Source–Grid Side Large-Scale Energy Storage EMU900 detailed introduction

Detailed Introduction

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CATALOG

1. EMS Technical Requirements

The utility-scale energy storage EMS mainly consists of modules for PCS, BMS, battery cells, equipment monitoring, report analysis, auxiliary control, centralized control, load tracking, alarm history, and configuration management. It supports real-time data acquisition and coordinated control of energy storage, photovoltaic generation, and load systems.

1.1. Overall Features

The equipment configuration and functional requirements of the Energy Management System (EMS) are designed for unattended operation of commercial and industrial energy storage stations.

The EMS monitoring scope for commercial and industrial energy storage stations includes batteries, Power Conversion Systems (PCS), transformers, air-conditioning systems, fire protection systems, switchgear, and other equipment. Battery information includes individual cells, battery clusters, and battery racks. PCS information includes operating status, voltage, current, active power, and other parameters.

The EMS provides the following key functions:

(1) Real-time monitoring of all station equipment, including real-time status monitoring, operating data recording, and historical data queries.

(2) Support for energy control strategies, including scheduled and constant-power charging and discharging, to achieve peak-valley arbitrage and peak shaving and valley filling.

(3) Coordinated control of the Battery Management System (BMS), including BMS alarm acquisition and PCS power derating or shutdown, to ensure safe and reliable battery operation.

(4) Real-time data acquisition and coordinated control of energy storage, photovoltaic generation, and loads, supporting end-to-end rapid coordinated control within 30 ms.

(5) External communication functions, including data transmission to the cloud through a local switch or the built-in 4G/5G module. The system supports local data buffering and breakpoint-resume transmission.

(6) Cloud-based data access and mobile-phone viewing.

1.2. Operating Rules

Overall Operation Principles for Energy Storage Systems：

(1) The charging and discharging power of the energy storage system shall be controlled to maximize the benefits of peak shaving and valley filling, prevent reverse power flow to the grid, and avoid transformer overload during charging.

(2) During nighttime valley-price periods, or daytime shoulder-price periods when the load is relatively low, the EMS controls the energy storage PCS to charge according to the battery SOC. During peak-price periods, the energy storage system discharges.

(3) When the load power is less than or equal to the maximum discharge power of the energy storage system, the EMS controls the PCS discharge power to remain less than or equal to the load power.

(4) When the load power is greater than or equal to the maximum discharge power of the energy storage system, the EMS controls the PCS discharge power to reach its maximum discharge power.

(5) When the load changes suddenly, the EMS tracks the load power in real time and controls the charging and discharging power of the energy storage PCS to ensure that the discharge power is not fed back into the grid.

AGC/AVC Coordinated Operating Rules

(1) When the grid-connection conditions are satisfied and the system is in the “in-service” state, the energy storage system can receive AGC/AVC commands from the dispatch center. AGC is responsible for active-power regulation, while AVC is responsible for reactive-power and bus-voltage regulation.

(2) AGC active-power commands shall be executed while satisfying the peak-shaving and valley-filling logic, anti-reverse-power requirements, SOC limits, and the upper and lower limits of the equipment. The EMS may limit or modify AGC commands, or automatically distribute them among multiple PCS units according to their available capabilities.

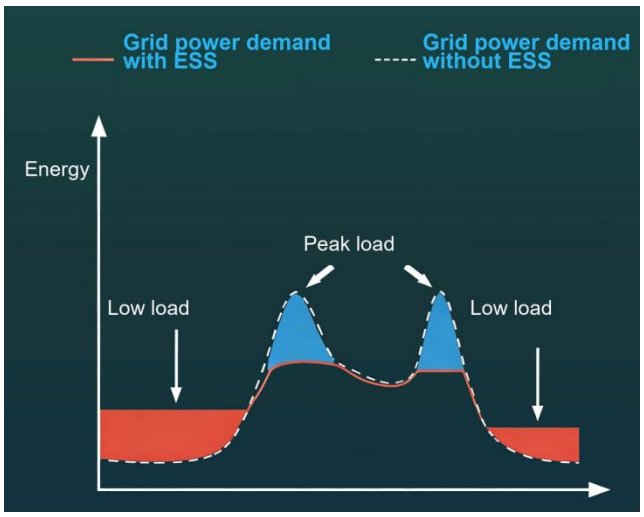
(3) AVC reactive-power/voltage commands shall comply with the overall station ' s reactive-power regulation capability, upward/downward regulation blocking status, and grid limitations. The EMS automatically calculates the required reactive-power adjustment according to the target and distributes it to each PCS.

(4) When AGC/AVC commands conflict with the local peak-shaving and valley-filling strategy, the EMS shall prioritize equipment safety, reverse-power protection, and SOC safety. The commands may be limited or rejected, and the reasons shall be recorded.

(5) In AGC/AVC mode, if an overall accident signal, upward/downward regulation blocking condition, PCS fault, SOC limit violation, or other abnormal condition occurs, the system shall automatically exit the corresponding regulation direction and maintain a safe output.

The specific application scenarios include the following:

1.2.1. PV-Storage-Charging – Peak Shaving and Valley Filling



Time Interval	Strategic Operation	commercial value
Low point	charge	Low-cost energy storage
Standard section	Let stand	Maintain base load
peak	discharge	Selling stored electricity at a premium price
spike	discharge	Maximize revenue per kilowatt-hour

Set peak and off-peak usage periods along with corresponding charging and discharging power levels to reduce electricity costs by leveraging the price differential between peak and off-peak hours.

(1) When the PV power exceeds the load and there is excess electricity, and the battery SOC is below 90% (adjustable), the excess PV power is used to charge the battery.

(2) During charging (battery priority):

1) When PV power ≥ maximum battery charging power and battery SOC <90% (adjustable): The DCDC converter is turned on (the PV system prioritizes charging the battery; the load is powered by both the grid and the PV system). When battery SOC ≥ 90% and the total battery SOC <98%, the battery stops charging; the control logic sets PV ≤ Load (the battery stops charging; the load is powered by both the PV system and the grid). When battery SOC ≥ 98%, the DCDC converter is turned off (the battery stops charging; the load is powered by both the PV system and the grid).

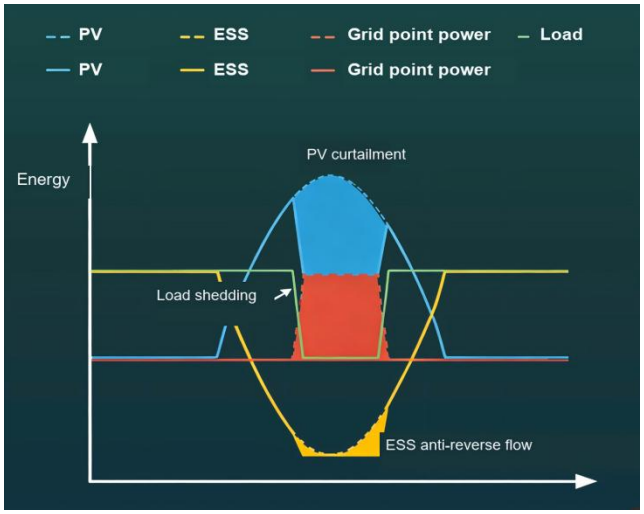
(3) During discharge (load priority):

1) When the PV power exceeds the load power and the battery SOC is below 90% (adjustable), the DCDC converter is activated to charge the battery with the excess power; when the battery SOC is ≥90% and the total battery SOC is <98%, and the PV power is limited to ≤ load power while the total battery voltage is ≥894 V, the DCDC converter is deactivated.

2) When the PV power is less than the load power, energy storage-based power

generation is activated to supplement the grid supply, with both the energy storage system and the PV system contributing to powering the grid; when the battery State of Charge (SOC) falls below or equals the minimum discharge threshold (adjustable), the energy storage system ceases generating power, and the grid is powered solely by the mains electricity and the PV system.

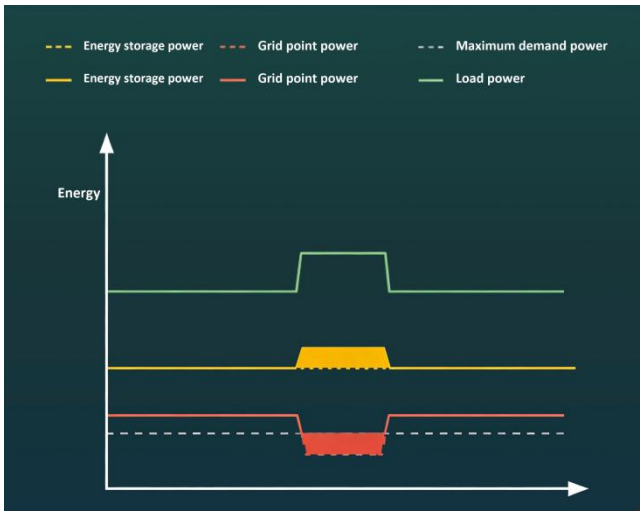
1.2.2. Reverse Flow Prevention



Real-time monitoring of the meter data at the grid interconnection point, with dynamic adjustment of the energy storage system to prevent the site from feeding energy back into the grid.

During the energy storage discharge cycle, the EMS monitors the power measured by the point-of-interconnection meter. When the meter power is less than or equal to the anti-reverse-power-flow threshold plus the lower deadband limit, the EMS reduces the energy storage discharge power to maintain the meter power at the configured anti-reverse-power-flow threshold.

1.2.3. Prevent Excess Demand

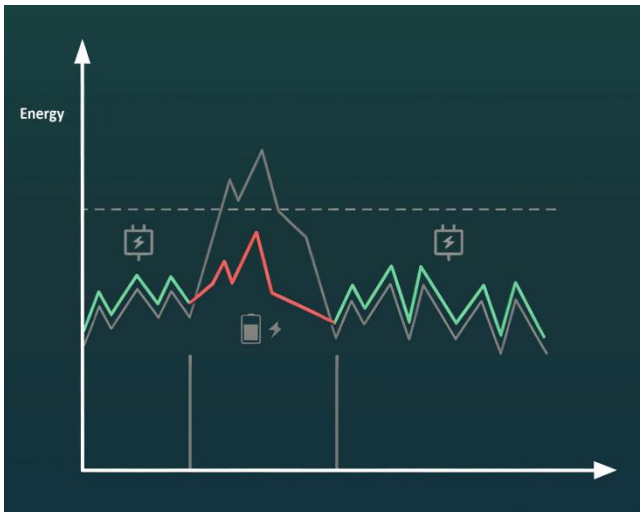


Use energy storage technology to balance electricity supply and demand, preventing power demand from exceeding supply capacity during peak periods. Excess electricity is stored when demand is low and released when demand is high, ensuring the stability and reliability of the power system.

During the energy storage charging cycle, the EMS monitors the power measured by the point-of-interconnection meter. When the meter power is greater than or equal to the configured over-demand protection threshold plus the upper deadband limit, the EMS reduces the energy storage charging power so that the meter power remains at the configured threshold. If the energy storage system is already idle or on standby and the meter power remains greater than or equal to the configured over-demand protection threshold plus the upper deadband limit, the EMS reduces the EV charger power to maintain the meter power at the configured threshold.

During the energy storage standby cycle, the EMS monitors the power measured by the point-of-interconnection meter. When the meter power is greater than or equal to the configured over-demand protection threshold plus the upper deadband limit, the EMS reduces the EV charger power so that the meter power remains at the configured threshold.

1.2.4. Dynamic Scaling



The EMS system collects real-time load data using a meter installed on the low-voltage side of the transformer. When the load factor approaches the safety threshold (typically 90% of the rated capacity), the capacity expansion mechanism is triggered.

When the load exceeds the threshold, the Energy Management System (EMS) automatically switches the operating mode:

(1) Discharge supplementation: The Power Conversion System (PCS) discharges during peak demand periods to fill the power grid supply gap.

(2) Reduce charging/standby mode: Pause energy storage charging or lower the charging power to reduce the load on the power grid.

When the load rate falls below the safety threshold, the EMS automatically terminates the expansion mode and resumes the energy storage charging and discharging schedule.

1.2.5. Solar-Storage-Biomass System

The photovoltaic – energy storage – diesel generator hybrid power system combines photovoltaic generation, energy storage, and diesel generators to provide a stable power supply through the coordinated operation of these three energy sources.

The core logic is:

1) Prioritize the use of clean electricity generated by photovoltaic systems; any excess electricity should be stored in energy storage devices for future use;

2) When photovoltaic power output is insufficient or the energy storage system is depleted, a diesel generator is activated as an emergency power source to replenish the supply, ensuring an uninterrupted power supply throughout the entire process – a solution commonly used in scenarios where a stable grid is unavailable or high reliability of power supply is required.

key role:

1) Ensure continuous power supply: Address the intermittency issue in photovoltaic power generation – where generation is available during the day but absent at night, or occurs more frequently on sunny days than on cloudy days.

2) Improve energy efficiency: Prioritize the use of clean photovoltaic electricity; diesel generators should be used only for emergency startup, thereby reducing fuel consumption and carbon emissions.

3) Suitable for off-grid scenarios: Widely used in areas lacking a stable power grid, such as remote regions, base stations, outdoor projects, and islands.

1.2.6. Lighting, Storage & Charging

The photovoltaic–energy storage–charging system is an integrated power supply and charging solution combining "photovoltaics + energy storage + charging"; its core principle lies in the synergistic integration of clean energy and energy storage technologies to provide stable, clean charging services for electric vehicles.

The core logic is:

1) Photovoltaic modules convert solar energy into electrical energy, which is then prioritized for direct supply to charging stations to power vehicles;

2) Excess electrical energy is stored in energy storage systems; when there is insufficient

sunlight, during peak charging demand periods, or when the grid supply is strained, these systems release the stored energy to replenish the power supply. When necessary, they can be connected to the grid for auxiliary power supply – thereby reducing reliance on the conventional power grid while enhancing the flexibility and sustainability of charging services.

key role:

1) Clean charging: Prioritizes solar energy – low-carbon and environmentally friendly.

2) Stable power supply: Energy storage for peak shaving and valley filling – uninterrupted charging.

3) Reduced reliance on the grid: alleviating grid load and expanding charging scenarios

1.2.7. AVC/AGC Configuration

When the grid-connection conditions are met and the energy storage system is in the "AGC/AVC activation" state, it may receive AGC (active power) and AVC (reactive power/voltage) control commands from the dispatch center.

AGC execution requirements: All constraints—including peak shaving and valley filling, no reverse power flow, SOC upper and lower limits, and PCS power upper and lower limits—must be simultaneously satisfied. The EMS will apply amplitude clipping or corrections to the AGC commands, or allocate them based on the combined capacity of multiple PCS units; if the capacity is exceeded or a risk is identified, the command will be trimmed or rejected.

AVC execution requirements: The system must meet conditions such as on-site reactive power regulation capability, voltage limit exceedance, locked-out status, and grid constraints. The EMS calculates the required reactive power/voltage regulation amount based on the target and allocates it to each PCS according to its adjustable capacity.

Synergy and Priority: When AGC/AVC conflicts with local control policies (e.g., peak shaving, counter-flow control, demand overlimit prevention, etc.), the following priority order

shall be applied – Device Safety → No Reverse Power Supply → SOC Safety – to implement power reduction or operation rejection, and the reason for such action shall be recorded.

Abnormal termination: When abnormal conditions occur—such as the appearance of an accident general signal, a PCS fault, SOC exceeding the limit, voltage exceeding the limit, or upper/lower adjustment lockout — the system automatically terminates the corresponding control direction to ensure safe and stable operation.

1.3. Data Acquisition, Display and Storage

(1) The real-time data acquisition and display system monitors the operational status and fault alarm information of all connected devices, including PCS operational data (power, voltage, current, etc.) and their status; BMS operational data (cell voltage, temperature, SOC, etc.) and their status; electric energy meters (forward and reverse active power, reactive power, power factor, voltage, current, etc.); as well as data and status information for system access control, water ingress monitoring, switches, air conditioning systems, fire protection systems, and other equipment (transmitted by the BMS or directly connected via dry contact terminals).

(2) The query displays the operational records of all devices, showing the operational data curves and operational status curves of the devices stored in the database.

(3) Charge/discharge energy statistics can be tracked by time slot, or queried by year, month, or day.

(4) Store fault status information for ≥ 90 days; data collection for one cycle must be completed within 3 seconds.

1.4. System Architecture Design

Scenario Architecture Diagram:

Power & New Energy: Suitable for applications such as power equipment monitoring,

solar power generation systems, wind power generation systems, photovoltaic energy storage and charging stations, and microgrid scenarios; enables remote monitoring and control of energy equipment, thereby improving energy utilization efficiency.

The system architecture diagram is shown below:

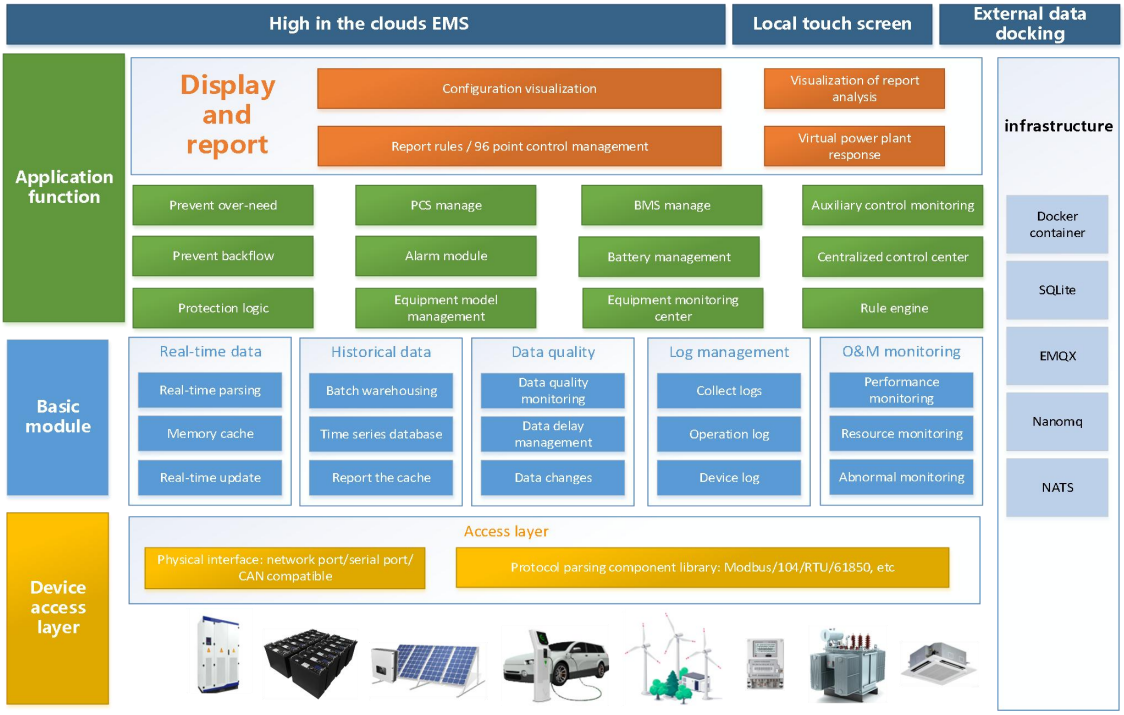


Figure 1-1: Functional Composition Diagram

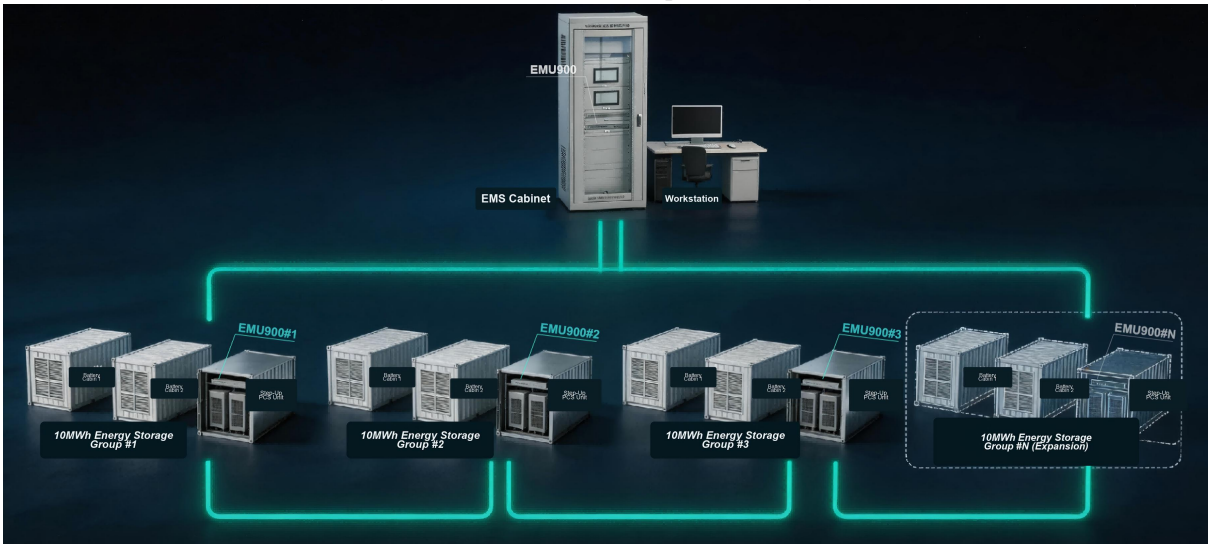
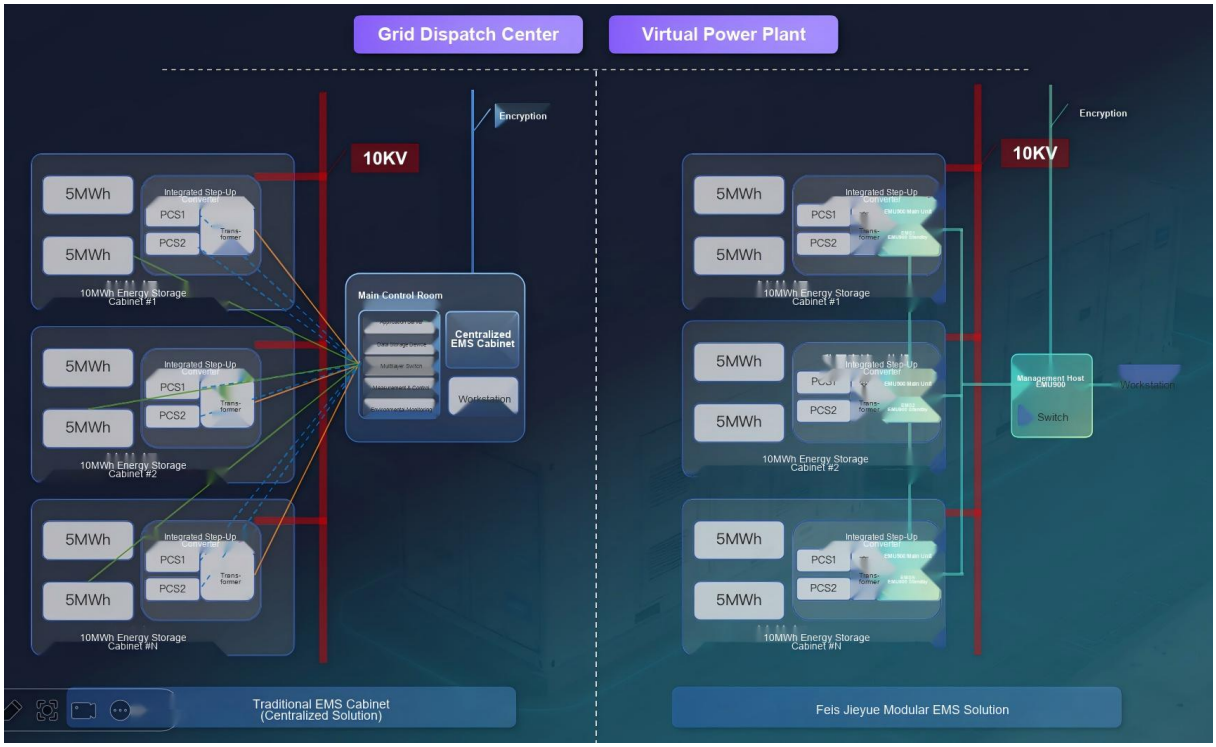


Figure 1-2 – Architecture Diagram

1.5. Innovation Advantage

The system adopts a two-tier distributed modular ring-network architecture featuring

edge autonomy and centralized coordination. Each 10 MWh energy storage group is equipped with an independent EMU900 edge EMS, which performs local BMS/PCS data acquisition and charge/discharge control. The upper-level master controller aggregates site-wide data, coordinates power dispatch among multiple energy storage groups, and exchanges data and dispatch instructions with workstations, virtual power plants, and grid dispatch centers. The solution supports plug-and-play deployment, flexible expansion, and fault isolation, reducing the risk of single-point failures associated with centralized architectures.



2. Java Runtime Environment Java

2.1. Hardware Equipment

EMU900 is a large-scale energy storage control terminal designed for utility-scale energy storage applications of 5 MW and above. Based on a "one EMU900 manages one group of energy storage cabinets" architecture, it enables each energy storage unit to operate, protect, and communicate independently.

The device adopts a recommended domestically sourced solution and is equipped with a

quad-core processor, 4 GB of RAM, and 32 GB of storage, with the RK3562 serving as its core processor. The system uses an ultra-simplified ring network topology: only one Ethernet cable is required to connect the containers in a ring. The EMU900 can connect locally within the container to devices such as the BMS and PCS, reducing the need for long-distance control cables and complex wiring.

The device is pre-installed and pre-commissioned before shipment, allowing it to be put into operation quickly after being connected on site. The overall delivery cycle is approximately 3–6 weeks.

Each energy storage unit operates independently and supports fault isolation. A failure in one unit will not affect the normal operation of other modules. When expanding the project, additional EMU900 units and their corresponding energy storage groups can be added directly, without modifying or cutting over the existing wiring.

The system also supports centralized operation and maintenance from the control room and adopts a maintenance-free in-container design. This significantly simplifies installation, shortens the commissioning period, reduces expansion risks, and lowers long-term operation and maintenance costs.

Product Positioning:

(1) Aggregation and management platform for multiple EMU900 units

(2) Site-level energy management hub for utility-scale energy storage plants

Core Capabilities:

(1) Centralized display of the real-time status of each energy storage unit

(2) Unified issuance of power dispatch strategies

(3) Historical data aggregation, report generation, and SCADA functionality

Key Features:

(4) One unit, one controller: Each EMU900 independently manages one group of energy

storage cabinets, enabling unit-level autonomy.

(5) Built-in switch: Supports fiber-optic ring networking between cabinets, reducing the need for external network switches.

(6) Plug and play: Preconfigured and pre-commissioned before shipment; rapid on-site deployment is possible after power-up and network connection.

(7) Millisecond-level response: Local edge computing enables a target control response time in the 100 ms range according to the solution documentation, with faster response achievable in certain control scenarios.

(8) Fault Isolation:In principle, a failure of a single EMU900 affects only its corresponding energy storage unit and does not impact other modules.

2.2. Environmental Requirements

- Altitude: < 4,000 m
- Ambient temperature (indoor or outdoor) Maximum air temperature: 55°C
- Minimum air temperature: −25°C
- Maximum daily temperature variation: 25°C
- Maximum relative humidity:

  Daily average: 95%

  Monthly average: 90%
- Operating temperature: −30°C to +55°C
- Vibration resistance: Seismic fortification intensity: Level 9 (0.2g)

2.3. Installation Method

Pre-installed within prefabricated containers or outdoor cabinets; standard rack and cabinet installation − 1U height.

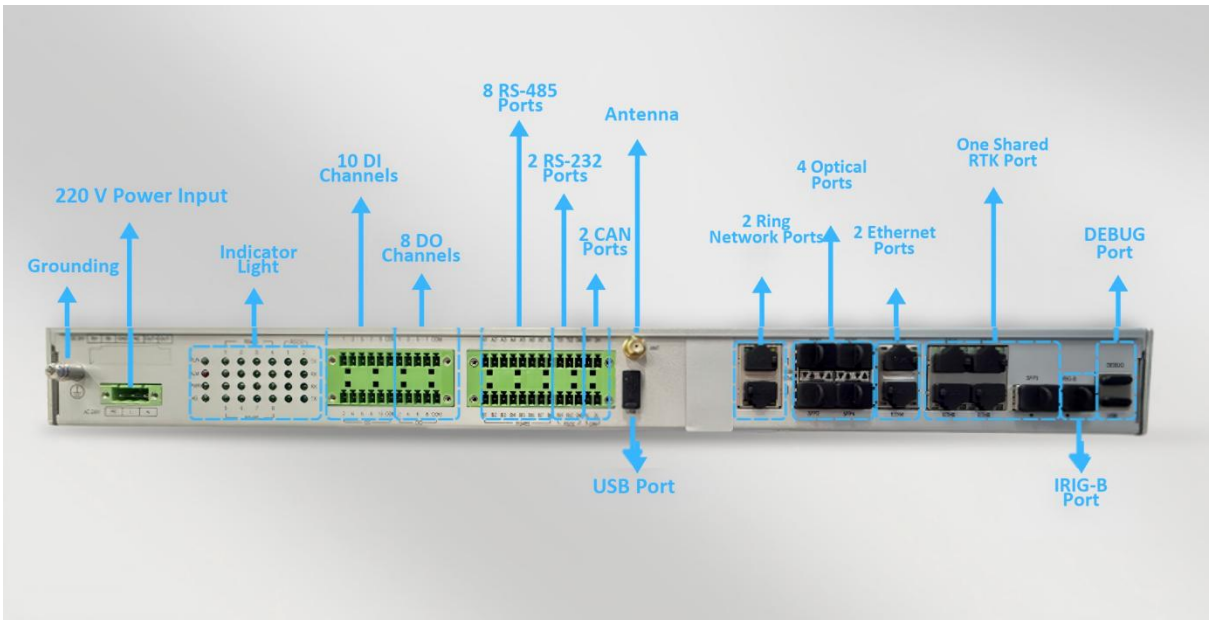
2.4. Support Software

Databases: SQLite, TDengine, Redis

Development languages: Vue, JavaScript, GO

Middleware: EMQX, Nanomq

2.5. Product View



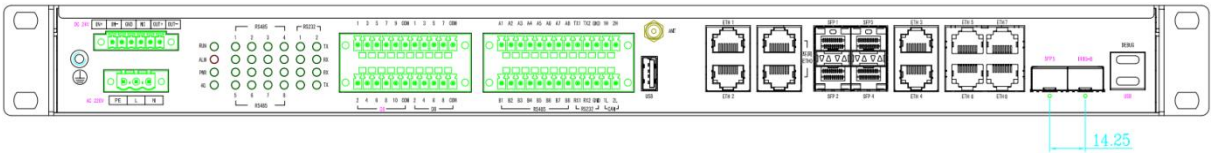
2.6. EMUparameter

2.6.1. EMU900 Hardware Specifications

equipment	elaborate
CPU	ARM core platform; four-core ARM Cortex-A53 processor operating at 2.0 GHz
NPU	NPU computing power: 1 TOPS; supports hybrid INT4/INT8/INT16/FP16/BFP16 operations; enables deployment on TensorFlow. Network model conversion for frameworks such as MXNet, PyTorch, and Caffe.
GPU	ARM Mali-G52-2EE, OpenGLES 1.1,2.0,3.2、Vulkan 1.0,1.1、OpenCL 2.0
FPGA	One XMOS1 chip (expandable to three chips) for rapid SV sampling and GOOSE communication.
RAM	4GB DDR4
memory	32GBeMMC – supports expandable M2 interface hard drives, with a maximum capacity of 1 TB;
Ethernet	Eight external 10/100/1000 Mbps RJ45 Ethernet ports with four indicator lights; three independent IP addresses; optional ring network configuration; the remaining four ports function as a single switch sharing a single IP address; six optical ports – two for Goose-A/B network, two for MMS-A/B network, and two as backup ports.
4G	1x 4G expansion interface (supports standard SIM cards and eSIM cards); 1x

	status indicator light
USB	Bus 1: Used for expanding the mouse and keyboard, or for transferring data between an external USB flash drive.
RS485	10 channels with isolation; including 8 RS485 channels and 2 RS232 channels
CAN	2-channel, with isolation
DI	10-channel, isolated protection design
DO	Channel 8
watchdog	Built-in CPU watchdog
Console	Type-C debugging port
source	Supports AC 220V (1 input) and DC (1 input, 9–36V).
Overall dimensions	Dimensions: 484 × 260 × 44 mm – Suitable for standard 1U cabinet installation.
work environment	Humidity: 5%–95% (no condensation); Operating temperature: –30°C–55°C; Storage temperature: –40°C–85°C

2.6.2. EMU900 Interface Solder Mask Diagram



Since the CPU connected to ETH1 and ETH2 has been removed, ETH1 and ETH2 are now invalid ports. The silk-screen labels ETH0, ETH2, ETH3, and ETH4 on the four electrical ports correspond to the underlying configuration port names eth.0, eth.2, eth.3, and eth.4, respectively; the silk-screen labels SFP1, SFP2, SFP3, and SFP4 on the four optical ports correspond to sfp1–sfp4. The silk-screen labels ETH5–ETH8, together with SFP5, refer to the same RTK port and share a single IP address.

The factory default configuration assigns the IP address 192.168.1.65 to eth.3; therefore, in addition to eth.3, there are seven other network ports that can be freely configured—consisting of three electrical ports and four optical ports.

When performing MMS data collection, depending on the network segment to which the MMS device is connected − whether it requires an electrical or optical port − simply configure the corresponding network port and assign it the same IP address.

