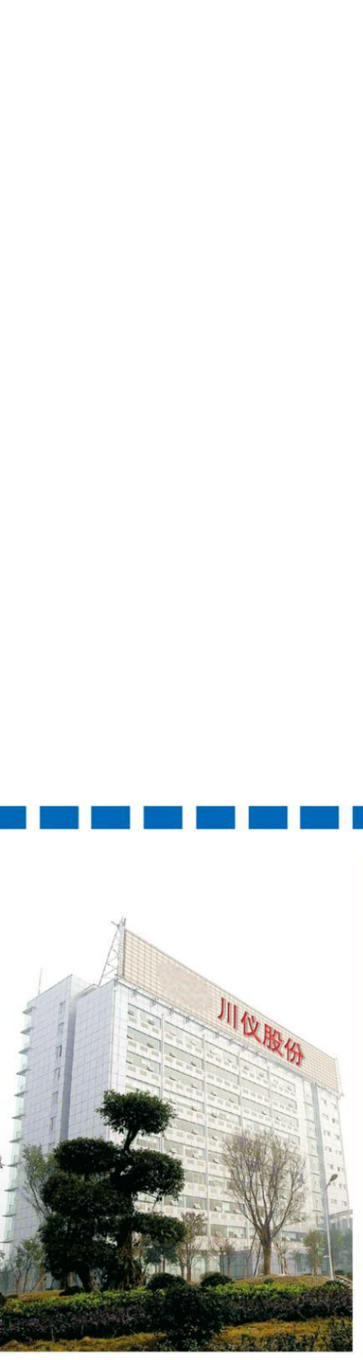
重庆川仪自动化股份有限公司
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PAS300
Distributed Control System Introduction

CHUANYI is always by the side of Customers
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重庆川仪自动化股份有限公司智能控制系统分公司
Chongqing Chuanyi Automation Co.,Ltd. Intelligent Control System Branch



DIRECTORY



Enterprise concept

CHUANYI is always by the side of Customers
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1.2 System Scale

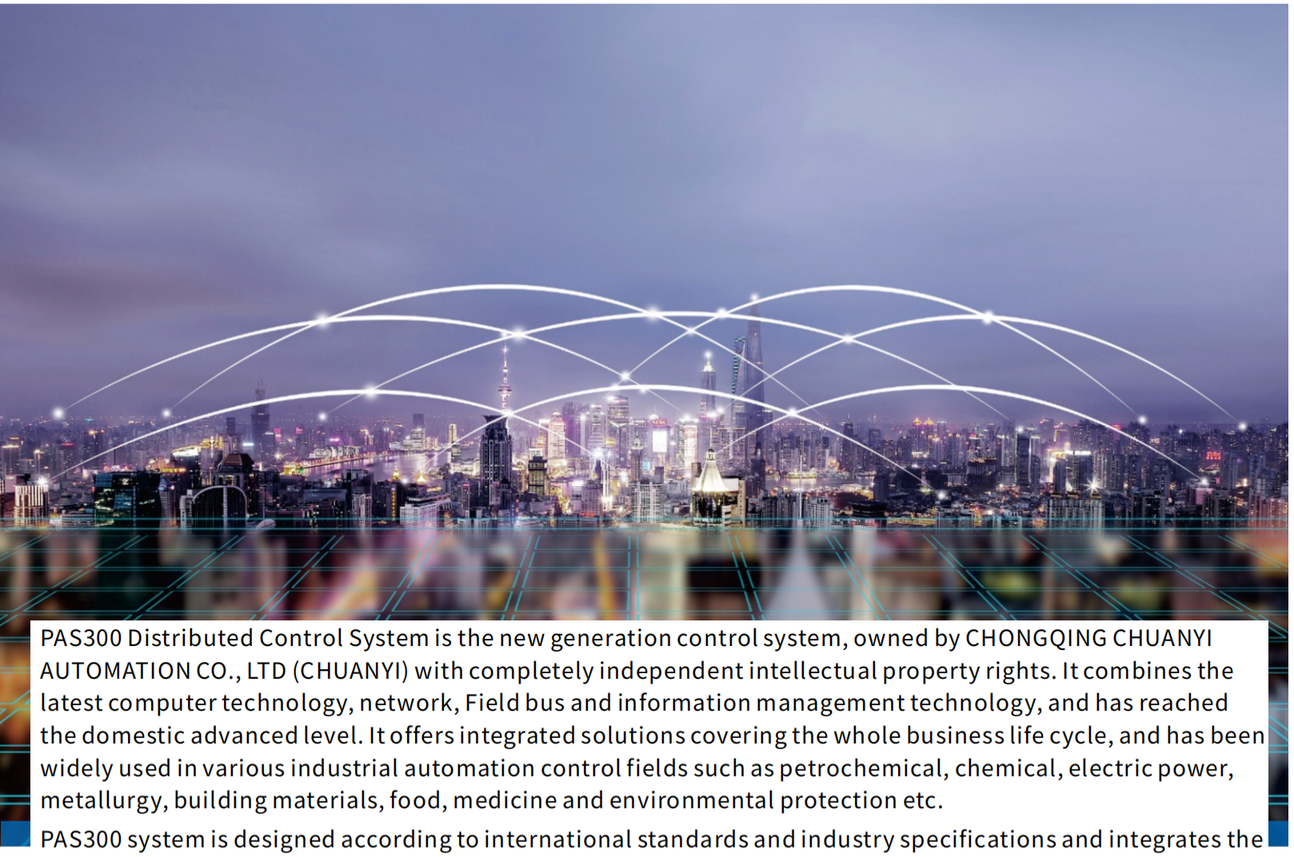
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TC6210-8: Channel Thermocouple Input Module
DI6211-16: Channel 24VDC Digital Input Module
DI6212-16: Channel 48VDC Digital Input Module
DI6411-16: Channel 24VDC Redundant Digital Input Module
DO6210-16: Channel 24VDC Digital Output Module
DO6410-16: Channel 24VDC Redundant Digital Output Module
SOE6211-16: Channel 24VDC SOE Input Module
SOE6212-16: Channel 48VDC SOE Input Module

