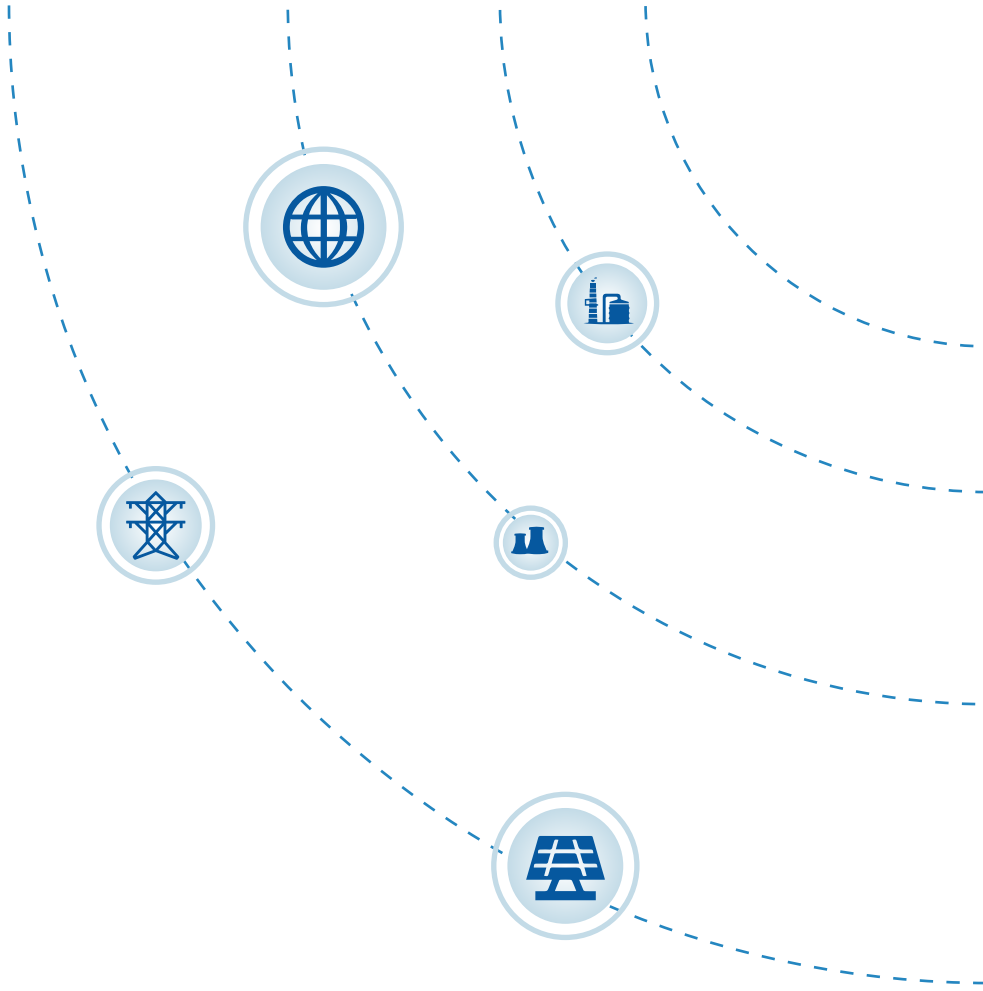
UNITECH

Technical Solution for Distribution Network New Lock Control System



UNITECH

Unitech

Founded in 1998, Zhuhai Unitech Power Technology Co., Ltd. is dedicated to providing customers with safety and automation solutions for industrial operation and maintenance work.. The Company has been honorably titled "National Champion Demonstration Enterprise of the Manufacturing Industry" and "National Intellectual Property Demonstration Enterprise", and won "China Excellent Patent Award". We have obtained more than 1000 authorized patents, and many achievements and products have been identified as "international leading level". Presently, company products have been widely used in electric power, rail transit, petrochemical, metallurgical and coal industries, etc.

60000+

Unitech products are applied to more than 60000 engineering projects worldwide in such industries as power, petrochemical, metallurgy, coal, and rail transportation.

