accurate detection results.

6.3 Mode of operation

Mode parameter adjustment range 1-2

An important feature of the HS-6000 is the use of two different operating systems, which support both audio and a new digital silent mode. This design can fully inherit the advantages of analog silent machines while using a digital solution, and solves the problem of inconsistent component characteristics in the mass production of analog silent machines, ensuring that each machine has identical performance.

1. Sound mode

The signal is converted into sound after digital filtering, without any additional processing, directly reflecting the signal changes. By adjusting the threshold value, a relatively dense click-click-click critical sound can be heard, thus achieving the detection of metal targets.

2. Digital silent mode

In the digital silent mode, the HS-6000 is completely consistent with traditional silent machines, unlike some instruments that only turn off the critical sound and are considered to be silent machines. Based on the operating principle of analog silent machines, it relies on servo feedback to maintain the stability of the output point and achieve slow reset. Therefore, there is no sound output in the silent state, but once there is a metal signal, a reliable and strong audio signal will be output. However, due to the presence of feedback, the circuit will gradually

The intensity of the audio will gradually decrease until it reaches zero. The detector coil must be moved away from the object before the instrument can return to its zero state. Once the detector coil is moved over the object again, the instrument will output an audio signal. Compared to analog silent machines, this digital silent mode has higher stability and is suitable for beginners and ordinary detection enthusiasts.

6.4 filter, filter

Adjustment range of filter parameters: 0-5

Filtering is an important option for controlling the speed of audio response and sound changes. The higher the filter level, the slower the response speed, and vice versa. For example, turning off the filtering function in option 0,

The sound changes very quickly, and when the option reaches level 5, the sound changes relatively slowly. You can choose different filter levels based on your actual situation and personal preferences to achieve the best results.

Generally speaking, the choice of filter level is closely related to the size of the detection coil. For example, if using a smaller detection coil (such as a 1x1 meter coil), it is usually ideal to choose a level 2 or 3 filter. When using a larger detection box (such as a 2x2 meter coil), it is recommended to choose a level 4 or 5 filter to obtain a more stable sound effect. Of course, you can also adjust the filter level according to your own auditory experience to achieve the most suitable sound effect for you. In summary, the filter level is an important option that can help you adjust the sound response speed. Proper adjustment can improve the accuracy and efficiency of detecting metal objects.

6.5 Frequency of

Frequency parameter adjustment range 1-9

In nature, there are various electromagnetic wave interference sources in different places. Even the same kind of

The frequency may also face unexpected interference in different places, which has a huge impact on the sound resolution when detecting metals. The critical sound may fluctuate greatly, and these interfering sounds are often difficult to distinguish, causing a lot of trouble for detection.

To solve this problem, we provide 9 high-precision and high-stability digital transmission frequencies. Compared to ordinary analog pulse instruments, these new digital transmission frequencies have higher frequency accuracy and stability, which can improve the accuracy and stability of the detector. When detecting metal, if you find regular or irregular interference sound outside the critical sound, just switch among these 9 frequencies to find a stable frequency and ensure that the detection depth is not affected. In addition, choosing the appropriate transmission frequency can also make the audio more stable, effectively improving the detection efficiency and accuracy.

To sum up, we provide 9 high-precision and high-stability digital transmission frequencies, aiming to solve the problem of electromagnetic interference during metal detection, effectively improving the accuracy and stability of the detector, and providing more reliable protection for detection work.

6.6 Volume

Adjustment range of volume parameter: 0-5

Adjust the sound volume of the speaker or headset.

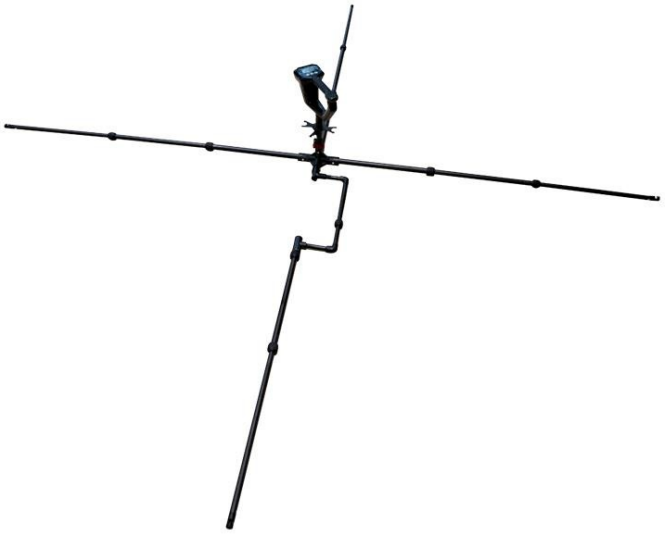
7. Folding, connecting and charging methods

