



NINGBO GOLDEN LAND ELECTRONICS INC.

GL600 *USER'S MANUAL*

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No.01 Introduction

GL600 is a locating system designed to assist horizontal directional drill machine operators in locating and tracking underground drill head location and orientation. This system consists of a transmitter, a receiver, and a remote display. The transmitter transmits digital information of the transmitter pitch, roll, temperature and battery status through a FM modulated RF signal. The receiver receives the information and uses RF signal to identify the transmitter' s status and location. The receiver transmits the locating information to a remote display through a radio telemetry system. A horizontal directional drill machine operator can use the information from the display to guide the drill head to the desired path. The FM communication between the transmitter and the receiver provides more noise suppression than the traditional AM modulation widely used in this industry. The receiver offers a very simple and clear method to locate underground drill head.

This locating system also offers 5 channel license free radio telemetries between the receiver and remote display. The user can easily register any two receivers and displays so that communications between the “pair” will not be interfered by other “pairs” .

This manual is intended to provide information and instructions on how to use the locating system properly. Golden Land Electronics Inc. reserves the rights of improving the locating system and user’ s manual anytime without notice.

No.02 Warning

- A horizontal directional drill machine can cause serious personal injuries or death if it strikes an underground power line.
- A horizontal directional drill machine can cause explosion, serious personal injuries or death if it strikes a gas line.
- A horizontal directional drill machine can cause property damages and personal injuries if it strikes underground power lines, gas lines, phone lines, television cables, fiber optic cables, sewer lines etc.
- Wear proper and safe gear when using the locating system as directed.
- Ningbo Golden Land Electronics Inc. is not responsible for any losses, damages, or injuries when using this system.
- This locating system is only a tool to assist the operator to locate the drill head. It is the operator not GL600 that is responsible for identifying the drill head location. Golden Land Electronics Inc. is not responsible for any loss caused by using GL600. Users should operate GL600 according to the manual. If you have any question, do not hesitate to contact us.

No.03 Safe Use of GL600 System

- Make sure all underground utilities along the intended bore path are properly located, marked, and exposed if necessary.
- Check and make sure the locating system is working properly.
- Walk the bore path before drilling.
- Do not use the locating system near flammable and explosive substances. Make sure wearing safety glasses, safety shoes and helmet.



No.04 Receiver






4.1. Introduction

- 5 keys and a LCD user interface, the system offers a very easy, fast and accurate way of tracking and guiding a bore.
- Using advanced FM modulation, the system offers advantaged performance against noise compared to current available products in the market.
- The system offers a 0.1% resolution pitch based on advanced MEMS technology, which will allow sewer applications.
- With 5 data telemetry channels, the system provides instantaneous remote updates up to 600 meters.
- Rugged, light in weight and ergonomically designed plastic housing provides a water resistant protection of the device and reduces the fatigue of the operator.
- Flash memory technology based computer system allows in field program updates.
- Easy to understand pictorial instruction decal provides very convenient operational instructions for the operator.









4.2. Specifications

- System freq: 12KHz/30KHz
- Power: 6 C-cell off shelf batteries, or lithium rechargeable batteries
- Batteries life: 18 hrs (C-cell) / 10 hrs (rechargeable) continuous operation
- Display: Industrial rated LCD graphic display
- Telemetry: 5 channels of license free radio with range up to 600 meters
- Accuracy: 1% distance accuracy
- Temperature: Under 85°C
- Dimensions: 28cmx13cmx67cm
- Weight: 2.0 KG (with 6 C-cell batteries)
- Water proof: IP65

4.3. Keys

-  Power key: press and hold to turn it on and off. Tap to turn the back light on and off.
-  Up key: move to next cursor selection.
-  Down key: move to last cursor selection.
-  Confirm key: confirm the cursor selection.
-  Setup key: tap to enter calibration page. Press and hold to enter setup page.

4.4. Icons

-  Receiver can receive transmitter signal
-  Receiver can not receive transmitter signal
-  Receiver battery status
-  Transmitter temperature; flash indicates transmitter is over heating
-  Radio is available
-  Radio is unavailable
-  +20% Transmitter pitch in percentage
-  Transmitter battery status