3. Function Requirement

3.1. Function List

Primary Menu	Secondary Menu	Tertiary Menu / Function	Quaternary Menu	Function Description
Station Overview		Basic Station Information Display		Displays station rated power, installed capacity, PCS/BMS quantity, grid-connection information, SOC/SOH and other key parameters
		Equipment Information Monitoring		Displays real-time operating status and key data of PCS, BMS, auxiliary-control and other equipment
		Operation / Generation / Revenue Data Visualization		Uses charts to display trends in operating power, charge/discharge energy, revenue and other data
PCS		PCS Equipment Information Management		Selects a specific PCS device to view communication status, operating status and other basic information
		PCS Alarm Management		Includes real-time alarm display and historical alarm query functions
		AC/DC-side Parameter Monitoring		Monitors DC-side total voltage/current, AC-side phase voltage/current, active power and other electrical parameters
BMS		Cluster-level Real-time Information Monitoring		Monitors key indicators such as battery-cluster SOC, SOH and current; supports switching between different BMS devices
		Cluster Energy Statistics		Counts battery-cluster charge/discharge energy by week/month
		Cluster Extreme-value Monitoring		Displays extreme values such as maximum/minimum voltage and temperature of the battery cluster
		Cell-level Data Monitoring		Supports viewing detailed voltage, temperature, SOC, SOH and other data for all cells in each PACK
Cells		Cell Data Details		Views real-time voltage, temperature, SOC, SOH and other data for each cell
Auxiliary Control Monitoring		Liquid-cooling System Monitoring		Displays measurement points and event records of liquid-cooling equipment and monitors its operating status
Alarm Analysis		Event Level / Status Analysis		Performs statistical analysis of event levels and statuses;

Primary Menu	Secondary Menu	Tertiary Menu / Function	Quaternary Menu	Function Description
				supports multi-condition alarm record queries
Alarm Configuration		Alarm Rule Management		Supports adding and deleting alarm rules and setting rule name, alarm level, enabled status and other parameters
Electricity Cost Configuration		Electricity Price Settings		Configures time and price templates by season/month; supports setting effective year and issuing configurations
		Time / Price Template Management		Creates and maintains time and price templates to support electricity-price strategy configuration
Data Analysis	Report Analysis	Daily Total Energy Meter Query		Supports daily total energy-meter and other report queries; allows custom time ranges and displays revenue and other data
	Load Tracking	Power Curve Tracking		Queries historical curves for the grid-connection point, revenue meter and load power; supports data export
Operating Strategies	Strategy Management	Anti-backfeed Strategy		Monitors grid-inlet meter data and dynamically regulates the energy-storage system to prevent reverse power flow to the grid
		Demand-control Strategy		Balances power supply and demand through energy storage: charges during low demand and discharges during high demand to maintain grid stability
		Peak Shaving and Valley Filling Strategy		Sets peak/valley periods and corresponding charge/discharge power to reduce electricity costs through price differences
		Safety Configuration Strategy		Handles customized source-grid-load-storage control logic for scenarios not covered by other fixed strategies
		Reactive Power Compensation Strategy		Optimizes grid power factor and improves power quality and energy-use efficiency
		Dynamic Capacity Expansion Strategy		Dynamically adjusts station power-supply capability to address growing load demand
		Microgrid Strategy		Achieves energy autonomy and supply-demand balance within the microgrid and improves power-supply reliability
		Scheduled Full-charge Strategy		Periodically charges the battery to a specified threshold for SOC calibration and other scenarios
	Strategy History	Strategy Execution Record Query		Views strategy name, execution type, content, time and result;

Primary Menu	Secondary Menu	Tertiary Menu / Function	Quaternary Menu	Function Description
				supports paging and filtering
	Smart Temperature Control	Temperature-control Parameter Configuration		Configures cooling/heating start-stop temperatures during idle/working periods, full-condition cycle temperature difference, advance run time and other parameters
	Operating Mode	Local Mode		Runs local strategies autonomously and displays the strategy details executed in this mode
		Debug Mode	Group Control	Stops strategy execution and issues control commands to all cabinets in the station with one click
		Debug Mode	Individual Control	Stops strategy execution and issues a control command to a single cabinet in the station with one click
		Proxy Mode		Has no autonomous strategy-control capability; only receives upper-level dispatch commands and displays the dispatch content
		VPP Mode		Prioritizes upper-level dispatch commands; runs local strategies autonomously when no dispatch is received
		AGC/AVC Mode	AGC / Active Power Control	Responsive frequency regulation (secondary frequency regulation): receives target active power dispatched by upper-level commands and outputs active power
				Automatic frequency regulation (primary frequency regulation): monitors grid frequency at the grid-connection point and automatically outputs active power
			AVC / Reactive Power Control	Responsive voltage regulation (secondary voltage regulation/power factor): receives target reactive power dispatched by upper-level commands and outputs reactive power
				Automatic voltage regulation (primary voltage regulation/power factor): monitors three-phase voltage/power factor at the grid-connection point and automatically outputs reactive power

Primary Menu	Secondary Menu	Tertiary Menu / Function	Quaternary Menu	Function Description
		Peak Shaving and Valley Filling Period Configuration		Sets start/end times, charge/discharge mode and power for peak shaving and valley filling
		Safety Parameter Configuration		Configures safety thresholds such as SOC upper/lower limits, maximum charge/discharge power and cell-voltage limits
	Host Configuration	Host Status Monitoring		Monitors host and slave operating status, power, SOC/SOH and other key indicators
		Host/Slave Management		Supports host switching, slave configuration and status monitoring
	EMU Monitoring	Energy Management Unit Monitoring		Monitors CPU/memory/disk utilization of the local unit and operating parameters of acquisition devices
Equipment Management	Equipment Analysis	Equipment Measurement-point Data Monitoring		Selects equipment type and measurement points to query real-time operating status, faults, voltage, current and other data; supports export
	Equipment Registry	Equipment Registry Management		Manages equipment codes, names, types, groups and other basic information; supports adding, editing, deleting, importing and exporting
	Equipment Models	Equipment Model Management		Manages model information for PCS, BMS, liquid-cooling and other equipment; supports model CRUD and import/export
	Equipment Groups	Equipment Group Management		Supports adding/deleting equipment groups and creating subgroups for classified equipment management
	Real-time Control	Remote Equipment Control		Performs real-time remote start/stop and mode switching for energy-storage meters and other equipment; supports viewing/control mode switching
	Control History	Control Record Query		Views historical equipment-control records, including equipment name, issue type, time, control status and details; supports paging and filtering
System Settings	User Management	User Information Management		Manages login name, name, mobile number, enabled status and other information; supports adding, editing, password reset and search
	Audit Log	Operation Log Query		Records and queries user system operations, including login

Primary Menu	Secondary Menu	Tertiary Menu / Function	Quaternary Menu	Function Description
				name, user, IP, operation content and time; supports multi-condition filtering
	Station Information	Basic Station Configuration		Configures project name, commissioning/grid-connection date, address, station type, rated power, PCS/BMS quantity and other key information; supports editing
		System Parameter Configuration		Configures basic settings such as system users, permissions and communication parameters

3.2. Energy Storage Function

The power station overview displays information on the power station, including operational power, equipment details, power generation, and revenue. Equipment details include PCS, BMS, and auxiliary control information. Revenue statistics are displayed on a weekly, monthly, and yearly basis, allowing users to switch between these views. The central part of the page shows configuration information and corresponding equipment location details, as shown in Figure 3-1.

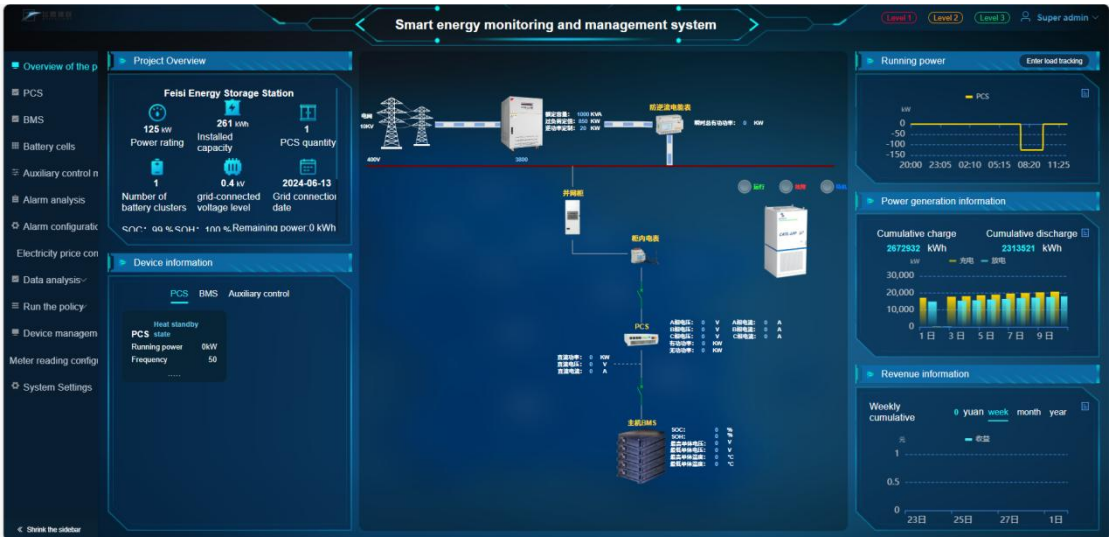


Figure 3- 1 Project Overview

3.2.1. PCS

The module displays basic information such as PCS information, equipment status, manufacturer, equipment model, battery cluster, number of batteries, battery specifications,

and rated power. It shows active and reactive power. On the DC side, it displays total voltage and total current. For AC measurement, it shows voltage, current, active and reactive power, apparent power, and frequency. The left side of the module displays real-time and historical alarm information for the PCS, as shown in Figure 3-2.

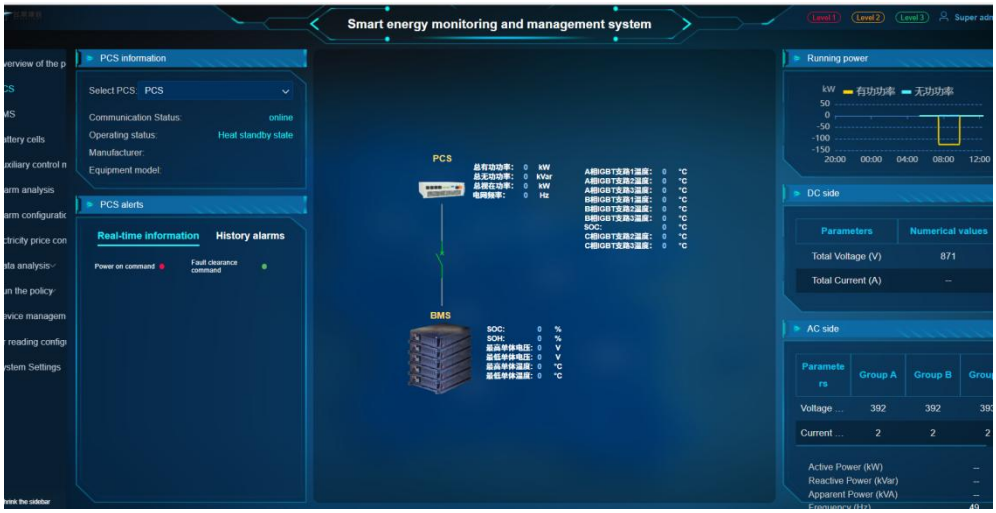


Figure 3- 2 PCS

3.2.2. BMS

The BMS Battery Manager module displays the status of battery clusters, battery health, and remaining power. It also shows cluster extreme values, including the highest and lowest voltages, temperatures, SOC, and serial numbers. In the lower left corner, it displays cluster power information, including statistics on charge and discharge. Users can click to switch between daily, weekly, and monthly statistics. In the lower right corner, it displays historical alarm information, such as low battery voltage and excessive current discharge. The middle section shows the real-time status of the equipment in a configuration format, as illustrated in Figures 3-3.

Figure 3- 3 BMS Main Interface

3.2.3. Battery

The battery page mainly displays the cell information. Users can view the real-time voltage, temperature, SOC and SOH measurement point information, as shown in Figure 3-4 and Figure 3-5.

Figure 3- 4 Battery Data

Figure 3- 5 Historical data

3.2.4. Auxiliary Control Monitoring

The auxiliary control mainly displays and detects auxiliary control equipment, such as air conditioning, liquid cooling units, comprehensive protectors and other equipment. It also checks measurement points, alarm records and other information, as shown in Figure 3-6.

Figure 3- 6 Auxiliary Control Information

3.2.5. Alarm Analysis

The alarm analysis module displays all alarm records of the project, categorizing them by level: critical, major, severe, and urgent. It also provides detailed information on each alarm, including the device name, alarm level, event description, occurrence time, creation

and recovery times, and time status. The module allows users to manually confirm alarm records, filter records based on specific conditions, and view records in a paginated manner, as shown in Figure 3-7.

Figure 3- 7 Alarm History

3.2.6. Alarm Configuration

The alarm configuration adds rules to determine whether the point condition meets the trigger condition and generates an alarm record, as shown in Figure 3-8.

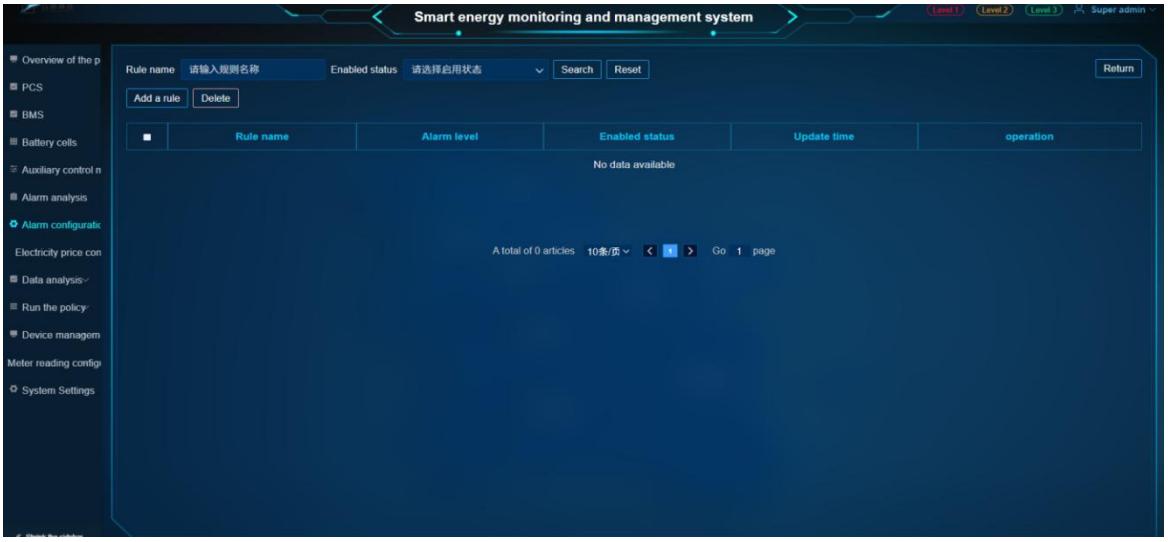


Figure 3- 8 Alarm Configuration

3.2.7. Electricity Tariff Configuration

3.2.7.1. Electricity Price Setting

The price setting is used to set and manage the price information of different months, including time template and price template. The price situation in different periods is displayed intuitively in a graphical way, as shown in Figure 3-9.

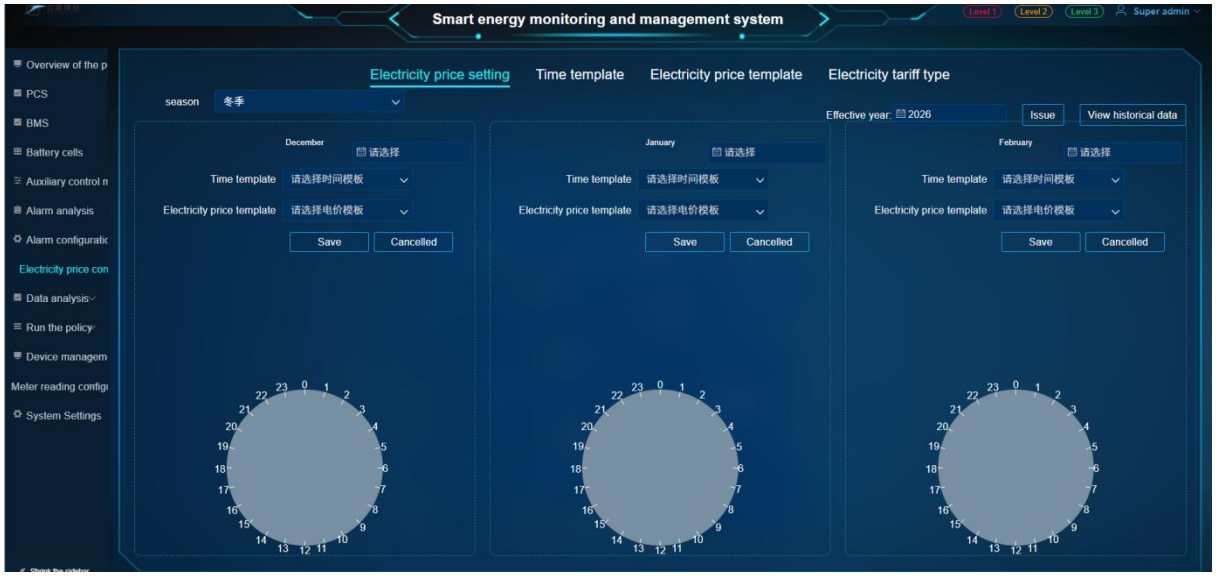


Figure 3- 9 Electricity Price Setting

3.2.7.2. Time Template

The time template facilitates the creation, editing and management of electricity price periods according to the type of electricity price. As shown in Figure 3-10.

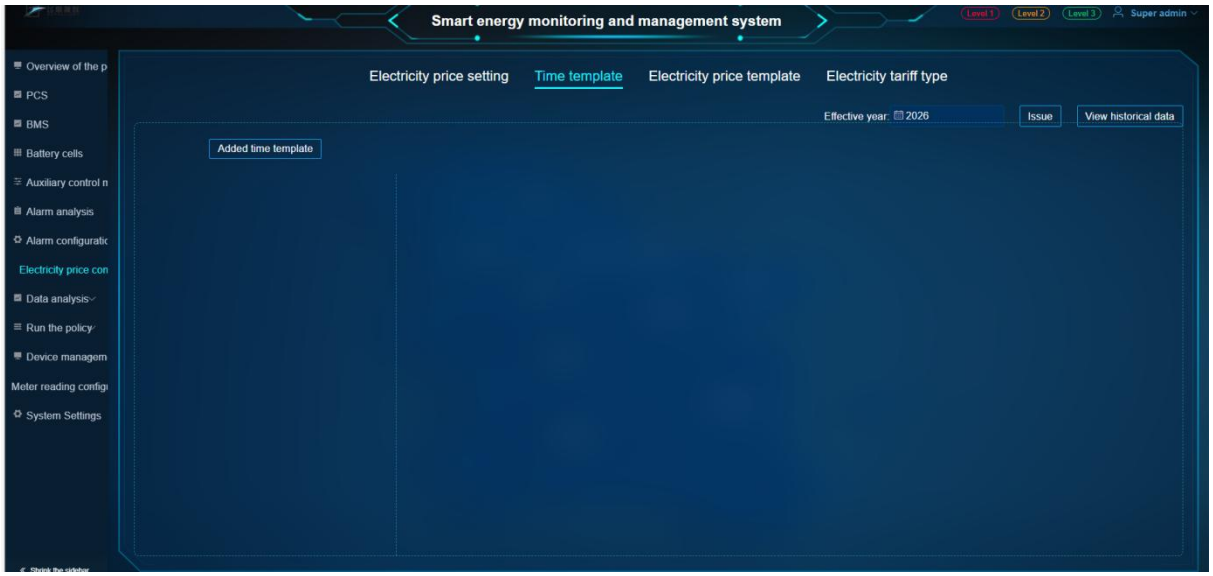


Figure 3- 10 Time template

3.2.7.3. Electricity Price Template

The electricity price template creates, edits and manages specific electricity price information according to the type of electricity price. As shown in Figure 3-11.

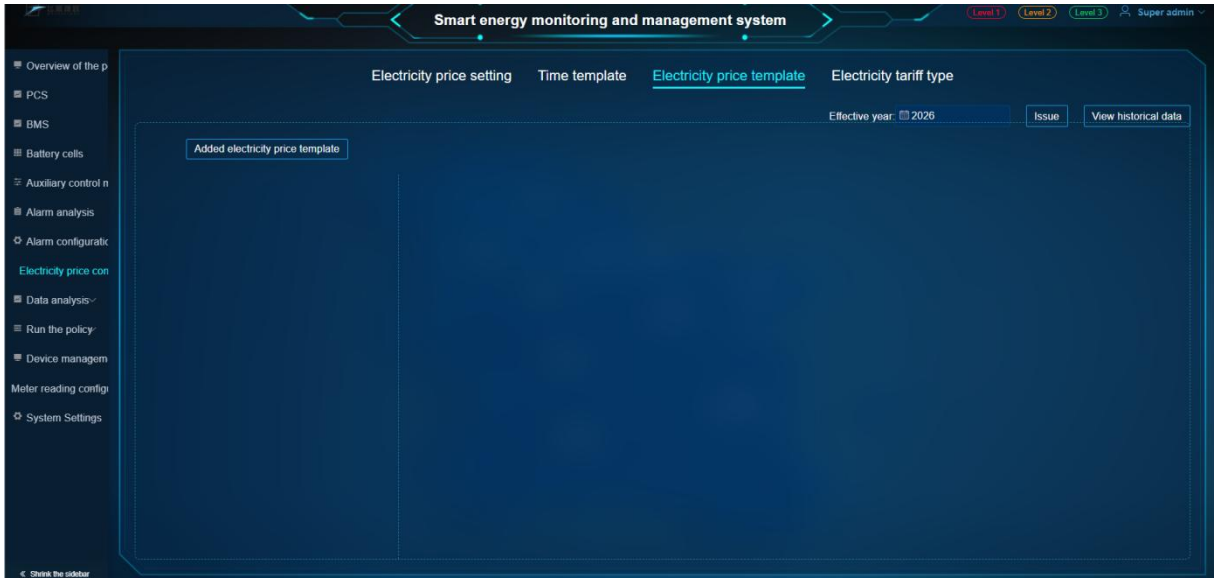


Figure 3- 11 Electricity Price Template

3.2.7.4. Type of Electricity Price

Customize and manage the name and color of the electricity price type, which is convenient to display in the electricity price setting, time template and electricity price template. As shown in Figure 3-12.

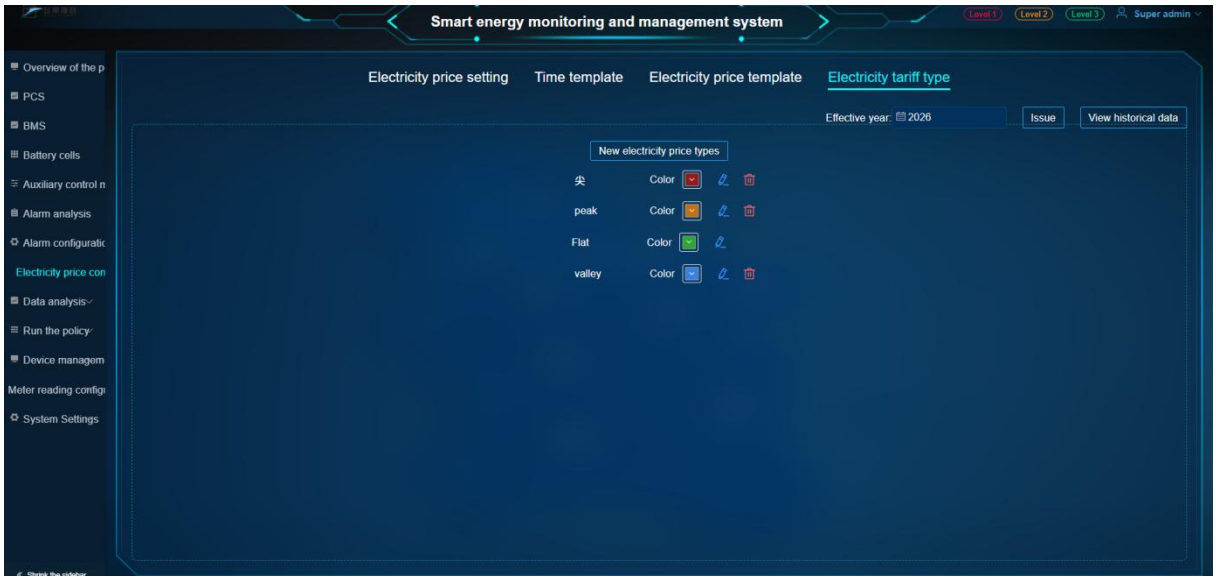


Figure 3- 12 Type of Electricity Price

3.2.8. Data Analysis

3.2.8.1. Statement Analysis

Users can view the charging current and discharge current information of day and month. Charging is divided into forward active total, peak, peak, flat and valley energy, and discharge is reverse active total, peak, peak, flat and valley energy, as shown in Figure 3-13.

Date	pointed		peak		Flat		valley		Revenue (yuan)
	Charging volume	Discharge volume	Charging volume	Discharge volume	Charging volume	Discharge volume	Charging volume	Discharge volume	
2026-02-10	9.00	285.00	131.00	10588.00	1149.00	7073.00	19451.00	0.00	0.00
2026-02-09	9.00	285.00	128.00	10335.00	1146.00	6990.00	19065.00	0.00	0.00
2026-02-04	9.00	285.00	115.00	9066.00	1134.00	6271.00	16796.00	0.00	0.00
2026-02-03	9.00	285.00	113.00	8815.00	1131.00	6268.00	16507.00	0.00	0.00
2026-02-08	9.00	285.00	125.00	10082.00	1144.00	6880.00	18651.00	0.00	0.00
2026-02-07	9.00	285.00	123.00	9829.00	1141.00	6841.00	18316.00	0.00	0.00
2026-02-06	9.00	285.00	120.00	9574.00	1138.00	6588.00	17737.00	0.00	0.00
2026-02-05	9.00	285.00	118.00	9320.00	1136.00	6512.00	17360.00	0.00	0.00
2026-02-02	-64.00	0.00	4.00	505.00	-153.00	-200.00	505.00	-52.00	0.00
2026-02-01	73.00	285.00	106.00	8060.00	1281.00	6465.00	15713.00	52.00	

Figure 3- 13 Statement Analysis

Provide detailed monitoring and analysis of energy load in the form of charts to help users understand energy consumption patterns, optimize energy use strategies, and improve energy efficiency. See Figure 3-14.

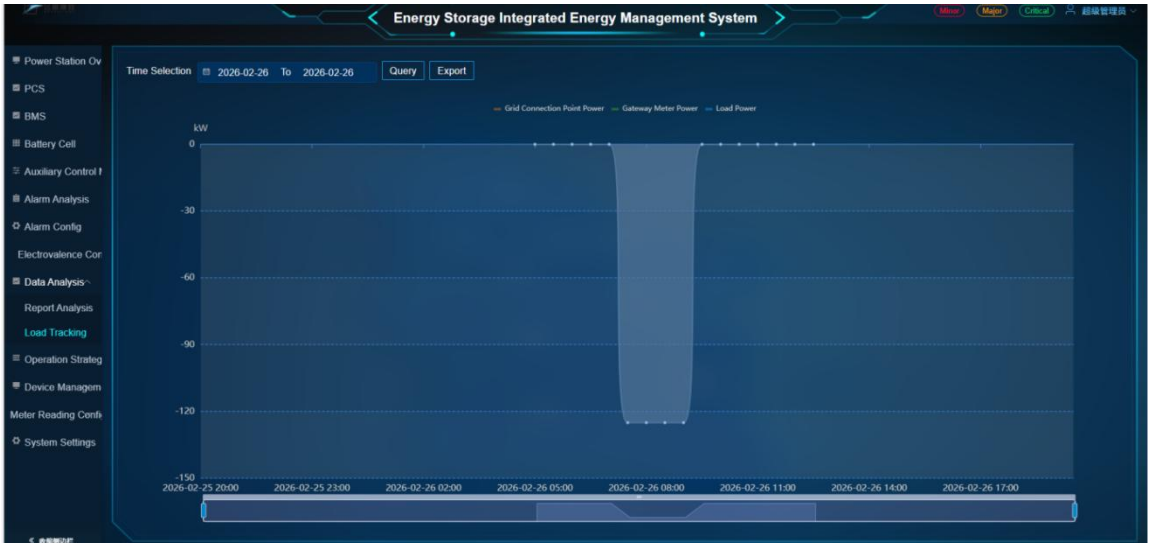


Figure 3- 14 Load following

3.2.9. Operational Strategy

3.2.9.1. Strategy Management

Strategy configuration shows the usage scenarios and functions of various strategy configurations in the system by combining graphics and text, as shown in Figure 3-15.

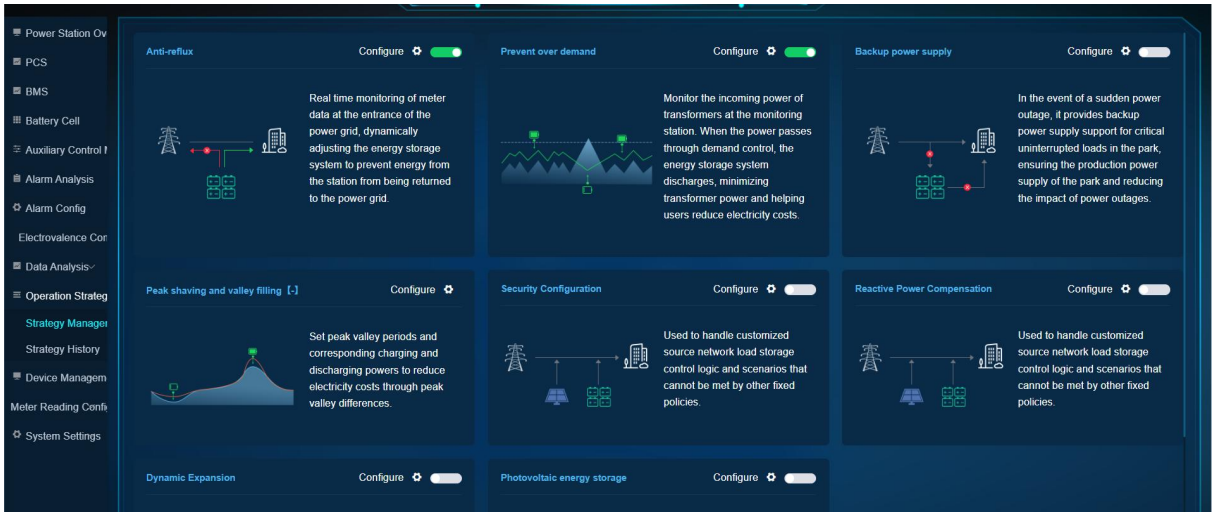


Figure 3- 15 Strategy Management

3.2.9.2. Strategy History

The history is issued to record and query the historical records of policy issuance, so that users can track the policy issuance and know whether the policy has been successfully issued to the specified device. As shown in Figure 3-16.

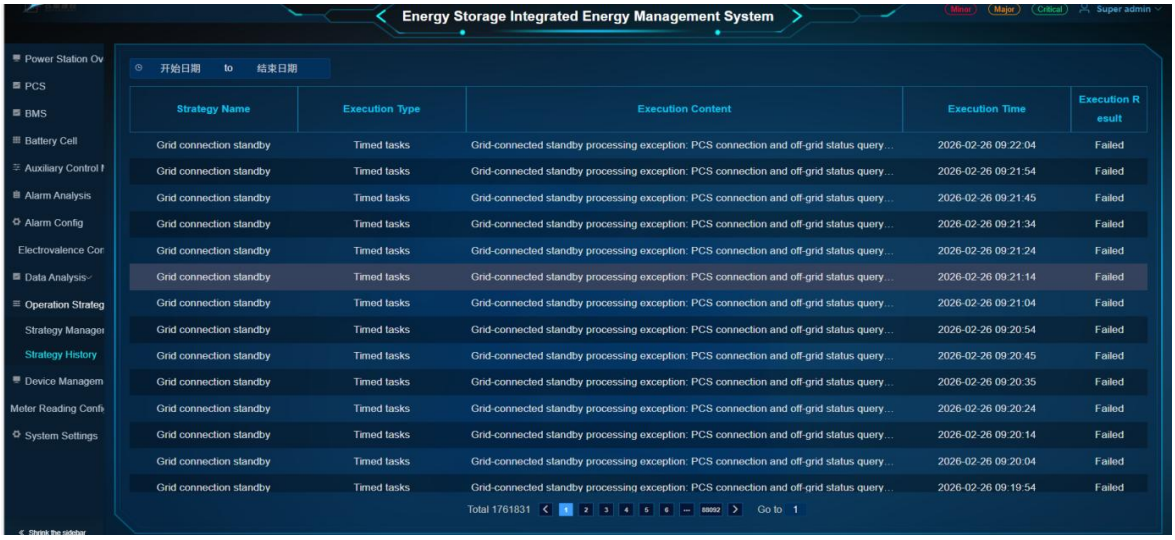


Figure 3- 16 Strategy History

3.2.9.3. Smart Temperature Control

The Intelligent Temperature Control Configuration Interface allows users to set the start/stop temperature thresholds for the cooling and heating equipment of the energy storage system during both idle and operational periods; it also enables the configuration of parameters such as the full operating cycle temperature difference and the advance runtime

duration for the temperature control equipment. Users can activate the control strategy by turning on the status switch and manage the configuration using the Save and Reset buttons. Its primary function is to precisely regulate battery temperature, ensuring the safe and efficient operation of the system. See Figure 3-17 for details.

Figure 3-17 Smart Temperature Control

3.2.9.4. Running Mode

1. Local Mode

The Local Mode Configuration Interface, available in operational mode, is used to configure key parameters for the energy storage system when it is operating locally. Users can set power thresholds and deadband parameters to prevent backflow or excessive demand, define the charging and discharging periods and power levels for peak shaving and valley filling, and manage safety parameters such as SOC upper and lower limits as well as maximum charging and discharging power. Through these configurations, the system can achieve precise scheduling and robust safety protection for the local operation strategy of the energy storage station. See Figure 3-28.

Figure 3-18 Local Mode

2. Debugging Mode

The Operation Mode Debugging Configuration Interface is designed for debugging and controlling the core equipment of the energy storage system. Under either Group Control or Single Control mode, users can issue commands to the PCS – such as fault clearing, power-on/off operations, grid connection/disconnection, and power target setting – and can monitor the PCS's operating status and power data in real time; simultaneously, users can issue commands to the BMS – including fault clearing and circuit breaker opening/closing operations – and monitor key parameters such as SOC and operating status in real time. Through these operations, precise debugging and state monitoring of the energy storage system can be achieved. As shown in Figure 3-19.

