High-voltage Combined Electrical Distribution Room Sulfur Hexafluoride Environmental Monitoring System Solutions

Catalogue

Chapter 1 Project Overview

1.1 Project Background

Sulfur hexafluoride (SF6) is a colorless, odorless, non-toxic, non-combustible stable negative gas with the ability to adsorb free electrons and has good arc extinguishing and insulating properties.In a uniform electric field at 101.325 kPa atmospheric pressure, the voltage resistance of SF6 gas is about 2.5 times that of nitrogen, and SF6 is so chemically stable that it is widely used as an insulating gas.The superior performance of SF6 gas enables economical, low-maintenance operation of the unit, saving up to 90 percent of space compared to a conventional unit.Among the many applications of SF6, it is mainly used in electric power equipment, and has become a very important medium in the electric power industry, being widely used as insulation medium material for high-voltage switches, large-capacity transformers and high-voltage cables.

SF6 gas in its normal state is not toxic to humans. However, under the action of high-voltage arc, SF6 gas will be partially decomposed, and its decomposition products often contain highly toxic, even in trace amounts, can cause people to be non-living.When SF6 gas is used as insulation and interrupting medium for indoor switchgear leakage occurs during use, the leaked SF6 gas and its decomposition products will accumulate in the lower indoor space, causing local oxygen deficiency and poisoning.It poses a serious risk to the life and safety of the staff entering the room. Therefore, it is necessary to monitor SF6 gas leaks in power distribution rooms.

In order to solve this problem, Shandong Renke launched the high voltage combination electrical distribution room sulfur hexafluoride monitoring system.It uses a variety of intelligent environmental monitoring sensors to implement 24-hour all-weather monitoring of the environment in high-voltage distribution rooms, and can detect the SF6 gas content and oxygen content in the ambient air.When the SF6 gas content in the environment exceeds the standard or lacks oxygen, it can be alarmed in real time, and at the same time automatically start the fan for ventilation, and has many rich functions such as temperature and humidity detection, infrared intrusion alarm, etc., which provides new ideas for maintaining the safety of electricity in high-voltage distribution rooms and safeguarding the personal health and safety of staff.

1.2 Construction Objectives

High-voltage combined electrical distribution room sulfur hexafluoride monitoring system solution is an intelligent distribution room environmental monitoring management system integrating **environmental monitoring** (in addition to SF6/O2

gas monitoring, it also includes temperature and humidity, infrared human detection, etc.), **fan linkage control,** and intelligent **environmental monitoring cloud platform**, whose overall construction goal is to achieve unified monitoring and management of the environment and equipment inside the distribution room to ensure the safety of electricity consumption.

Specific construction objectives:

- Real-time data monitoring of elements such as sulfur hexafluoride concentration, oxygen concentration, temperature and humidity through various intelligent sensor devices, providing highly stable and reliable monitoring information resources for the operation of various systems and equipment in the distribution room;
- When the gas as well as temperature and humidity values in the monitoring area are higher/lower than the set alarm value, the system automatically issues an audible and visual alarm signal and provides the necessary remote control and intelligent control;
- Equipped with infrared sensors in the monitoring area, the system automatically issues an alarm signal when it senses people entering;
- Generating fault alarms for faults occurring in the power distribution room, notifying the relevant management personnel in a variety of ways, dealing with them in a timely manner, solving them in a timely manner, and providing early warning of impending faults;
- Promote the automation and intelligence of the power distribution room, clarify the rights and responsibilities of the management personnel, improve the management level of the plant room, save the operation and management costs of the power distribution plant, and achieve the purpose of short-term investment and long-term benefit;
- Using the platform's perfect data statistics and analysis functions to provide a reliable reference basis for power distribution room managers and an adequate decision-making basis for power distribution room construction and improvement;
- It is easy to expand, easy to change, and can adapt to changes in the environment and diversification of management needs.

1.3 Design Principles

According to the actual needs of power distribution room operation and management, as well as the current situation and direction of domestic and foreign technology development, referring to the advanced projects of power distribution room environment monitoring technology construction at home and abroad and drawing on their construction experience, we follow the following general principles in the program:

- **Stable and reliable**

Only a stable running system can ensure the smooth operation of the power

distribution engineering system, and the role and significance of the monitoring system can be reflected. The overall solution has been designed with stability and reliability as the first goal from all levels, such as program architecture and product design.

- **Rational architecture with scalability**

A platform-level concept is used to structure the system so that the whole solution runs safely and smoothly and has good scalability. Scalability ensures that when users have more requirements, the new equipment introduced can work smoothly with the current equipment equipped, further expanding and improving the performance and functions of the system.

- **Minimalist configuration as possible**

The whole program adopts as simple a connection as possible, removes various redundant configurations, reduces failure points, improves system stability, and reduces system cost.

- **Better system efficiency**

The solution design is based on the importance of improving the overall operational efficiency of the system as much as possible, and choosing more suitable products and more suitable technical solutions to achieve it.

- **Better cost performance**

The program has been aimed at higher cost performance, constantly upgrade and improve the hardware and software products, for the major environmental monitoring systems have corresponding products and programs. With the design goal of "providing customers with the most cost-effective solutions", we design solutions to integrate customer needs and scalability requirements, select the most appropriate products, reduce system costs, and save project costs for customers.

- **Easier to use and maintain system**

Program design according to the project construction rules and other selection of appropriate monitoring products and technical solutions to achieve, and strive to make the system easier to use and maintain, reduce the management and maintenance costs of customers using the monitoring system.