7.1 Use of carbon fiber integrated frame

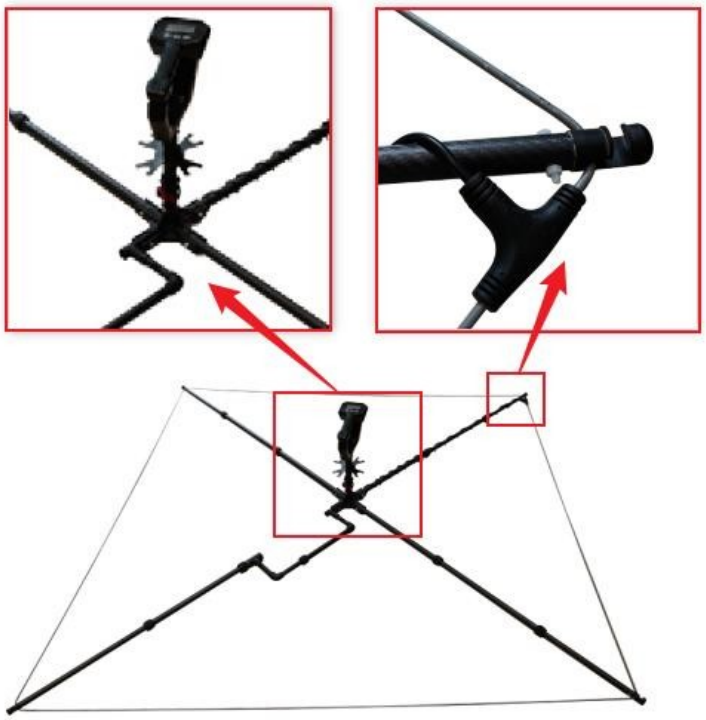
① Separate and deploy the 4 support arms from the chuck.

② Unscrew the two nylon knobs on each of the four support arms counterclockwise, completely extract the probe rod, and then tighten the nylon knobs clockwise.

The final effect is shown in the following figure:



7.2 Connection between detection coil and frame



① Refer to Section 7.1 for the deployment framework and lay out the 8-meter coil.

② Place the three-way connection point of the coil on the side of the opposite support arm of the "concave anti-mixing leg structure", as shown in the figure above (the position of the three-way connection point of the coil cannot be incorrect, otherwise it will cause the frame to be unbalanced).

③ Clip the cable of the detection coil into the slots on the top of the four support arms.

④ Arrange the coil and adjust the nylon knob to make the detection coil straight and firmly fixed.

⑤ Ensure that the bisector of the angle between the central axis of the detection host and the two support arms coincides. The final effect is shown in the figure above.

7.3 Connection between host and detection coil

After completing the work described in Section 7.2, connect the 6-pin aviation plug of the 8-meter detection coil to the socket on the bottom of the host.

If the detection environment is relatively open and the detection area is large, it is recommended to use a fully spread 8-meter detection coil, which can be assembled into a 2x2-meter detection frame, which can greatly improve detection efficiency and speed. However, if the detection environment is small, you can fold the 8-meter coil in half and spread it out, which can be assembled into a 1x1-meter detection frame to adapt to different detection environments.

Compared to a 1x1 meter detection frame, a 2x2 meter detection frame covers a wider area, covering four times the area covered by a 1x1 meter frame coil, and has better induction strength for larger metal objects. However, if

If you need to detect smaller objects, it is recommended to use a 1x1 meter detection frame for detection.

In addition, if it is necessary to filter out medium-sized metal objects smaller than horseshoes, a 2-meter-long sieve can be used.

The 1.5m×2m frame coil, which is about 40cm above the ground, can be easily operated by one person without any straps. Such a coil can effectively reduce the sensitivity of the detector to small metal objects, thus avoiding misidentifying small items such as coins and nails.