30+

Since the microcomputer controlled interlocking system was invented, Unitech has had more than 30 years of industry experience.

4

It has four product series: safety management, intelligent monitoring, intelligent auxiliary control and intelligent lock control.

Contents

01 Current situation and problems

At present, the distribution network is growing fast and large in scale. The distribution stations, box transformers and loop network cabinets on the distribution network lines have the characteristics of wide distribution, large scale and harsh environment. There are some problems in the management of locks when dealing with daily inspection, maintenance and maintenance operations:

(1) The lock protection ability is weak

The traditional mechanical lock has poor environmental adaptability and weak anti-theft ability, easy to block, easy to rust, easy to open by technology, and there are safety hazards.

(2) There are many kinds and quantities of keys, which makes management difficult

Because the equipment comes from different manufacturers, the types of locks are different, resulting in a large number of keys, variety of types, daily management difficulties and low efficiency.

(3) The lock unlocking permission is not controllable

The use of traditional mechanical keys cannot be effectively supervised, and the unauthorized use of keys will cause hidden dangers to equipment operation and personnel safety.

(4) There is no record of unlocking, and it is difficult to trace the responsibility

There is no effective record of the unlocking process, and it is impossible to trace the responsible person in case of safety accidents.ogy, and there are safety hazards.

(5) The operating environment is difficult to monitor

A large number of power distribution equipment is in the outdoor open environment, which needs to face rain and snow, wind and sand, humidity and heat and other natural environments, as well as prevent man-made damage, theft and other illegal behaviors, so it is difficult to achieve timely monitoring and alarm.

Based on the above problems, UNITECH Company launched a new type of lock control system for distribution network, which has the functions of personnel lock permission management, operation record traceability, environmental equipment status monitoring and so on. It effectively solves the above hidden dangers and defects, making the management of distribution network equipment more efficient and the operation safer.bove problems, UNITECH Company launched a new type of lock control system for distribution network, which has the functions of personnel lock permission management, operation record traceability, environmental equipment status monitoring and so on. It effectively solves the above hidden dangers and defects, making the management of distribution network equipment more efficient and the operation safer.

02 Normative reference documents

The following documents are essential for the application of this programme. For dated references, only the dated version applies to this document. For undated references, the latest version (including all amendments) applies to this document.