Chapter 2 Project Introduction

2.1 Introduction of monitoring system

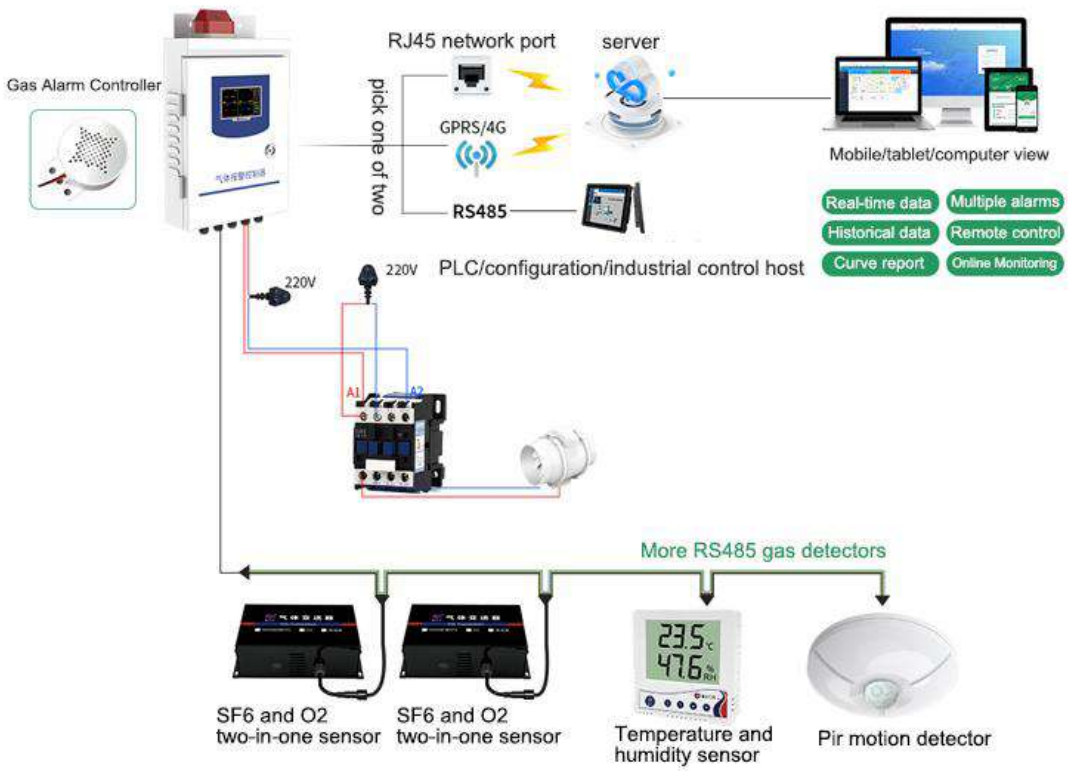
In order to fully guarantee the environmental safety of equipment operation inside the distribution room, the internal environment needs to be monitored for the purpose of real-time automatic monitoring and control of the distribution room environment. The system mainly involves **SF6/O2 gas concentration, temperature and humidity, infrared human detection** and other environmental monitoring elements inside the

distribution room.

By analyzing various environmental monitoring and alarm data in the power distribution room, it reflects the environmental conditions of on-site equipment operation and the operation of the equipment itself in real time.Through **linkage control fans**, guarantee the safe operation of power equipment in the distribution room, prevent accidents caused by environmental changes and changes in equipment status, meet the requirements for reliable control and management of remote operation and maintenance of the distribution room, and provide effective support for the **intelligence, visualization, automation** and **interaction** of the new modern distribution room;By setting up a unified monitoring and management station, multiple devices and information distributed in different areas of the distribution room are monitored and managed centrally in a fully digital manner, realizing a less manned or unattended distribution room, meeting the needs of modern intelligent distribution room management, and changing the maintenance mode of users from "**passive repair mode**" to "**active prevention mode**".

This monitoring system is simple and easy to deploy for construction, with thoughtful details and easy expansion.All monitoring devices are transmitted to the gas alarm controller via **RS485 bus wiring, and then uploaded to the cloud platform via 4G/RJ45 network port,** so that users can choose the uploading method independently according to the actual situation, which is convenient for practical operation and management;Monitoring management platform is also very user-friendly, with a friendly interface, simple operation and comprehensive functions, the management of monitoring equipment using plug-and-play, monitoring platform can automatically search for new equipment, no need to manually add, maintenance is very convenient. The smooth transition of plug-and-play system integration and expansion is realized, so that the demand side can easily invest in the project according to their own needs and investment budget, without causing wasteful duplication of investment.

2.2 Monitoring system topology diagram



2.3 Advantages of the monitoring system

■ Concentration so professional

Our company has been focusing on environmental monitoring industry for many years, striving to provide customers with the best and most cost-effective environmental monitoring products and solutions, and is a well-known manufacturer in the environmental monitoring industry. We have a complete range of products and solutions, supplying 300+ regions and serving 110k+ customers worldwide.

■ System-level Integrity and Platforming

With its years of experience in the industry, we combine all aspects of customer needs to provide a system-level, holistic solution with better division of labor and synergy efficiency, and the design will have good system scalability. The solution covers the monitoring of SF6/O2 gas concentration, temperature and humidity, infrared and other environmental parameters in the distribution room, with a high degree of integration; it integrates the overall consideration of measurement, management and control, and enhances the platform-level management function of the SF6 monitoring system in the distribution room of high-voltage combination appliances.

■ **Standard IP-based network, easy networking**

The network structure of high voltage combined electrical distribution room SF6 monitoring system is completely based on TCP/IP network communication protocol, which provides the most effective monitoring means for centralized intelligent monitoring of multiple sites with wide distribution and large number of monitoring nodes, and the use of IP-based network monitoring system provides convenience for unified management of network operation and maintenance.

■ **Easy to extend,using standard protocols**

The use of standard, open protocols to facilitate integration and system expansion. As the IP-based monitoring platform is built, the standard MODBUS protocol is used for on-site data collection, making it easy to add monitoring nodes or increase monitoring information, and achieving a smooth transition of plug-and-play system integration and expansion, so that the demand side can easily invest in the project according to their own needs and investment budget.

■ **Fan Control**

The system integrates environmental monitoring and fan linkage control, in which the alarm values of SF6 gas concentration, oxygen content, temperature and humidity can be set by the manager as needed. It can automatically control the fan start and stop according to the current gas, temperature and humidity values, and independently select the automatic exhaust, forced exhaust and manual exhaust modes, and the automatic exhaust and forced exhaust time can be set flexibly, thus reducing the potential danger in the distribution room.

■ **With a wealth of automatic alarm mode**

The system supports sound and light, mobile, SMS, e-mail and other alarm functions, and optional voice alarm module, voice alarm prompts when the human body is sensed near or entering, so there are a variety of alarm strategies to choose , and a universal system can meet the needs of most users.

■ **Optimized data teleportation**

The alarm event of high voltage combination electrical distribution room SF6 monitoring system adopts advanced real-time alarm mode. In addition to the monitoring center which can notify the management personnel of the alarm information, it can also transmit the real-time monitoring data and alarm information of the system to the relevant equipment through wireless data transmission, and it can be connected to the existing communication equipment on site such as power plants, substations and high-voltage switchgear manufacturers to transmit the real-time data and alarm information It can also be connected to existing communication equipment on site such as power plants, substations and high-voltage switchgear manufacturers to transmit real-time data and alarm information to field equipment. It allows flexible setting of the interval for reporting data, reducing the common data sent when the

system is normal, and notifying the monitoring center of alarm events in time when abnormalities occur. It thus ensures the real-time and reliability of monitoring system alarms.

■ High integration of software and hardware products

According to the needs of the industry development, the software and hardware products of the high voltage combined electrical distribution room SF6 monitoring system keep pace with the times, constantly update the corresponding products, eliminate obsolete and redundant functions, and constantly integrate effective new functions, so that the products have a higher and higher degree of integration to provide customers with more cost-effective products.