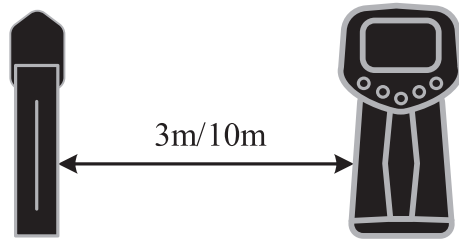
4.5. Calibration


4.5.1. Depth Calibration

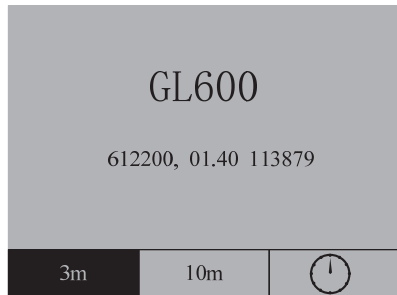
Warning: Even if the transmitter works properly, which means roll, pitch, battery status and temperature displayed correctly, calibration can not be done in the following situations: the receiver is too close to reinforced concrete, metal mesh, construction equipments, cars, power lines, etc; the receiver is directly over steel or underground pipelines; or when there is too much electromagnetic interference at the job site.


1. Make sure that transmitter is working properly. Put it in the housing!
2. Put transmitter in a location away from interference.

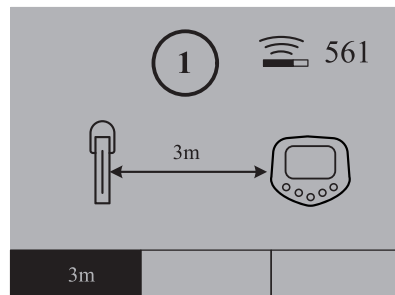
3.Set the transmitter 3m/10m apart as shown:



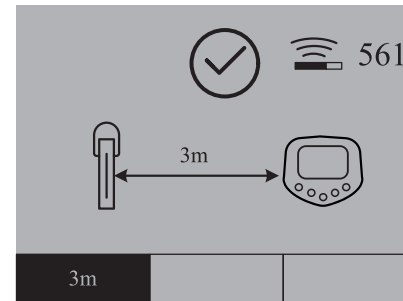
4.Tap  to enter the calibration page.




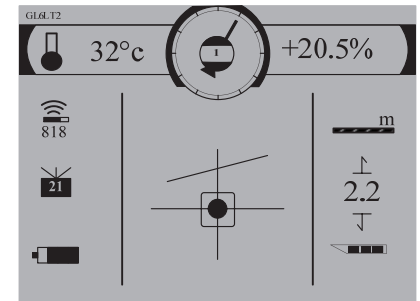
5.Tap  3 times to start the depth calibration.



6.Wait until the calibration is complete.




7.Tap  to return to main page.

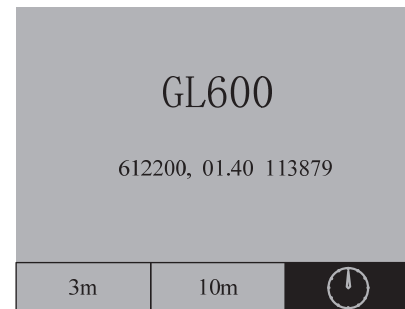


4.5.2. Roll Calibration

1.Put the transmitter housing at 12 o'clock position.




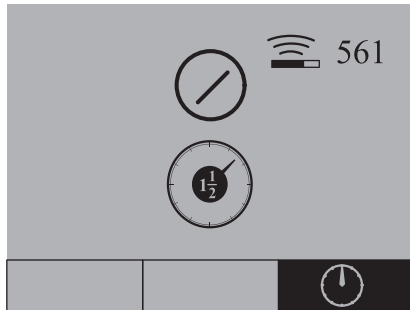
2.Tap  to enter the calibration page.



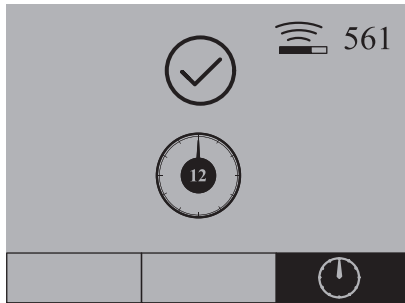
3.Use  to highlight roll calibration.



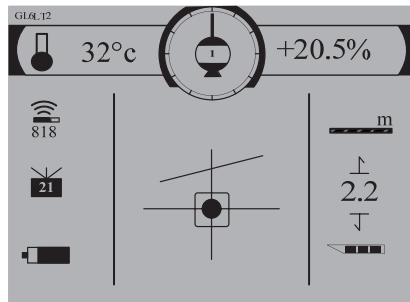
4. Tap  3 times to start the roll calibration.