GB 21556-2008, General safety technical conditions for locks

GB 17565-2007 General Technical Conditions for Anti-theft Security Doors

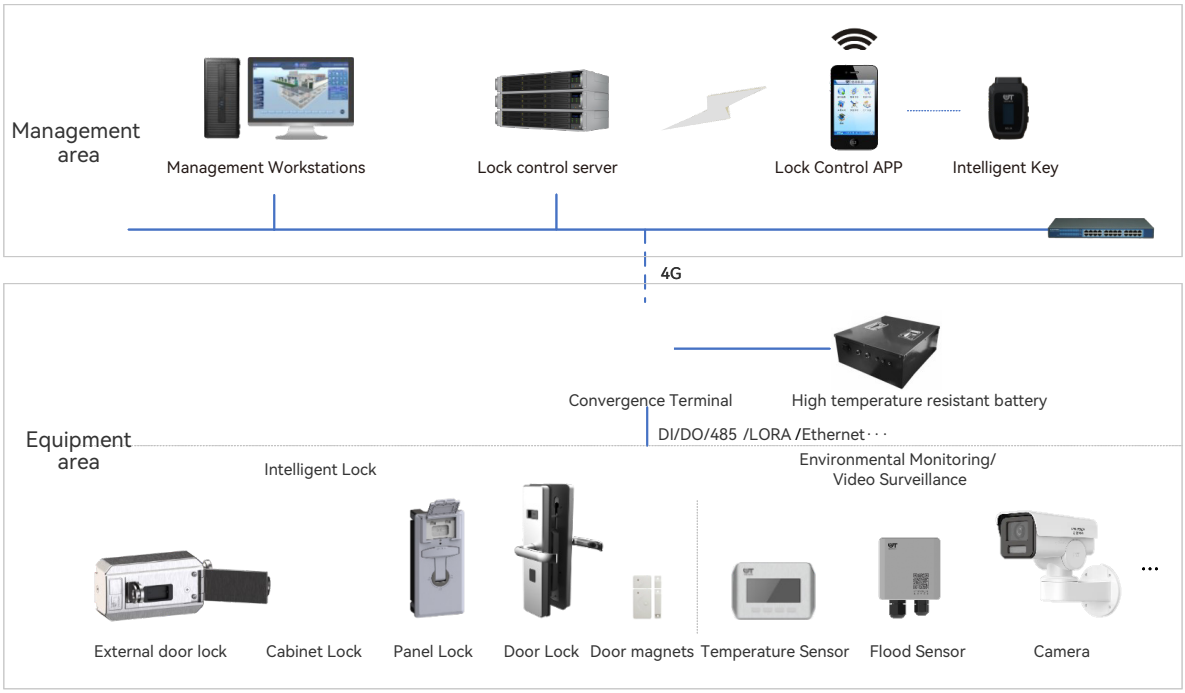
GA 374-2019 Electronic anti-theft lock

GB/T 4208 Enclosure protection class (IP code)

GB/T 17626.2-2018 Electromagnetic Compatibility Test and Measurement Technology Electrostatic discharge Immunity test

GB/T 17626.3-2016 Electromagnetic Compatibility Test and Measurement Technology Immunity to Radio Frequency Electromagnetic Field Radiation Test