■ Complete network offline management function

When the communication link of the monitoring host is interrupted, the alarm information and real-time data of the monitoring host will exist locally, and when the communication link is restored, the offline data will be re-uploaded to the monitoring center to ensure the integrity of the monitoring data. The monitoring center has a perfect interruption monitoring mechanism, and the alarm will be issued in time after the equipment communication is interrupted.

■ System with display memory function

It can display the status of the monitored object in real time, has an operation interface and man-machine communication function, and has a memory function for the occurrence of alarm indicators, which can be queried at any time.

■ Simple and easy to deploy system construction

All monitoring devices are wired with RS485 bus; monitoring and management platform with multiple deployment methods, for simple needs can achieve foolproof installation, very user-friendly, friendly interface, simple operation, comprehensive functions, easy to achieve the configuration of monitoring functions and alarms.

■ Unique features to meet customer needs

The high voltage combined electrical distribution room SF6 monitoring system integrates many of the more practical functions in conjunction with customer needs, and can also be customized to support customer needs. From the perspective of customer use, it makes application and maintenance as convenient and hassle-free as possible.

■ Powerful multi-platform remote management

High-voltage combined electrical distribution room SF6 monitoring system supports remote viewing and management of data in various ways, such as computer PC terminal, APP mobile terminal and WeChat public number.

Chapter 3 Project Solution Design

High-voltage combined electrical distribution room sulfur hexafluoride monitoring system is to be composed of three working modules. The first part: environmental monitoring (SF6/O2 gas monitoring, temperature and humidity monitoring, infrared human intrusion monitoring, etc.); the second part: fan linkage control; the third part: intelligent gas alarm controller and platform software communication.

The system uploads the collected environmental data to the environmental monitoring cloud platform via 4G/RJ45 network port by configuring the corresponding sensors in the distribution room and connecting the gas alarm controller **with RS485 wiring**, and continuously collects the measured value of each measurement point and its sensor equipment working status through the platform software. **The gas alarm controller contains smart voice alarm module**, if the system finds abnormal data, it will automatically send out **sound and light, SMS, voice and email alarms**, and there will also be voice alarm prompt when it senses human body approaching or entering, so as to remind attention to environmental safety, eliminate possible dangerous situations in the bud, and notify relevant management personnel in time when there is an accident, so as to avoid causing big losses and affecting the normal work of power distribution room and equipment.

3.1 Environmental monitoring subsystem

3.1.1 SF6/O2 gas concentration monitoring

Monitoring Meaning: SF6 is an artificial inert gas mainly used in the electric power industry. This gas has good electrical insulation properties and excellent arc extinguishing performance, but with prolonged use, gas leakage problems may occur. Pure SF6 gas is a physicochemically stable gas that decomposes under the action of an electric arc, and some of the decomposition products are toxic. Experience has shown that even if staff are in an environment containing very small amounts of decomposition products, they will feel a pungent or uncomfortable odor, which will cause significant irritation to the nose, mouth, and eyes, and this reaction will occur within a few seconds before there is an obvious toxic reaction. The system uses intelligent gas detection sensors to monitor the concentration of SF6 and O2 in the distribution room in real time, and to send an alarm before the dangerous section value is reached, so as to prevent dangerous accidents from occurring.

Monitoring Objects: Monitor the SF6 and O2 content in gas sampling areas such as

cable trenches, distribution units, and secondary equipment rooms within the distribution room.

Monitoring Content： Each gas sensor signal acquisition, measurement point status detection, over-limit alarm, alarm recording, relay control.

Monitoring Effect：SF6 and O2 2 in 1 transmitters are installed in the cable trench, distribution device, secondary equipment room and other areas in the distribution room, and the data is transmitted to the gas alarm controller through **RS485 wiring and finally uploaded to the cloud platform.** When the system monitors that the concentration of any gas exceeds the limit, the alarm is automatically triggered, and alarm information such as sound and light and SMS are activated at the same time, and the exhaust system such as fan is linked to ventilate in time to ensure the safety of personnel and equipment in the distribution room.

【Equipment Configuration】

Equipment	Technical Parameter
Sulfur Hexafluoride Oxygen Sensor **Model：RS-SF6O2-N01-MP** 	SF6 Resolution：1ppm
	SF6Max. permissible error：±10% （@500ppm,60%RH,25℃） 0~2000ppm:±10%（@2000ppm,60%RH,25℃）
	SF6 Measurement Range：0~1000ppm
	SF6 Zero Point Drift：±3ppm
	SF6 Stability：≤2%Signal value/Month
	SF6 Response Time：≤30S
	SF6 Preheating Time：≥30min
	SF6 Repeatability：≤3%
	O2 Resolution：0.1%VOL
	O2 Accuracy：±3%FS

	O2 Measurement Range：0~30%Vol
	O2 Service Life：2Years（Default） 5 years, 10 years available
	O2 Repeatability：≤1%
	O2 Preheating Time：≥5 min
	O2 Response Time：≤10S
	O2 Stability：≤5%Signal value/Year
	Operating Temperature：-10~60℃
	Operating Humidity：0~95%RH Non-condensation

3.1.2 Temperature and humidity monitoring

Monitoring Meaning： In the construction of information technology, the operation of the power distribution room is at the core of information exchange management, requiring all power distribution room equipment to operate normally at all times. Power distribution cabinets contain power switches, cable lines and other machinery and equipment; they must be maintained at a smooth temperature and humidity range during the operation of machinery and equipment and the transmission process of its power engineering. Once beyond a certain temperature and humidity range, it is easy to equipment failure, threatening data transmission, storage and system operation, and if not dealt with in a timely manner, it may even damage the hardware equipment, causing incalculable economic losses. Shandong Renke is equipped with appropriate temperature and humidity sensors for different environments and conditions, which can well monitor the changes of temperature and humidity values in the distribution room and upload them to the cloud platform for comprehensive processing and analysis to reduce the occurrence of unexpected conditions.

Monitoring Objects： Real-time monitoring of temperature and humidity in different areas of the power distribution room.

Monitoring Content： Real-time monitoring of temperature and humidity data inside the power distribution room to prevent equipment damage failures caused

by over-limit indoor temperature and humidity values.

Monitoring Effect： By installing **temperature and humidity sensors with LCD display** at important locations in the power distribution room, the temperature and humidity changes at the location of the temperature and humidity sensors are monitored in real time 24 hours a day, which **can be viewed remotely and in real time by the manager at the web end or at any time through the on-site LCD display.** Once the temperature and humidity values are out of range, an alarm is immediately activated to remind managers to adjust the working settings of fans or the distribution of equipment in the distribution room in time.