Figure 3-19 Debugging Mode

3. Proxy Pattern

The Proxy Mode Scheduling History Interface, displayed in operating mode, shows the scheduling history of the energy storage system under proxy mode. Users can view information such as scheduling source, scheduling time, scheduling content, scheduling result, and scheduling details; this interface supports paginated browsing. Through this page, system scheduling activities can be traced, aiding operations and maintenance personnel in analyzing scheduling execution status and system operating conditions. As shown in Figure 3-20.

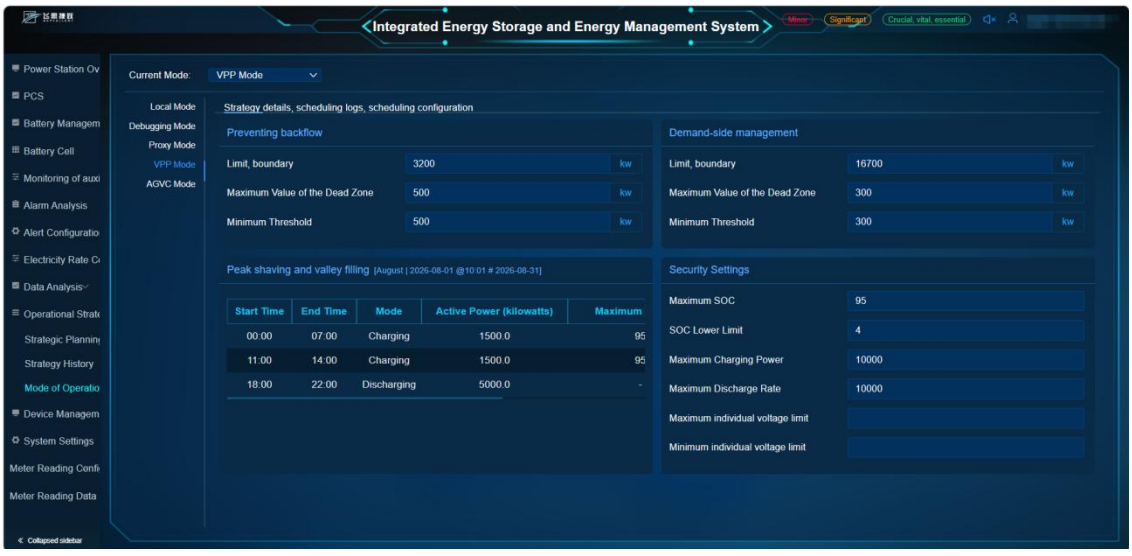


Figure 3-20 Proxy Pattern

4. VPP pattern

The VPP Mode Configuration Interface, used for configuring operational strategies under the Virtual Power Plant (VPP) mode, allows users to set power thresholds and deadband parameters for backflow prevention and over-demand protection; configure charging/discharging periods, power limits, and upper SOC limits for peak shaving and valley filling; and manage safety parameters such as upper and lower SOC limits as well as maximum charging/discharging power. Through these configurations, the system can participate in grid dispatching, enabling the optimized operation and secure protection of the energy storage station. As shown in Figure 3-21.

Figure 3-21 VPP Mode

1. AGVC pattern

The AGVC mode configuration interface in operating mode is divided into two sub-modules: AGC active power control and AVC reactive power control.

In the AGC Active Power Control Module, users can perform signal operations such as activating or deactivating the AGC substation, as well as switching between remote and local modes; they can also configure parameters including the active power target value, active power output upper and lower limits, adjustment rate, and maximum variation range, and can monitor real-time data such as active power output boundaries and total active power; see Figure 3-22 for details.

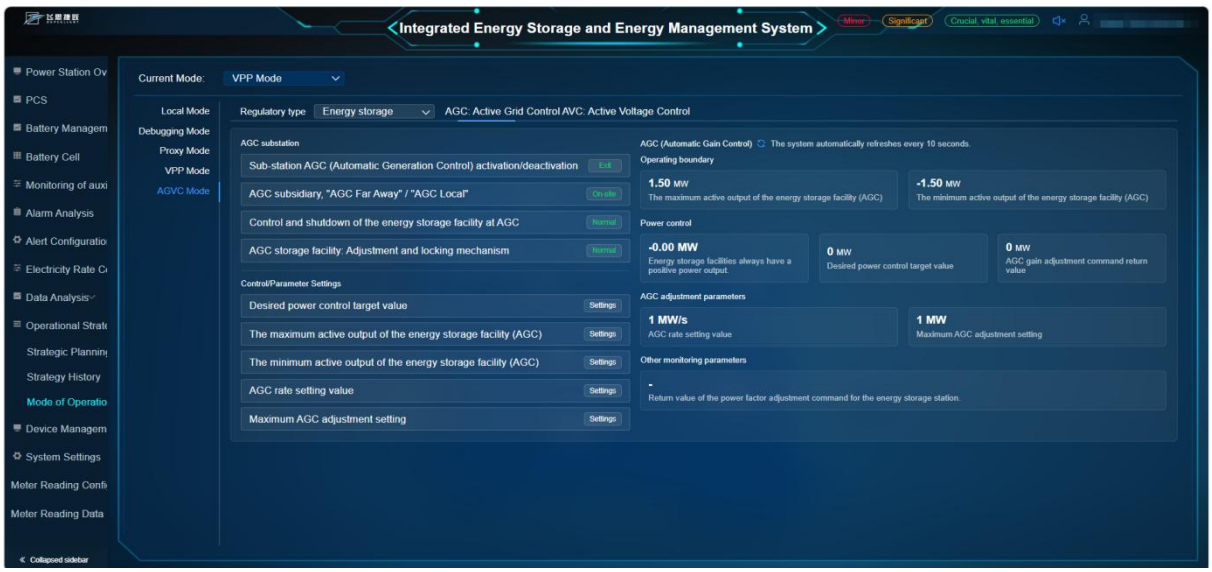


Figure 3-22 AGC Active Power Control

In the AVC Reactive Power Control Module, users can perform signal operations such as activating or deactivating the AVC substation, as well as switching between remote and local control modes; they can also configure parameters including the reactive power target value, bus voltage target value, the adjustable upper and lower limits for reactive power across the entire substation, and the power factor; additionally, users can monitor in real time data such as the reactive power regulation potential, bus voltage, and power factor. This is illustrated in Figure 3-23.

Through these configurations, the system enables precise regulation of both active and reactive power in energy storage stations, thereby meeting the requirements of grid dispatching.

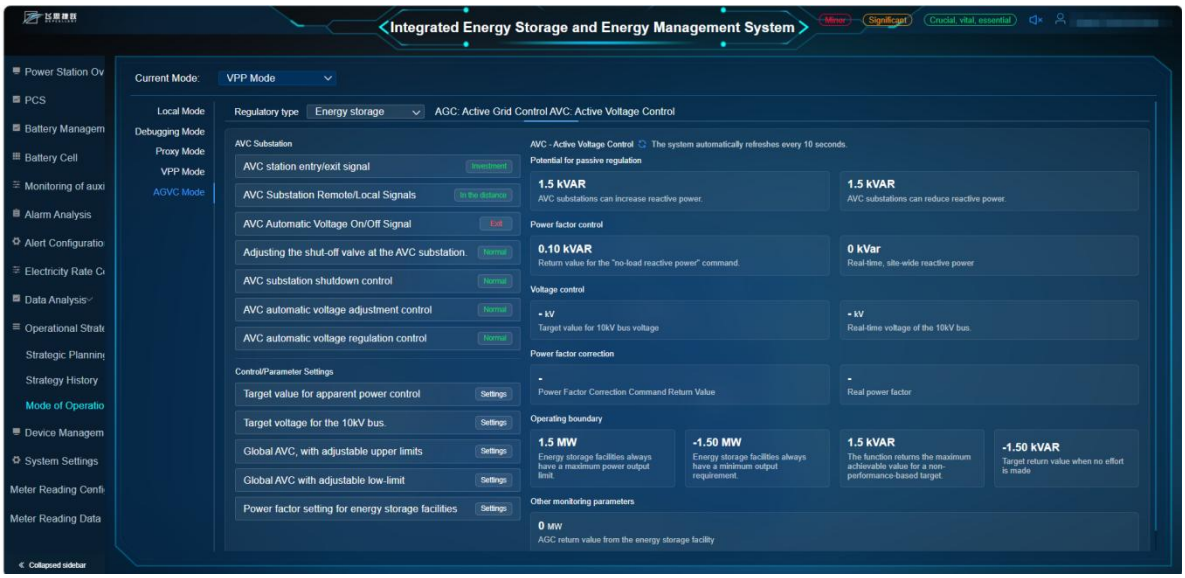


Figure 3-23 AVC Reactive Power Control

3.2.9.5. Main Unit Configuration

The Host Configuration Interface is used to display and manage the status of the system's main and slave units. Users can view core metrics such as the host's IP address, operating status, runtime mode, total active/reactive power, total SOC, and total SOH, as well as statistical data including daily charge/discharge amounts and total charge/discharge amounts. Additionally, users can monitor the real-time operating data of each slave unit—such as SOC, SOH, active/reactive power—and can filter the slave units as needed. This interface enables state monitoring and management of the energy storage system cluster; see Figure 3-24 for details.

Figure 3-24 Main Host Configuration

3.2.9.6. EMU Monitor

The EMU Monitoring Interface enables comprehensive status monitoring of the core equipment and operating environment of the energy storage system. Users can view the PCS's operating status, power, voltage, current and other electrical parameters, the EMU's system resource utilization rate, as well as key battery data such as the BMS's high-voltage status, SOC, and SOH. Additionally, the interface allows for monitoring auxiliary system information—including energy consumption statistics, liquid-cooled units, dehumidifiers, and ambient temperature and humidity — and provides trend charts for the active power consumption of the grid power supply, load, photovoltaic system, and energy storage system. Through this page, users can gain a holistic view of the energy storage system's overall operating status and perform visual management of its performance. As shown in Figure 3-25.

Figure 3-25 EMU Monitoring

3.2.10. Device Management

3.2.10.1. Device Analysis

By filtering device，, the device information status can be detected in real time, as shown in Figure 3-26.

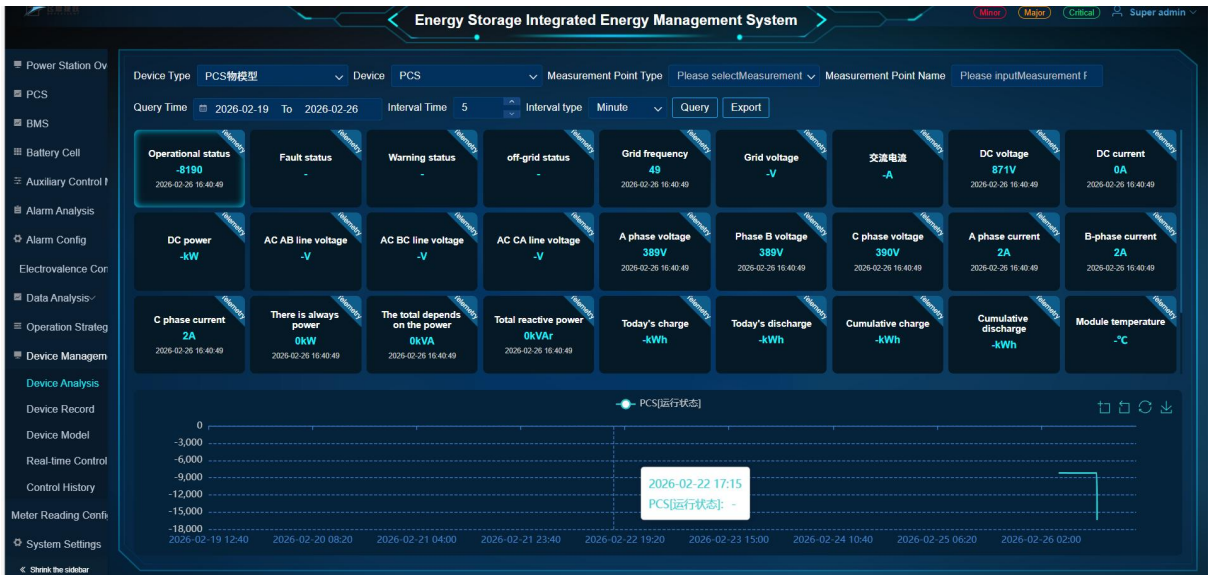


Figure 3-26 Device Analysis

3.2.10.2. Device Ledger

The device ledger is used to display the basic information of the device, and users can view, edit, and manage the point operations, as shown in Figure 3-27.

Figure 3-27 Device Ledger

3.2.10.3. Device Model

Manage the unique identity of the device model, the unique identity of the point, and the electricity price configuration, as shown in Figure 3-28.

Figure 3-28 Device Model

3.2.10.4. Real-time Control

It supports remote control and remote adjustment of the control device, and issues instructions to make the device effective, as shown in Figure 3-29.

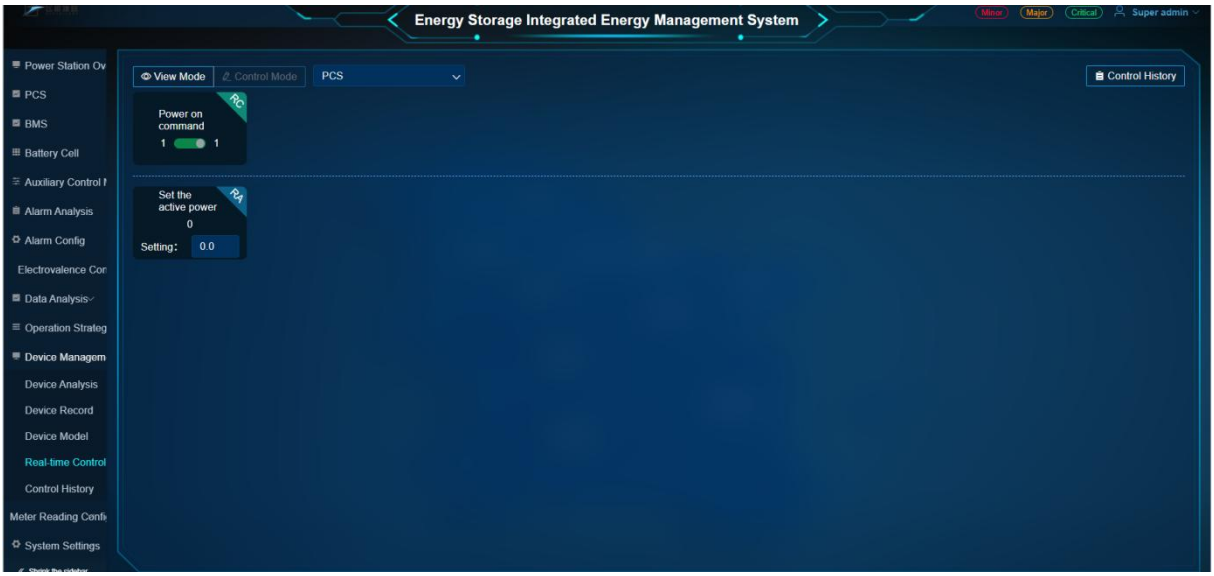


Figure 3- 29 Real-time Control

3.2.10.5. Control History

The control history records the operation of issuing point information in real-time control, which is convenient for user to observe whether the delivery operation takes effect, as shown in Figure 3-30.

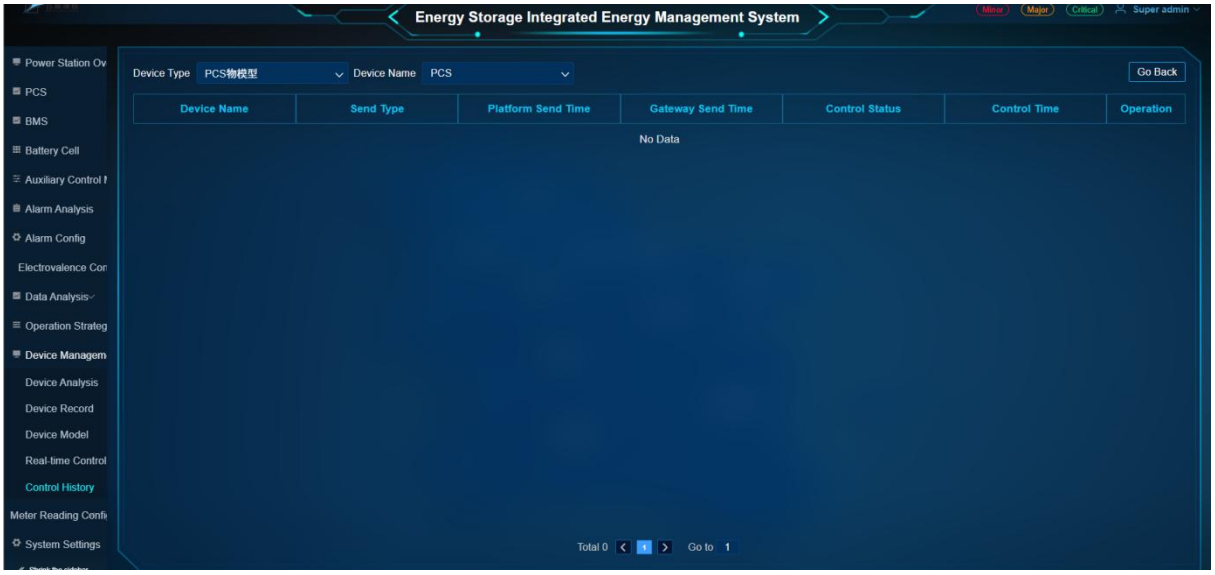


Figure 3-30 Control History

3.2.11. System Settings

3.2.11.1. User Management

Manage user basic information, login name, mobile phone number, role assignment, and password reset, as shown in Figure 3-31.

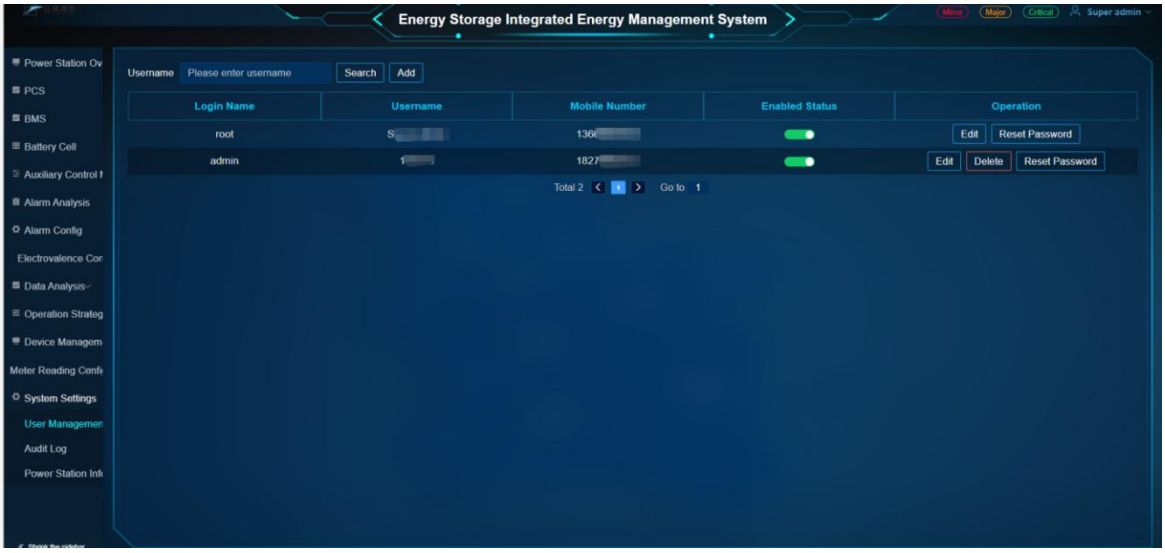


Figure 3-31 User Management

3.2.11.2. Audit Logs

The audit log records important information such as the IP address and time when users log in to the platform, tracks and audits user operation behaviors, and ensures platfor security and compliance. As shown in Figure 3-32.

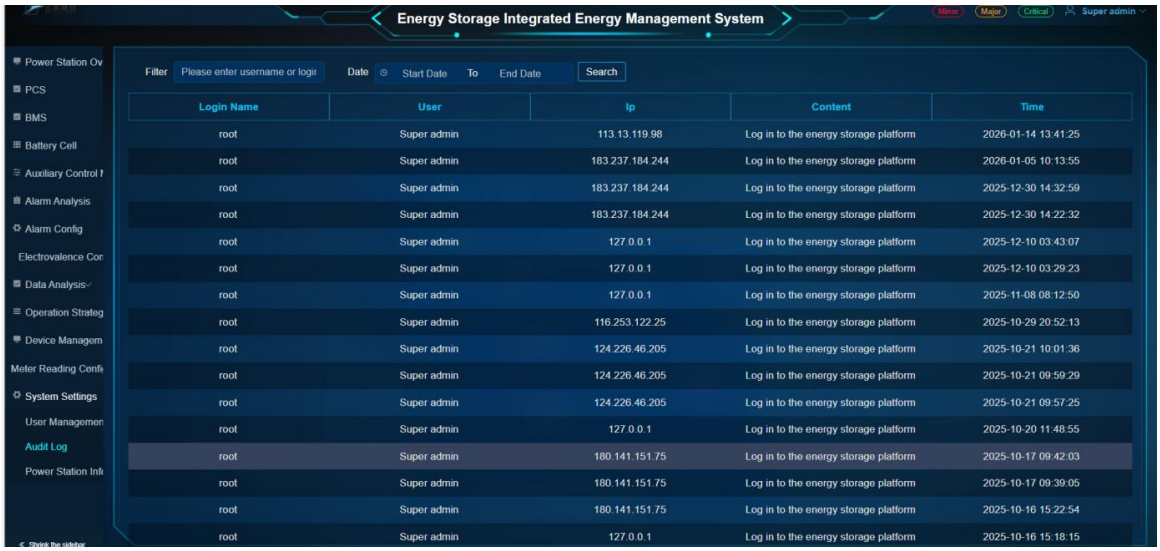


Figure 3-32 Audit Logs

3.2.11.3. Power Station Information

This module mainly displays the basic information of the project, and users can edit the project information, as shown in Figure 3-33.

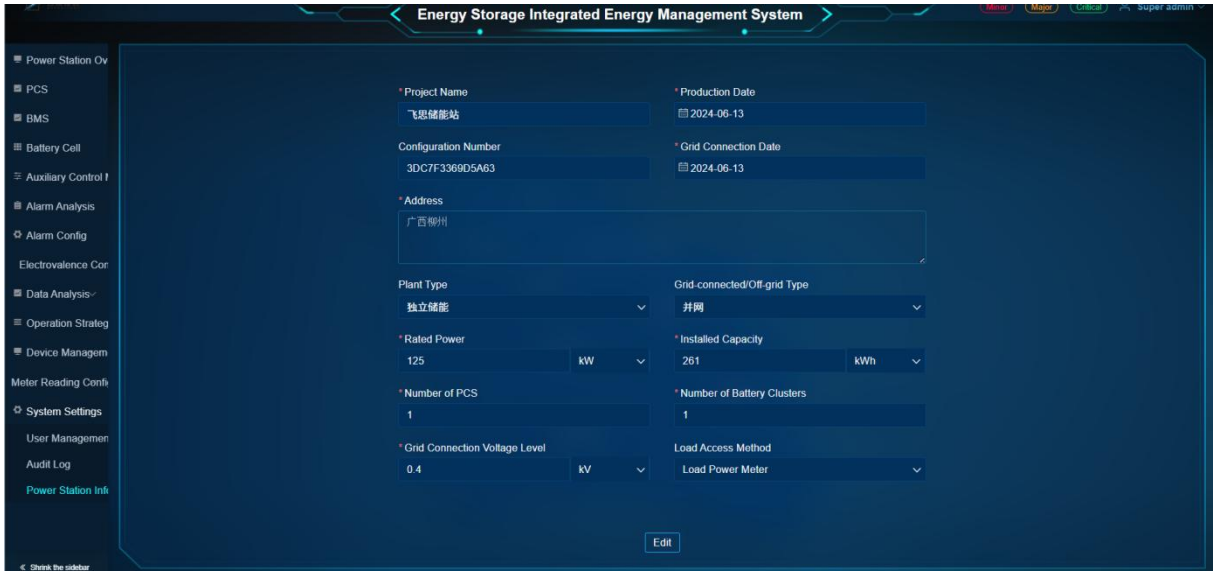


Figure 3-33 Power Station Information

3.2.12. Meter Reading

Manage and view meter and meter reading information, and perform meter reading configuration and meter reading operations, as shown in Figure 3-34.

Figure 3-34 Meter Reading

3.2.13. Meter Data

Check the meter reading information frozen for 15 minutes and daily freezing of the device, support re-metering and new meter reading data as shown in Figure 3-35.

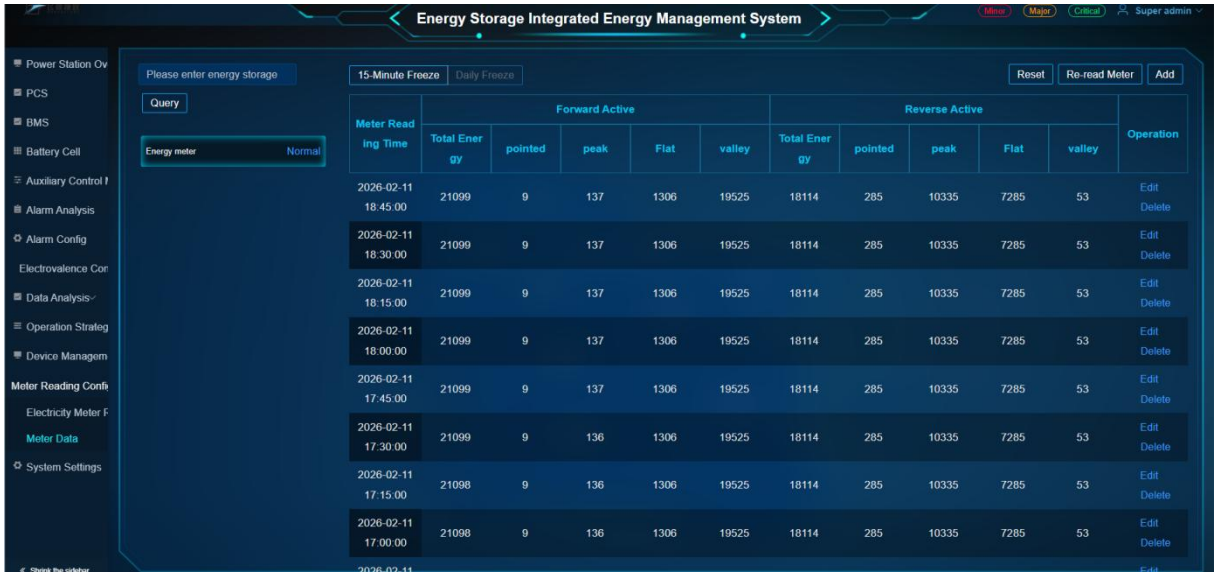


Figure 3-35 Meter Reading Data

The EMU (Energy Management Unit) is an innovative technology with outstanding advantages, representing a tailored solution specifically designed for energy storage and microgrid applications. Professionally engineered for energy management scenarios in energy storage and microgrid environments, the EMU integrates network interfaces, CAN, RS-485, RS-232, and DI/DO ports, fully supporting data acquisition and input/output control requirements for BMS, PCS, diesel generators, and photovoltaic inverters. At the software level, it incorporates standard data acquisition protocols and is compatible with interfaces from leading equipment manufacturers, making it widely applicable in industrial and commercial energy storage systems, residential energy storage systems, and microgrid control scenarios.

4. Data Acquisition Function

4.1.1. Home Page

The Home page generates a network architecture diagram based on the configured data collection settings; it also allows switching to a list-based display. Additionally, in list view, users can search for corresponding device information using the search bar as needed. As shown in Figures 4-1 and 4-2:

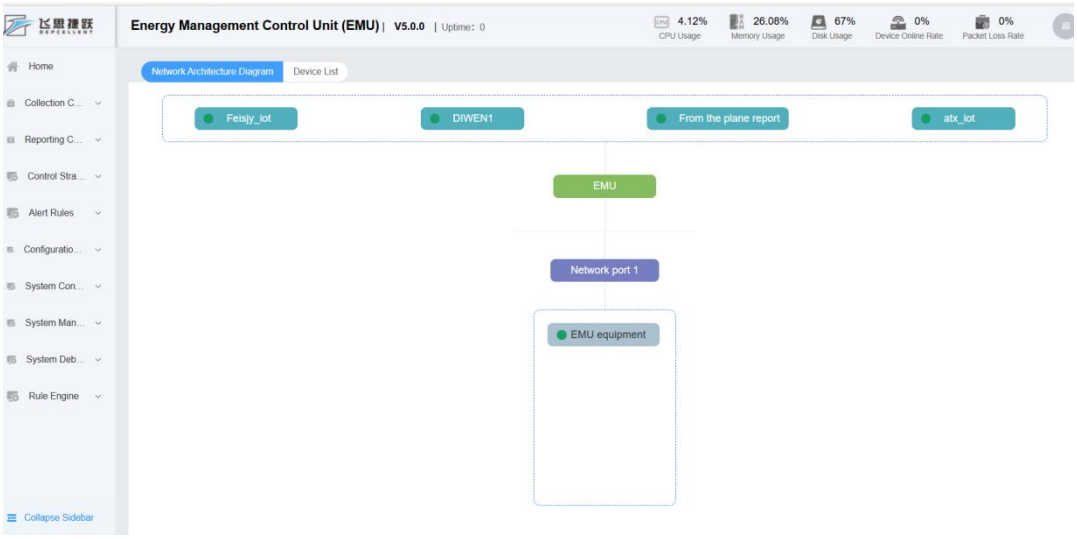


Figure 4-1 Network Architecture Diagram

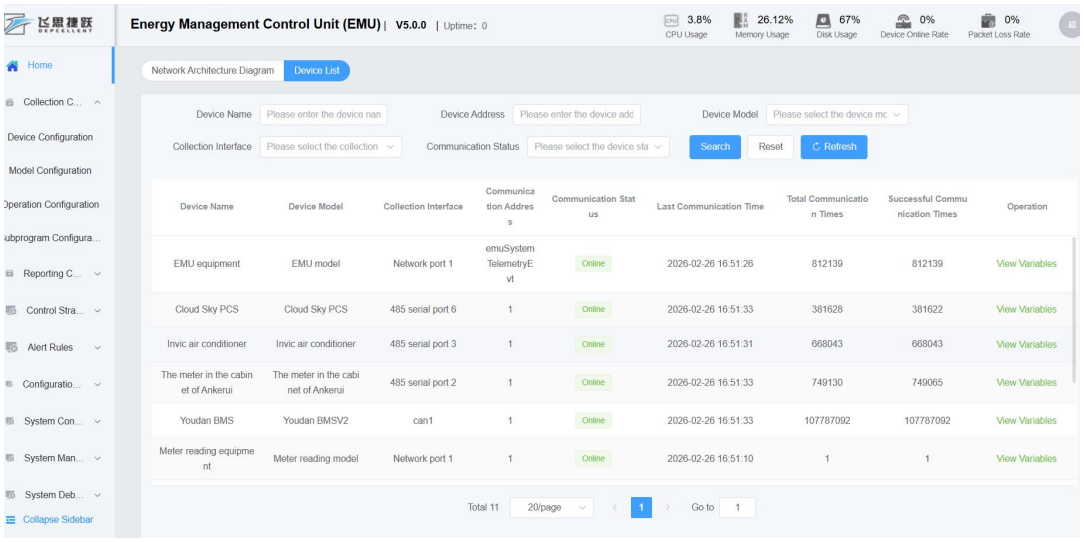


Figure 4-2 Device List

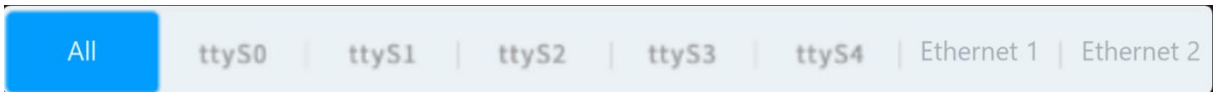
4.1.2. Modbus Southbound Configuration

Data communication function operation module between the gateway and the physical

device.

4.1.2.1. Configuration

This module consists of three interfaces: the All Devices interface, the Serial Port Devices interface, and the Network Port Devices interface. Click the "Devices" button in the center to switch between these interfaces; as shown in the figure below, ttyS0−ttyS4 represent serial port devices, while Network Port 1 and Network Port 2 represent network port devices.