03 Solution

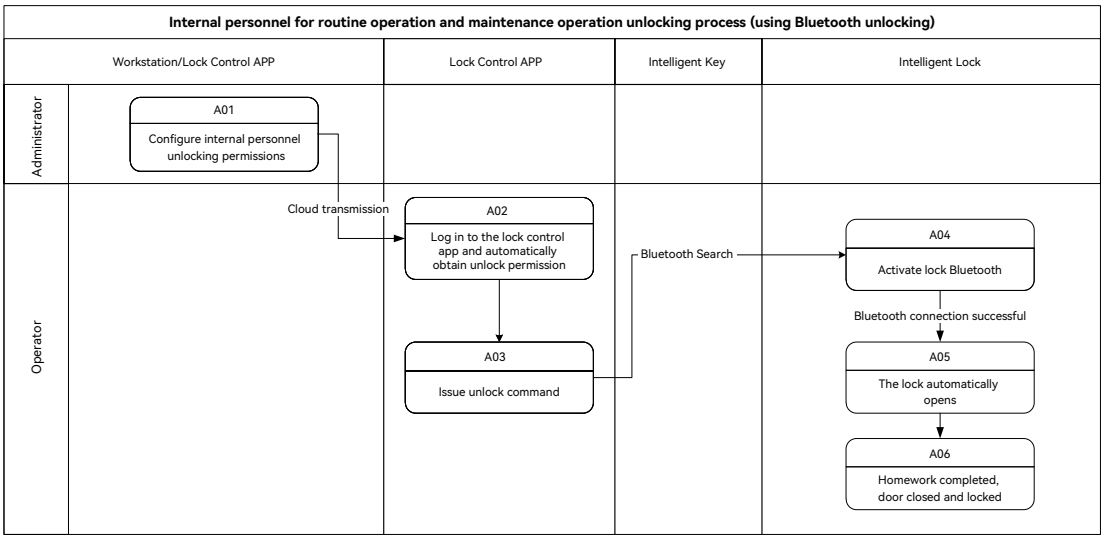


System architecture diagram

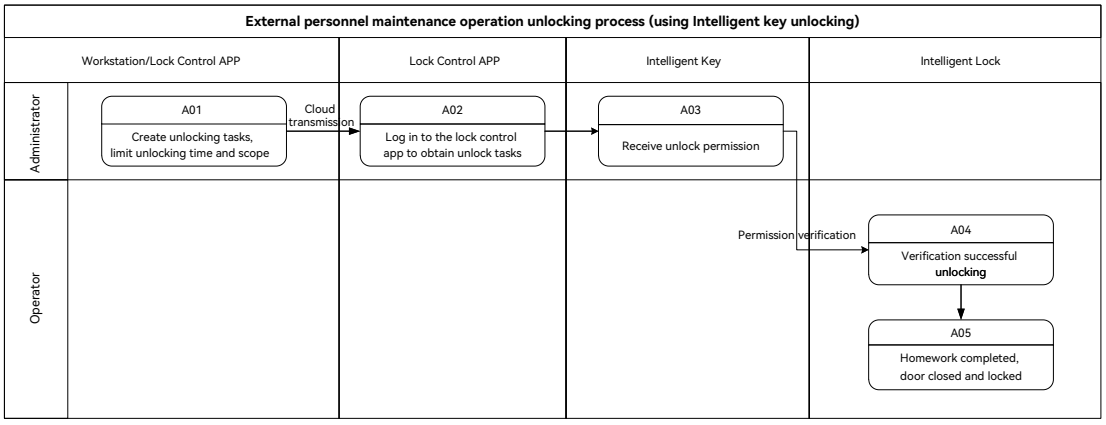
This solution supports modular configuration, the installation of Intelligent locks and door magnets on the doors of distribution rooms and equipment cabinets. Environmental monitoring and video surveillance devices can be configured as needed within the room and inside the cabinets. This setup enables real-time monitoring of the status of room and cabinet doors, lock conditions, and internal environments (such as temperature, humidity, water immersion, and perimeter security). By establishing a communication link between the Convergence terminal and the lock control server, this system can transmit the collected data in real time to the lock control server, enabling remote control of locks and real-time environmental monitoring with abnormal status alerts. The solution is equipped with a high-capacity high-temperature battery module, capable of operating in temperatures ranging from-40 to 85℃, making it suitable for various extreme environments. In the event of a main power failure, the system can continue to operate for over 7 days (168 hours).

04 Work Flow

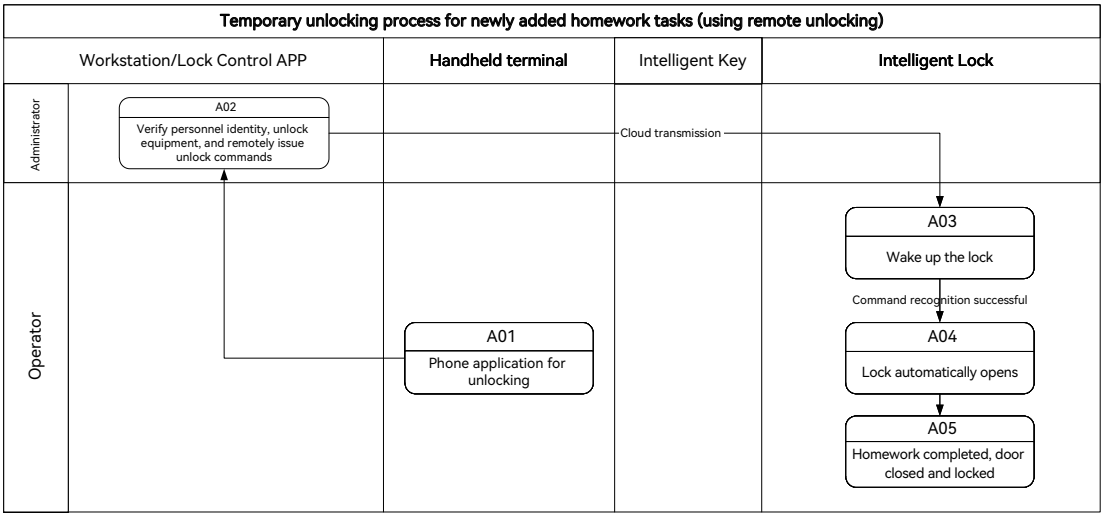
1) Bluetooth unlocking process



2) Intelligent key unlocking process



3) Remote unlocking process



05 Product functions and technical indicators

5.1 System Software

(1) Equipment area management function

- Equipment area information includes: equipment area name, equipment area ID, longitude and latitude, detailed address, and support GIS map presentation.
- Equipment area information supports query and export functions according to name, ID, region and other related functions.
- Support manual addition, deletion, modification, batch import and export functions.