System Overview



PAS300 Distributed Control System is the new generation control system, owned by CHONGQING CHUANYI AUTOMATION CO., LTD (CHUANYI) with completely independent intellectual property rights. It combines the latest computer technology, network, Field bus and information management technology, and has reached the domestic advanced level. It offers integrated solutions covering the whole business life cycle, and has been widely used in various industrial automation control fields such as petrochemical, chemical, electric power, metallurgy, building materials, food, medicine and environmental protection etc.

PAS300 system is designed according to international standards and industry specifications and integrates the AMS system of HART standard protocol. It can also integrate other standard systems such as SIS, EMS, EAM, GDS, CCTV, OTS, MES, ERP, etc. PAS300 system will implement seamless information communication between intelligent field instrument, control system and enterprise resource management system, fulfill factory intelligence and management control integration.

1.1System Features

1.1.1 Openness



Fully open application environment

PAS300 is developing with the latest technologies. It can be used crossing a variety of platforms. Advanced industrial control software ensures its stability and reliability. Through open interfaces such as OPC data interaction protocol, TCP/IP network protocol,Users can communicate information with PAS300.



Fully open network structure

PAS300's file format, as well as communication interface and communication protocol, are all open and safe. It can communicate with any kind of intelligent devices and is easy to be integrated to enterprise information system.



Safe and High- speed Field Bus

PAS300 constructs Control network and Information network, based on safe and high-speed Field Bus protocol. PAS300 seamlessly integrates several International standard Field Bus, such as MODBUS, PROFIBUS, FF and HART, and manages multi-type field bus devices on a unified platform. The internal parameters of any vender device meeting the standard field bus protocol can be read in by PAS300 as device maintenance information to greatly decrease its maintenance costs.



Industrial site video monitoring

In some highly dangerous sites, such as mines and chemical plants, video information can be directly introduced into PAS300 and displayed on the operation stations. The whole operation process on site is not only saved intuitively and completely in DCS system, but also being monitored by remote supervisors. Supervisors will warn the on-site operators in time to prevent the occurrence of dangerous situations.

1.1.2 Reliability

Fully redundant system structure

PAS300 system is designed as fully redundant structure. This ensures the continuous normal operation of the system, and any single fault will not affect the operation of the system. Redundant components can realize undisturbed switching without manual intervention.

Highly reliable design

The controllers and I/O modules have multiple protections from the impacts of the environmental circumstances, with online diagnosis and smart alarm functions. All kinds of modules support hot swap function, and added or removed from the running system.

System fault tolerance

PAS300 system adopts dual Ethernet, dual bus structure, and the redundant switching algorithm is embedded into the controller. This ensures the undisturbed switching of the redundant controllers and redundant network.

Stable and Reliable



1.1.3 Technical Advancement

Easy to develop and expand

With the application of integrated solution, Unified programming tools and automatically creating project, PAS300 makes it easy to develop and expand a huge scale system.