4.1.2.2. All Device

This interface displays all previously configured devices; the devices are categorized based on their connected serial port, as shown in Figure 4-3:

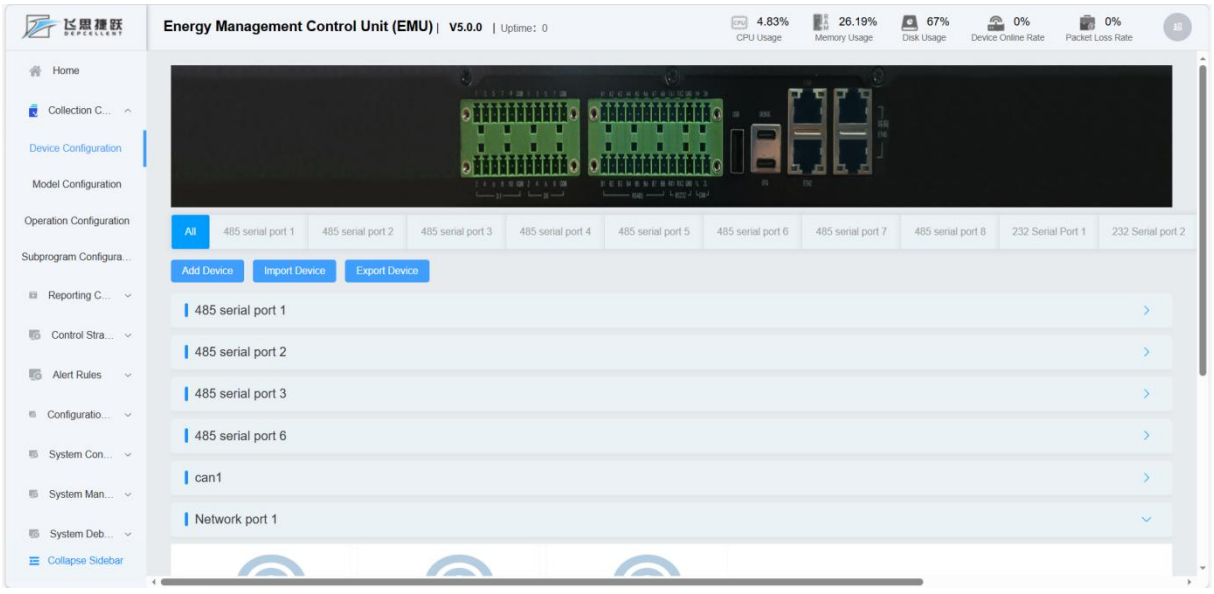


Figure 4-3 All Devices

4.1.2.2.1. Serial Port Device

Click on any of thettyS0−ttyS4 serial ports to display the information about the device connected to that serial port. As shown in Figure 4-4:

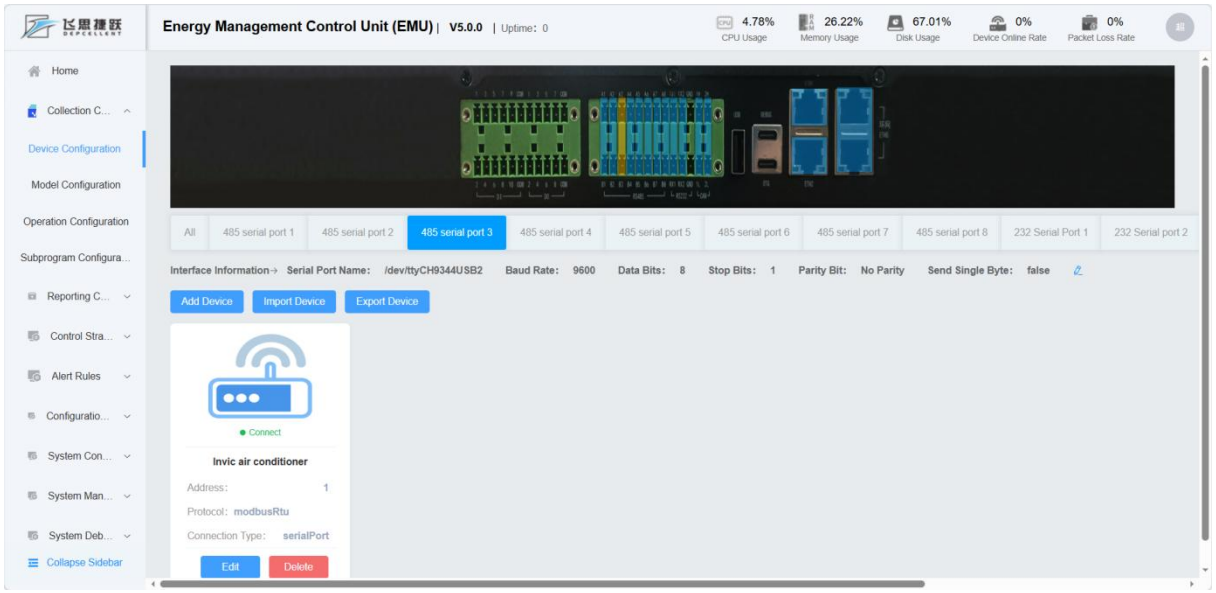


Figure 4-4 Serial Port Device

4.1.2.2.2. Network Port Device

Click on Network Port 1 or Network Port 2 to display the information about the device connected to that port. As shown in Figure 4-5:

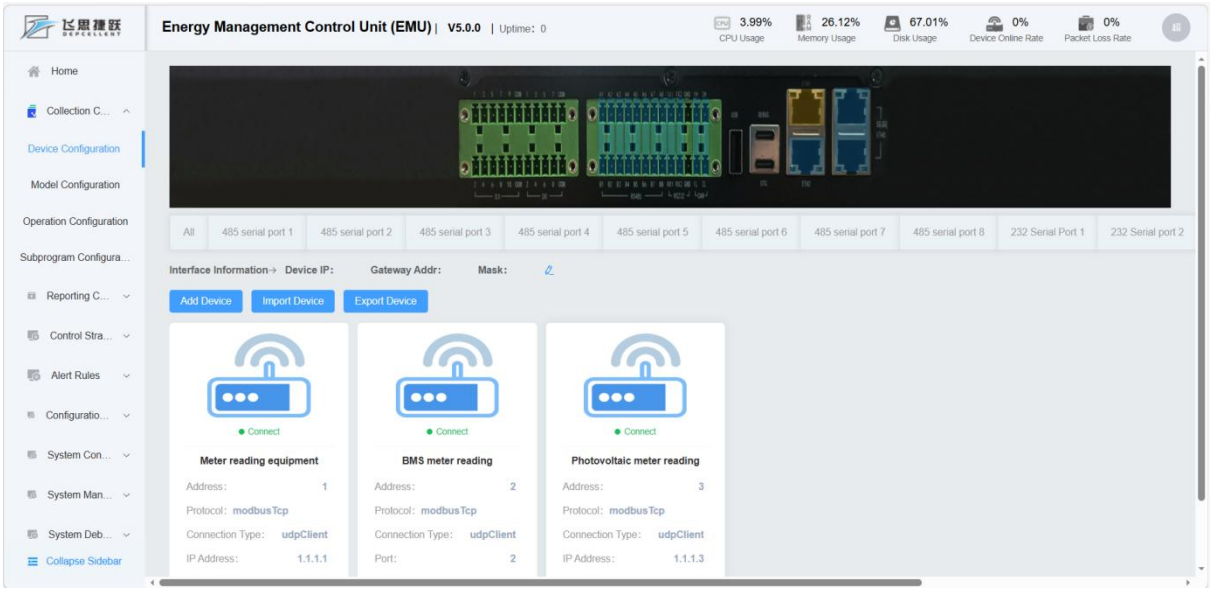


Figure 4-5 Network Port Device

4.1.2.3. Modbus Model Configuration

The model configuration is a module used to configure the device point information, including general, PLC, DL/T645-2007, and Modbus models, and the user can add variable

parameters to realize the data point configuration through the configuration command information, as shown in Figure 4-6:

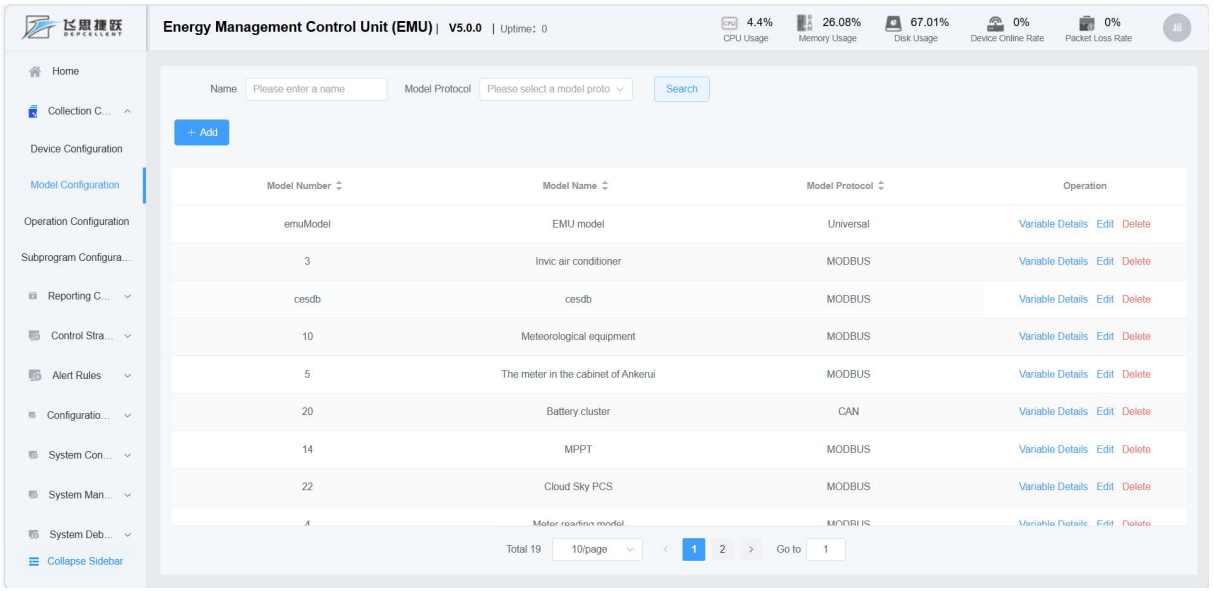


Figure 4- 6 Model Configuration

4.1.2.4. Variable Details

In the model configuration interface, click the variable details button of the model list to enter the corresponding model variable details interface, which is used to configure the corresponding model point data. As shown in Figure 4-7.

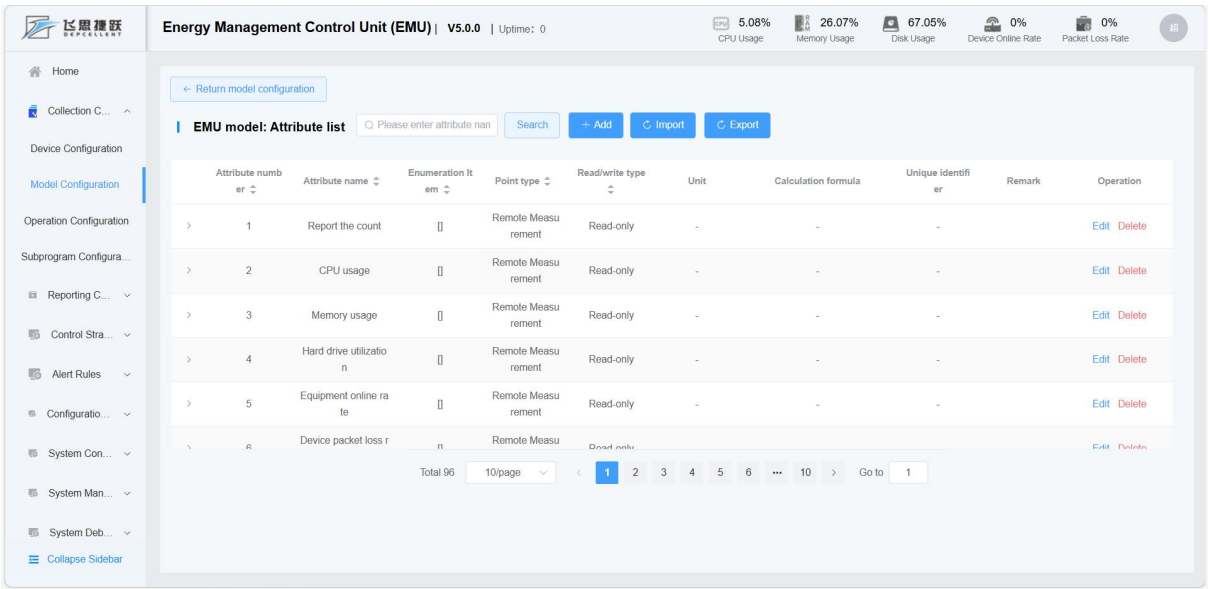


Figure 4- 7 Variable Details

4.1.2.5. Operation Configuration

Operational configuration: Create and manage data collection configurations for device groups. Each configuration card displays the configuration name, operating status, start/stop status, the number of attempts to determine whether an Internet connection is unavailable, the number of online devices, the total number of bound devices, and the online/offline device status. Users can add a new configuration, edit or delete an existing configuration, troubleshoot the configuration, bind devices, and view additional bound devices. A single operational configuration can be bound to multiple devices. As shown in Figure 4-8:

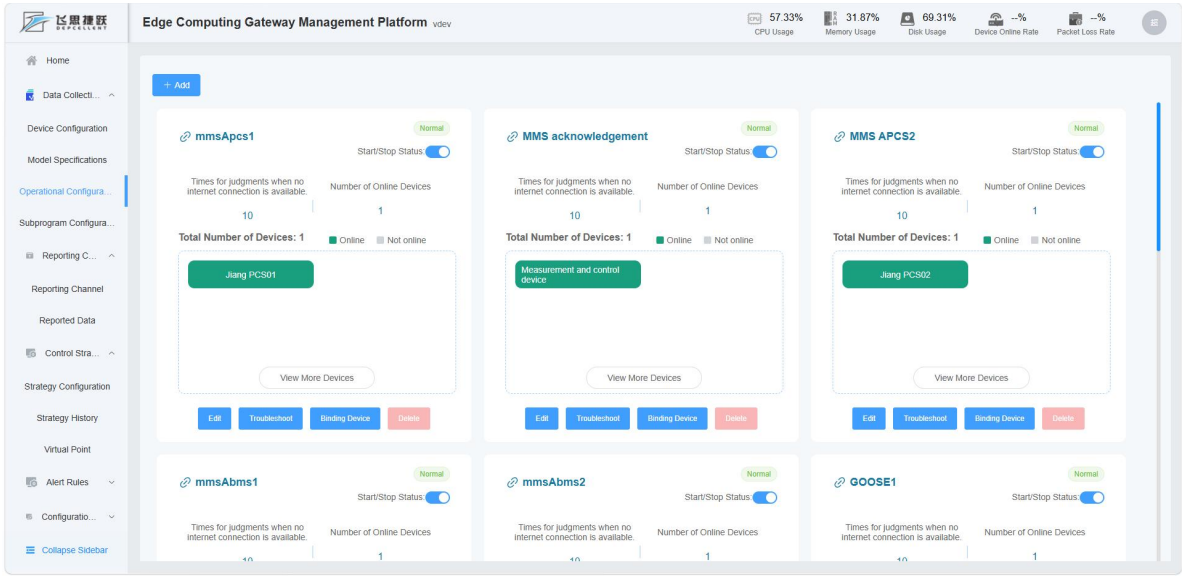


Figure 4-8 Operational Configuration

4.1.2.6. Debug

The interface can debug the devices bound to the current running configuration, such as command issuance, manual collection, stop collection and message debugging, as shown in Figure 4-9：

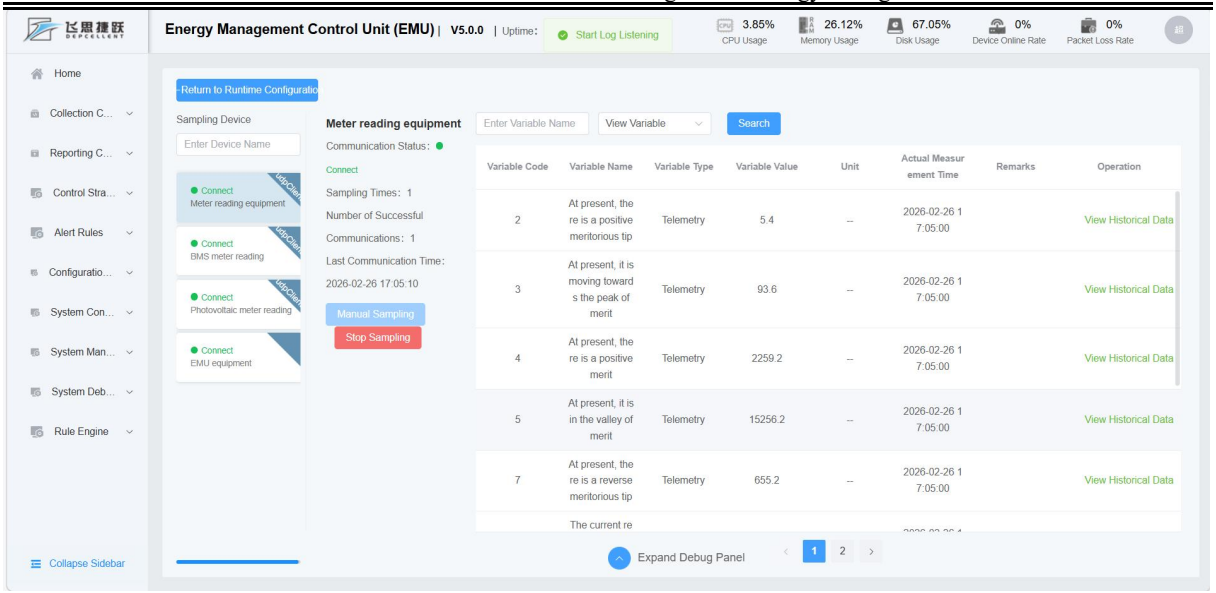


Figure 4- 9 Debug

Function：

1) The command is issued: the pop-up window shows the writable points, and the command can be issued.

2) Manual collection: manual collection once.

3) Stop collection: Click stop collection to temporarily stop the collection according to the cycle configured by the operation configuration. Exit the page or click again to resume the cycle collection.

Click on the right  , the system log information of the current device will appear.

4.1.3. Subroutine Configuration

The management and configuration of each subroutine running in the system allows users to view, add, edit and delete subroutines, as well as configure the operating parameters of the subroutines. As shown in Figure 4 -10:

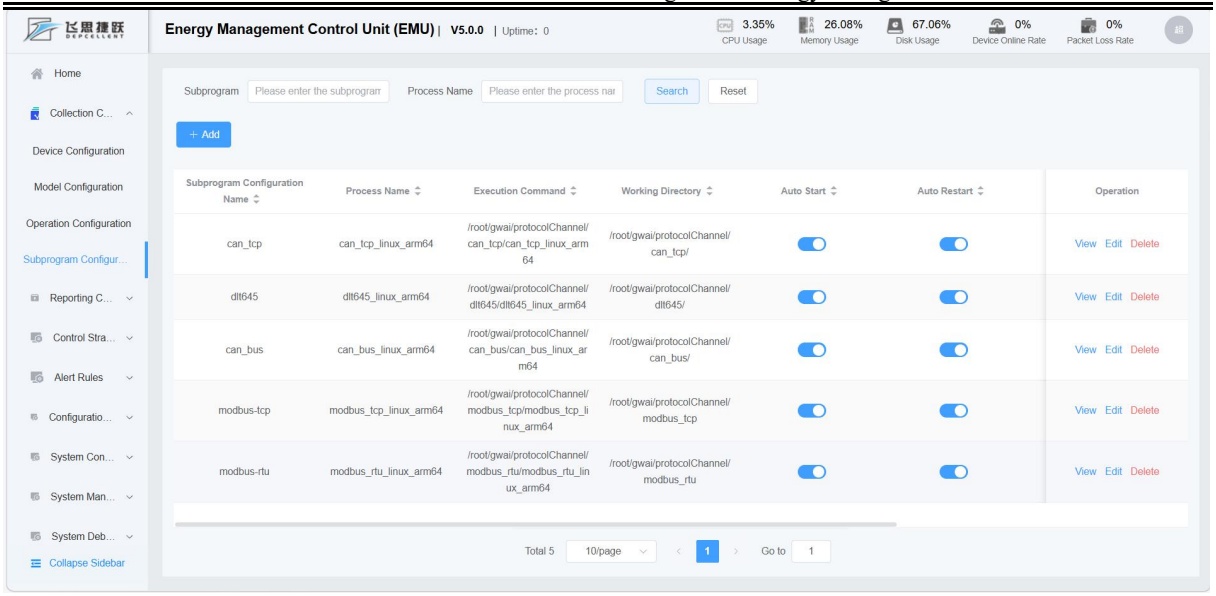
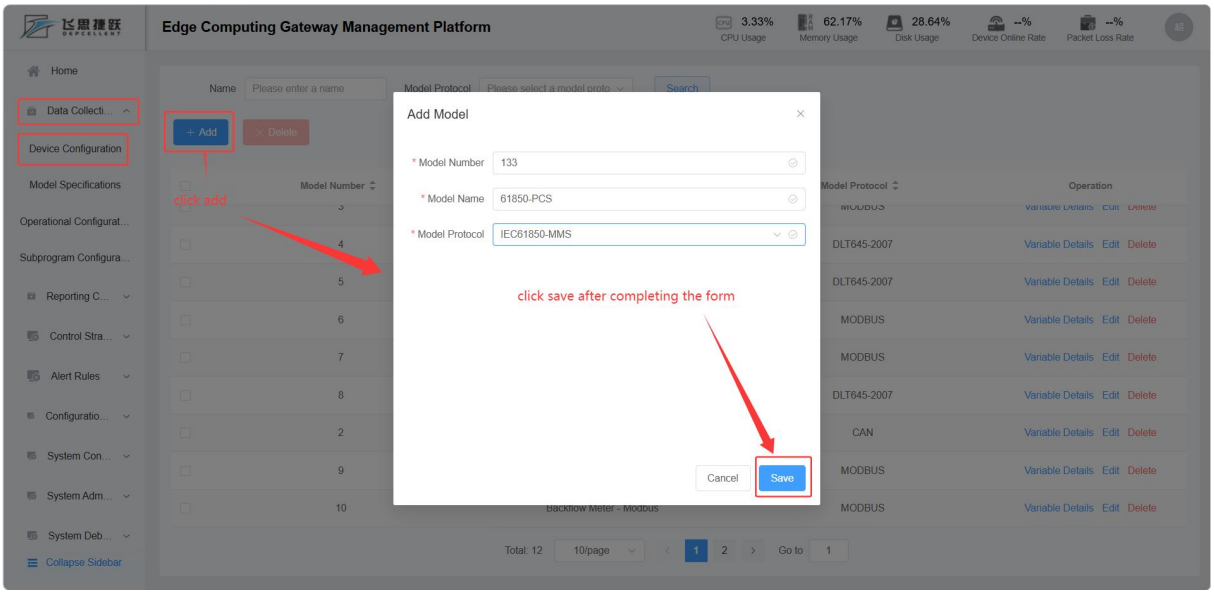


Figure 4- 10 Subroutine Configuration

4.1.4. IEC 61850-MMS Southbound Configuration

4.1.4.1. Create Model

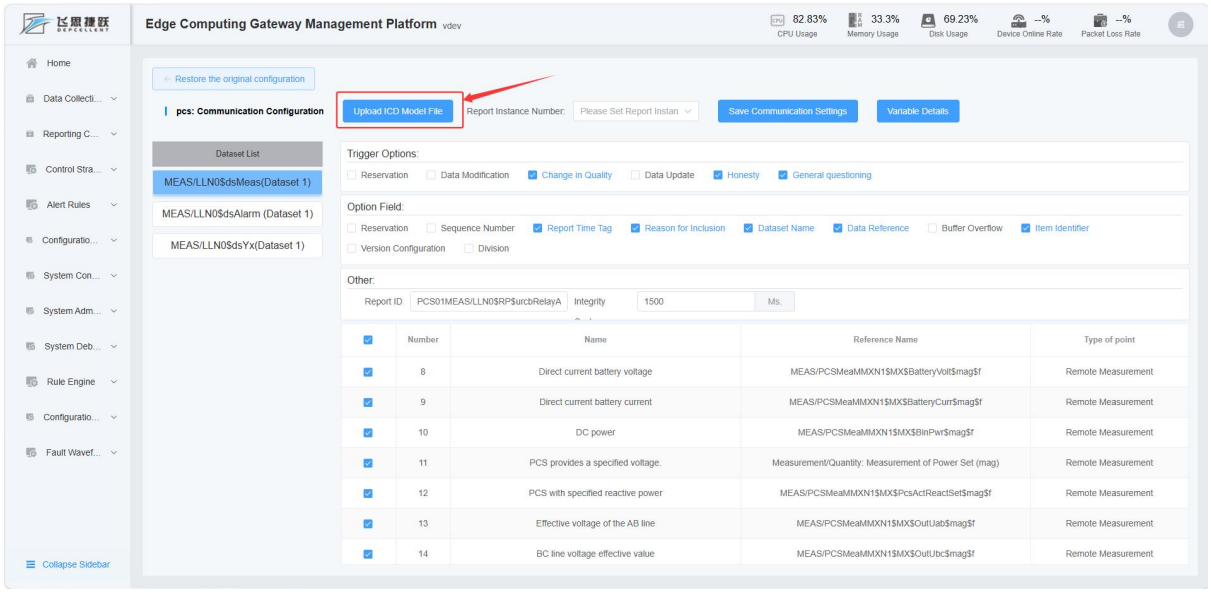
Create the 61850MMS model.



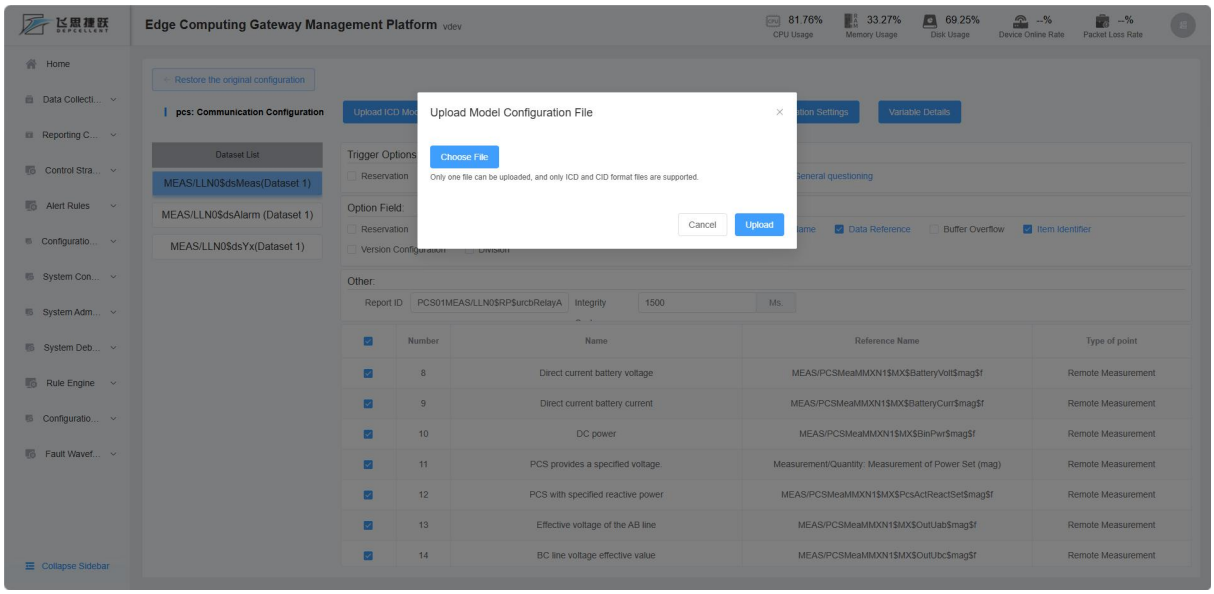
4.1.4.2. Import ICD File

After creating the model, click the button within the generated model to navigate to the Detailed Configuration page.

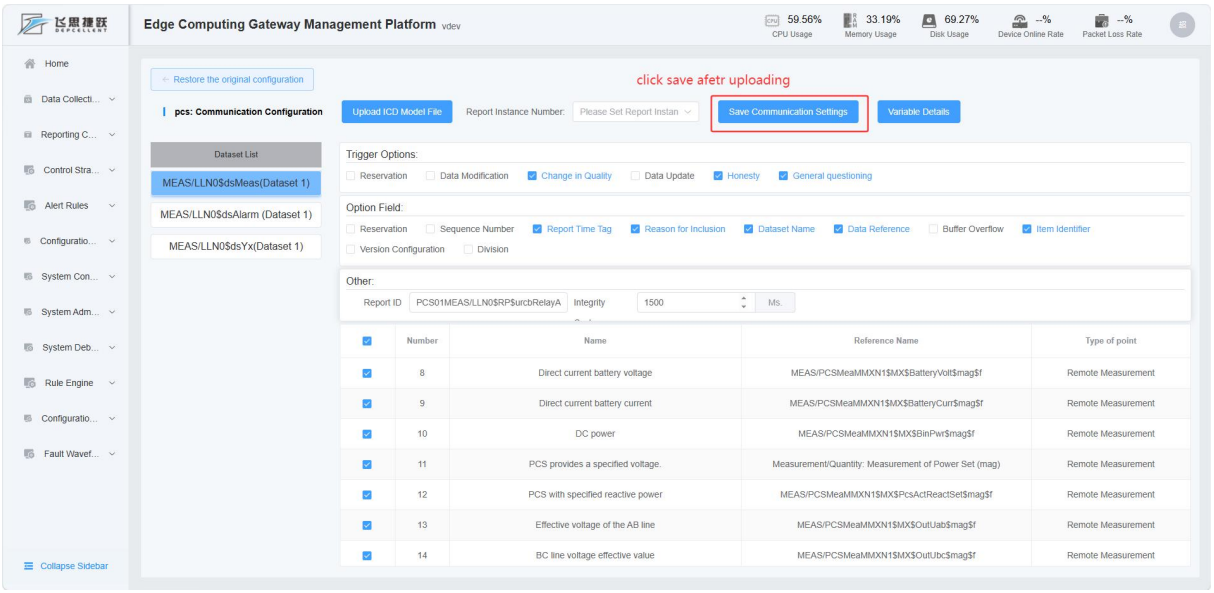
After entering the Upload Model ICD File page, click the button to upload the ICD file exported when you created the forwarding device.



After selecting the file, wait for the upload prompt to appear, then simply refresh the page.

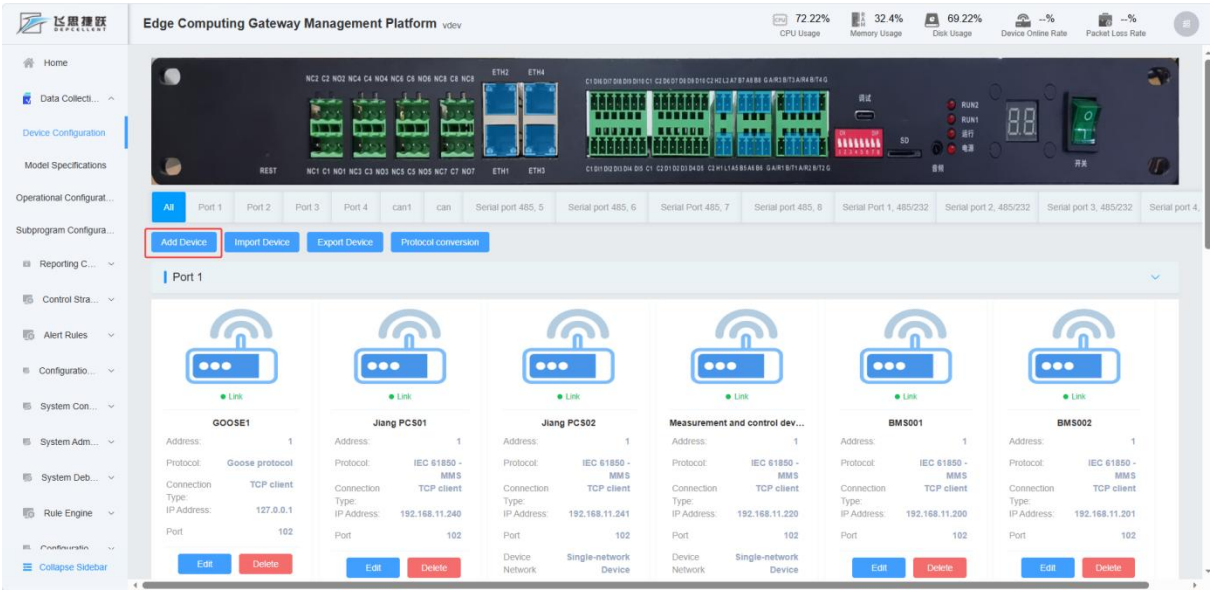


After returning to the page, you will see the generated configuration, indicating that the model creation was successful; then click "Save Communication Configuration".



4.1.4.3. Create a 61850 MMS Device

Click on the "Device Configuration" menu under the Collection Configuration menu bar to access the Device Configuration page. Then, select the corresponding port and click "Add Device".