5. Wait until the calibration is complete.



6. Tap  to return to the main page.




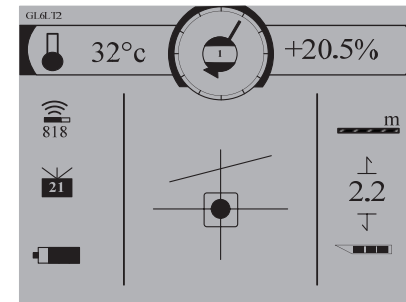
4.6. Operations


4.6.1. Noise Measurement

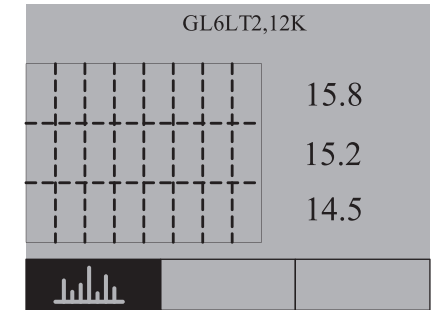
1. Press and hold  to enter the setup page.



3. Tap  to return to the main page.

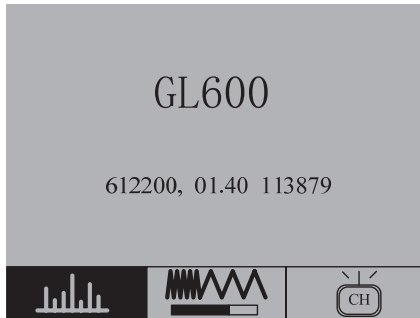



2. Tap  to enter the depth forecast (After frequency selection and calibration, the middle value is the depth forecast at the site. 15.2 is the depth forecast as shown in the following interface).

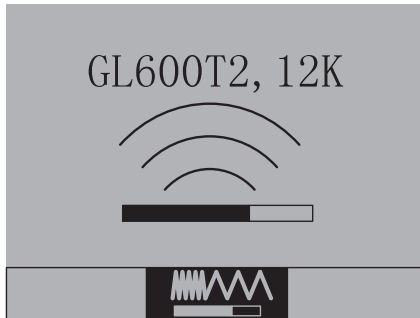



4.6.2. Receiver Frequency Selection

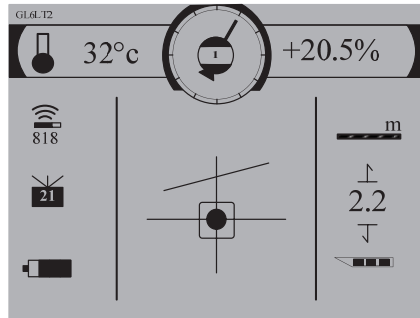
1. Press and hold  to enter setup page.
2. Tap  to highlight system frequency.



3. Tap  to enter frequency selection, and tap  or  to select frequency.

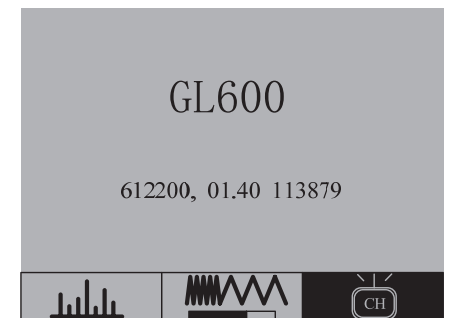
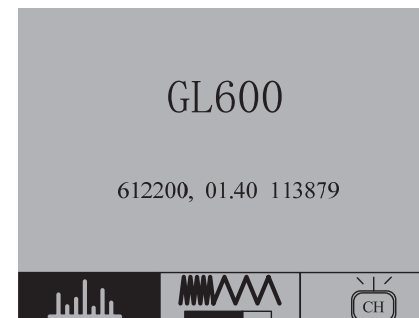





4. Tap  to return to main page.

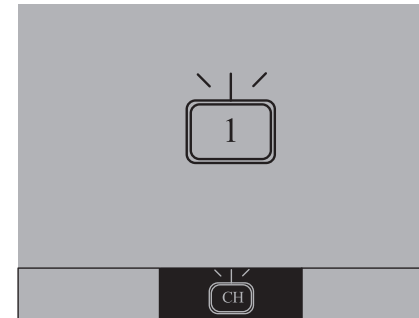


4.6.3. Radio Channel Selection

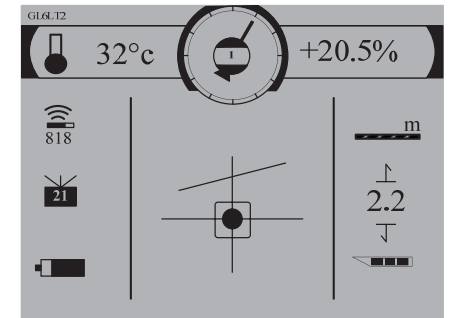
1. Press and hold  to enter the setup page.
2. Tap  to select radio channel.



