LRK-CXT50

Automatic Lateral Deviation Measuring Robot Instruction Manual

Product Overview

1.1 Product Overview

The automatic elevation measurement robot is a comprehensive device for measuring deep horizontal displacement data. It can automatically retract and extend the probe, automatically measure displacement, automatically record data, and automatically upload the records.

The equipment can be equipped with a solar charging panel to achieve long-term monitoring of a single borehole; it can also be equipped with a portable instrument box to enable manual measurement and monitoring of multiple boreholes. At the same time, the equipment is internally equipped with Bluetooth communication function, which can realize remote control of the equipment by mobile phone and viewing of data curves, equipment power consumption and other parameters. The equipment can be disassembled into a main unit and a probe. The probe is a universal probe that can be replaced and used.

Data upload adopts the single-point transmission mode of mobile Internet of Things, featuring stability, economy, high efficiency and low power consumption. It is mainly applied in data collection and communication for engineering such as automatic monitoring of foundation pits, automatic monitoring of high slopes, and automatic monitoring of

geological disasters, as well as other related fields.

Product Features

※ Utilizing imported high-precision digital inclinometer chips to measure deep horizontal displacement;

※ Incorporating multi-dimensional measurement chips to address the zero drift of measurement data caused by sensor creep;

※ Setting the measurement depth freely within the depth range, using servo motors to automatically lift the measurement without manual intervention and data recording.

※ Equipped with built-in lithium batteries, combined with solar energy, enabling long-term monitoring;

※ Adopting automatic timed startup mode; capable of achieving timed and frequency-controlled startup; automatic sleep mode, ultra-long standby;

※ Utilizing single-point data transmission; equipped with built-in mobile IoT card for wireless transmission; automatically records and uploads data to achieve remote monitoring; the device is internally equipped with Bluetooth communication function, enabling remote control of the equipment by mobile phones and viewing data curves;

Application Domains

1) Foundation pit automatic monitoring:

Suitable for deep foundation pit projects with a depth exceeding 30 meters, especially for projects with increasing measurement hole depth, the cost is controllable, one hole one machine, low cost, meeting the requirements of different depths for regular use; in large cities with special foundation pits, the automatic inclinometer technology has significant advantages, able to meet the monitoring requirements of high frequency and high precision.

2) High slope automatic monitoring:

In the field of slopes and geological disasters, the measurement points are unevenly distributed according to soil layer thickness, the automatic inclinometer robot can easily achieve unmanned, high-frequency, and high-precision collection, effectively monitoring the displacement changes of the slope.

3) Geological disaster automatic monitoring:

For the early warning and monitoring of geological disasters, the automatic inclinometer robot can quickly and accurately provide displacement data, providing strong

support for the early warning and prevention of geological disasters.

4) Bridge cable inspection:

Similar to the intelligent detection robot for bridge cables, the automatic inclinometer robot can also be applied in the health monitoring of bridge structures, especially in the monitoring of stay cables, capable of quickly and effectively detecting the appearance condition and internal steel wire health of the stay cables.

technical specification

Project	**Parameters**
Measurement range	±30°
Measurement accuracy	0.25mm/m
Resolution	0.02mm/m
Power supply method	Internal lithium battery (can be externally connected with solar panel)
Communication method	4G，NB-IOT
Installation method Installation	through pipe opening
Measurement depth	≤30m(Adjustable Depth)
Equipment size	205*190*230mm

Product Structure and Composition

The equipment is mainly composed of the acquisition probe, cable reel storage frame, motor control system, etc. The acquisition probe is made of corrosion-resistant and shock-resistant materials, and is equipped with a high-precision tilt sensor. It can directly measure the tilt angle or displacement change of the pipeline. The overall design is compact and lightweight. Combined with the guide wheels, the equipment can always be in the center position of the pipeline, with high measurement accuracy and stability. Combined with the motor reel lifting module at the pipe opening, the communication cables can be orderly wound or lifted with the probe's lifting or lowering, and a winding module is equipped in the hoisting part to avoid cable accumulation at the same place. Using a high-torque reduction motor to smoothly lift the probe, when the motor stops working, the self-locking property and built-in braking system of the motor will prevent the probe from sliding due to gravity, effectively protecting the safety of the equipment.

Electrical Connection and Equipment Installation

Connect the probe to the connector of the equipment. Pay attention to the direction and angle of the notch during connection. After completion, use a pipe wrench to tighten the interface to avoid loosening and water seepage causing damage to the probe.