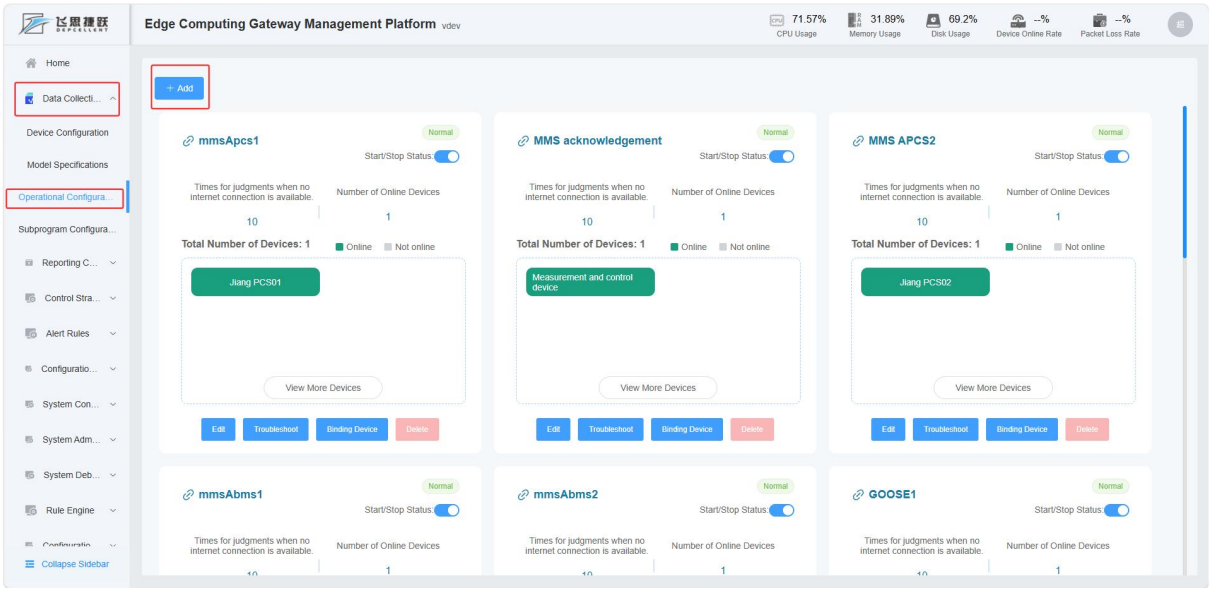


Enter basic equipment information

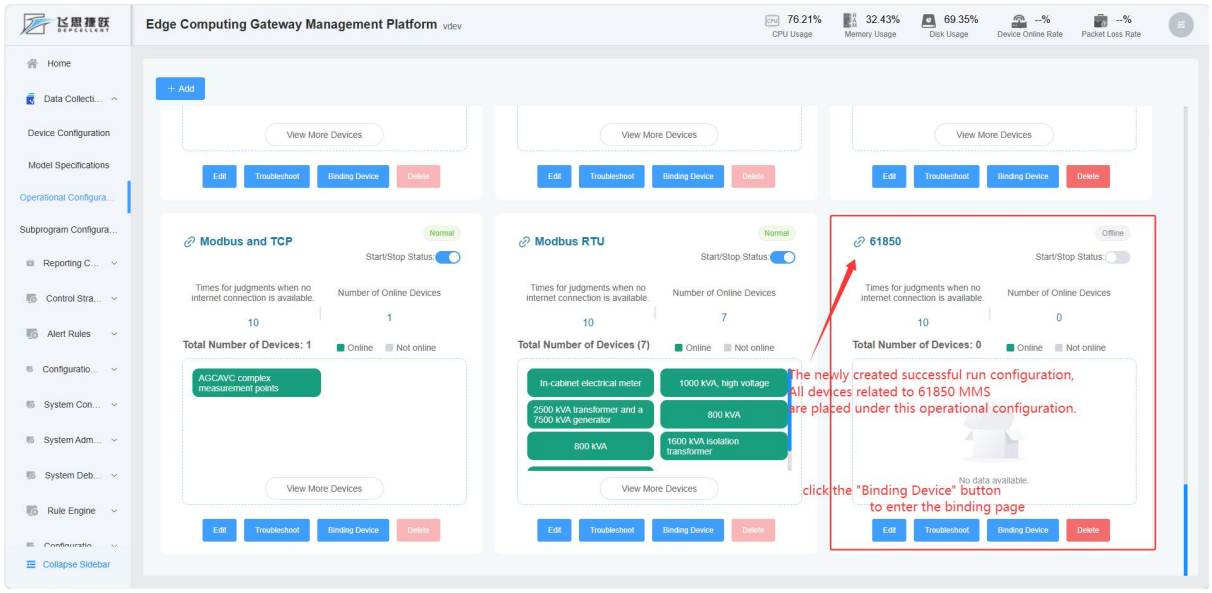
4.1.4.4. Create 61850 MMS Operational Configuration

Create a 61850 MMS operational configuration: click on the "Operational

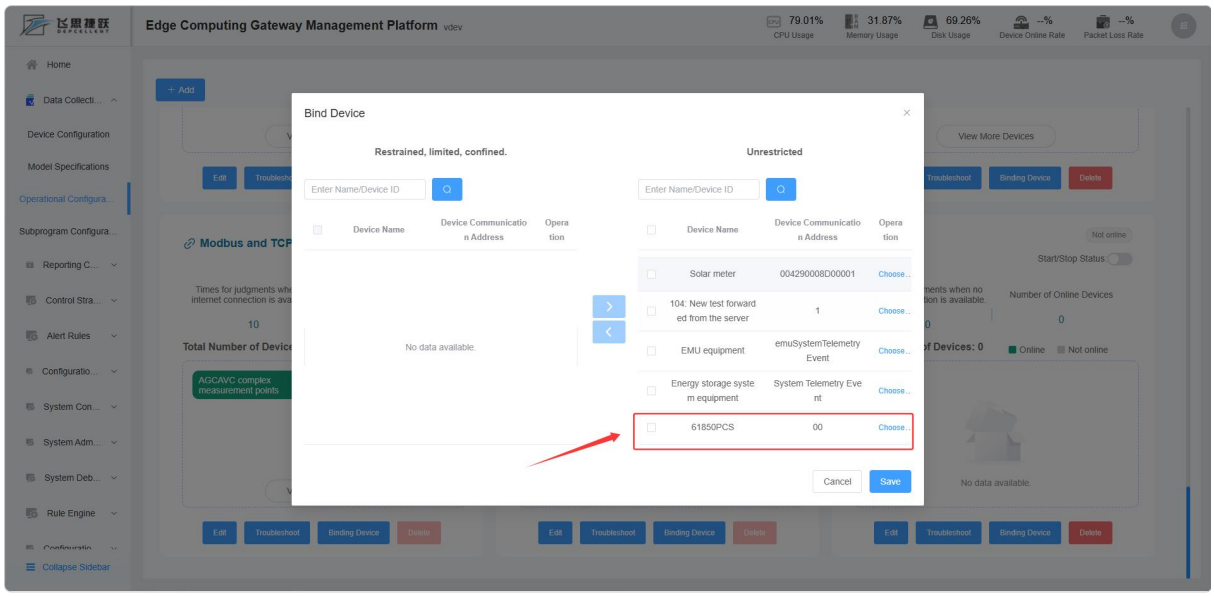
Configuration" menu under the Data Collection Configuration menu bar to access this page, then click the "Add" button. Enter a custom operational configuration name, specify the number of offline detection attempts and the binding protocol to be used, and finally click "Save".



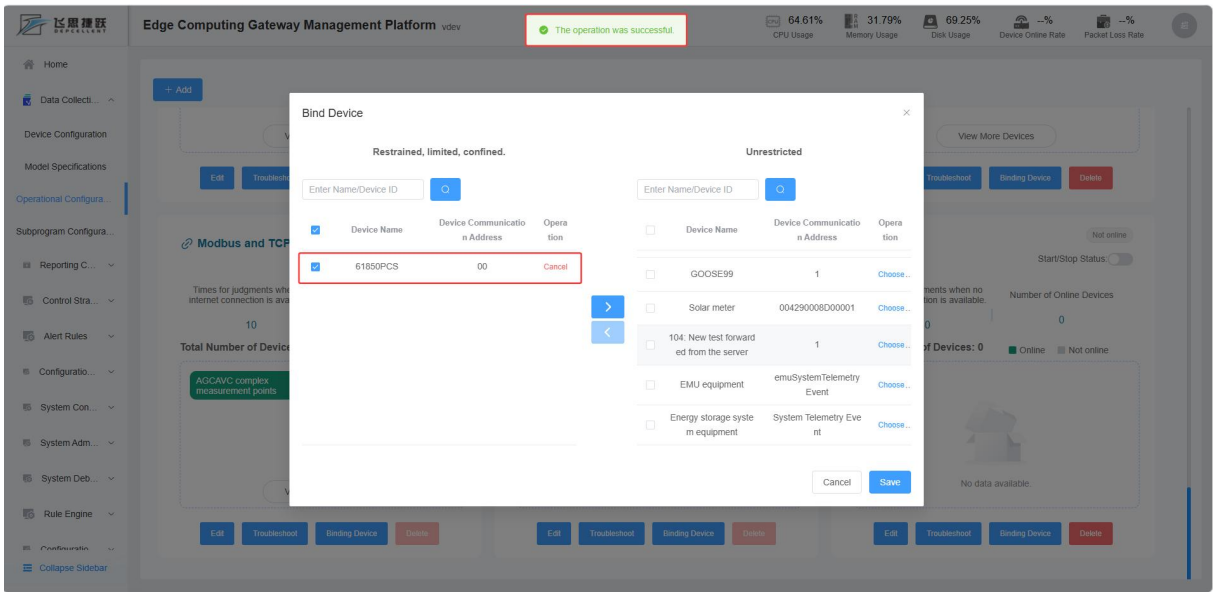
After successful creation, click the button  in the newly added Run Configuration section.



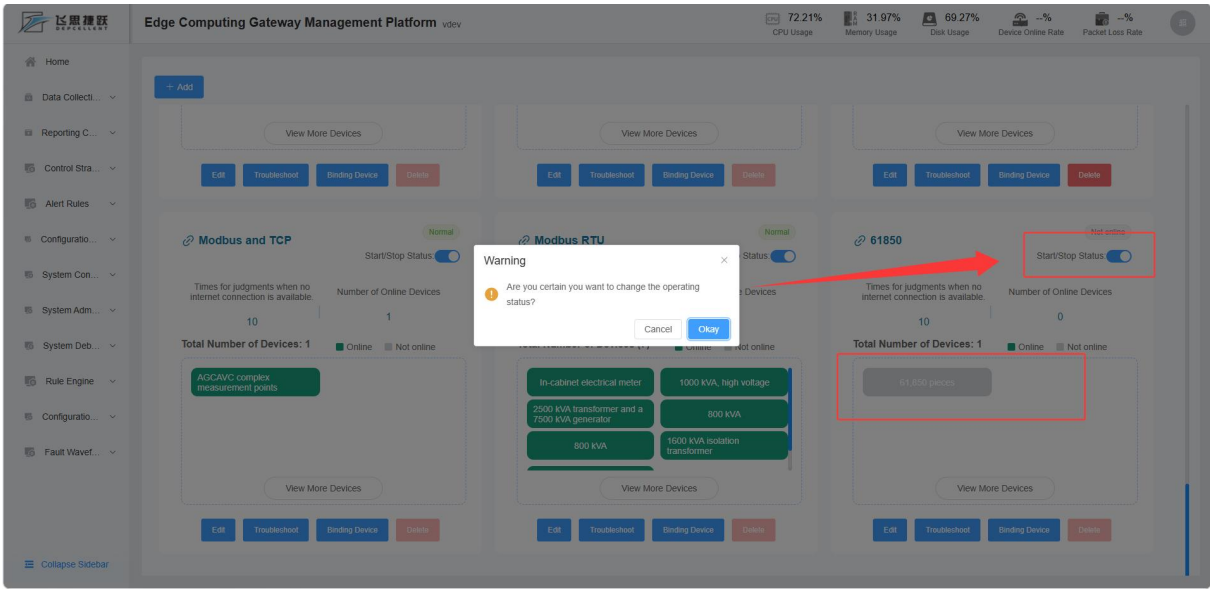
After entering the binding page, tap the device you wish to bind and then tap the Select button.



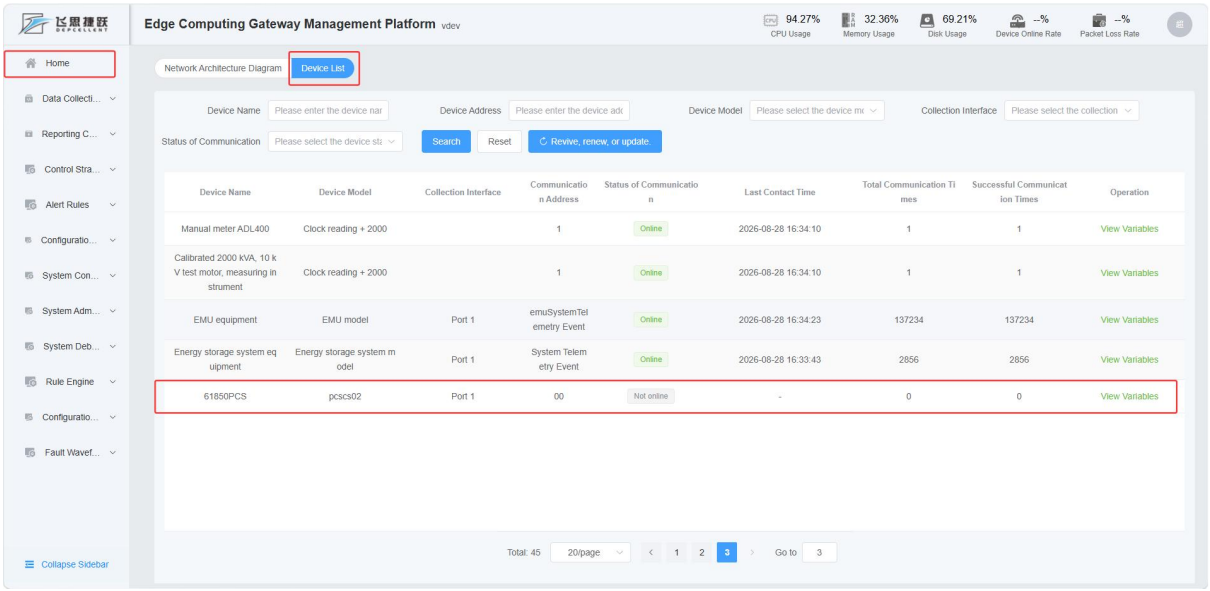
Once the device has successfully entered the binding zone, simply tap "Save".

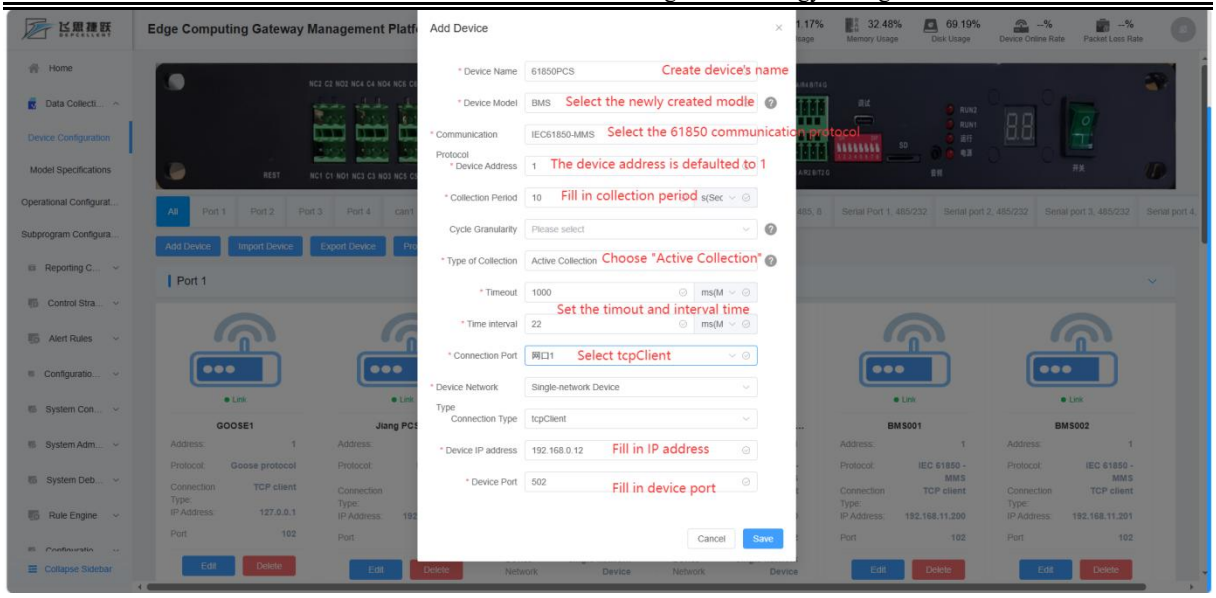


After successful binding, the page will display as shown below. At this point, the runtime configuration is in the disabled state; simply click the button to enable it, then select "OK" from the pop-up prompt.



When all device IP ports are functioning correctly, normal communication can be established; provided that the ICD file is valid, the collected data can be viewed on the home page.

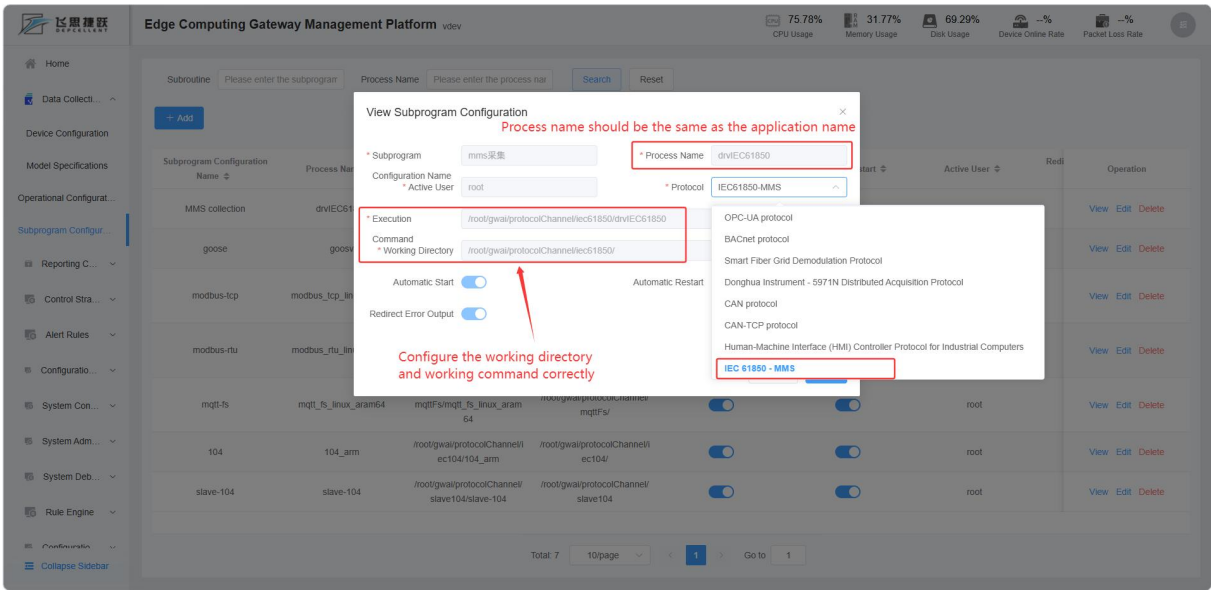




4.1.5. IEC 61850-GOOSE Southbound Configuration

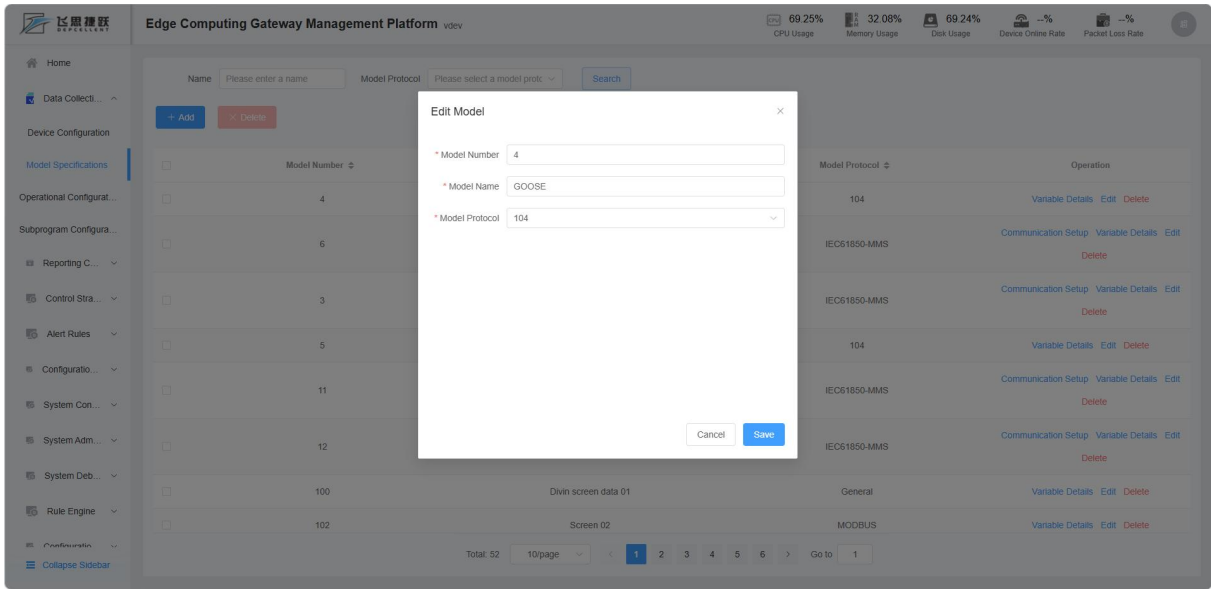
4.1.5.1. Configuration Subroutine

Configure the Goose subroutine in the Subroutine Navigation Window; if it does not exist, add it; if it already exists, proceed to the next step.

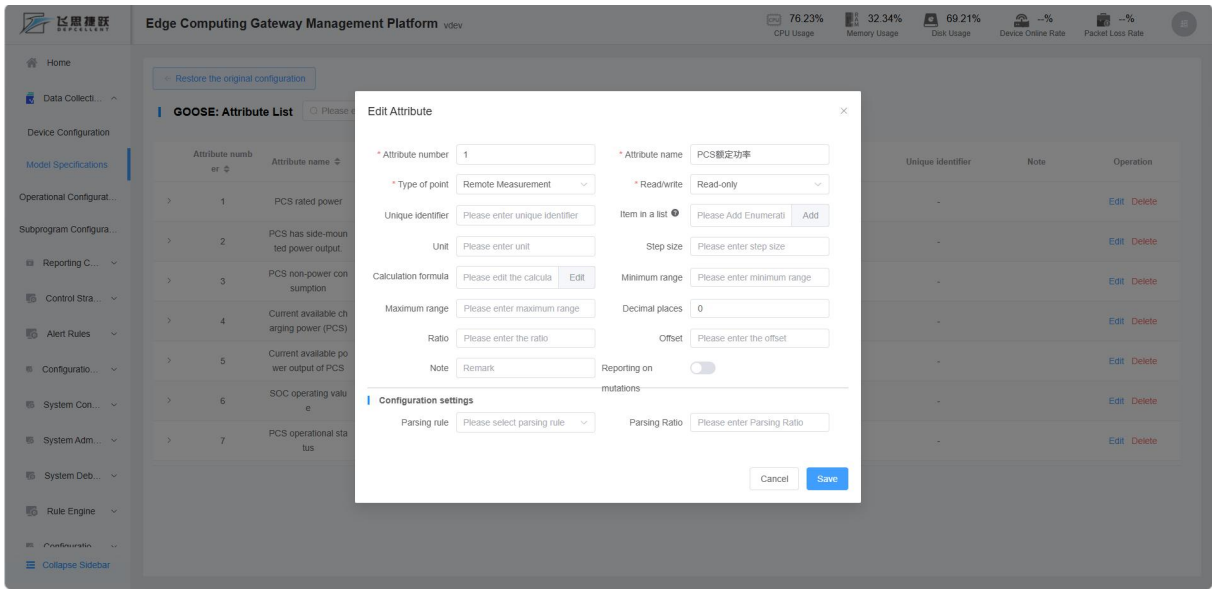


4.1.5.2. Create a Goose Model

In the Model Configuration Navigation Window, create a model; the model code must be unique, select Protocol 104, and click Save.

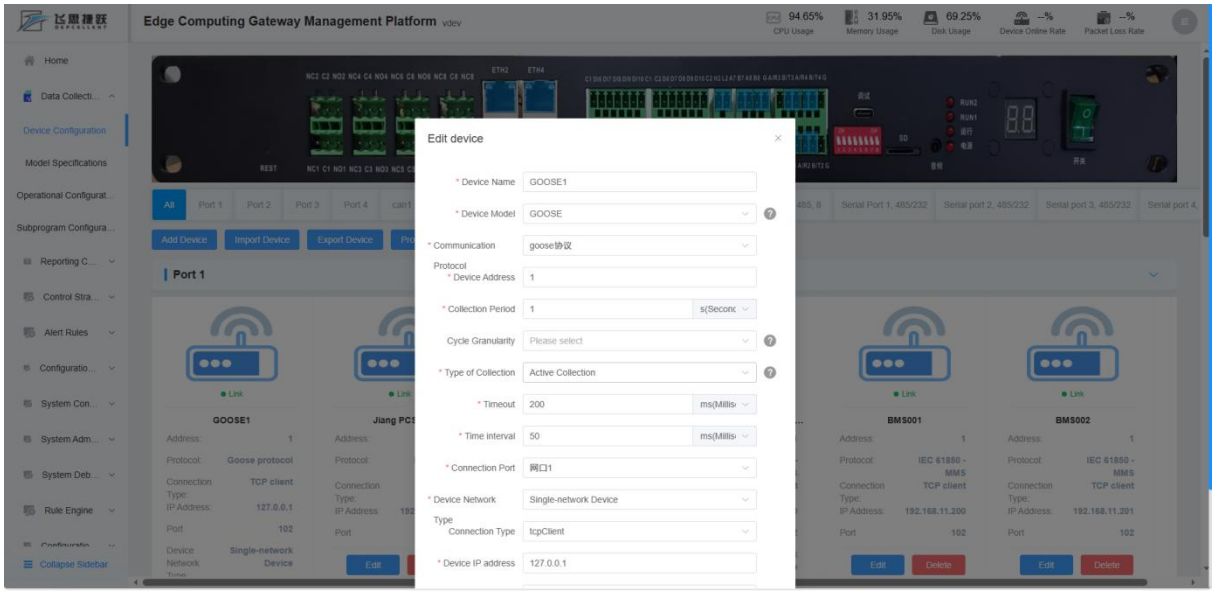


Next, click on "Model Variable Details" to add actual point locations to the model based on your device information.



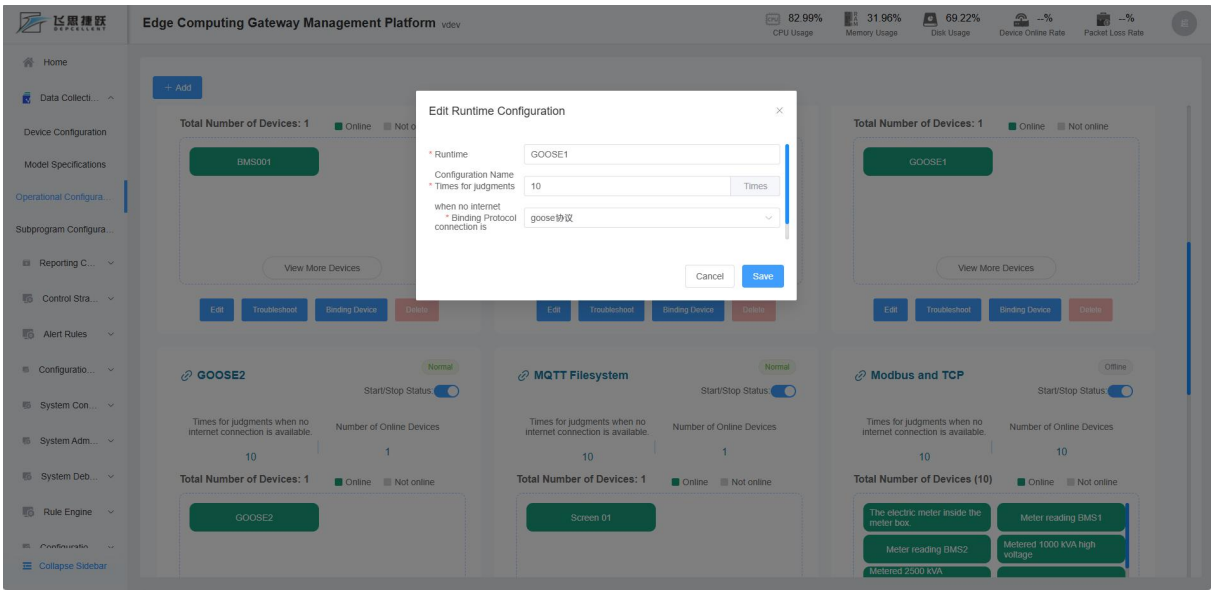
4.1.5.3. Create Goose Device

Create a new device in the Device Navigation Bar. The device parameters are as follows; note that the model selected must correspond to a model that includes the specified data acquisition points, and the protocol should be set to the GOOSE protocol; all other parameters should match those specified below.

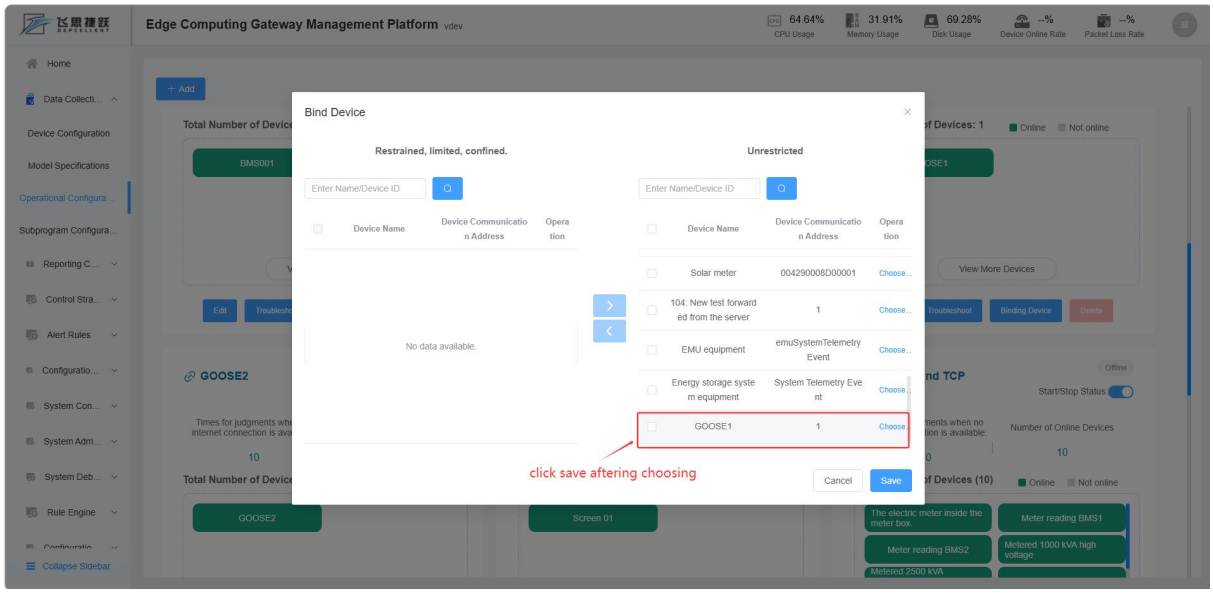


4.1.5.4. Runtime Configuration

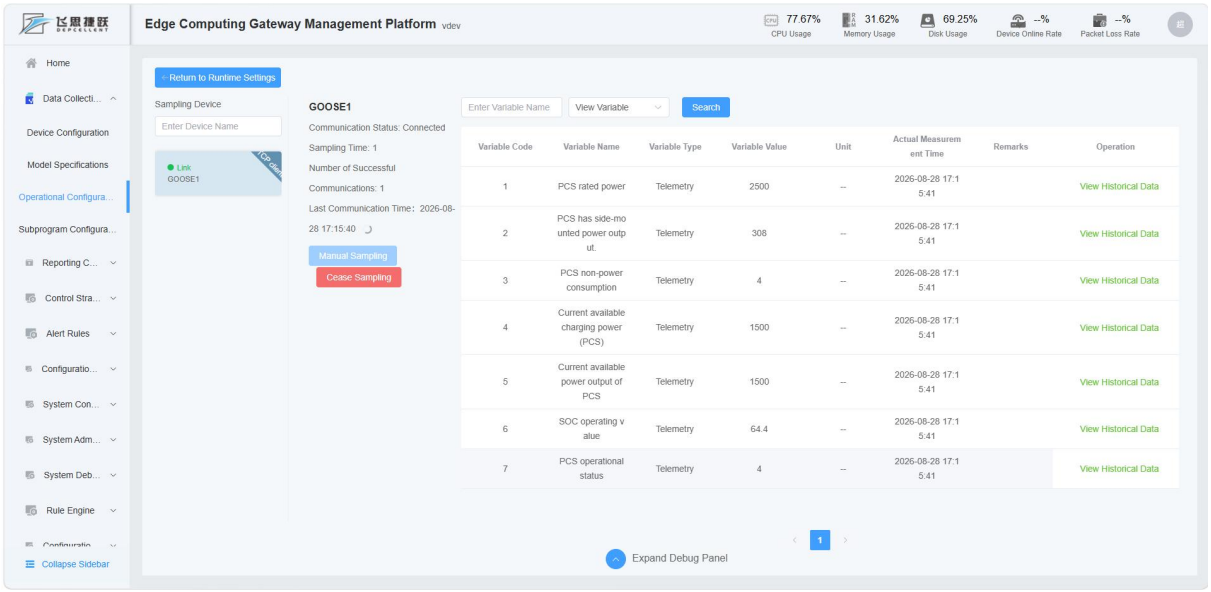
In the Runtime Configuration navigation window, create a new runtime program for the Goose protocol – this corresponds to the Goose application within the enabled server; you may assign any name to this runtime program, and select the Goose protocol as the protocol.



After creating the running program, the corresponding device must be bound to that program.



After binding the device, click the debugging option for the running configuration to view the device's data acquisition status in real time.