【Equipment Configuration】

Equipment	Technical Parameter
86-shell 485 temperature and humidity sensor **Model：RS-WS-N01-1-*** 	DC power supply (default)：10-30V DC
	Max. power consumption：0.4W
	Temperature A accuracy：±0.4℃（25℃） Humidity A accuracy：±2%RH(60%RH,25℃)
	Temperature B accuracy：±0.5℃（25℃） Humidity B accuracy：±3%RH(60%RH,25℃)
	Sensor circuit operating temperature humidity： -20℃~+60℃，0%RH~95%RH(Non-coagulation)
	Probe operating temperature：-40~+80℃ Probe operating humidity：0~100%RH
	Temperature display resolution：0.1℃
	Humidity display resolution：0.1%RH
	Temperature and humidity refresh time：1S
	Long-term temperature stability：≤0.1℃/y

	Long-term humidity stability：≤1%RH/y
	Temperature response time：≤25s（1m/s Wind speed） Humidity response time：≤8s（1m/s Wind speed）
	Hole size：60mm
	Parameter setting: set by software or modify directly by key.

3.1.3 Infrared intrusion monitoring

Monitoring Meaning： The human body has a constant body temperature, will emit a specific wavelength of infrared light in about 10μm, the human body infrared detector is the use of infrared reflection principle, through the equipment inside the human body pyroelectric infrared sensor, the infrared radiation emitted by the human body to detect. Shandong Renke specially developed ceiling-mounted infrared detector installed in power distribution rooms, computer rooms and other places of high security, can play an intelligent security, to prevent illegal invasion.

Monitoring Objects： Infrared human intrusion monitoring in power distribution rooms.

Monitoring Content： Automatically detects whether there are abnormalities in the surrounding environment, and automatically transmits alarm signals to the host if there is a human movement phenomenon. Prevent illegal entry and destruction of power distribution room equipment and facilities.

Monitoring Effect： The **485 infrared detector** produced by Shandong Renke is small and exquisite, with internal configuration of human body dual-element pyroelectric infrared sensor and a small number of external components, **ceiling-mounted**, with installation height between 2.5~6m and installation height of 3.6m, which can all form a detection range of 6m in diameter and can achieve 360° detection of the distribution room environment. The infrared detector is installed at the entrance and window of the power distribution room and connected to the gas alarm controller through the **RS485 wiring**. The gas alarm controller is equipped with sound and light alarm lights and a **built-in voice alarm module**. When an intruder passes through the detection area, the detector automatically detects the activity

of people in the area and issues sound, **light and voice alarms.** In the case of an unattended server room, the access of personnel can be monitored in real time and the relevant personnel can be notified of illegal intrusion by mobile, SMS and email for timely handling.

【Equipment Configuration】

Equipment	Technical Parameter
Ceiling-mounted infrared detector **Model：RS-HW-N01** 	Power Supply： 10~30V DC
	Power Consumption：0.3W
	Sensor Type: Microwave sensor
	Alarm Delay：0-65535S Adjustable (alarm duration)
	Time Delay Alarm：Software settings (delay time for alarm occurrence)
	Working Frequency：24.00~24.25Ghz
	Installation Method：Ceiling-mounted
	Installation Height：2.5~6m
	Detection Range：Diameter 6m (Installation height 3.6m)
	Detection Angle：Omni-directional 360°
	Signal Output：RS485（Modbus-RTU）
	Communication Protocol：Modbus-RTU
	Working Environment：-10℃~50℃，≤95% (Non-condensation)

3.2 Fan linkage control subsystem

System Meaning： At present, many high-voltage switches use SF6 gas as insulation and arc extinguishing medium. Although SF6 gas is non-toxic in the normal state, there may be discharges or arcs in the distribution room, when the

SF6 gas will decompose into harmful components, and if ventilation is not timely, the accumulation of these harmful gas components will cause great harm to the human body. At the same time, the temperature and humidity values in the distribution room are too high or too low, which will also cause damage to the indoor equipment and even the human body. Shandong Renke can cope with this problem very well by using fan-linked sensor equipment.

System Content: Timely ventilation based on the information of temperature and humidity, gas concentration and other values in the distribution room.

System Effect: The gas alarm controller actively receives the monitoring data uploaded by all collection devices, and when it monitors that the concentration of **SF6 gas in the distribution room exceeds the standard, the O2 content is too low or the temperature and humidity value exceeds the limit,** it automatically turns on the **sound and light alarm and sends the linkage ventilation command to the fan for timely ventilation.** In addition, the relevant staff can also **manually turn on or turn off the fan control** through the equipment, **set the timer control mode or remote control fan mode on the cell phone or computer,** and set the time for the fan to start and stop regularly every day to ventilate the distribution room regularly.

3.3 Smart gas alarm controller and platform software communication

3.3.1 Introduction of gas alarm controller

Gas Alarm Controller (Model: RS-GAS-100) is a gas alarm controller developed by our company. It can connect our gas sensor to the gas alarm controller via **RS485 interface** and upload the data to our cloud platform or customer's own server in real time. The device supports **RJ45 and 4G (optional)** to upload data, users can choose the corresponding sub-models according to the actual use requirements. The device has a built-in large LCD screen with friendly and easy-to-operate interface. When the device exceeds the limit, the screen will display the alarm channel and the alarm data in real time, and the embedded microprocessor with rich software functions can **automatically collect the data uploaded by each sensor**. Equipment with **sound and light alarm lights, built-in intelligent voice alarm module,** when any of the parameters exceed the set value triggers a **sound and light alarm**, and has a **voice broadcast prompt function**, in order to promptly remind the approaching or entering personnel environmental safety-related matters, the occurrence of danger in a timely manner to notify the management of emergency treatment.

3.3.2 Function features

■ **Multi-sensor integration**

With 1-channel ModBus-RTU master interface, up to **32** sets of our 485 gas sensors can be connected, and different sensors can be selected according to the site monitoring requirements, with 1-channel ModBus-RTU slave interface, which can be connected to the user's own monitoring host, PLC, configuration screen or configuration software; with 4-channel passive relays, which can be connected to external equipment such as fan, and can control the work of external equipment when the gas is leaking, normally open and normally closed are optional; relay with load capacity: 250VAC 5A/30V DC 5A.

■ **Multiple data upload methods**

Optional 1-channel multi-functional **4G** communication interface, just insert a mobile phone card to upload data to the remote monitoring software platform; optional 1-channel **RJ45 network port** , with the existing Ethernet network, upload data to achieve centralized monitoring.

■ **Multiple alerting methods**

The gas alarm controller is equipped with sound and light alarm lights, and **the sound**

and light alarm is turned on when the limit is exceeded, and the sound level can reach 70~115db at 1 m from the equipment, which can distinguish 6 states of **normal, high alarm, low alarm, fault, shield and delay.** When the SF6 concentration, temperature and humidity values in the distribution room environment are higher than the set alarm value or the O2 content is lower than the set alarm value, the equipment outputs alarm signals and issues sound and light warnings to remind the relevant personnel to pay attention and take further measures; in addition, the environment monitoring cloud platform will use **pop-up windows, sound, nodes turn red**, etc. In addition, the environmental monitoring cloud platform will prompt with pop-up windows, sound, nodes turn red, etc., and notify remotely through **phone, SMS, email, WeChat push,** etc. It is convenient for management personnel to quickly go to the location where the abnormality occurs to check the site situation.