The configuration software is powerful, convenient and interface-friendly. The user programs are programmed with standard function modules, supporting program duplication between different projects. This function avoids repeated configuration work and improves efficiency.

Simple and flexible engineering tool

The functionality, easy-using and easy-commissioning of the PAS300 engineering tool have been deeply optimized and improved to ensure the efficiency of the configuration work

- Global database is adopted. Any data can be configured once and henceforth used by the whole project.
- All configuration work is carried out on a unified platform, including the configurations of system structure, hardware, tag, control strategy and flow chart.
- Batch data can be imported into the database through EXCEL tool to reduce the workload.
- PAS300 system adopts graphical and object-oriented control programming tools to implement continuous control, sequence control, logical control and batch control.
- PAS300 system supports online simulation function and can simulate the operation of the controller, including program downloading, commissioning, data monitoring. It's convenient for Engineers to test and debug programs at any stage.

Advanced software platform supporting

PAS300 system applies advanced industrial control configuration software to support its software platform and ensure its stability and reliability. Comply with IEC61131-3 international standards

- Comply with IEC61131-3 international standards
- Rich algorithm library enables users to realize stable and reliable control strategies

Advanced software platform supporting

PAS300 provides abundant graphic tools and supports graphic files in multiple formats. These tools will depict the flow chart more vivid and realistic.

1.1.4 Expansibility

Running across different platforms and different terminals

PAS300 system is developed based on HTLM5 and supports various operating systems, such as Windows, Linux, Android, IOS, etc. Users can visit the system through PC, PAD, or smartphone.

Supporting various Field bus and third-party devices

PAS300 system supports various international standard field bus, such as MODBUS, PROFIBUS, FF and HART, etc. as well as TCP, OPC, or self-defined protocol. It provides various interfaces in different levels to communicate with third party devices through RS485 or Ethernet.

Supporting online upgrade and capacity expansion

PAS300 system supports online upgrade and capacity expansion. It will inherit and utilize the users' existing assets to the greatest extent, highly integrate existing devices, therefore protect the users' investments.

Through crucial technologies such as multi-domain management, multi-person collaborative configuration, single program downloading, and online distributing, PAS300 can implement undisturbed online capacity expansion.

PAS300 can add new modules to the existing system without interrupting its operation. It will keep practicing latest technologies in users' existing system and help enterprises enhance their competition continuously.

1.2 System Scale

Scale of system	Max number of domains	32
	Max number of operation stations / per domain	64 /per domain
	Max number of controllers / per domain	64 /per domain
Scale of single controller	Number of I/O modules	Max 96
	Number of I/O signals	Max 1536
Real-time response capability	Response time from command input to related feedback	
	Control cycle of controller	10 ms ~500 ms
	Flow chart data updating time	< 1 s

System Network Structure

2.1 Network Overview

PAS300 system network consists of management level network (MNet), system level network (SNet) and Control level network (CNet). SNet and CNet are redundant network. MNet can be configured as redundant network.

2.1.1 Control level network (CNet)

Control level network CNet builds the connection between single controller and its related I/O modules, and transfers real-time data and various operation commands between these devices. It ensures stable and real-timed communication in the control level.

※ Support redundancy; A/B networks work simultaneously and switch to each other without disturbance.
※ Support multiple bus network topologies and flexibly dividing process control network segments
※ Data transmission adopts multi-level data verification mechanism to ensure data correctness.
※ The fault diagnosis software monitors and alarms the status of the bus network and the status of each node in real time



2.1.2 System level network (SNet)

System level network SNet builds the connection between all controllers, operate stations, engineer stations and servers, and transfers historical data, alarm information and operation records between these knots. These knots can read real-time data and historical data, and send operation commands.

SNet is designed as redundant Ethernet as either star-shaped or ring-shaped configuration. Snet complies with IEEE 802.3 and IEEE 802.3u standards, based on TCP/IP protocol, 100/1000Mbps self-adaptation rates

※ Fully redundant network, undisturbed switching without manual intervention
※ Multi-domain structure, ensures data sharing while ensuring data security isolation
※ Data transferring under Multiple data verification mechanism to ensure data correctness
※ Setting firewall to ensure safety

With a variety of safety measures, such as adopting dedicated network structure, setting firewall between switches and routers, adopting default data access control mechanism, monitoring with self-diagnosis software, PAS300 system can ensure its safety and reliability.