(2) Lock management function

- The MAC address of the lock is unique in the whole network, and the lock can be bound to the equipment area for management.
- The lock information includes: name, site, model, type, longitude and latitude, detailed address and other information.
- Lock information supports online add, query, edit, delete and other functions.

(3) Personnel management function

- Supports different role definitions, each of which can be configured with different permissions and assigned to people as needed.
- Personnel registration requires the name, contact number, unit information and other verification methods.
- Personnel information support accurate query and export function according to account, name, contact number and other information.
- The account supports password recovery and automatic lock after multiple trials.

(4) Permission management function

- Supports the function of assigning permissions by role.
- Supports temporary authorization based on equipment area, operator, time and other elements.
- Support batch long-term authorization by region, team and so on.
- The authorized information is automatically synchronized after logging in to the lock control APP.
- It has the function of querying authorization information, which can be queried according to the name of authorization task and authorization personnel.

(5) Log management function

- Support the operation log management function of the platform itself. The log should include (such as adding, deleting and modifying data).
- Support the log of unlocking and locking operations, and query and export log information according to different screening methods such as account, time period and region.

(6) Status monitoring function

- Support real-time monitoring of door status and lock status.
- Support temperature, humidity, water immersion and other microenvironment monitoring functions.
- Supports video surveillance function with linked cameras.
- Supports the abnormal state alarm function.

5.2 Lock control APP

Lock control APP is installed in the intelligent terminal of the operation and maintenance personnel, can unlock the lock locally or send the operation task and authorization information to the intelligent key through Bluetooth communication. At the same time, the unlocking record can be uploaded to the lock control server, and it has the functions of task application, task approval, positioning and navigation, and record query. The specific functions are as follows.

- There is a process for applying and reviewing the unlocking task.
- Support the function of uploading unlocking information to the lock control server in real time.
- Supports the lock permission allocation query function.
- Supports GIS map navigation function.
- Supports the function of unlocking log statistics and viewing.
- Support password modification and recovery function of users.personnel.

5.3.Intelligent Key

It receives the unlocking permission issued by the lock control APP, and control the opening and closing of the lock within the authorized range. It has functions such as wireless power supply, wireless communication, identity identification, lock code acquisition, status acquisition, automatic saving operation records, etc.

(1) Basic function

- It can supply power to the lock by electromagnetic carrier wireless method, and the power supply is stable and reliable.
- It can communicate with the lock by electromagnetic carrier wireless method, and supports encryption algorithm, so the communication is safe and reliable.
- It can automatically identify the identity of the lock and open the corresponding lock according to the assigned permission.
- With one key, you can open multiple locks according to your management authority.
- Equipped with lighting for night operation.
- Support the Bluetooth connection between intelligent key and lock control APP to realize authorization distribution and unlock record upload.
- OLED display is adopted, can display the remaining battery, whether Bluetooth is connected, whether the lock is authorized and other information.

(2) Technical indicators

- Working environment temperature: -40℃ ~ +85℃
- Working relative humidity: 5%~95%RH
- Number of recognizable code locks: ⩾ 1000
- The number of times the lock can be opened continuously when fully charged: ⩾500
- Log storage: more than 1000 entries
- Communication connection: Bluetooth or USB or wireless technology
- Key charging interface: wireless or USB interface
- The unlocking life is not less than 50,000 times
- Protection class: IP54

5.4 Intelligent Lock




Locks rely on external power supply or intelligent key power supply, with a unified unlocking interface, unique identification code, used for locking doors and cabinets door locking.

(1) Basic function

- There is no lock hole on the surface of the lock body to prevent foreign matter from entering or being opened by tools such as screwdrivers and wires.
- The lock body does not contain battery, no exposed metal contact, through external power supply or intelligent key electromagnetic carrier wireless power supply, the power supply is stable and reliable.
- The lock has a unique ID code to identify the lock.
- Supports remote online unlocking, Bluetooth unlocking with lock control APP and smart key unlocking.
- It can detect the open and closed state, and upload the lock control server through the convergence terminal.