7.4 Charging method

The device uses a dedicated charging port for charging. Please use a dedicated adapter for charging, and do not use third-party devices for charging. When connecting to the outlet, be aware that the outlet is a multi-function outlet, which can be used for both connecting the detection coil and charging. When plugging in or unplugging during normal use, do not use excessive force, just ensure that the connection is reliable. When charging, please insert the dedicated charging adapter into the charging port and turn on the power. At this point, the charging status light will turn red Color. During charging, do not unplug the charging adapter or move the device. When the device is fully charged, the charging status light will turn green, at which point you can unplug the charging adapter.

To ensure battery life and charging efficiency, try to avoid deep discharge. It is recommended to reduce the battery level to 20% each time

Charge the device when you use it. If the device is not used for a long time, it should be charged once every month or so to avoid power loss. Also, be careful to prevent water or other damage to the charging adapter.

8. Technical specifications and accessories list

8.1 Technical parameters and specifications of hardware

project	Specification Parameters
microprocessor unit	Originally imported from the United States, 32-bit 72M high-speed processor
ADC resolution	32 Bits (32-bit 12-channel synchronous sampling of ADI Company in the United States)
ADC sampling rate	10K SPS (10,000 samples per second)
Display screen	4-inch high-definition LCD
control software	Independent research and development, PID control algorithm technology for stabilizing the entire system, Quadrant algorithm technology for identifying delay values.
Host battery	4000mAh lithium battery, standby time of 2 months, use time of 20 hours When charging, the charging time is 4 hours.
detection coil	8-meter detection coil, which can be combined with 1X1-meter or 2X2-meter
Display backlight	Equipped, open and close adjustable

8.2 Technical parameters and specifications of software

project	Specification Parameters
pulse emission frequency	100~165Hz, 9 frequency levels, adjustable
pulse transmitting power	6W fixed power
threshold value	Level 10, adjustable

sensitivity, sensitivity	Level 5, adjustable
Filter device	Level 5, adjustable
volume adjustment	Level 5, adjustable
The mode	0~4000 Hz
sound frequency	2 modes adjustable: sound mode, digital silent mode
automatic tuning	Voice recovery, level 5, adjustable
signal strength indication	Progress bar for signal strength indication
Battery power indicator	Display of host power
Software update	Software upgradeable

8.3 Dimension of host

project	**Specification Parameters**
Weight of the whole machine	1915g
Main unit size	275x206x134mm
detection frame	carbon fiber folding frame
Storage size of the whole machine	650*300*150mm
Expanding size of the whole machine	2000*2000*45mm
Charging adapter voltage	AC 90V~264V/50-60Hz
Equipment operating temperature	-10~50℃

8.4 Accessory list

Goods	quantity
host machine	1
12.6V~1A power adapter	1
8-meter detection coil	1
carbon fiber folding frame	1
a knapsack	1
Operation manual (including warranty card)	1
Certificate of Conformity	1

9. Knowledge of instrument maintenance

The host uses an integrated structure design, which generates a certain amount of heat during normal operation, which is a normal phenomenon. This is due to the characteristics of lithium batteries: the lower the temperature, the smaller the capacity. Therefore, in order to maintain the lithium battery within a specified temperature range during winter use, and to achieve optimal performance, it is necessary to increase the operating temperature of the host to some extent.

However, it is important to note that when connecting the socket, it is a multi-function socket that can be used for both detecting coils and charging. When plugging in or unplugging at ordinary times, do not use excessive force, just ensure that the connection is reliable. At the same time, it is absolutely forbidden for rainwater to seep into the interior of the socket. If accidental leakage occurs, please use a hot hair dryer

Use the socket after drying it out. The socket port must not come into contact with metal objects, as this can easily cause the battery to short circuit. In addition, it is important to note that rainwater should not infiltrate the charging hole, earphone hole, and audio speaker hole.

If the panel has moisture, it needs to be cleaned and dried in time to ensure the normal use of the equipment.

10. warranty system

The main unit of the HS-6000 is covered by a two-year warranty (except for the detection frame), and the warranty period for the detection coil is

1 year. However, it should be noted that the following situations are not covered by the warranty:

1. Violation of the operating method in the instruction manual.
2. Used for other abnormal purposes.
3. Disassemble the shell without authorization.
4. All damages caused by water ingress, natural wear and tear, or natural disasters.

During use, if your device encounters errors or any problems, please first contact the purchasing dealer. The dealer will communicate with the manufacturer and resolve the issue. Therefore, we strongly recommend that you strictly follow the instructions during normal use to ensure the proper functioning of the device and avoid unnecessary damage.

After-sales service card

User name	
Contact number	
User address	
Product code	
Purchase date	
Sales unit	
Sales address