3. Tap  to enter radio channel, and use  or  to select radio channel.

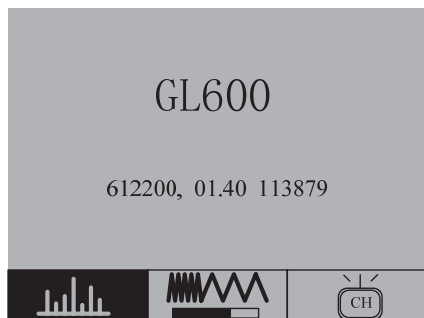


4. Tap  to return to the main page.

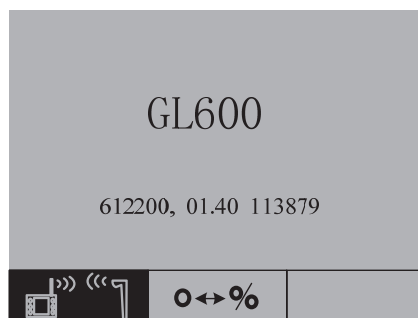



4.6.4. Radio Registration (It is required that the following procedures are performed on the display at the same time.)

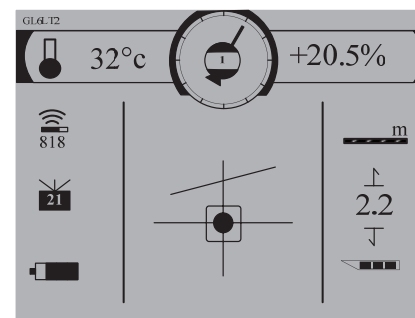
1. Press and hold  to enter setup page.



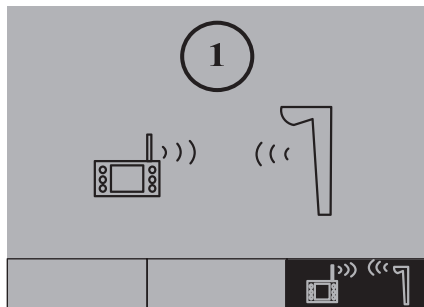
2. Use  to select radio registration.



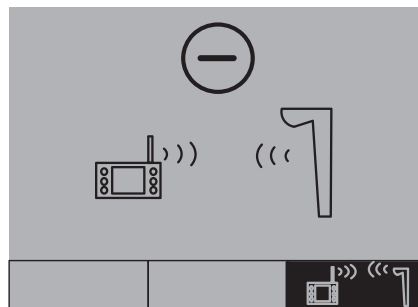
5. Tap  to return to the main page.



3. Tap  3 times to start radio registration.



4. Wait until registration is complete.

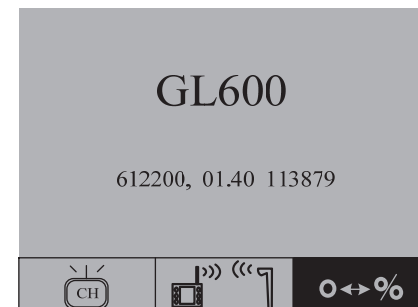



4.6.5. Pitch Unit

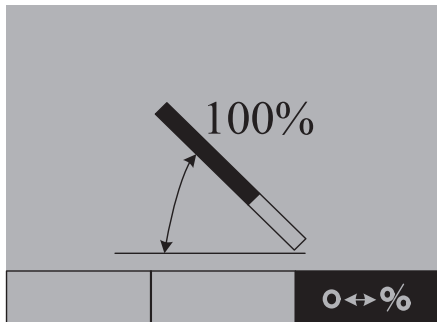
1. Press and hold  to enter the setup page.




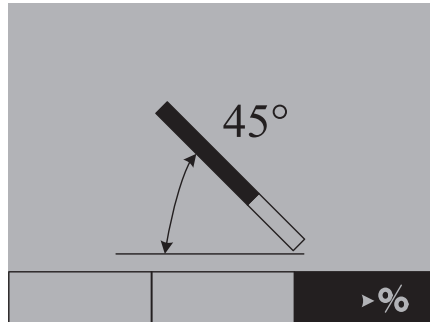
2. Use  select pitch unit.