Place the probe in the inclinometer tube (note the X-direction orientation of the probe and record it) and place the host on the top of the inclinometer tube, and fix it firmly with no loosening to the pipeline; Put the equipment into the stainless steel protective cage, drive in expansion bolts at the fixed position of the protective cage and tighten to confirm no shaking. After completion, fix the solar panel at the top and adjust the angle, connect the solar panel to the charging port of the equipment, and check if the equipment is charging normally.

Chapter 5 Equipment Usage

Button Introduction

From left to right: 1. Power on / Confirm / Return; 2. Upward scroll / Increase; 3. Downward scroll / Decrease.

Startup Interface

The display upon startup shows the device number (CXA22070018), the program version (V10), and the remaining battery power (100%).

Interface One

1) Wire length: It can set the current measurement depth of the equipment.

2) 间隔深度：提升测量时,设备测量的间隔距离（0.5M）。Interval Depth: The distance (0.5M) between measurements when the equipment is in operation.
3) Startup Mode: The equipment can be set to automatically start up within an interval time (default 60 minutes); the mode status can be saved; when not in use, it can be set to manual startup.

4) Firmware update: Upgrade the device program via Wi-Fi. No operation required when there is no update.。

Interface Two

1) Probe reset: Pull the probe back to the starting position.

2) Automatic measurement: Automatically measure once according to the set <line laying depth>.

3) Manual: Manually control the probe's up and down movement; display the current depth and probe data; (When the probe is not installed, it shows 0.000)

Parameter: Manual calibration parameters, usually no operation required;

Precautions

1. The equipment can only be started and used in the inclined shaft. Before measurement, ensure that the inclined pipe is unobstructed and free from any blockage or jamming phenomena.

2. When installing the probe, pay attention to whether the rubber ring at the connection position of the host is intact. The interface between the probe and the host needs to be tightened to ensure that all rubber rings are intact and prevent water ingress into the

equipment.

3. When starting the equipment, the sensor should remain connected and be perpendicular to the ground.

4. Pay attention to protecting the electrical connection leads. The leads must not be subjected to tension.

5. The equipment is a precision measuring instrument. Do not subject it to strong impacts or drops to avoid damaging the core body.

6. During automatic monitoring, do not move the equipment unless there is no special situation.

7. The equipment must not be placed upside down.

8 Common Fault Handling

1. Missing measurement data: Check the battery level of the equipment, charge it in time. Insufficient battery power may cause interruption of measurement and data loss.

2. Failure to read the probe: Check whether the sealing at the interface between the probe and the host is intact. Water ingress and short circuit may cause damage to the probe.

3. Incorrect wiring of the equipment: Check whether the wiring is disordered due to power failure and whether there is a situation of wire entanglement or the wire is caught by foreign objects, resulting in inability to wind or release the wire normally.

Equipment List

name	**quantity**
LRK-CXT50 Automatic inclined shaft measurement robot	1
Square inclinometer rod	1
charge coil	1
expansion screw	4
9 pieces of 1.2mm thick silicone waterproof ring	5

20*2 waterproof ring	4
16*2 waterproof ring	4
5V 2Acharger	1
Certificate of Conformity	1
M6*25 Z-shaped hand screwdriver	1

表 1.1 设备清单

1.2 Quality Assurance

1) The quality of the products is covered by three guarantees: The warranty period is calculated from the date of delivery and lasts for 13 months. During the warranty period, if the failure of the product is due to its own quality issues, our company will provide free repair, replacement and return services.

2) For the general components and parts of the products that fail, if they can be restored to the required usage conditions after replacement, they will be repaired free of charge on schedule.

3) For the main components and parts of the products that fail and cannot be repaired on schedule, qualified products of the same specification will be replaced.

If the main functions of the products fail due to design or manufacturing reasons and do not meet the requirements stipulated in the enterprise standards and the contract, when the customers request a return, the faulty products will be retrieved and the customer's payment will be refunded.

1.3 Exclusions of Liability

Exclusions: During the warranty period, the following factors caused by human error and force majeure shall not be covered by the free repair, replacement and return service:

1) Product malfunction caused by improper use by the customer;

2) Self-repair and modification of the product by the customer;

3) Severe damage or deformation of the product appearance, loss of product identification, and inability to identify the source of the product;

4) Product damage caused by natural disasters such as earthquakes, floods, fires, etc.;

5) Other human factors.