(2) Technical indicators

- Working environment temperature: -25℃ ~ +70℃
- Working relative humidity: 5%~95%RH
- Service life: more than 10,000 times
- Protection class: IP65
- Electrostatic discharge immunity: 4 levels
- Power frequency magnetic field immunity: 5 levels

5.5 Convergence Terminal

It is a device with functions of acquisition, regulation, calculation, control and gateway, which is used to realize communication and data forwarding. It has functions of issuing unlocking instructions, sending back door lock status and uploading microenvironment data.

(1) Basic function

- Collect the sensor operating status value, including normal, abnormal, low power information .
- Receive the configuration instructions of parameters such as sleep time and working frequency band issued by the background of the receiving system, and transmit them downward.
- Support flexible networking in different scenarios.
- Support simple Network Time Protocol time synchronization.

(2) Technical indicators

- Working temperature: -40℃ ~ +70℃
- The linkage response time is less than or equal to 2s
- Protection grade of shell: IP30
- Electrostatic discharge immunity: 4 levels
- Power frequency magnetic field immunity: 5 levels

5.6 High temperature resistant battery

The system is equipped with a large capacity high temperature lithium battery, which can withstand all kinds of extreme environments. As the backup power supply of the system, it can continue to supply power for more than 7 days (168 hours) after the failure of the main power supply.

(1) Technical indicators

- Nominal voltage: 3.7V
- Nominal capacity: 5000mAh
- Internal resistance of the connection: 100mΩ
- Discharge temperature: -40℃~ +85℃
- Charging cut-off voltage: 4.2V
- Cut-off voltage: 2.5V
- Maximum continuous charging current: 1C (5A)
- Maximum continuous discharge current: 2C (10A)
- Cycle performance:> 500 cycles

5.7 Sensor

Name	Water level sensor	Temperature and humidity sensor	Flood sensor
function	Collect the water level data and send it to the lock control server through the convergence terminal	Collect the temperature and humidity data of the environment and send it to the lock control server through the convergence terminal	The environmental water immersion situation is collected. The water immersion probe sends the resistance value of the contact substance to the sensor to realize the determination of whether it is water immersed or not.
technical indicators	Working temperature: -40℃~85℃ Working humidity: 0~99% RH Sampling period range: 1min~24h Range: 0m~10m, accuracy class 0.5	Working temperature: -40℃~85℃ Working humidity: 0~95% RH Sampling period range: 1min~24h Detection temperature range: -20℃~80℃, measurement accuracy ±0.5℃ Detection humidity range: 0%~99%RH, measurement accuracy ±3%RH	Working temperature: -40℃~85℃ Working humidity: 20~95% RH Sampling period range: 1min~24h Sensitivity adjustment: can be set to high, medium and low three positions, factory default high sensitivity;

06 Application Cases

(1) Project overview

The 2024 Inner Mongolia distribution network project mainly includes intelligent Internet of Things electric control lock device products and services. Through the deployment of online panel lock, the goal of intelligent upgrading of key control loop cabinets has been achieved, with functions such as real-time monitoring of on-site

(2) Application effects

- High security level: encryption communication design, no conventional mechanical lock core, prevent illegal key replication, operation process control;
- Multiple unlocking methods: remote unlocking, Bluetooth unlocking, smart key unlocking;
- Real-time status sensing: 4G network communication, real-time sensing of lock state changes, regular automatic wake up and upload door, lock and power state.

Zhuhai Unitech Power Technology Co., Ltd.

Address: No. 68, Jinhong 7th Road, High-Tech Zone, Zhuhai City,
Guangdong Province, China Post code: 519085
TEL: 0756-2662941 FAX: 0756-2662919

Technical support

Technical support hotline: 4008338286
URL: http://www.ut.com.cn

WeChat QR Code

Website QR Code

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