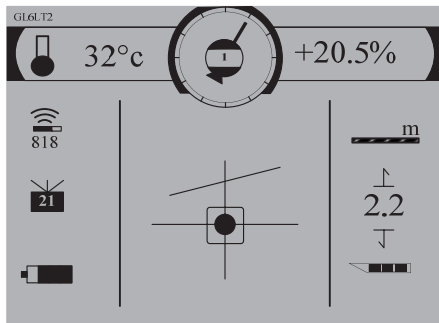
3. Tap  to enter pitch unit page.



4. Use  to toggle between percentage and degree.



5. Tap  to return to the main page.



4.7. Maintenance

- The receiver uses 6 C-cell batteries. The receiver will shut itself off if there is no key pressed over a time period of 20 minutes and there is no information received from the transmitter. It is strongly recommended that the batteries are taken out of the receiver if it is not to be used for a long period of time to avoid potential erosion from a leaking battery!
- The receiver is an electronic measurement device. Severe shocks and impacts can damage the housing and the electronics inside the housing. Treat the receiver as a measurement device.
- Keep the receiver from extensive heat to avoid damages to the plastic housing and electronics inside the housing.
- Do not soak the receiver in excessive amount of water.



No.05 Display

5.1. Introduction

- 5 keys and LCD user interface identical to that of receiver.
- 5 data telemetry channels, the system provides instantaneous remote updates up to 600 meters.
- Rugged plastic housing with easy dash mounting to a machine or usable as a portable unit.
- Flash memory technology based computer system allows in field program updates.
- The display can be powered with 6 C-cell batteries, lithium rechargeable batteries, or by a 12-32 VDC of a HDD machine.
- Standard J1939 CAN bus, the display can be used to network among receiver, display and HDD for machine control or remote control applications.

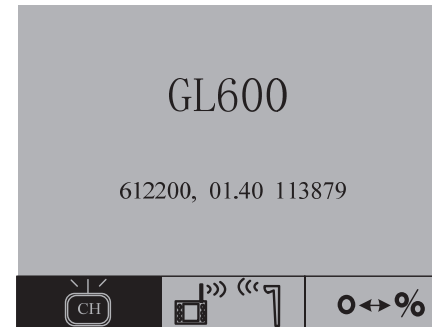
5.2. Specifications


- Radio freq: 2.4GHz
- Power: 6 C-cell off shelf batteries, or lithium rechargeable batteries
- Batteries life: 18 hrs (C-cell) / 10 hrs (rechargeable) continuous operation
- Display: Industrial rated LCD graphic display
- Telemetry: 5 channels of license free radio with range up to 600 meters
- Temperature: Under 85°C
- Dimensions: 18cmx14cmx22cm
- Weight: 1.34 KG (with 6 C-cell off shelf batteries)
- Water proof: IP65

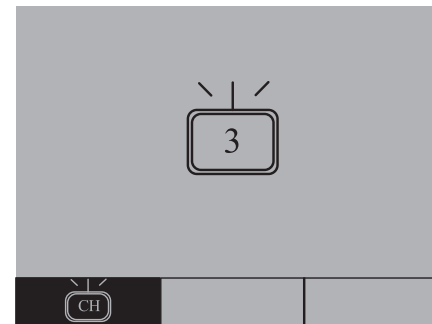
5.3. Operations


5.3.1. Radio Channel Selection

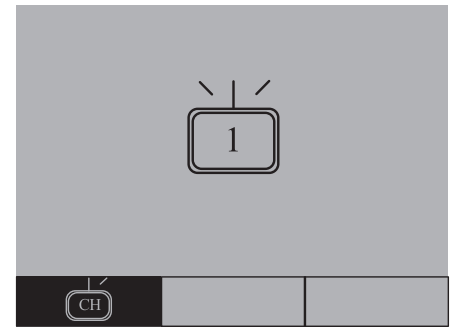
1. Press and hold  to enter the setup page.



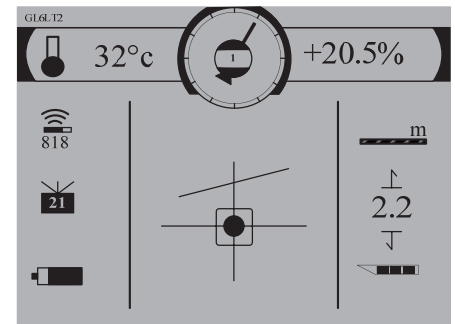
3. Use  to select radio channel.