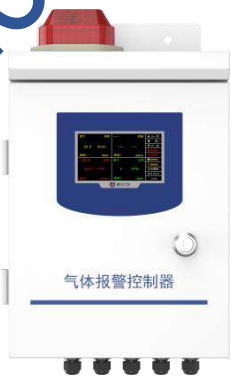
■ **Smart one-to-one voice alarm**

Gas alarm controller **with built-in intelligent voice alarm module.**When the human body infrared detector senses someone approaching or entering the power distribution room, the system will issue sound and light warning and voice alarm, and **the voice alarm content can be changed according to the requirements before leaving the factory**, such as: "Please make sure the site is in a safer environment before proceeding to the next operation", so as to provide accurate one-to-one voice prompting for people approaching or entering the power distribution room and remind the passing staff to pay attention to the safety of the power distribution room environment.

■ **Easy to install and operate**

The gas alarm controller adopts wall-mounted installation mode, which is convenient to install; 4.3-inch large screen LCD display, with simple and friendly interface; touch screen control is simple and intuitive to operate.

3.3.3 Technical Parameter

Equipment	Technical Parameter
Gas Alarm Controller **Model：RS-GAS-100** 	Communication Interface：4G(Optional)/RS-485Slave Interface
	Acquisition Interface：4~20mA Acquisition Interface/RS-485 Master Interface
	Sensor Type：Microwave Sensor
	Relay with Load Capacity：250VAC 5A/30V DC 5A
	Data Upload Interval：5S~65535S
	Built-in Storage Capacity：130,000

	Master-slave RS485 Interface Communication Distance：≥2000m
	Power Supply Range：AC220V±15%
	Power Supply Frequency：50~60Hz

Chapter 4 Integrated Environmental Monitoring Cloud Platform

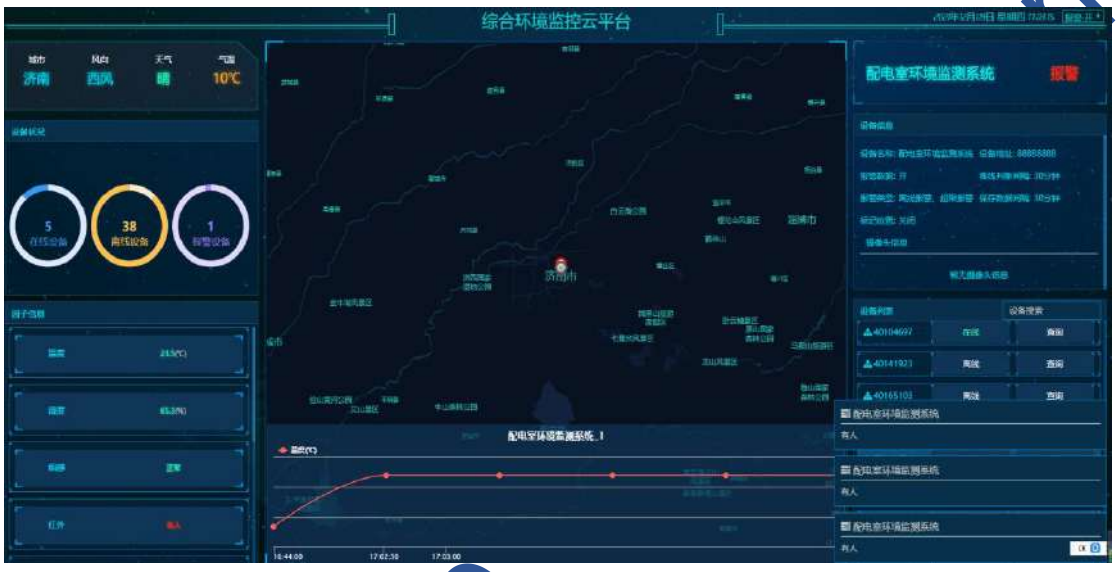
4.1 Integrated Environmental Monitoring Cloud Platform Overview

The integrated environmental monitoring cloud platform (www.0531yun.com) launched by our company is based on advanced information collection system, Internet of Things, cloud platform, big data and Internet and other information technologies. Users at all levels can access platform data through various channels such as PC WEB, APP client and WeChat terminal to realize remote system management functions. Users can monitor and manage each important parameter on the project in real time, and realize remote manual control based on the platform at the same time.

4.2 Integrated Environmental Monitoring Cloud Platform Function

4.2.1 Large Screen Visualization

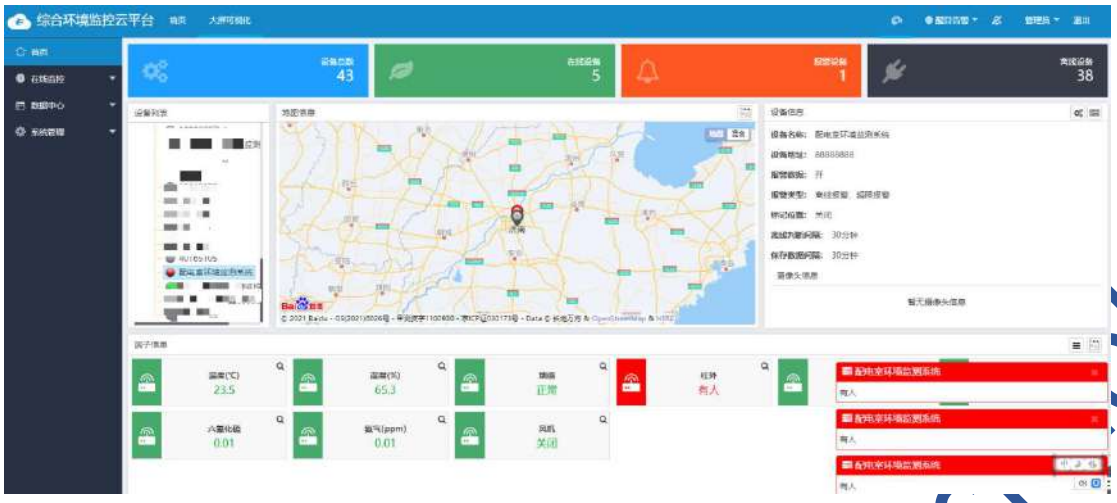
The environmental monitoring data in each area of the power distribution room can be displayed on a rolling basis with clear and intuitive data, making it easy for administrators to view.