4.1.6. Modbus Northbound Configuration

4.1.6.1. Reporting Channel

Configure a reporting channel to transmit collected data to a designated platform. As shown in Figure 4-11:

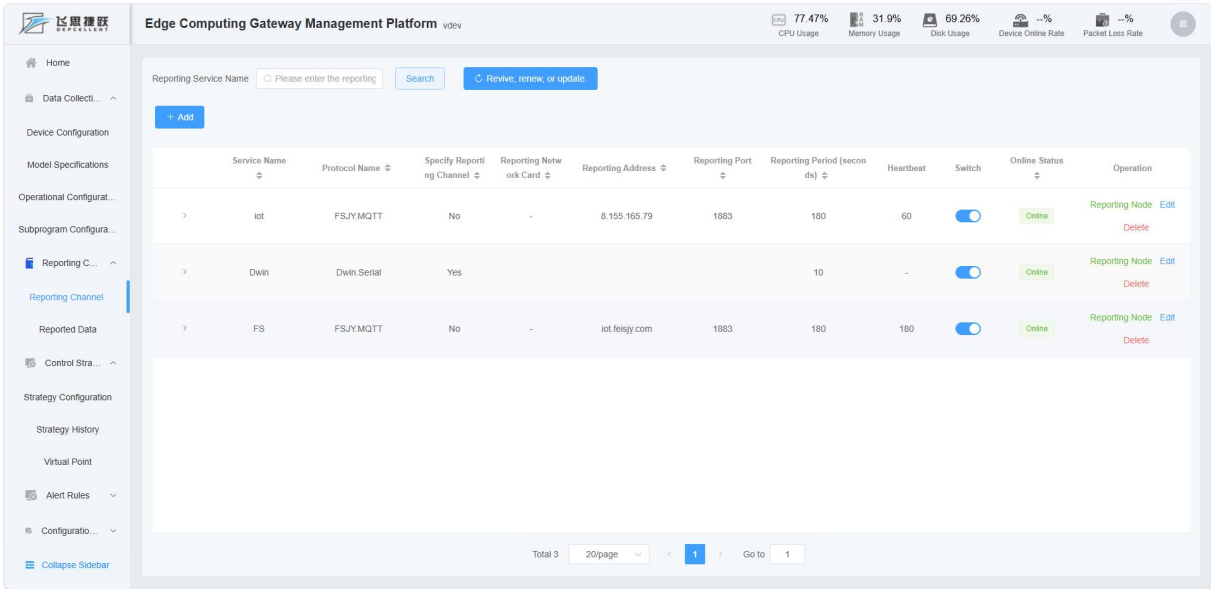


Figure 4-11Reporting Channel

4.1.6.2. Reporting Node

The device information corresponding to the reporting channel. As shown in Figure 4-12:

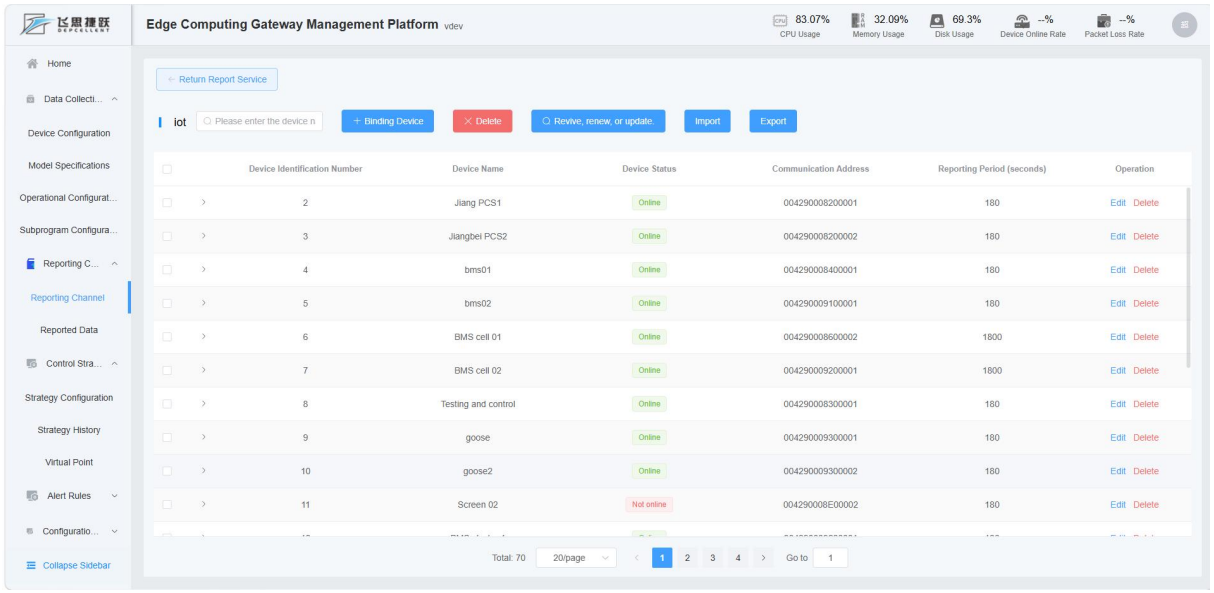
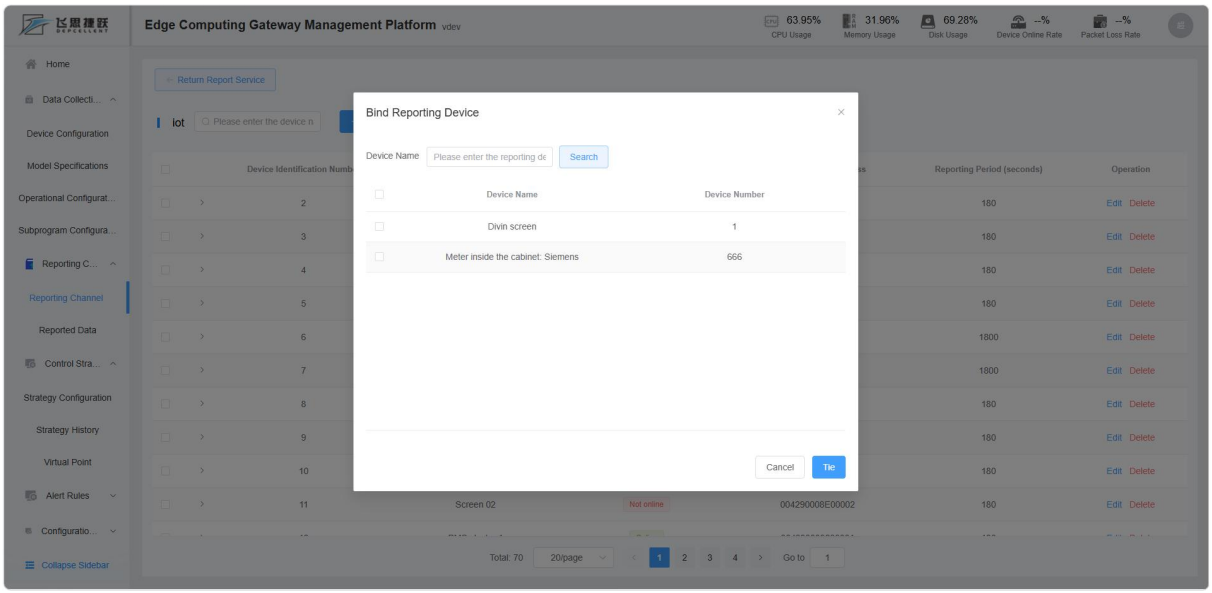


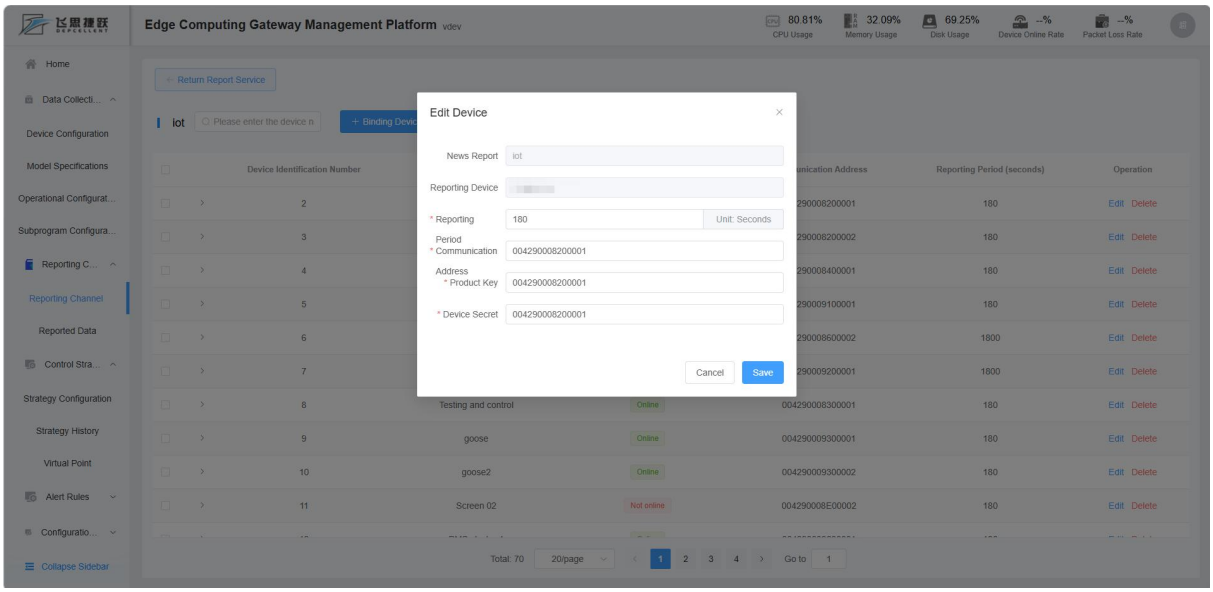
Figure 4-12 Reporting Node

function:

1) Add Reporting Node: Click the "Add" button to open a dialog box; then select the collection device and the corresponding reporting model to add the device for reporting, as shown in the figure below:



2) Click the Edit button to configure the product key, communication address, and device key for the collection device corresponding to the platform device, enabling communication between them. As shown in the figure below:



4.1.6.3. Report Data

This module is used to configure the reporting model employed by the reporting channel, as shown in Figure 4-13:

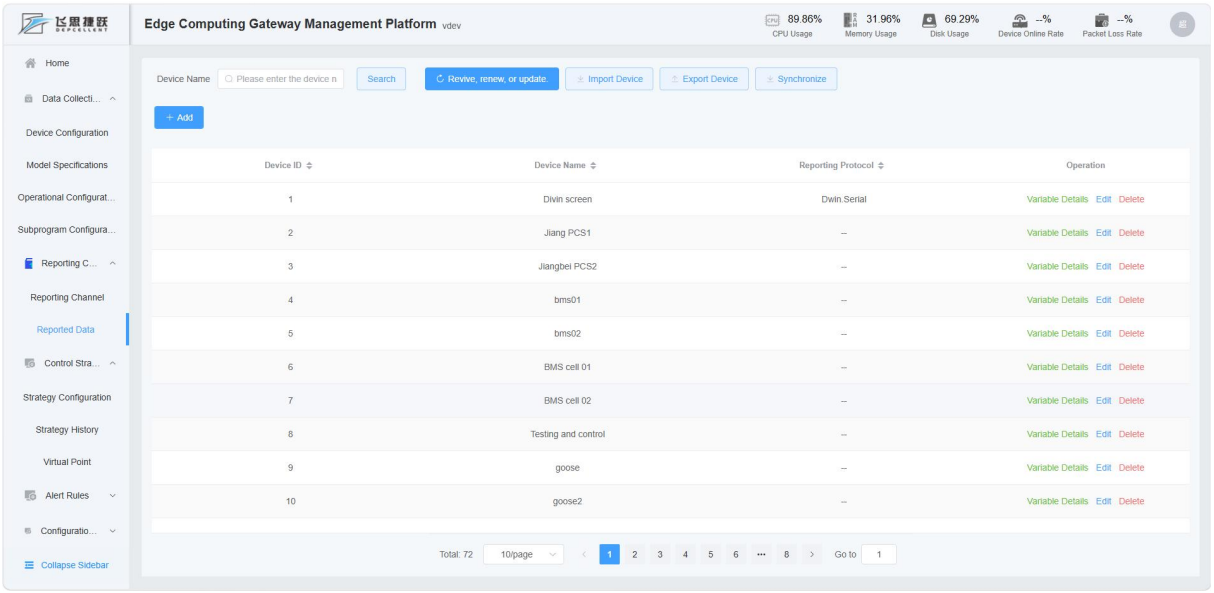
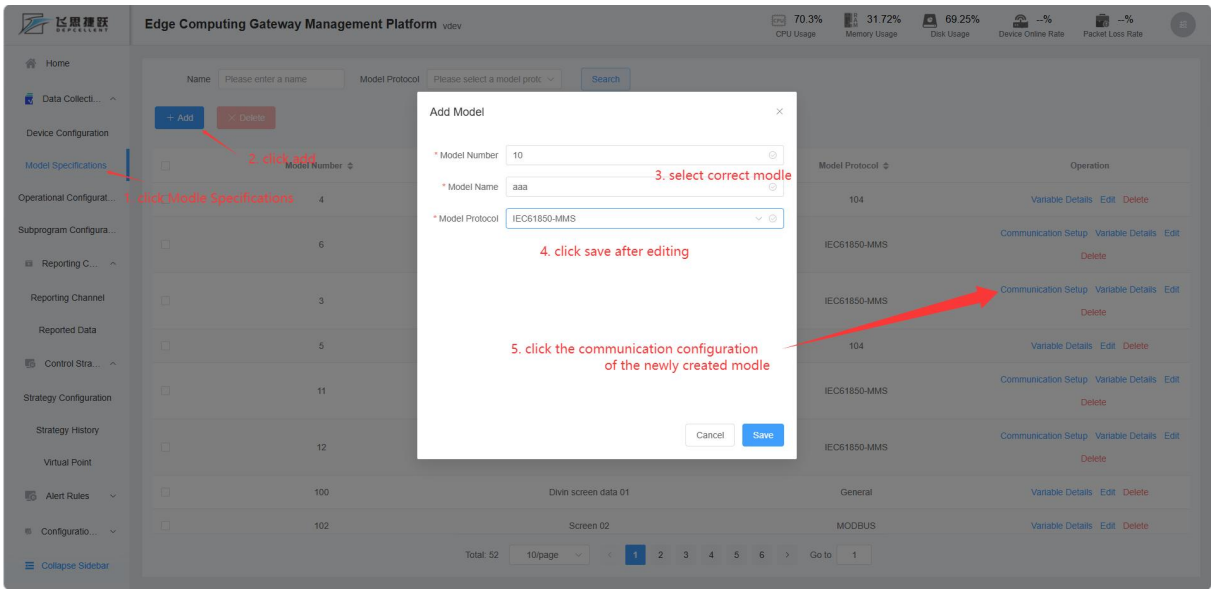


Figure 4-13 Reporting Data

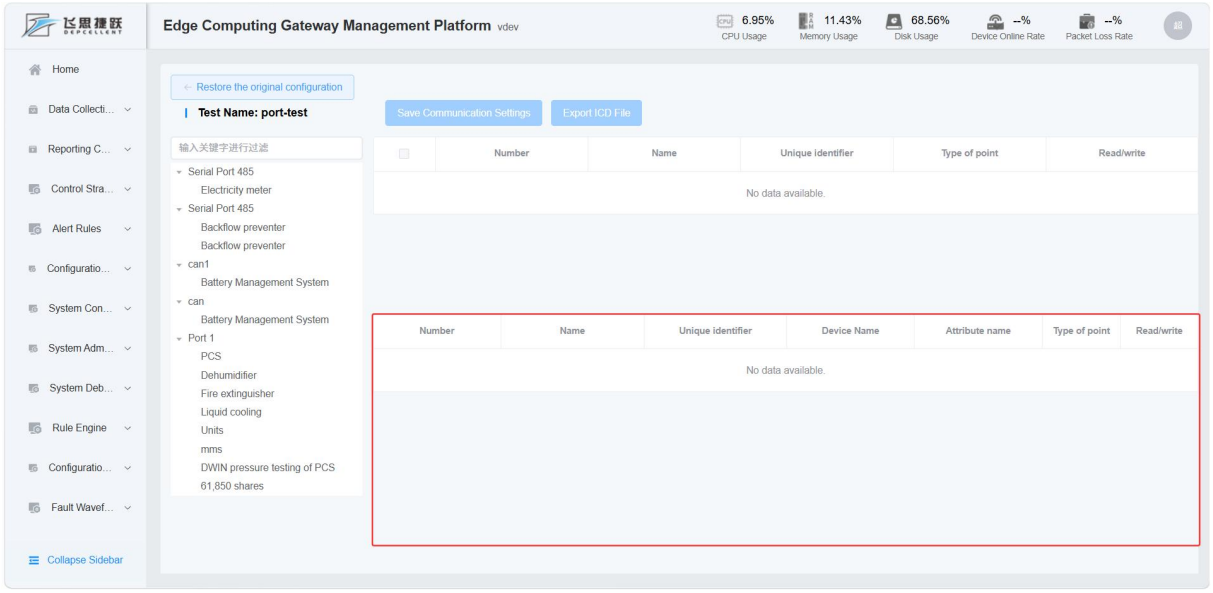
4.1.7. IEC61850 Server Northbound Configuration

4.1.7.1. Create Model

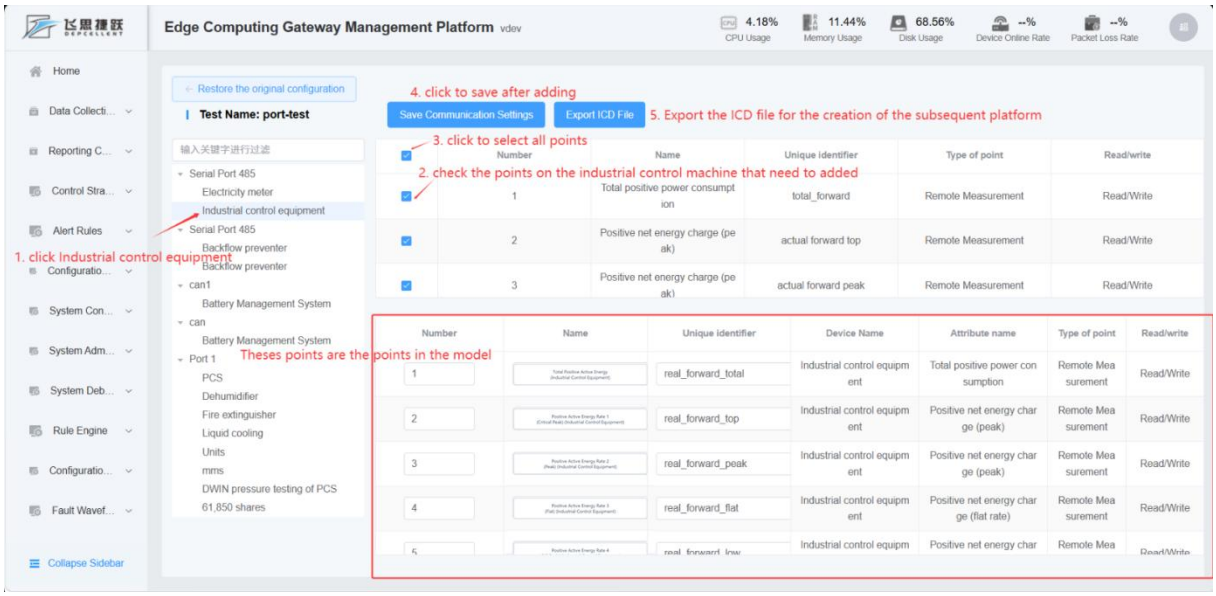
To configure the model and select the correct IEC 61850 Northbound Forwarding Protocol, refer to the diagram below.



After creating the model, click on the communication configuration tab of the newly created model to begin adding point locations; the newly created model does not yet contain any point locations, as shown in the figure below:



Then, based on the point locations added to the industrial PC, add these point locations to the forwarding devices and export the ICD file to prepare for model creation on the platform, as shown in the figure below:



Another method for obtaining ICD files

You need to access the gateway backend to retrieve the file.

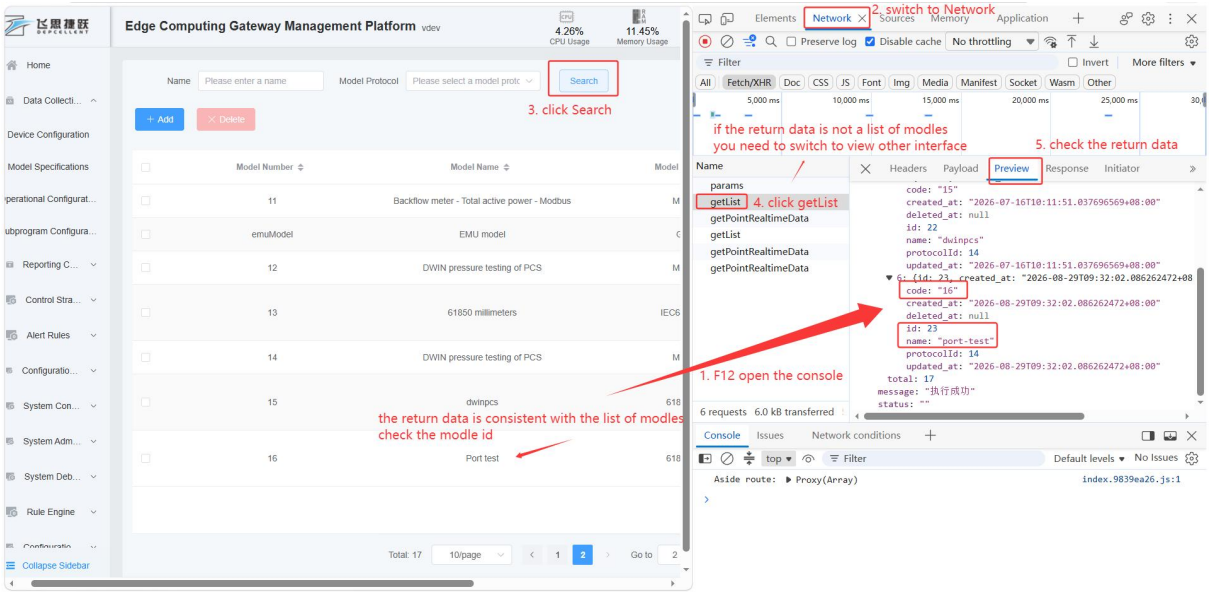
Table of Contents: root/gwai/selfpara/iec61850/

File format: ${{modelId}.icd}

The model IDs are inconsistent, and the files are also inconsistent.

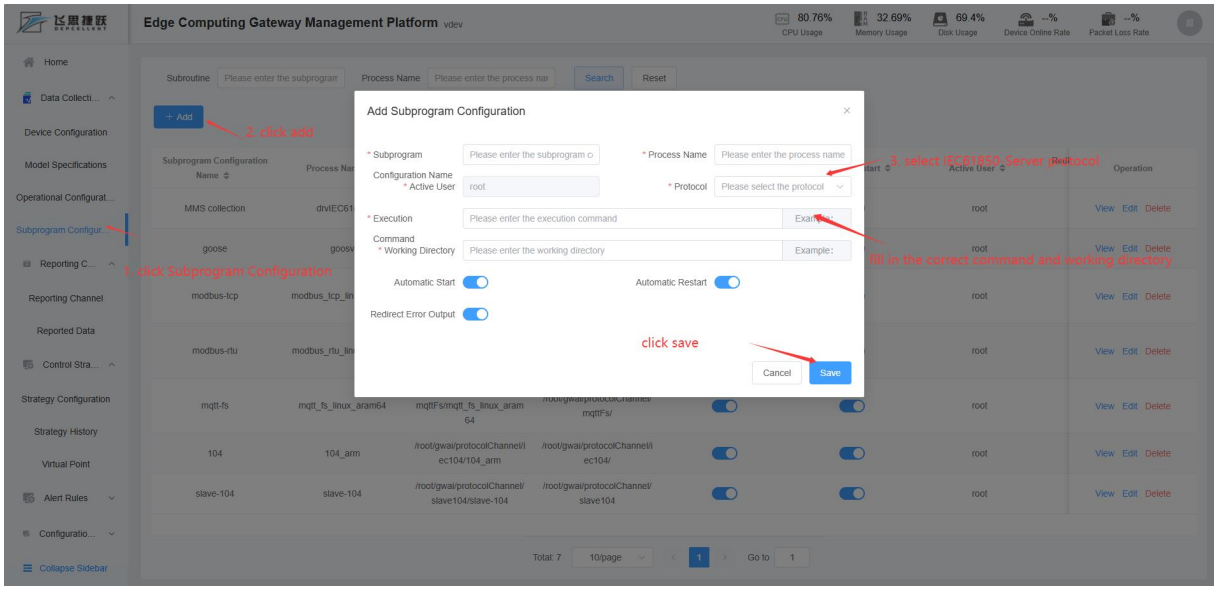
Model ID retrieval method:

Press F12 on the Gateway Model page to open the browser console and view the model ID.



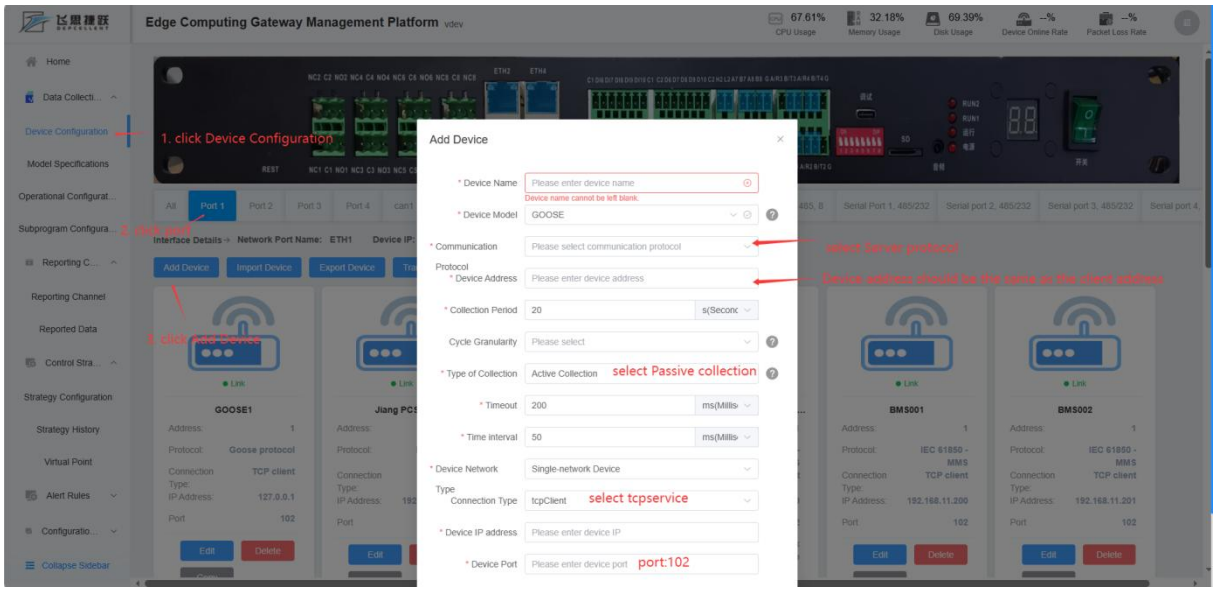
After obtaining the model ID, retrieve the corresponding ICD file from the `/root/gwai/gateway/selfpara/iec61850/` directory.

4.1.7.2. Create Forwarding Subroutine



4.1.7.3. Add Forwarding Device

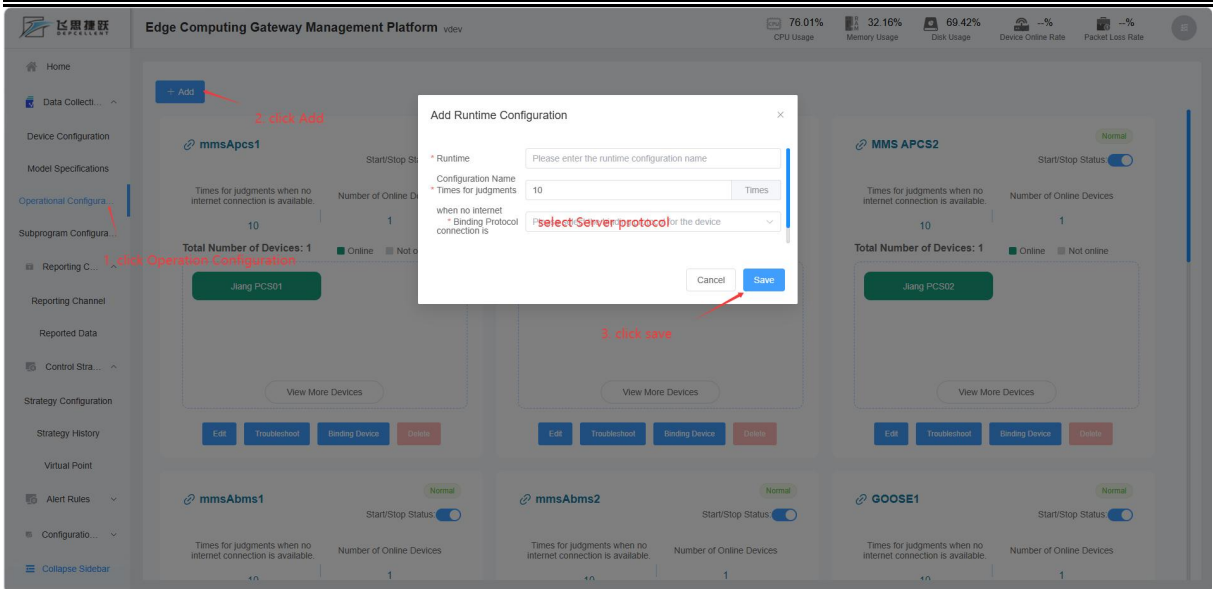
When adding a forwarding device, ensure that the network segment of the network port matches the network segment of the subsequent client; the device address, data collection type, and other parameters must correspond to the configuration of the data collection device. This is illustrated in the figure below.



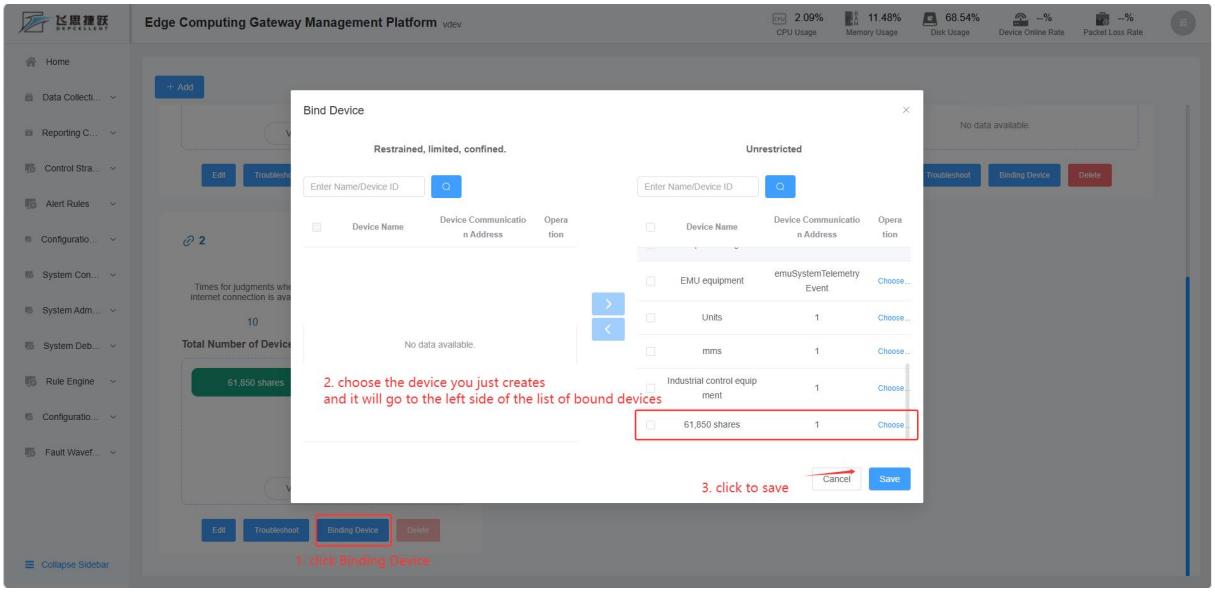
4.1.7.4. Add Runtime Configuration

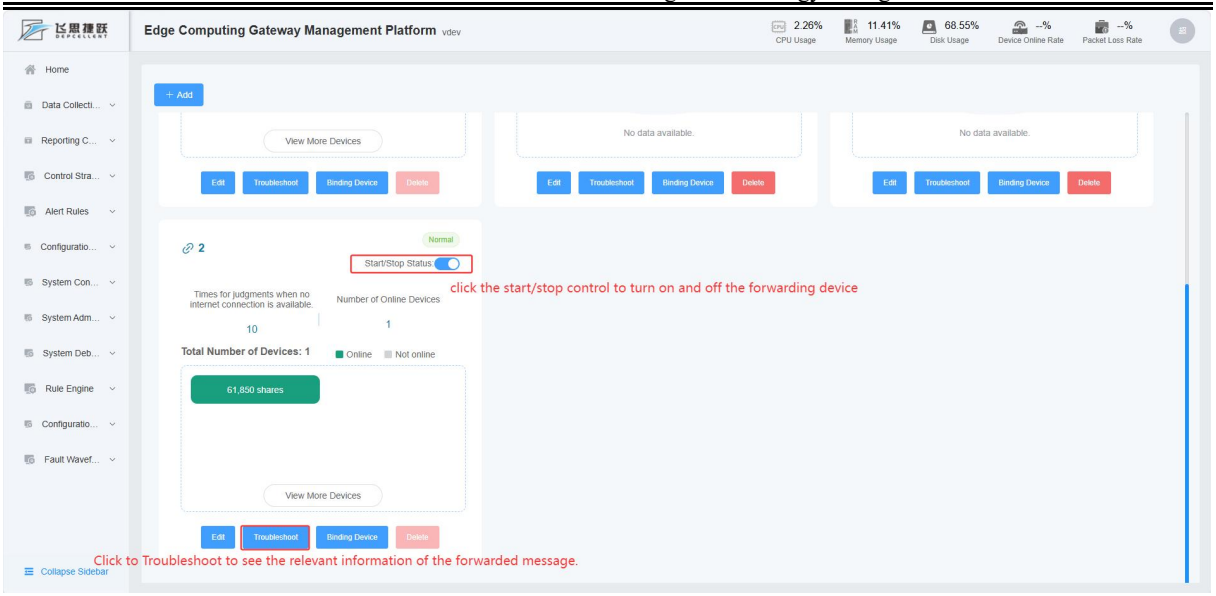
Add the operational configuration for the forwarding device, then bind it to the forwarding device just created; finally, use the start/stop switch in the operational configuration to turn the forwarding device on or off. The procedure is illustrated in the figure below:

Add runtime configuration

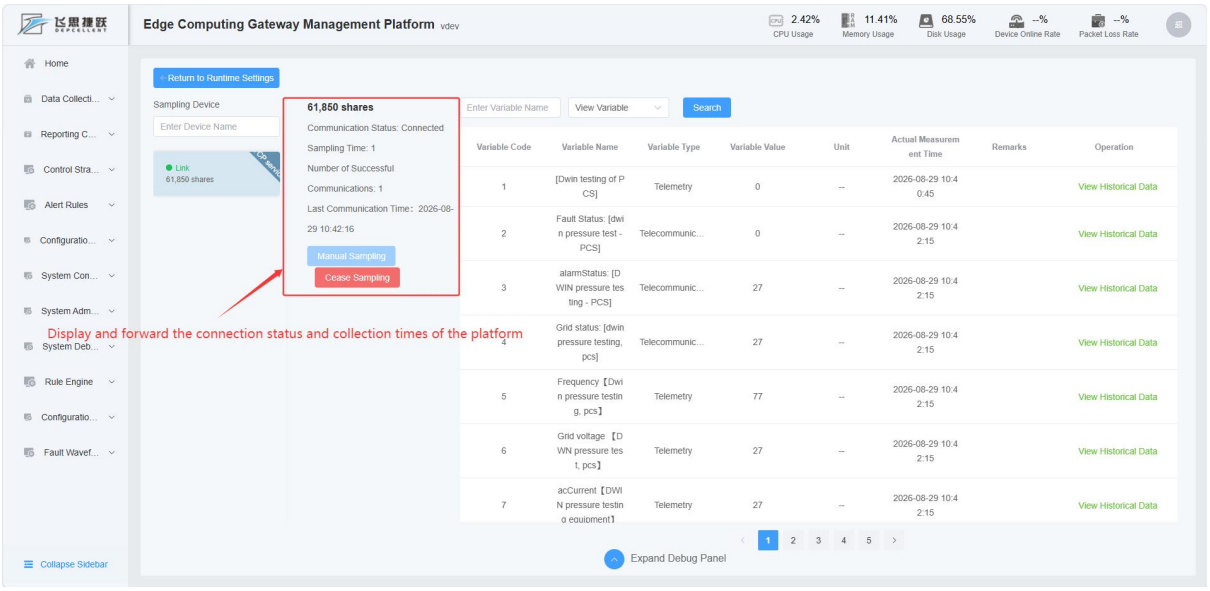

Edge Computing Gateway Management Platform
Add Runtime Configuration
Runtime
Configuration Name
Times for judgments
when no internet connection is
Binding Protocol
Please enter the runtime configuration name
10
Times
Cancel
Save
2. click Add
1. click Operation Configuration
select Server protocol
3. click save
mmsApcs1
MMS APCS2
mmsAbms1
mmsAbms2
GOOSE1
Jiang PCS01
Jiang PCS02
View More Devices
Edit
Troubleshoot
Binding Device
Delete

Bind Device


Edge Computing Gateway Management Platform
Bind Device
Restrained, limited, confined.
Unrestricted
Enter Name/Device ID
Device Name
Device Communication Address
Operation
No data available.
EMU equipment
emuSystemTelemetryEvent
Units
mms
Industrial control equipment
61,850 shares
Choose
2. choose the device you just creates
and it will go to the left side of the list of bound devices
3. click to save
Cancel
Save
1. click Binding Device



Once a connection is established with the forwarding platform, the uploaded data can be viewed.