2. Tap  to enter radio channel.

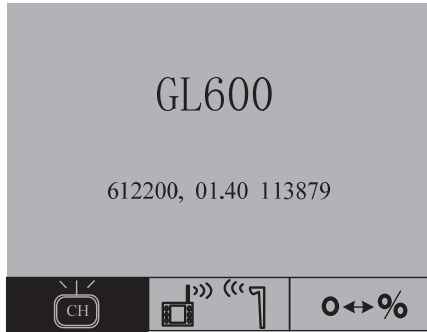


4. Tap  to return to the main page.

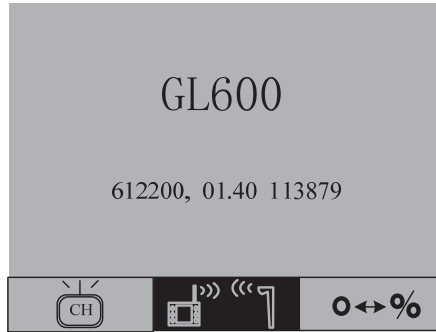


5.3.2. Radio Registration

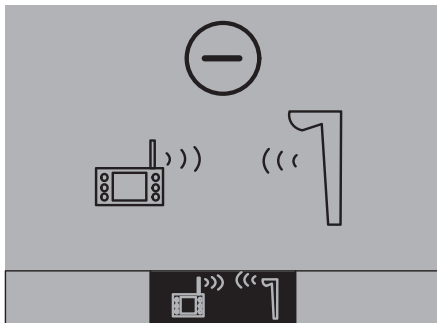
1.Press and hold  to enter the setup page.



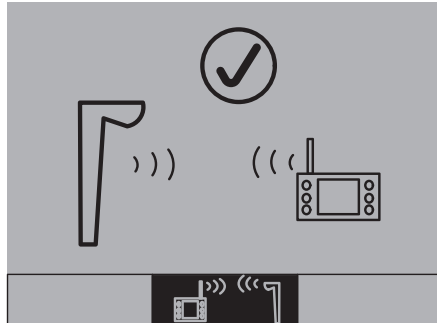
2.Use  to select radio registration.



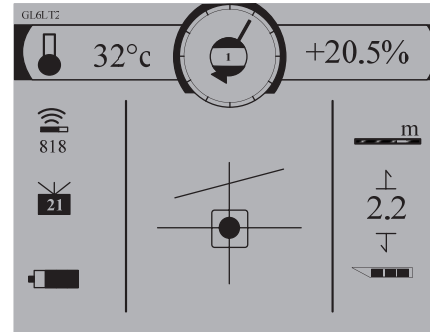
3.Tap  3 times to start radio registration.



4.Wait until registration is complete.

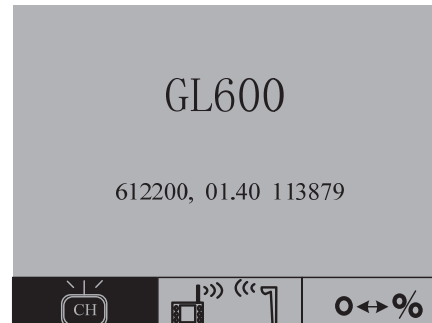



5.Tap  to return to the main page

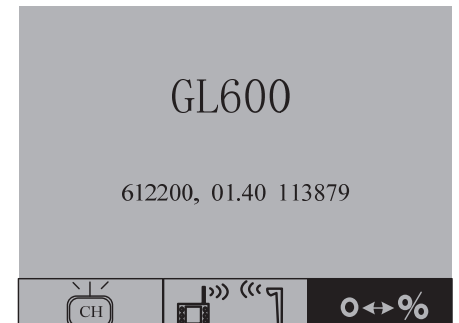


5.3.3. Pitch Unit

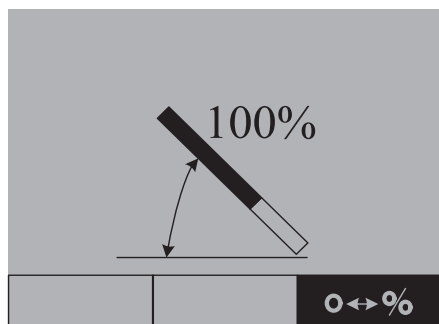
1.Press and hold  to enter the setup page.



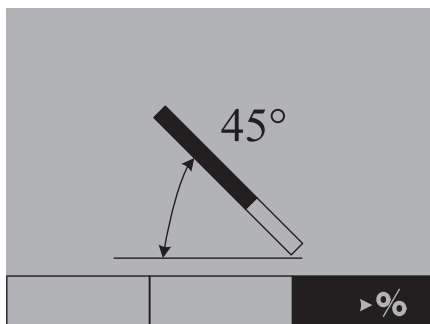
2.Use  to select pitch unit.