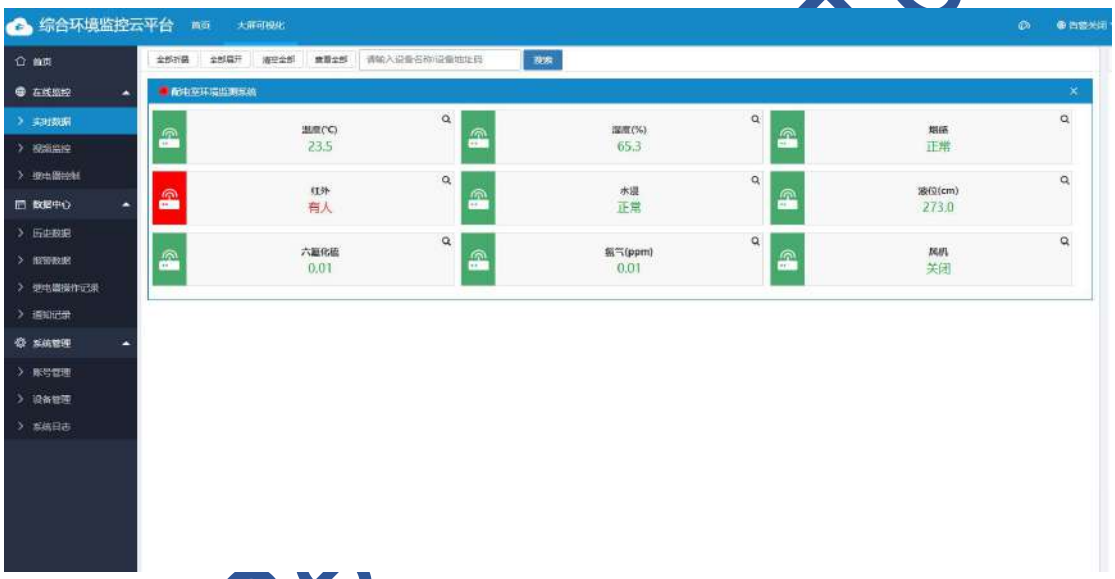
【Large screen visualization】

4.2.2 Real Time Data Monitoring

The data in the high voltage combination electrical distribution room SF6 monitoring system are processed by the integrated environmental monitoring cloud platform. In the software page, the environmental situation of each distribution room can be clearly identified from the tree diagram. The data can be reflected by graphical interface, lists and curves. The graphical interface has the advantage of allowing users to visualize the data and the relative positions of sensors, while the lists are more convenient for users to compare the data.



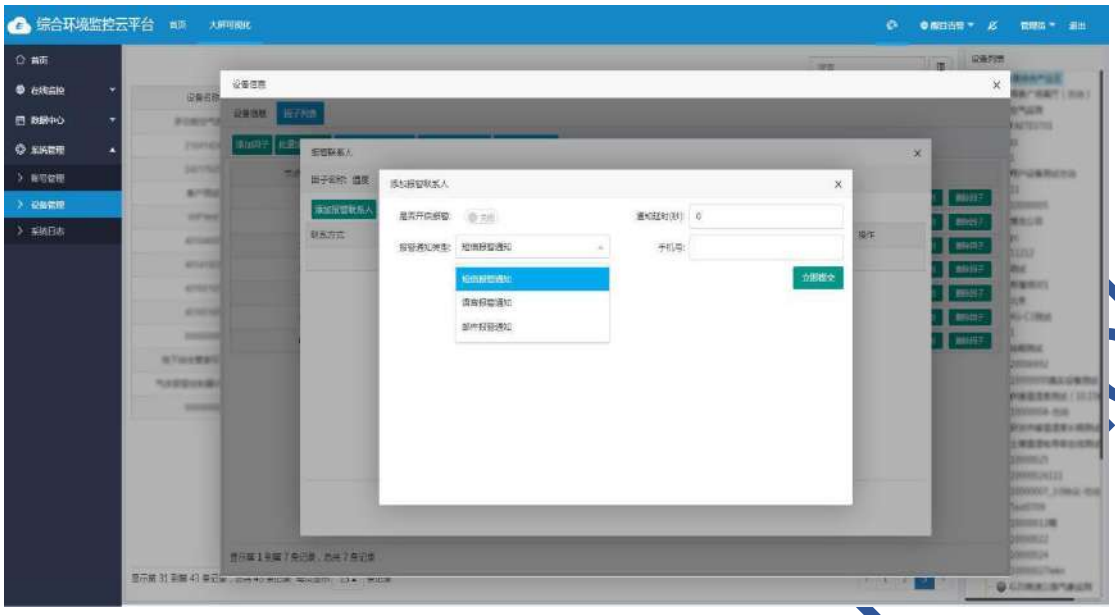
【Home Data Display】



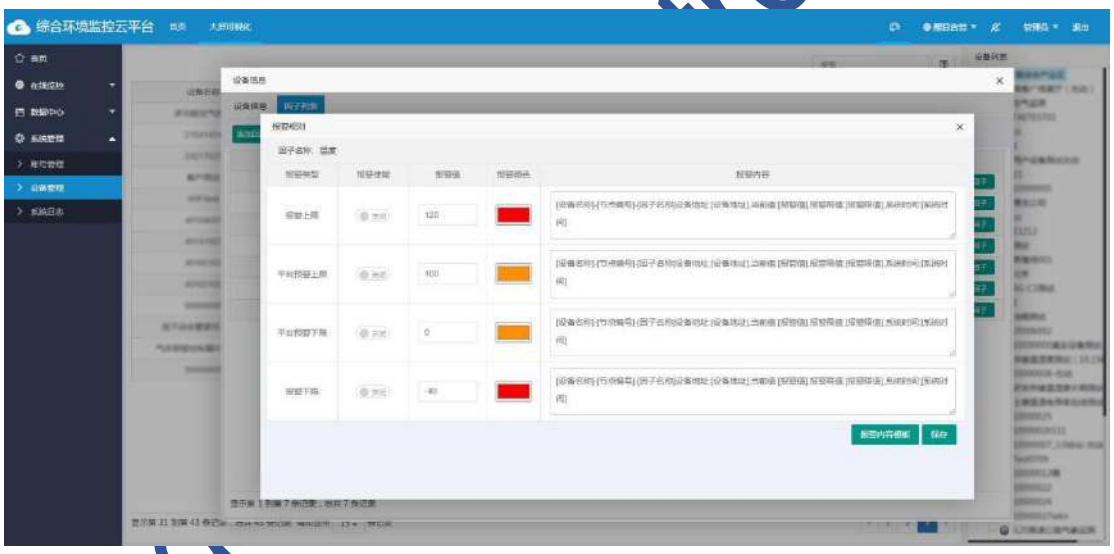
【Real Time Data】

4.2.3 Over Limit Alarm

The platform supports various alarm methods such as SMS, ringing, WeChat, email, alarm pop-up, audio alarm and offline alarm, and the alarm content can be customized.



It supports all monitoring factor alarm upper and lower limits, warning upper and lower limit settings, abnormal factor data font color change, factor alarm data color user-definable.