4.1.8. System Configuration

4.1.8.1. Storage Settings

Whether the configuration stores data locally. As shown in Figure 4-14:

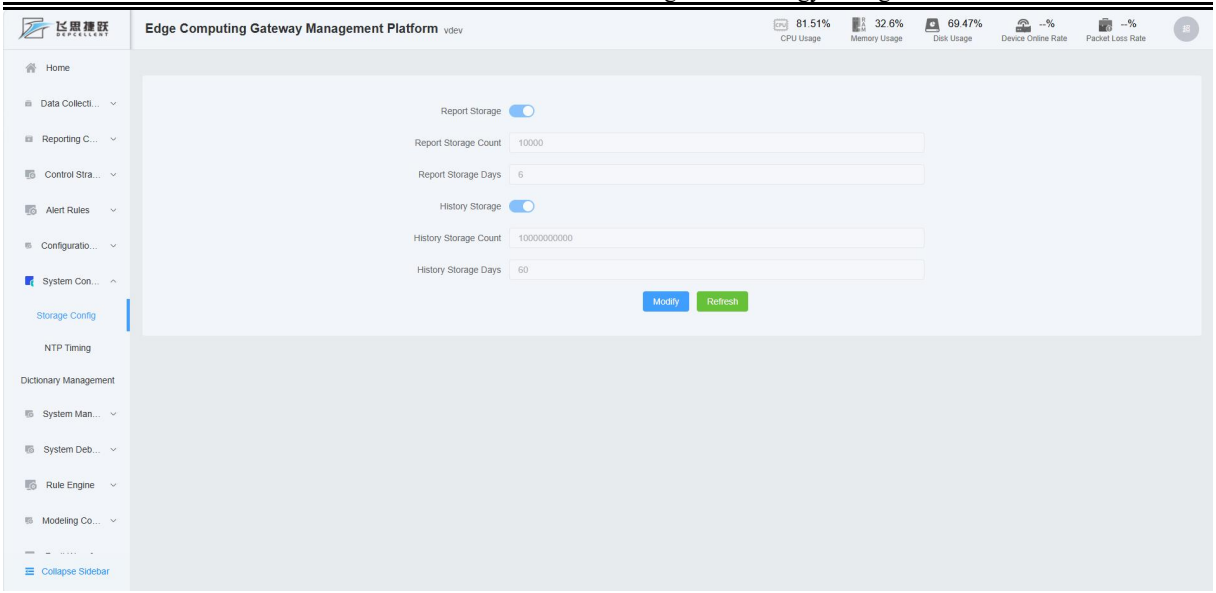


Figure 4-14 Storage Settings

4.1.8.2. NTP Calibration

The configuration and management system synchronizes the time function automatically calibrates the system time through the Network Time Protocol (NTP) server. As shown in Figure 4-15:

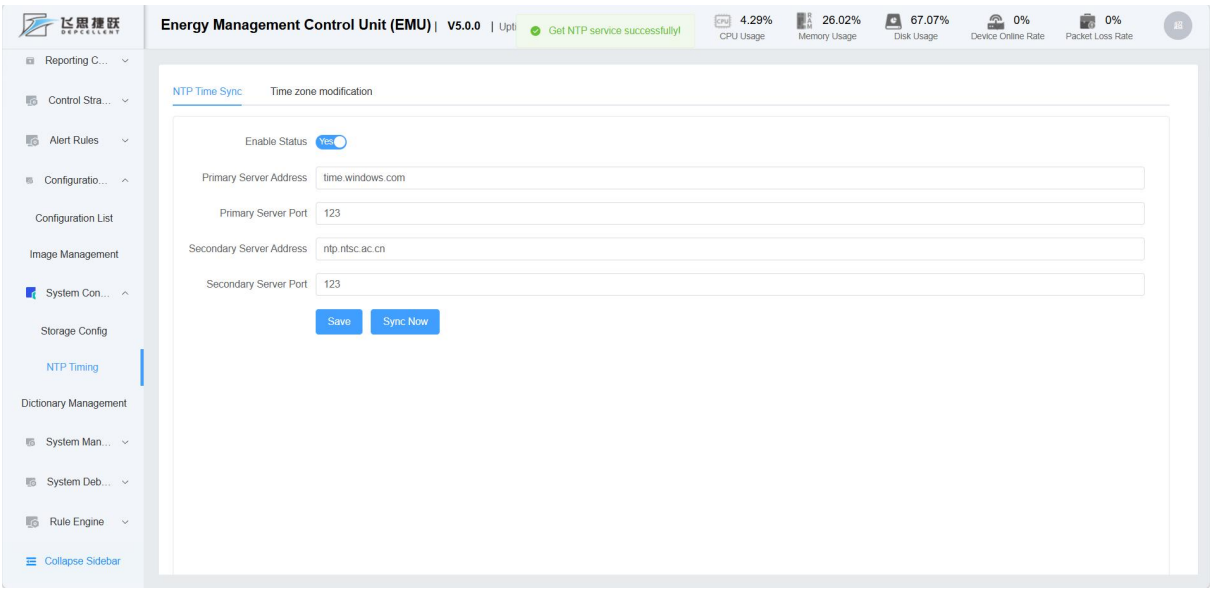


Figure 4- 15 NTP Calibration

4.1.8.3. Dictionary Management

Maintain various data dictionaries used in the system, and users can view, add, modify and delete dictionary entries to ensure the standardization and consistency of system data. As shown in Figure 4-16:

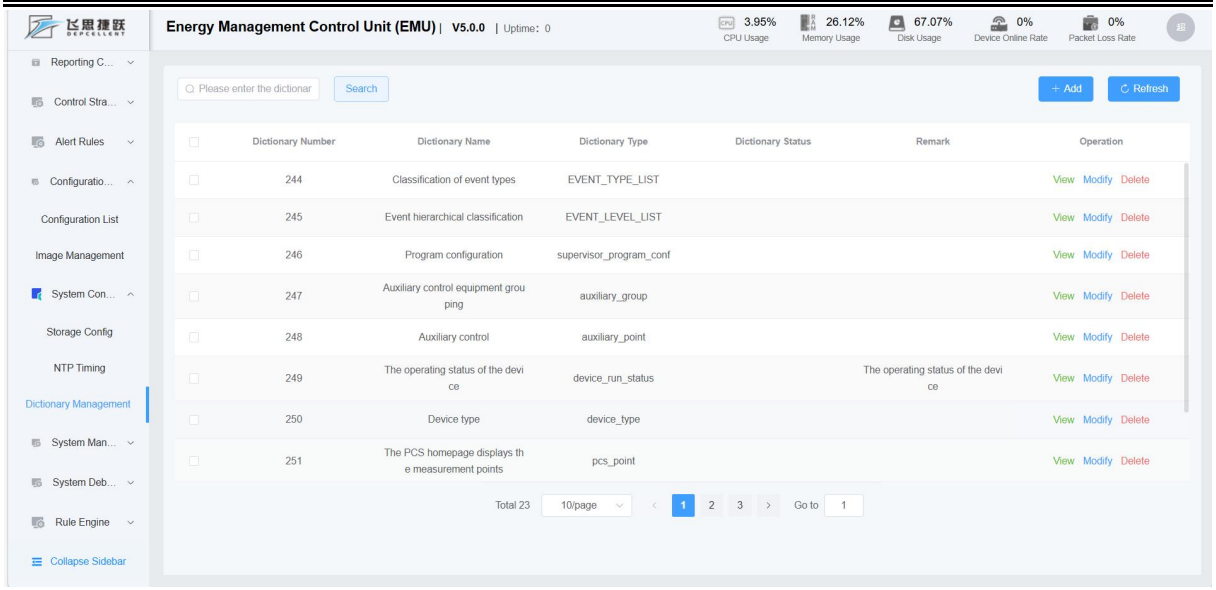
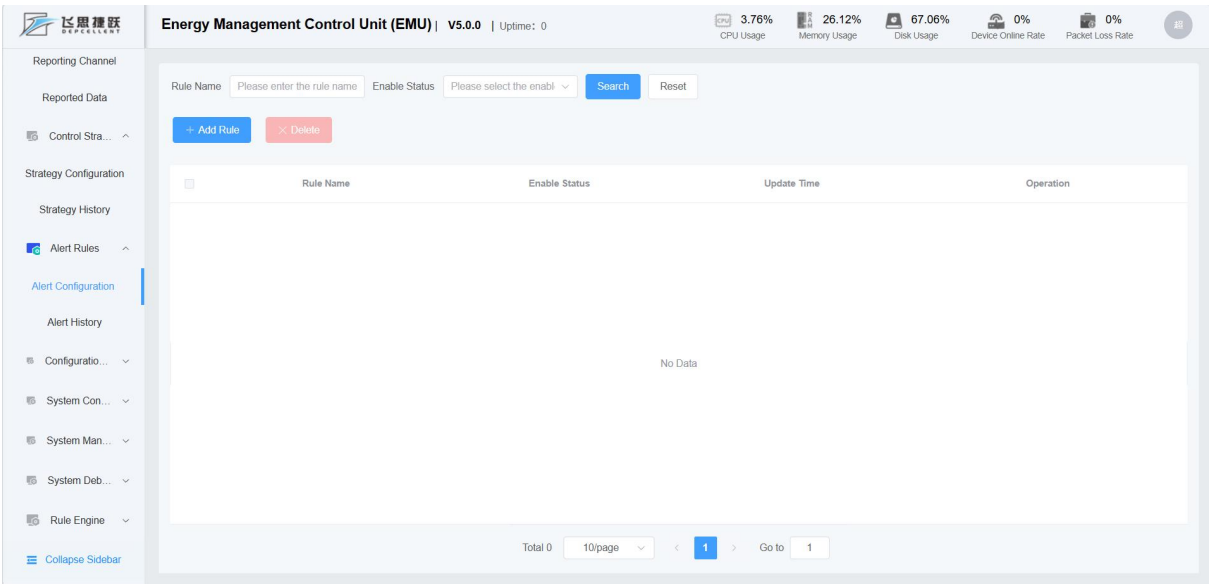


Figure 4-16 Dictionary Management

4.1.9. Alert Rule

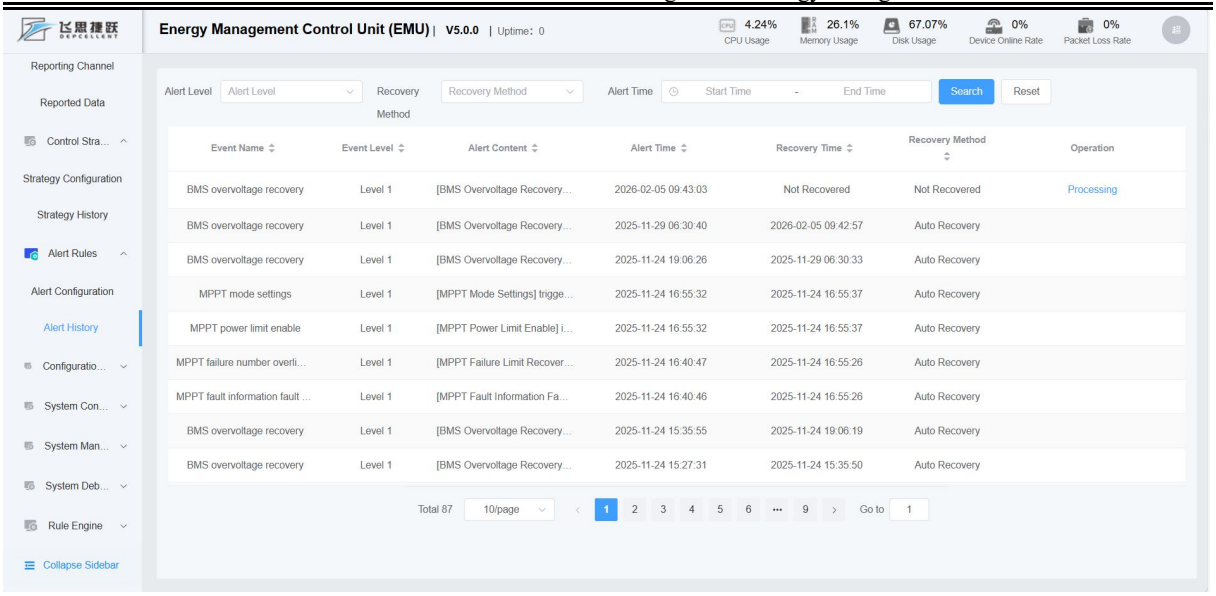
4.1.9.1. Alarm Configuration

By configuring device point-based rules, an alarm record is generated when the collected point data is determined to meet the specified rule.



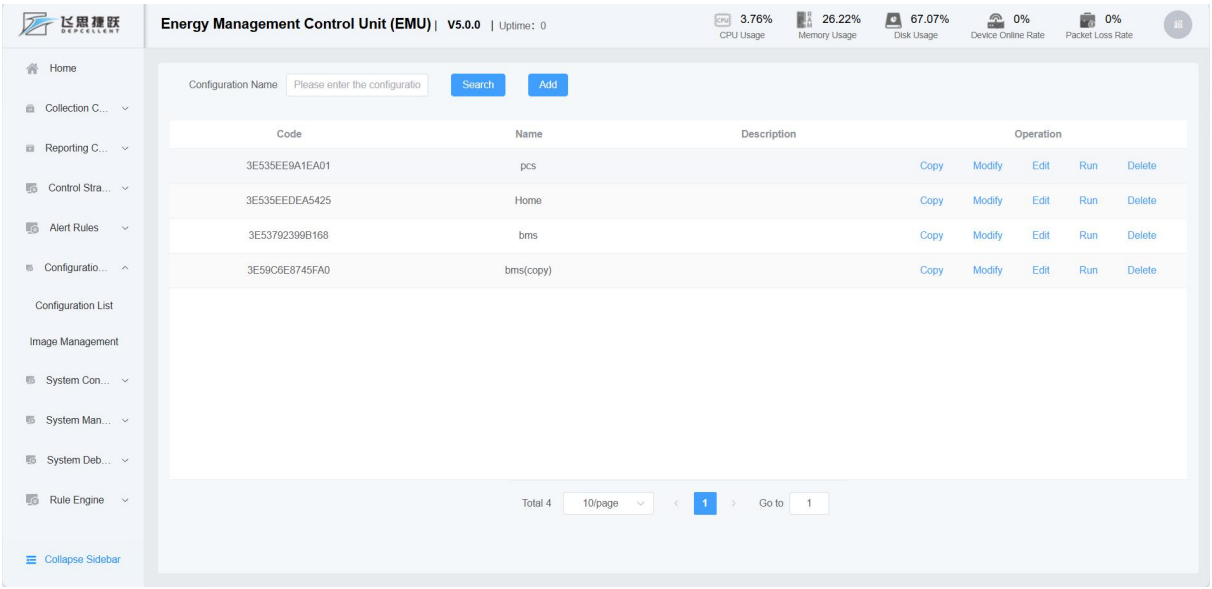
4.1.9.2. Alert History

Once the rules are configured, the system records information such as the rule creation time every time a rule is triggered; after a rule is triggered, the alert event can be processed manually.



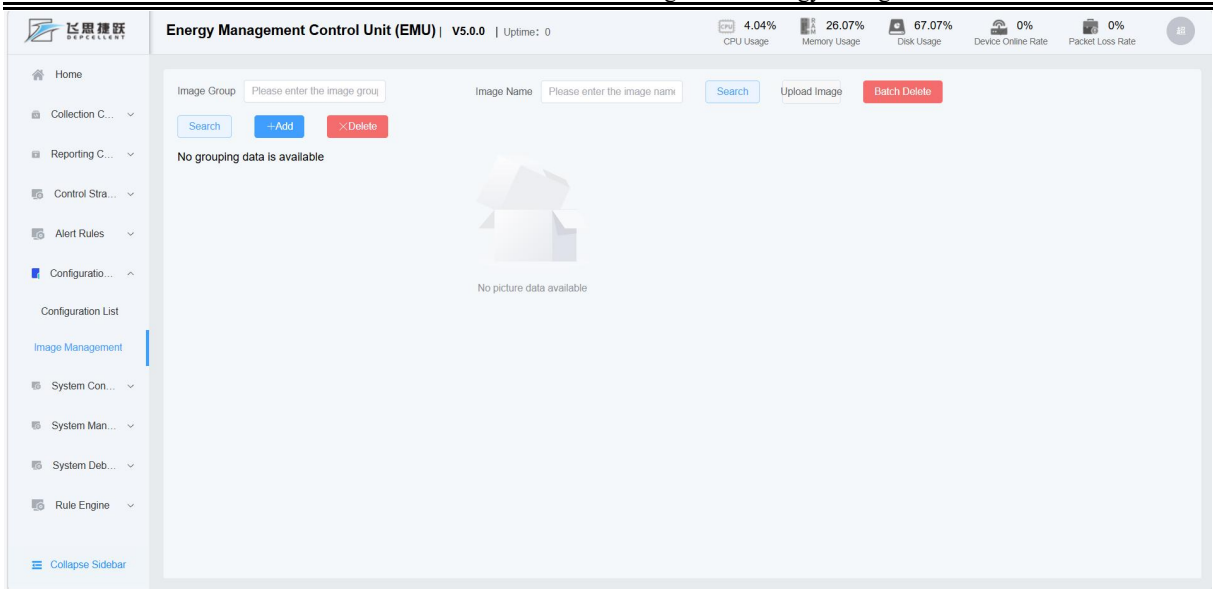
4.1.10. Configuration Management

Configuration management is used to display pages such as the Power Plant Overview, PCS, and BMS; users can configure the relevant pages as needed, allowing them to visually monitor the current operating status of the equipment and other relevant information.

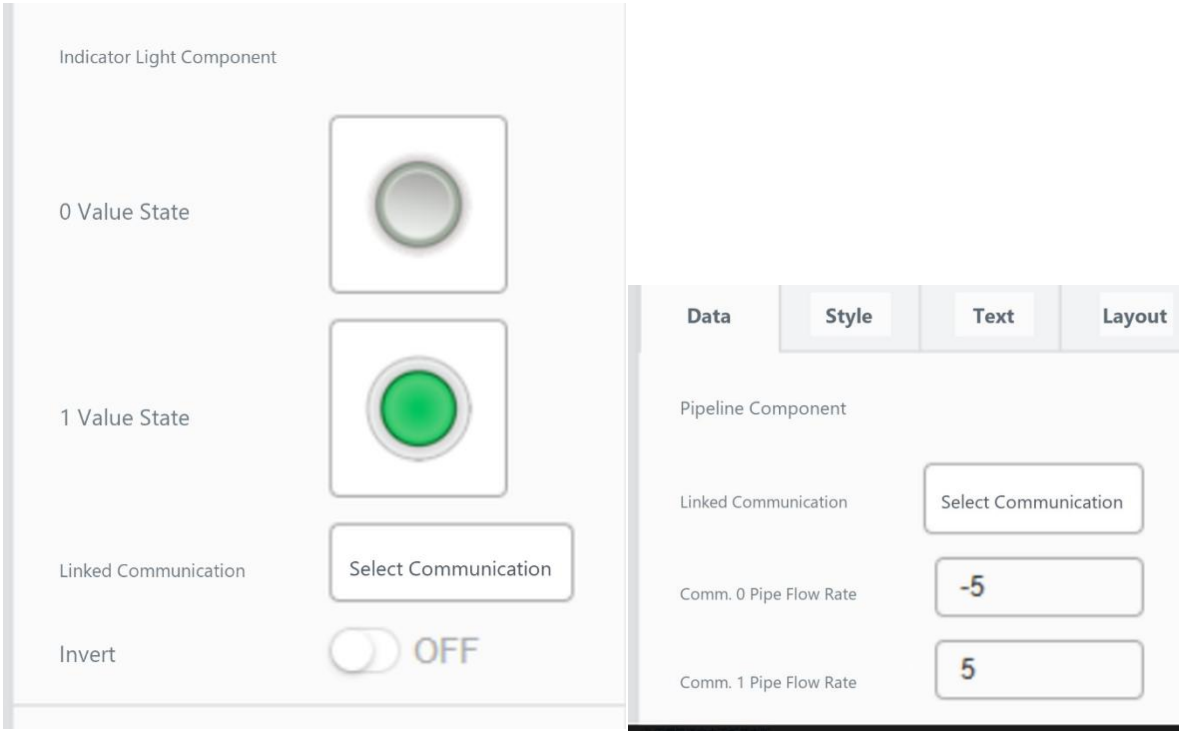


4.1.10.1. Configuration Editor

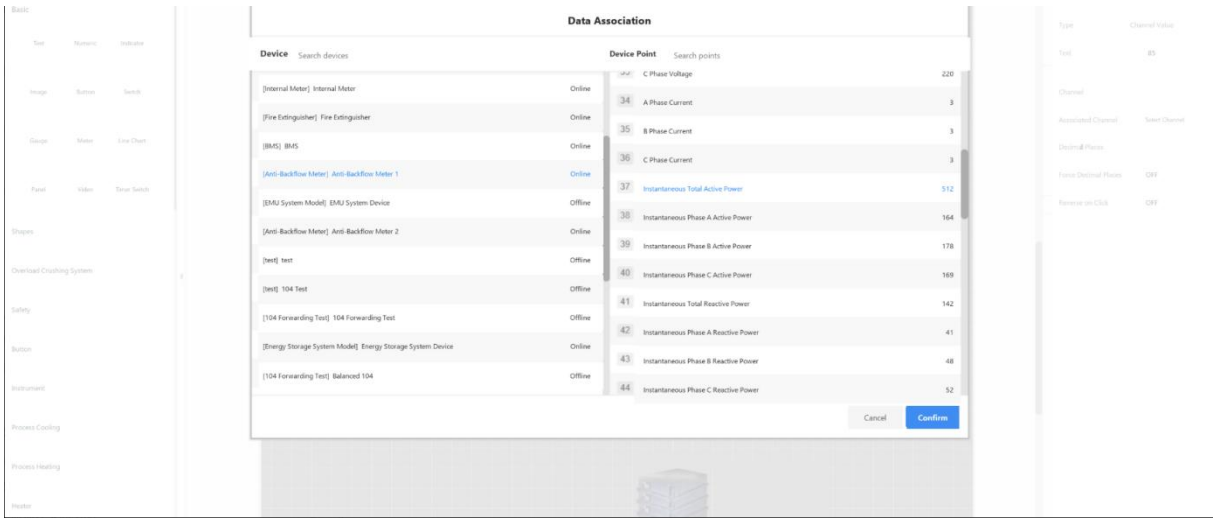
The configuration supports basic controls such as text, numerical values, and indicator lights; clicking a numerical component allows you to associate it with the corresponding telemetry data and display it. You can also configure parameters such as the number of digits displayed and the display format, as shown in the figure below.



Other features include setting the display color for indicator lights and configuring pipeline components to control the pipeline flow direction based on the sign of the data values, as shown in the figure below.



Related data can be bound using the Quick Search Binding feature; if a Point Code has already been bound, switching to another device of the same product will automatically select the corresponding location.



4.1.11. System Management

4.1.11.1. User Management

It includes adding, querying, editing and deleting users, as well as resetting user passwords for users in the management system. As shown in Figure 4-17:

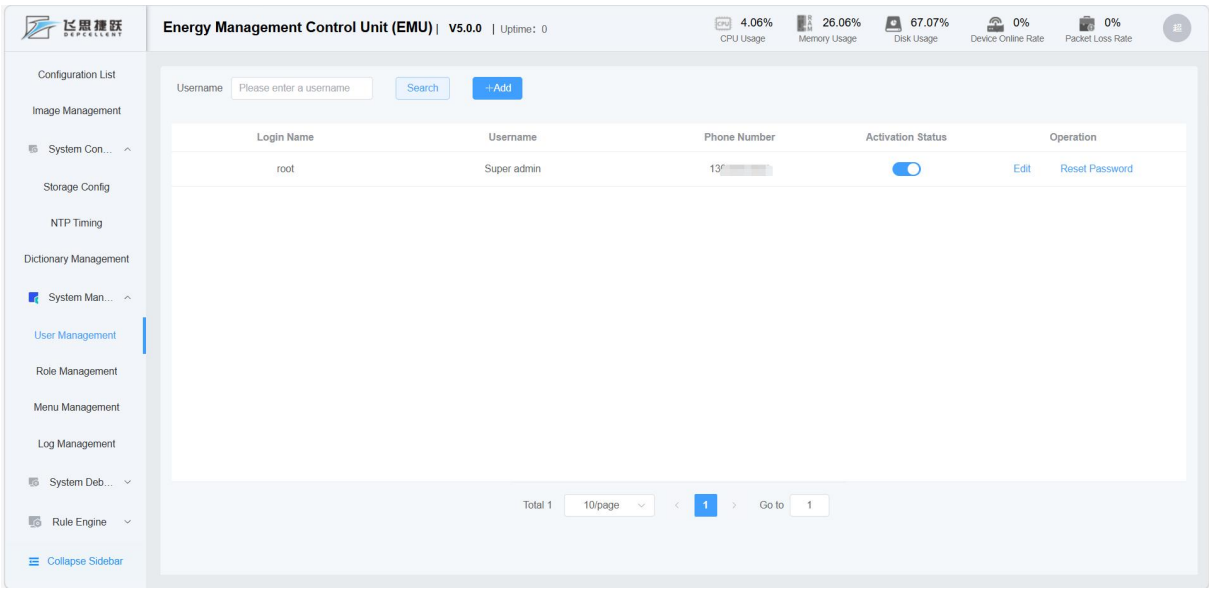


Figure 4-17 User Management

4.1.11.2. Character Management

The roles in the management system include adding, querying, editing and deleting roles, as well as updating user status and configuring menus. As shown in Figure 4-18:

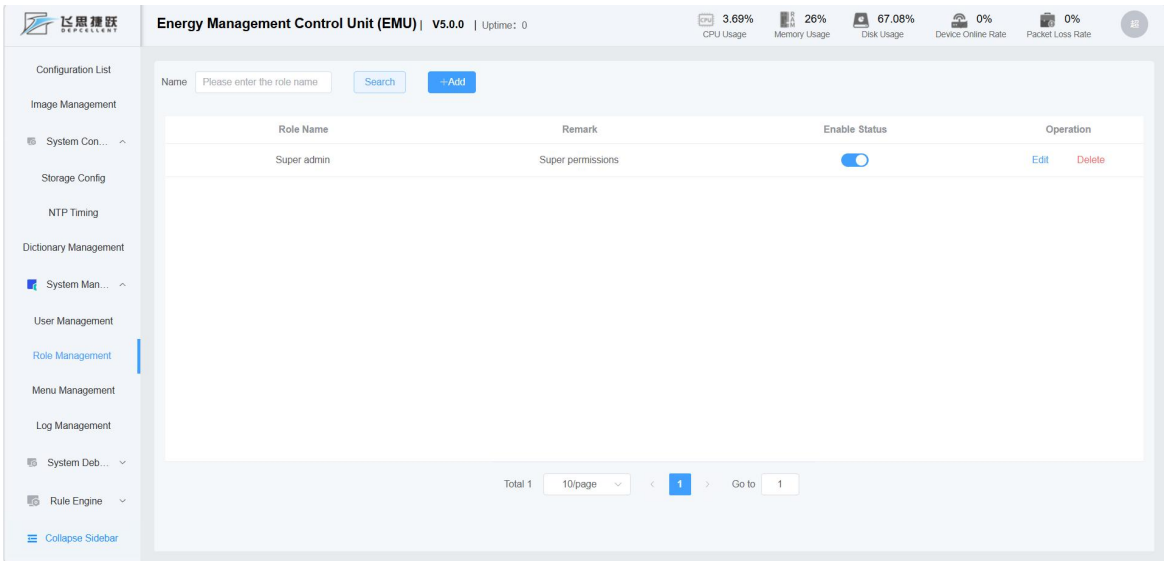


Figure 4-18 Character Management

4.1.11.3. Menu Management

The menu used in the management system includes adding, querying, editing and deleting menus, as well as sorting menus and other operations. As shown in Figure 4-19:

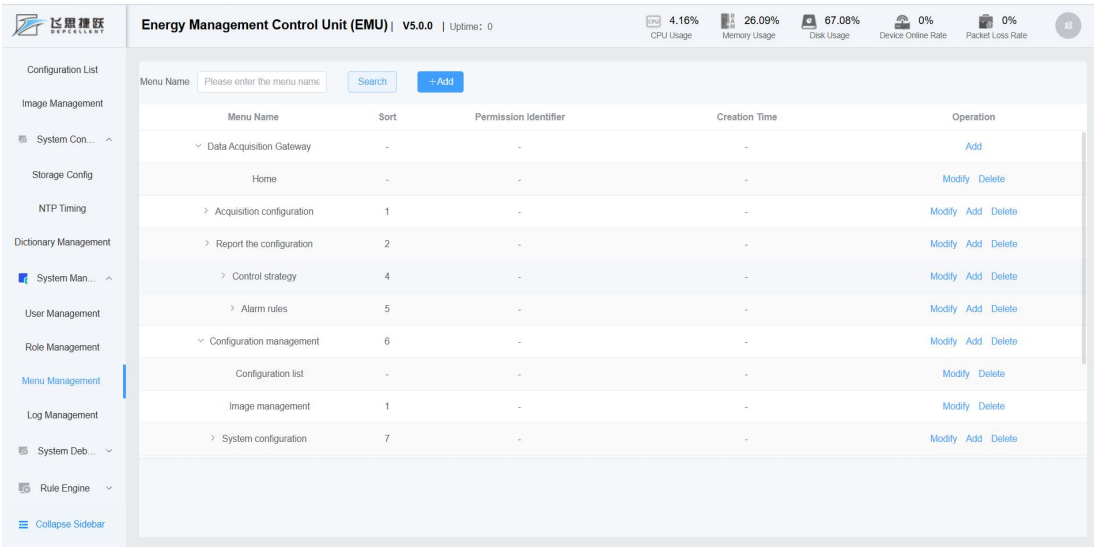


Figure 4-19 Menu Management

4.1.11.4. Log Management

Log management records important information such as the IP address and time of user login to the platform, tracks and audits user operation behaviors, and ensures the security and compliance of the platform. As shown in Figure 4-20:

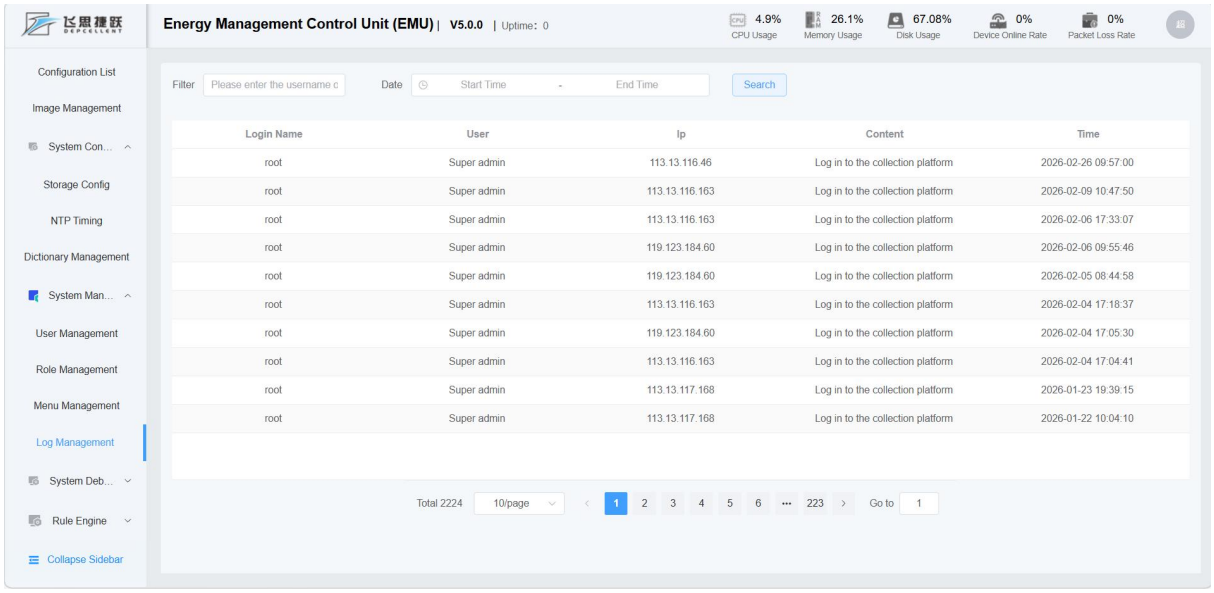


Figure 4-20 Log Management

4.1.12.System Debug

4.1.12.1. Channel Debugging

By opening serial port, CAN port, TCP client and other methods, the debugging channel is ensured to be smooth, and the accuracy of the data sent by the message is verified. As shown in Figure 4-21:

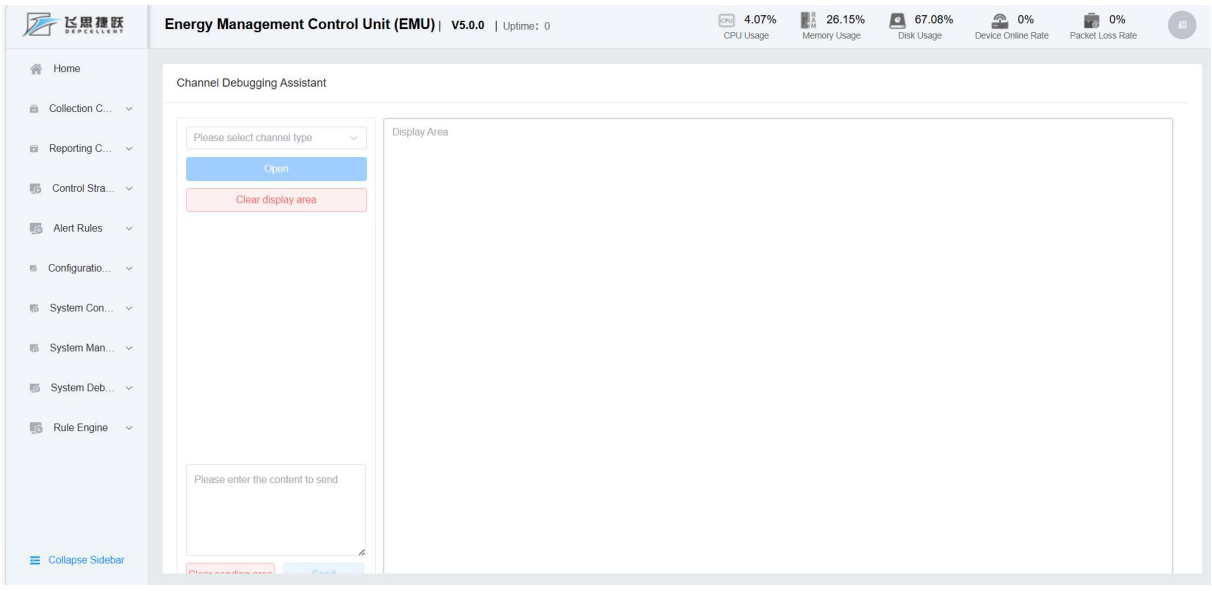


Figure 4-21 Channel Debugging

4.1.12.2. System Logs

View and analyze the log information generated during the operation of the system to understand the running status of the system and troubleshoot errors. As shown in Figure 4-22:

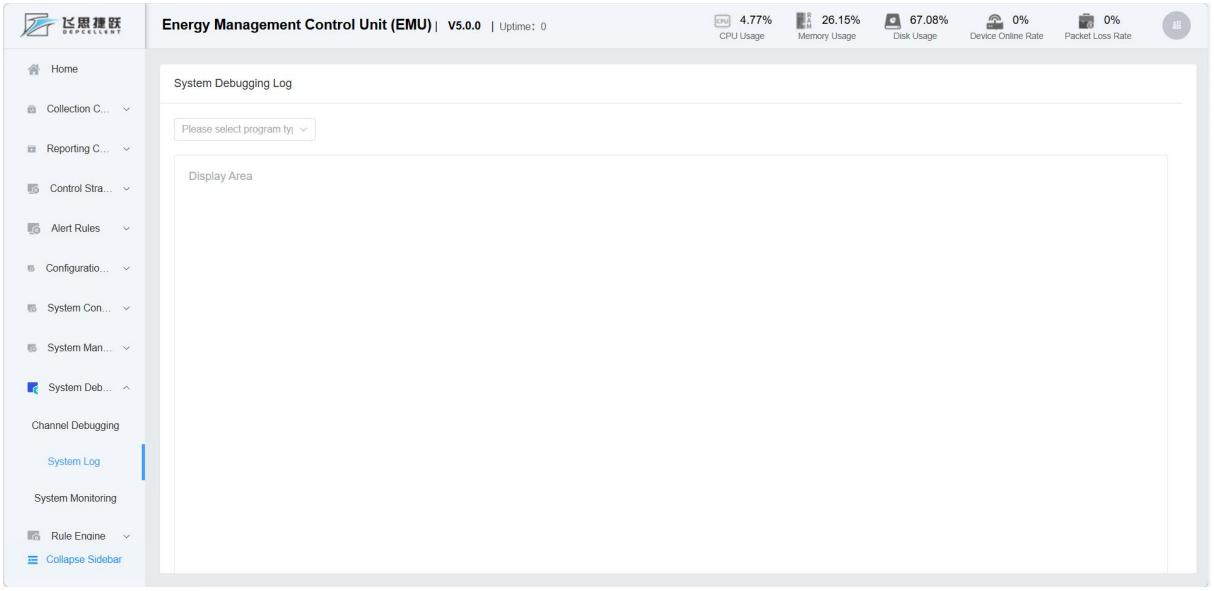


Figure 4-22 System Logs

4.1.12.3. System Monitoring

System monitoring is used to monitor the performance indicators of the system in real time to ensure the stability and reliability of the system. As shown in Figure 4-23:

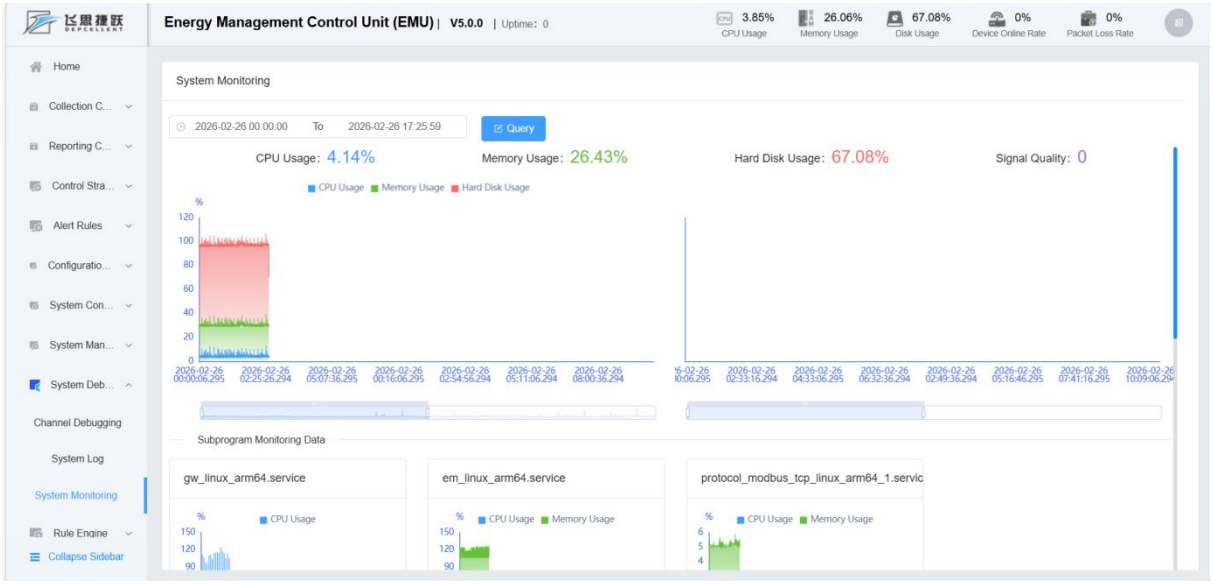


Figure 4-23 System Monitoring

4.1.13. Rule Engine

4.1.13.1. Rule Configuration

Rules are configured to manage and configure rules. Users can create new rules, set the trigger conditions and actions of the rules, and view, edit, and delete configured rules. As shown in Figure 4-24:

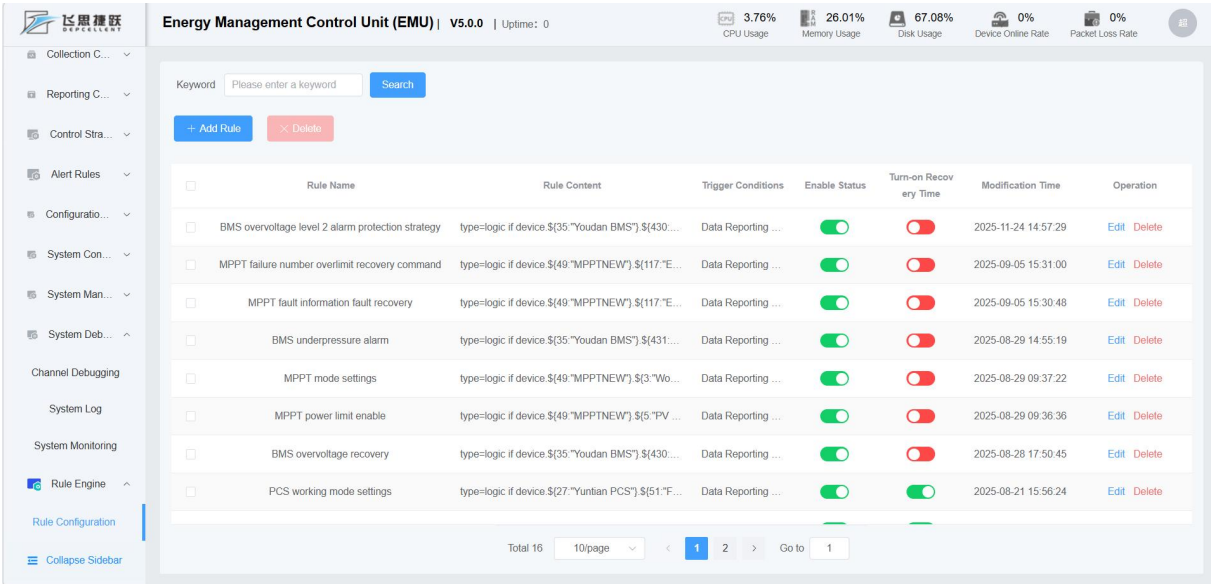
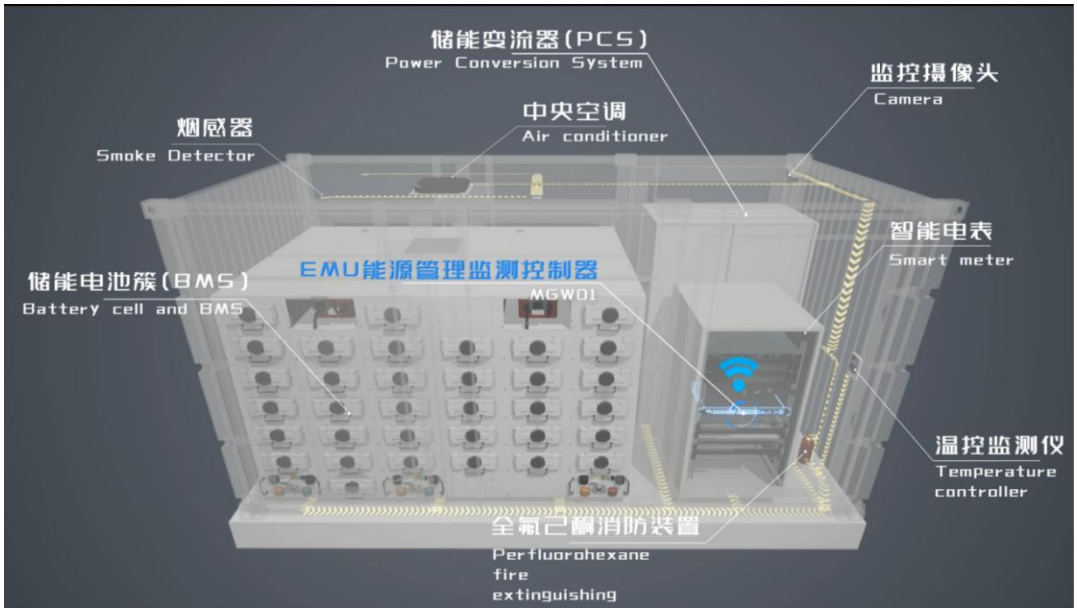


Figure 4-24 Rule Configuration

5. EMU Hardware Requirements

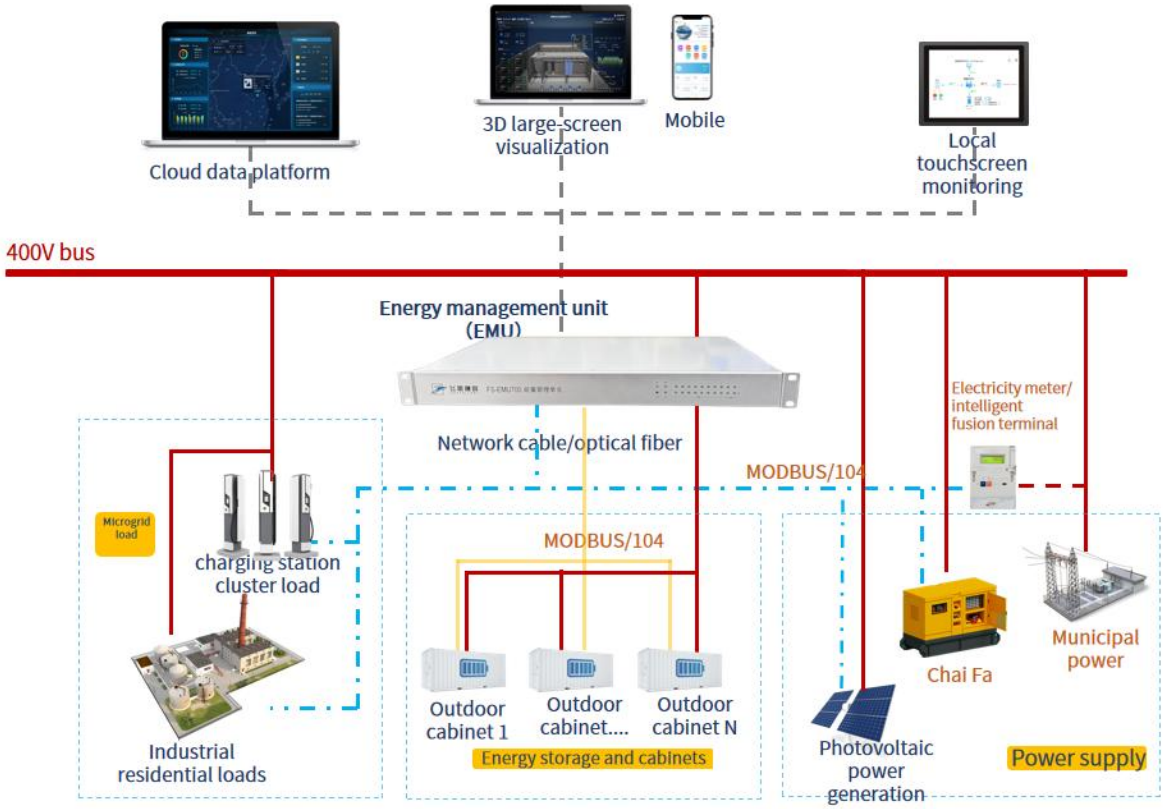
The EMU Energy Management and Monitoring Controller is an innovative technology with outstanding advantages, representing a solution specifically tailored for energy storage and microgrid applications. Compared to traditional devices such as 4G routers, 5G routers, and PLC controllers, the EMU enables integrated system management, simplifies system architecture, and reduces both the number of devices required and maintenance costs. Additionally, it offers efficient energy management capabilities, optimizing energy storage and utilization through real-time monitoring and intelligent control. This controller allows for precise control of energy storage equipment and provides flexible energy scheduling strategies to enhance energy utilization efficiency as well as system stability and reliability. Whether for industrial, commercial, or residential applications, the EMU Energy Management and Monitoring Controller delivers convenience and cost savings for users' energy needs,

making it an ideal solution for the operation of energy storage systems. Powered by a high-end ARM processor featuring a quad-core ARM Cortex-A53 architecture with integrated internal GPU and NPU, the controller offers advantages such as high efficiency, high performance, and low cost; it supports 4G memory and 32 GB of onboard storage. The gateway integrates various functional interfaces, including Ethernet, 4G,5G, Wi-Fi, RS485, RS232, HDMI, and DI/DO.

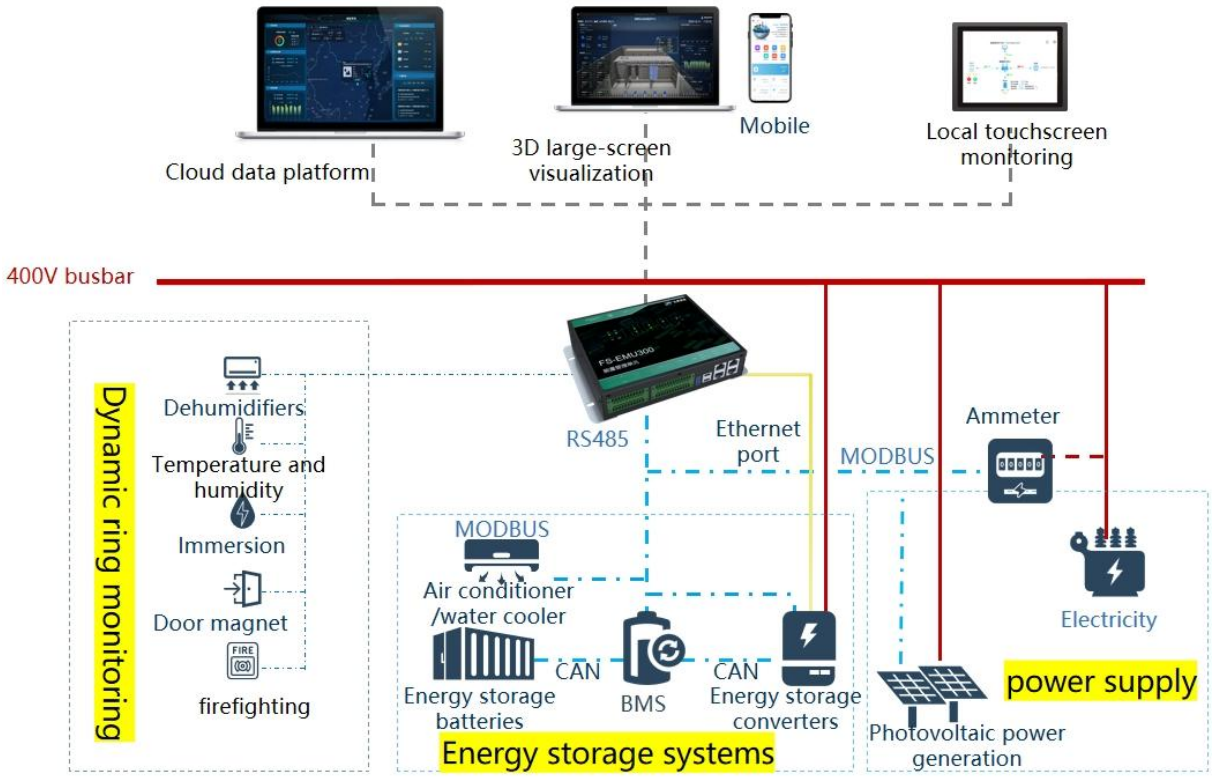


5.1. Product Features

EMU provides comprehensive monitoring for devices deployed in energy storage energy management scenarios, enabling timely collection of real-time operational status data from PCS/BMS/auxiliary control devices and supporting IO control output.



Suitable for industrial and commercial energy storage systems, as well as microgrid applications involving solar, storage, diesel, and charging scenarios.



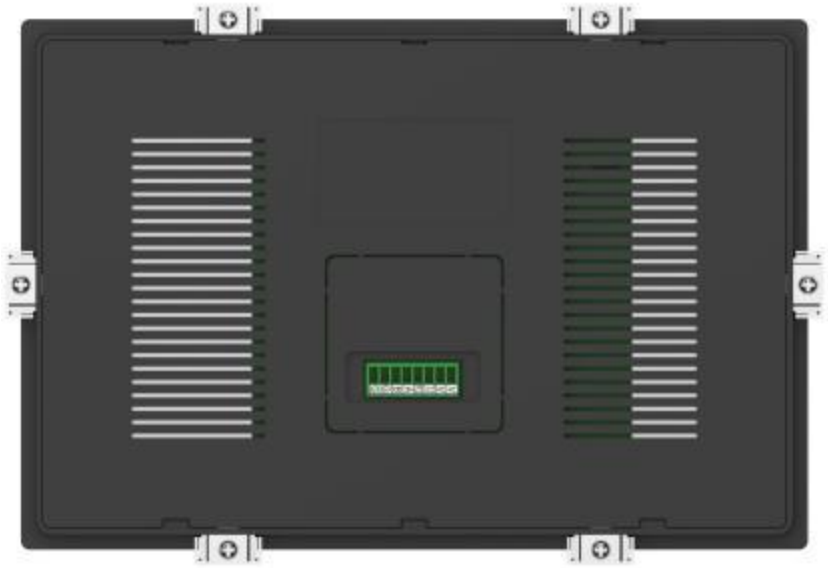
Suitable for small to medium-sized energy storage applications; designed as a multi-cabinet parallel configuration.

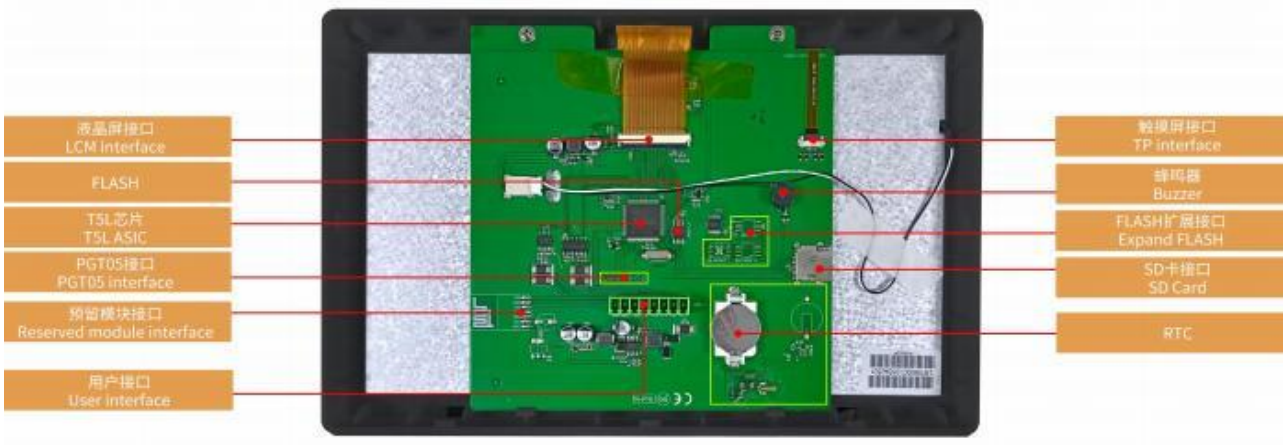
5.2. Screen Option

Product Features:

- Based on the T5L2 chip, runs the DGUS II system – commercial-grade.
- 10.1-inch display, 1024×600 resolution, 16.7 million colors, IPS panel, wide viewing angle.
- Resistive touchscreen.
- With a casing.

Screen Interface Diagram:





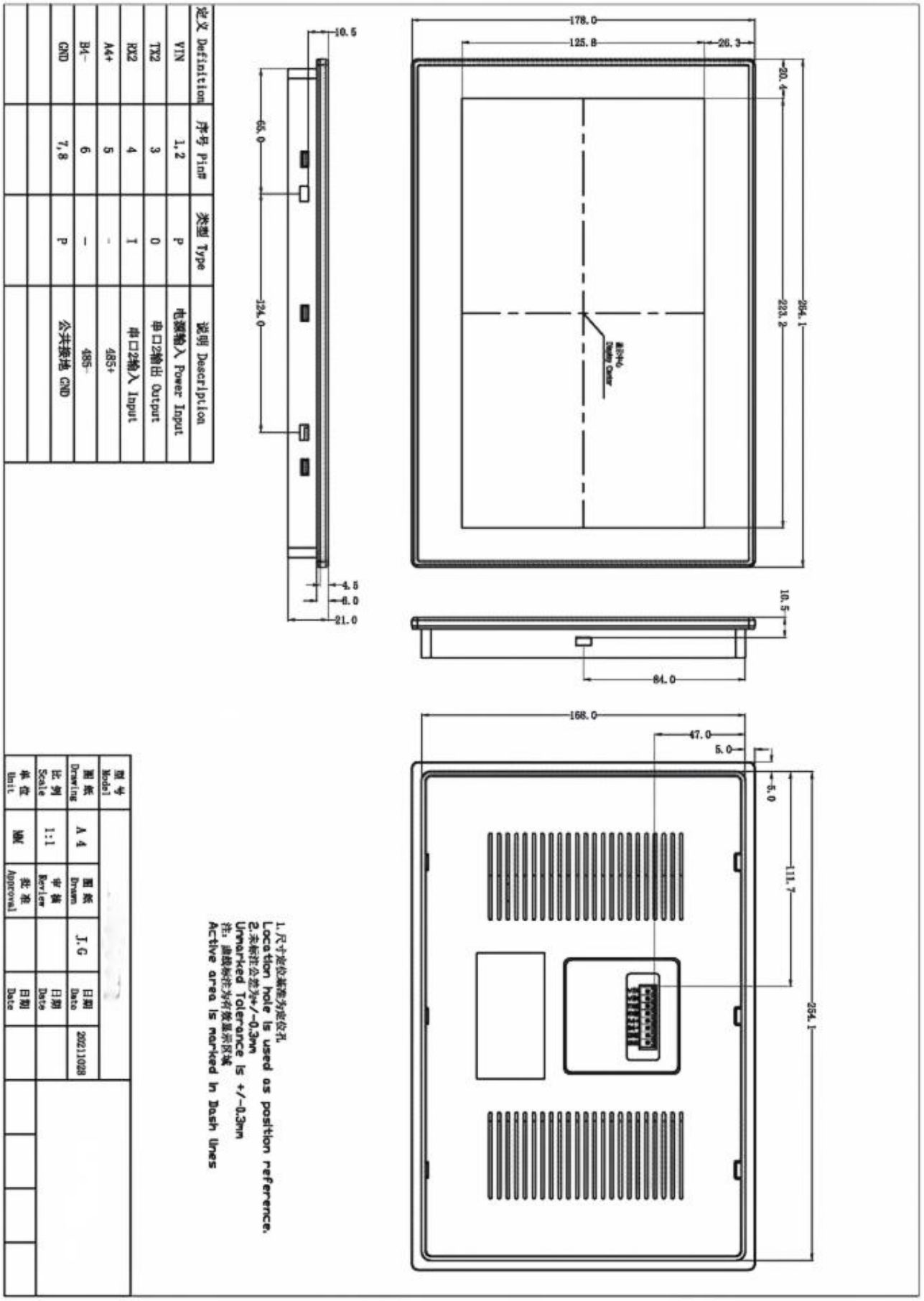
Hardware and Interface Specifications:

order number No.	nameName	explain Description
1	T5L2 Chip – T5L2 ASIC	Mass-produced in 2019; features an 1 MB in-package NOR Flash memory, with 512 KB dedicated to storing the user database; endurance exceeds 100,000 erase cycles.
2	LCD Screen Interface (LCM Interface)	FPC50_0.5mm, RGB interface FPC50_0.5mm, RGB interface
3	Resistance Touchscreen Interface (RTP Interface)	4-pin, 1.0 mm interface 4Pin_1.0mm interface
4	customer interface User interface	8-pin, 3.81 mm socket – for power supply and serial communication; typical serial download rate: 12 KB/s. Download rate(typical value): 12KByte/s
5	Flash	16 MB NOR Flash memory – suitable for storing font libraries, images, and audio files; erase/write cycles> 100,000.16 MB NOR Flash memory – for fonts, images, and audio files. Rewrite cycle: over 100,000 times
6	Expand Flash Interface	Can be expanded to 64 MB NOR Flash or 48 MB NOR Flash + 512 MB NAND Flash Expandable to 64Mbytes NOR Flash or 48Mbytes NOR Flash+512Mbytes NAND Flash
7	Buzzer	3V passive buzzer; Power: <1W 3V passive buzzer. Power: <1W
8	RTC	Button battery-powered; Accuracy: ±20 ppm @ 25°C Button cell for power supply. Accuracy: ±20ppm @25℃
9	SD Card Interface	FAT32 format; download files – files can be displayed on the screen with statistics. FAT32. Download files by SD interface can be displayed in statistics
10	Reserved module interface Reserved module interface	Wi-Fi Module: Solder the Wi-Fi-10 module to connect to a cloud platform for remote firmware updates. USB Module: Solder the USB module; files can be downloaded via a USB flash drive. Wi-Fi module: connect to the cloud platform to update remotely USB module: download files by USB flash disk

11	PGT05 Interface PGT05 interface	When a product fails to operate normally due to an unexpected issue, the DGUS underlying layer can be updated via PGT05 to restore the product to normal operation. When product crashes by accident, you can use PGT05 to update DGUS kernel and make the product return to normal

Packaging and physical dimensions:

outline dimension Form Factor	264.1mm (W)×178.0mm (H) ×21.0mm (T)			
Net weight Net Weight	660g			
Packaging Standards				
ackaging Box Model	Packaging box dimensions	Number of layers Layer	Quantity/Layer (Sheet) Quantity/Layer	Total quantity (pieces)
Box 1 – Carton1:	220mm(L)×160mm(W)×47mm (H)	-	-	-
Box No.2 – Carton 2:	250mm(L)×200mm(W)×80mm (H)	-	-	-
Box 3 – Carton 3:	320mm(L)×270mm(W)×80mm (H)	-	-	-
Box 4: Carton 4:	435mm(L)×335mm(W)×290mm(H)	-	-	-
Box 5 – Carton 5:	600mm(L)×430mm(W)×290mm(H)	1	10	10



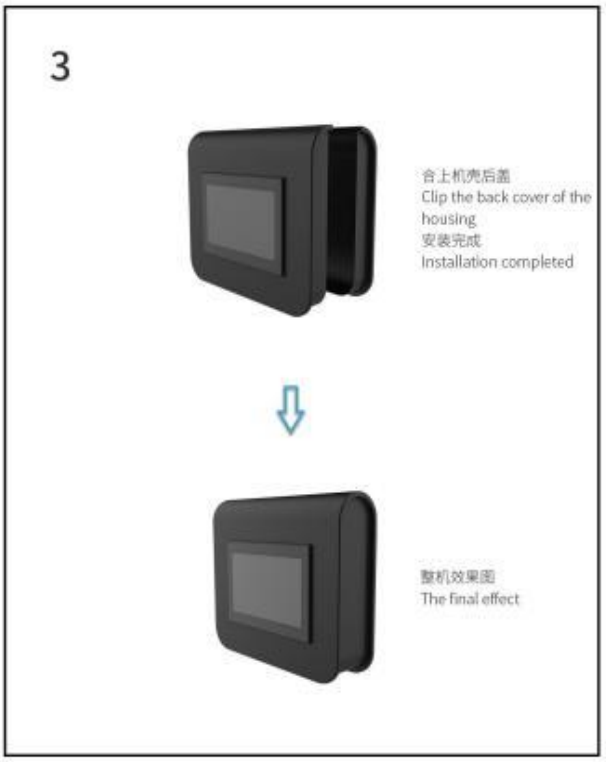
定义 Definition	序号 Pin#	类型 Type	说明 Description
VIN	1,2	P	电源输入 Power Input
TX2	3	O	串口2输出 Output
RX2	4	I	串口2输入 Input
A4+	5	-	485+
B4-	6	-	485-
GND	7,8	P	公共接地 GND

型号 Model				
图纸 Drawing	A4	图纸 Drawn	J.G	日期 Date	20211028
比例 Scale	1:1	审核 Review		日期 Date	
单位 Unit	MM	批准 Approval		日期 Date	


防水橡胶垫片（用蓝色突出展示，实际为黑色）：位于屏与机壳之间，防止进水。户外使用还可在防水橡胶处增加玻璃胶，强化防水性能
Waterproof rubber gasket (blue part in the schematic, actually in black): located between screen and shell to prevent water ingress. Additional glass glue is available for outdoor use to strengthen the waterproof performance


1
255.1
169.0
15.0
开孔要求如图所示。
深度＞15.0mm，
机壳面板厚度＜3.0mm
The opening requirements are shown in the figure.
Depth＞15.0mm
Device front housing thickness＜3.0mm
将屏从机壳前方安装到机壳上的开孔中
Install the screen from the front into the housing openings.


2
将 4 个卡扣从机壳背面安装在屏上
Install the 4 clips on the screen from the back of the housing
安装好卡扣后，顺时针拧紧四颗螺钉即可将屏固定在机壳上
After the installation, tighten the 4 screws clockwise to fix the product to the housing


3
合上机壳后盖
Clip the back cover of the housing
安装完成
Installation completed
整机效果图
The final effect

Make energy storage safer and more efficient

Make Energy Storage Safer and More Efficient

Shenzhen Feisi Jieyue Technology Co., Ltd.

https://www.feisjy.com

Email: support@feisjy.com