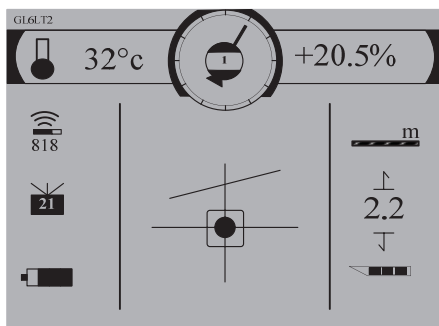
3. Tap  to enter the pitch unit page.



4. Use  to toggle between percentage and degree.



5. Tap  to return to the main page.



5.4. Maintenance

- The display uses 6 C-cell batteries. The display will shut itself off if there is no key pressed over a time period of 20 minutes and there is no information received from the receiver. It is strongly recommended that the batteries are taken out of the display if it is not to be used for a long period of time to avoid potential erosion from a leaking battery!
- The display is an electronic measurement device. Severe shocks and impacts can damage the housing and the electronics inside the housing. Treat the display as a measurement device.
- Keep the display from extensive heat to avoid damages to the plastic housing and electronics inside the housing.
- Do not soak the display in excessive amounts of water.

No.06 Transmitter



6.1. Introduction

Transmitter provides drill head temperature, clock position, pitch, battery status and locating signal. The transmitter transmits signals at 12KHz or 30KHz. Transmitter will enter a "sleep" mode after 15 minutes without rotation. It takes about 10 seconds to "wake up" when the transmitter is rotated.

6.2. Specifications

- Frequency: 12KHz/30KHz
- Power: 2 C-cell batteries (Total Voltage < 3.3 V)
- Batteries life: 12 hrs of continuous use
- Depth : 25 meters
- Clock: 1–12 clock position with half hour resolution
- Pitch: 0.1% resolution
- Temperature: Under 85°C
- Dimensions: 3cm(diameter)*38cm(length)

6.3. Digital Information

- Pitch: –100% to 100% with 0.1% resolution
- Clock: 1–12 clock position with half hour resolution
- Battery: Battery full, 2/3 full, 1/3 full and flash warning
- Temperature: When the transmitter is over heating, temperature indication in the receiver flashes. When the temperature is over 85°C, transmitter may be permanently damaged. Temperature dot in the front of transmitter will turn black or red.

6.4. Transmitter Maintenance

- Do not put the transmitter at extreme temperature (over 85°C).
- Do not put extreme pressure, shock or vibration.
- Take the battery out each time after use.
- Clean the spring and cap on battery compartment if necessary.
- Regularly check the sealing ring on the battery cover. Replace it if necessary.

No.07 Locating Methods

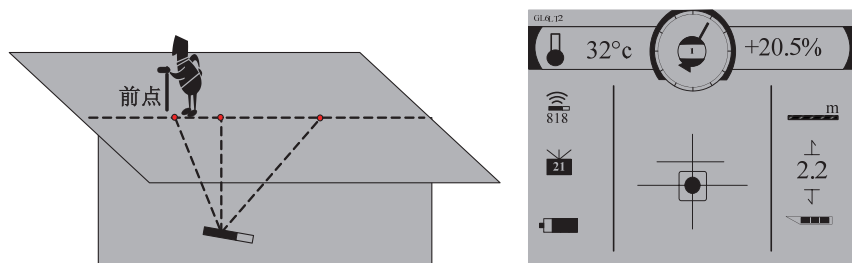
7.1. Introduction

There are two methods of locating a drill head: three point locating and signal deferential locating. Three point locating method is simple and accurate, while signal deferential method can be quick if a job depth is shallow and the accuracy requirements are not high.

7.2. Three Point Locating

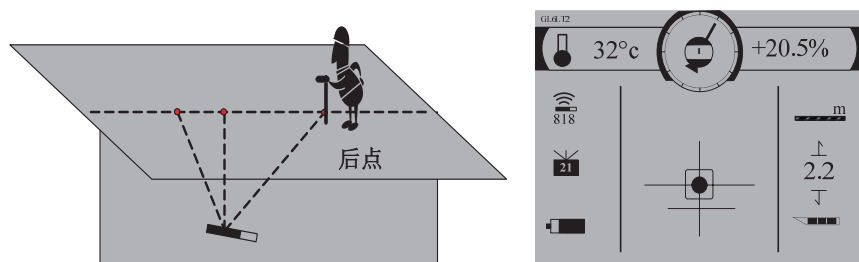
7.2.1. Find The Front Locating Point:

Front locating point is a point in front of the transmitter along the transmitter axis. When the front locating ball falls in the box, the front locating point is located.