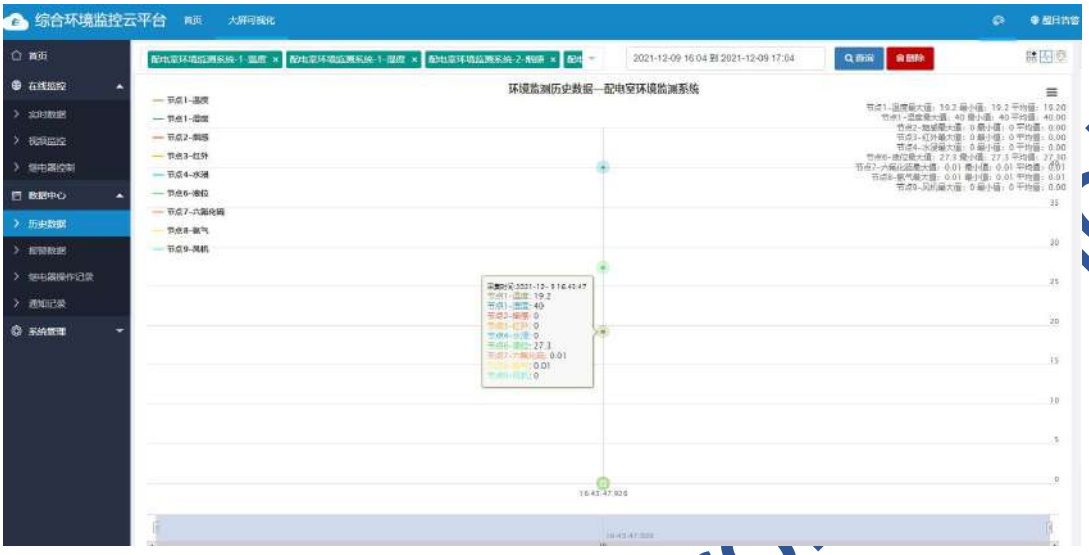
Data abnormalities can send alarm messages to different managers across levels according to the duration of the alarm.

There is a special alarm contact management list for SMS, ringing, WeChat and email alarm methods, which is easy to quickly check, add and delete when the alarm contact changes.

4.2.4 Historical Data Query and Export

The historical data and alarm data of one or more monitoring points can be queried, and the corresponding monitoring point, time range and data type can be selected as needed for query.

It supports PDF, excel and other data formats export, export content title, use unit name user-definable, at the same time it can export data query time period, query data account, save data interval, offline judgment interval and other important information.

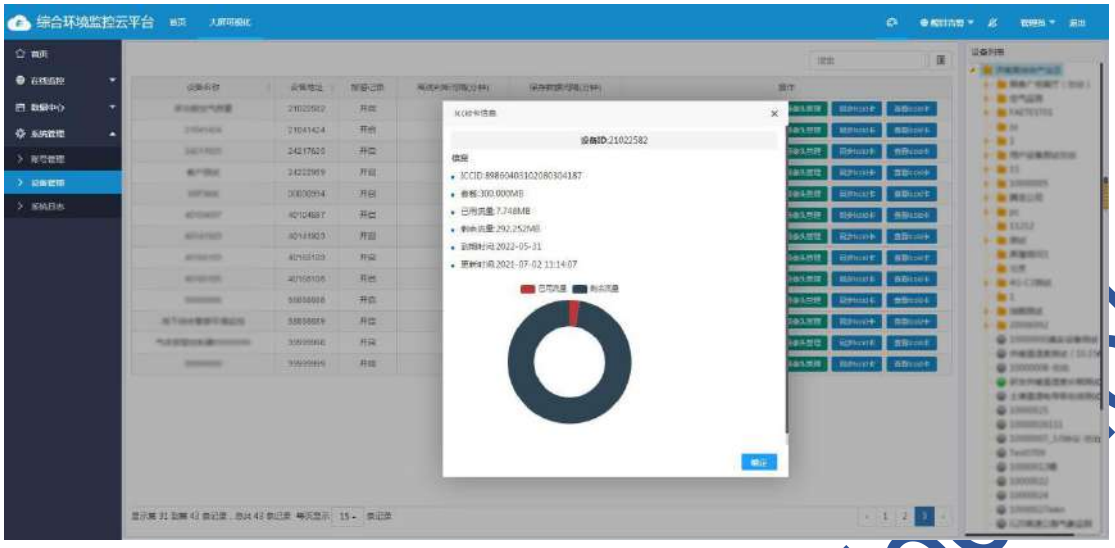


【Historical Data】

【Alarm Data】

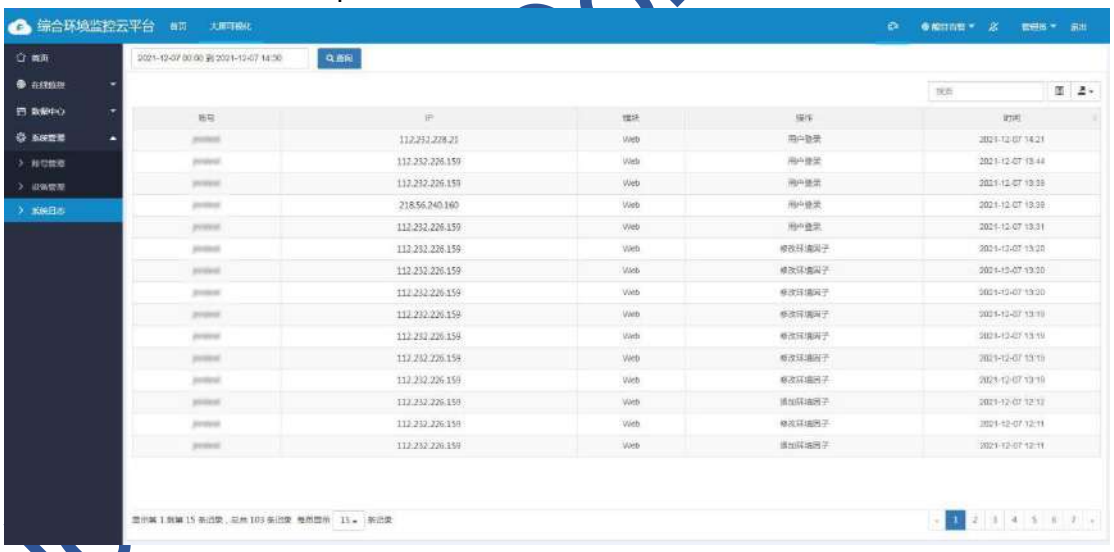
4.2.5 Mobile Data Card Alert Function

Real-time access to the site 4G type IoT device card number, automatic analysis of the card number remaining mobile data, automatic analysis, expiration time warning reminders, so that project management staff timely recharge, to prevent the expiration of the mobile data card operator pin number caused by the project stalled.