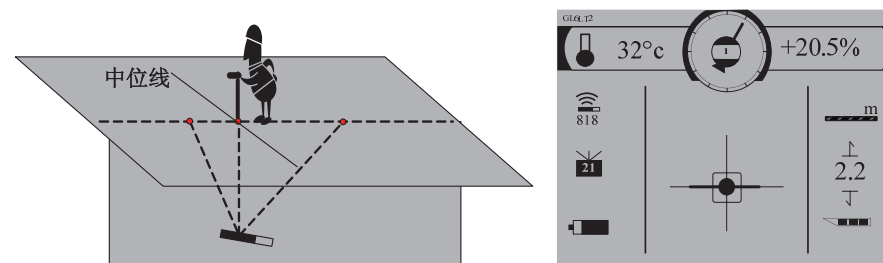
7.2.2. Find the Rear Locating Point:

Rear locating point is a point behind the transmitter along the transmitter axis. When the rear locating ball falls in the box, the rear locating point is located.



7.2.3. Find the Locating Line:

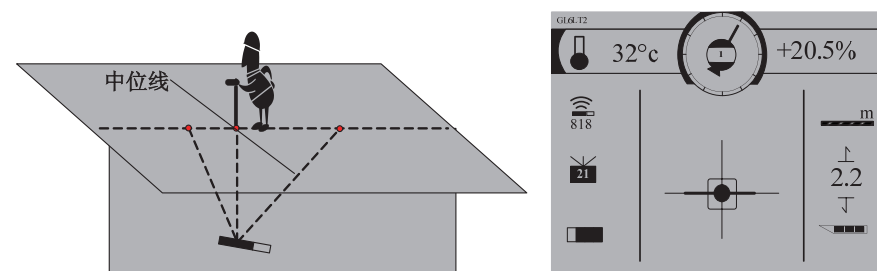
Draw a line between the front locating point and the rear locating point. Walk along the line forward. When a line overlaps with the horizontal line of the cross hair, the transmitter is directly underneath.



7.3. Signal Differential Method

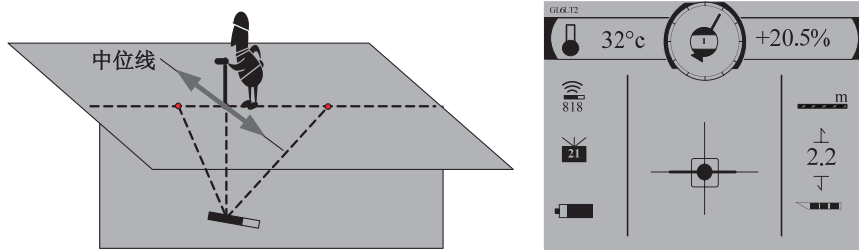
7.3.1. Find the Locating Line:

First find the locating line (the line that overlaps with the horizontal line of the cross hair).



7.3.2. Find the Peak Signal:

Along the locating line, find where the signal is the strongest. The transmitter is underneath.



Warning: GL600 locating system uses the transmitter's magnetic field to locate the transmitter. It prefers smooth movements rather than sudden changes of direction.

No.08 Battery

GL600 locator uses alkaline C-cell batteries, or lithium rechargeable batteries.

GL600 lithium rechargeable battery can be charged about 500 times over its life. When a battery per charge lasts considerable shorter than it normally does, please discard the battery properly.

GL600 lithium rechargeable battery comes with special charger. Any use of other lithium rechargeable battery or charger for the receiver can cause fire, explosion, leaking or other damages. Keep the battery at the normal temperature 15~25 Celsius. High and low temperature will short the battery life. Do not soak the battery in water or other liquid. Do not throw the battery into fire, it can cause explosion. Do not disassemble the battery. Avoid any kind of damage to the battery. Do not discard the battery as normal trash, please dispose it properly.

When charging the battery, red light of the charger is on. When charging complete, green light will be on. The battery life will be shorted if the battery is not taken off the charger after charging completed. Please place the battery properly as shown.

No.09 Warranty

Ningbo Golden Land Electronics Inc. offers standard warranty on parts and labor of the GL600 locating system under normal usage. The warranty period is one years for the receiver and display and 90 days for the transmitter.



MEMO

This image shows a full page of white paper with horizontal dashed lines, typical of primary school handwriting practice paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.