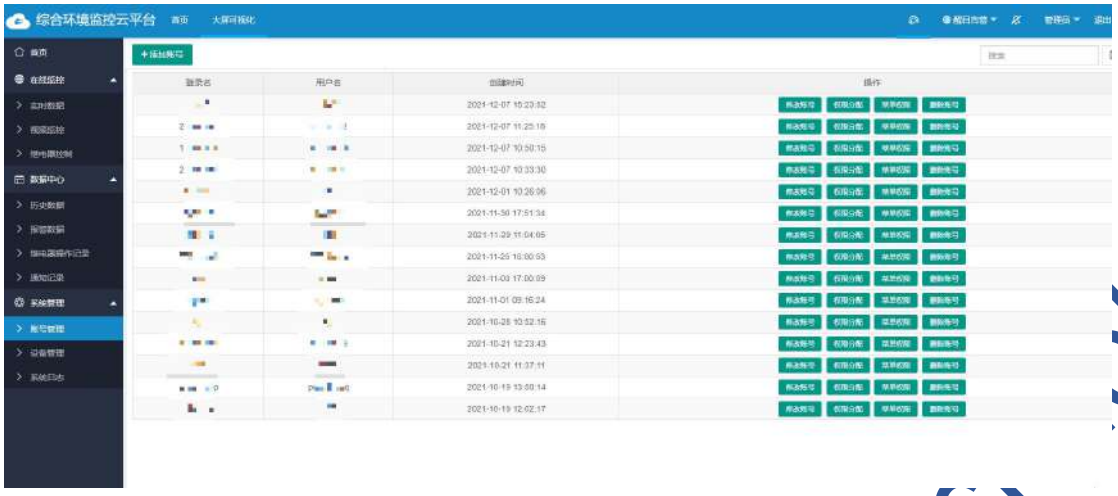
4.2.6 System Management

The platform has perfect authority grading and jurisdictional partition and other functions, unlimited level of authority setting, and free combination of authority according to requirements. The user operation has perfect log records, and it is convenient to check the operation records.

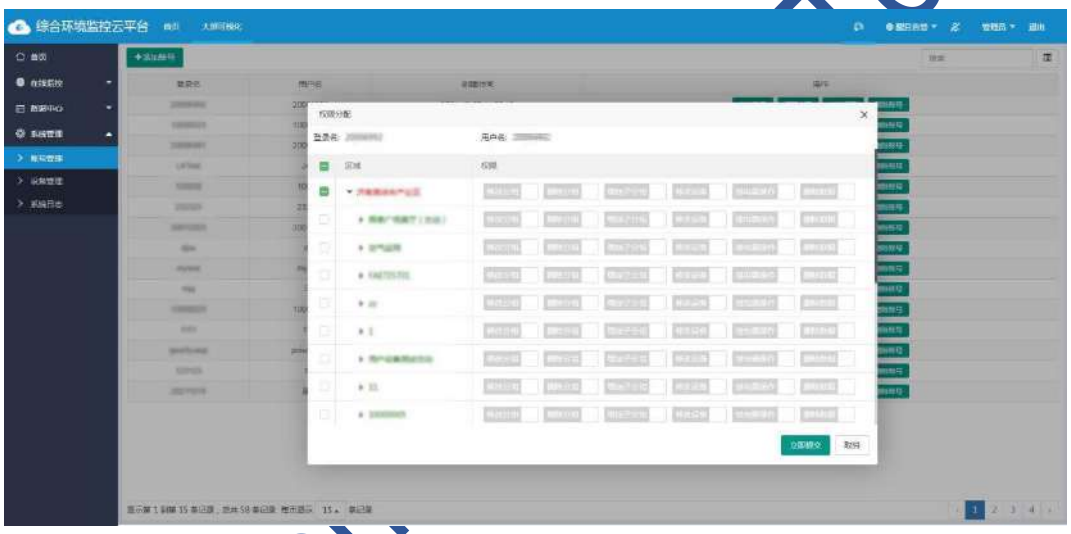


4.2.7 Permission Management

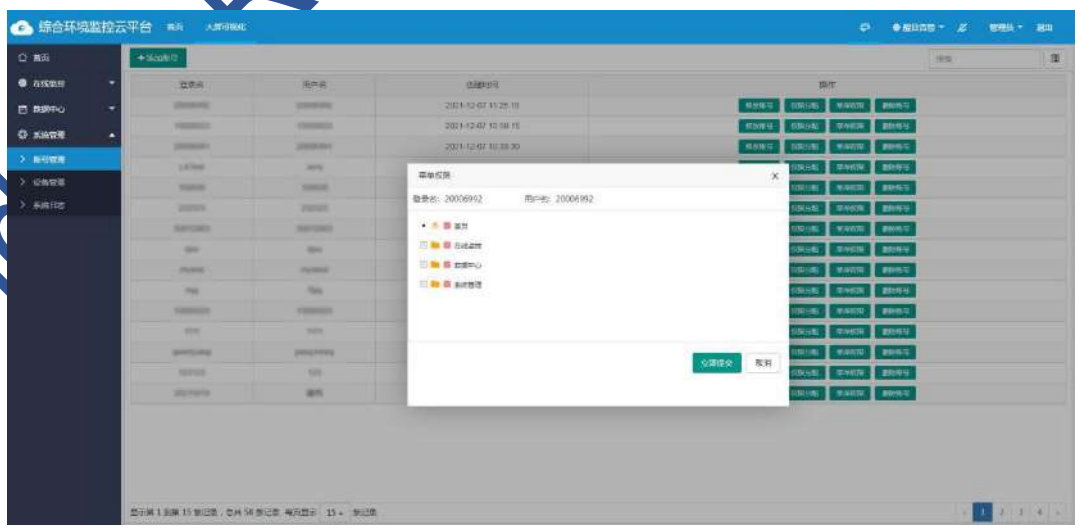
For the actual needs of the project to set up additional sub-accounts and assign different management rights to achieve a clear division of labor in project management, users can define different user roles, and give the role of different rights management.



【Account Management】



【Administrator Permission Setting】



【Administrator Menu Permissions】

4.2.8 Secondary Development

Provide API interface based on this platform to facilitate real-time data retrieval by third-party platforms.

4.2.9 Different display interfaces

For small-scale application users, the cloud platform provides configurable "different interface" interface and private domain name resolution services, customers only need to invest a few of dollars to buy a domain name, after the successful filing, they can have their own private login link, and the login interface platform name can be changed according to user requirements.

4.2.10 APP Client

For the convenience of customers, our company launched the cloud platform mobile APP "cloud control pass", convenient for users 24 hours real-time monitoring. You can log in the cloud platform through the account password and control thousands of devices with one click. Support video view, equipment failure / abnormal alarm, support offline alarm function, real-time data view, historical data curve view, also can connect Bluetooth printer for data printing.