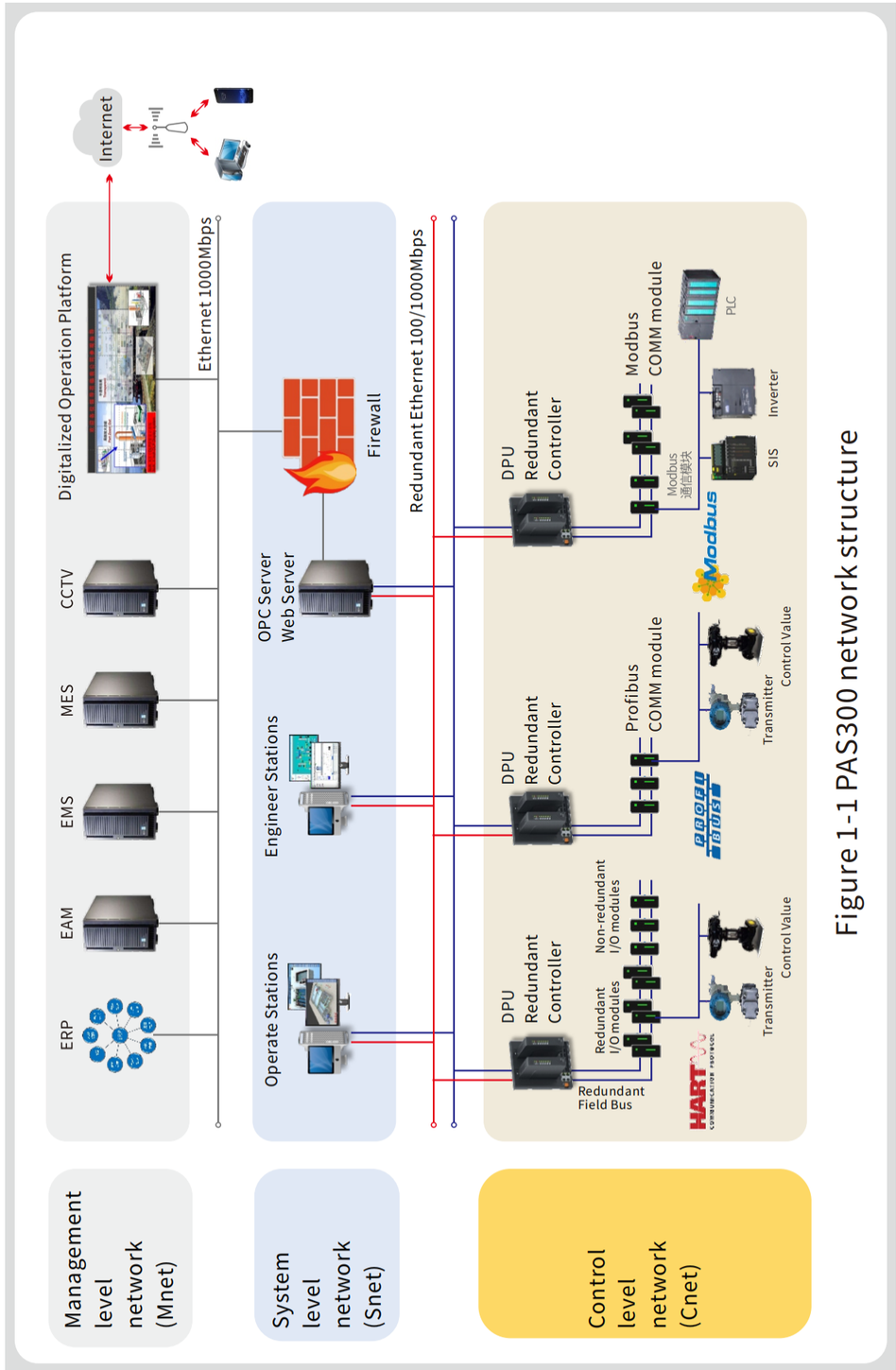


Figure 1-1 PAS300 network structure

2.1.3 Management level network (MNet)

According to the requirements, Management level network (MNet) can be configured as redundant or non-redundant network. Through this network, PAS300 can be integrated into enterprise management system, so that data communication, coordination control and dispatching management between different manufacturing units or workshops can be implemented. PAS300 can communicates with various Third-Party information management systems, such as ERP, MES, EAM, EMS, etc., and distributes information safely through Internet to share and manage the data.

2.2 I/O bus

Using redundant I/O bus, controllers can build their communication with their related I/O modules and smart field devices, and transmit the data in real time with highly efficiency.

Each controller offers several independent I/O bus branches, which are logically isolated from each other. I/O bus not only connects related I/O modules, it also connects smart field devices through various field bus communication modules, such as MOBUS or PROFIBUS.

I/O bus is designed as redundant.

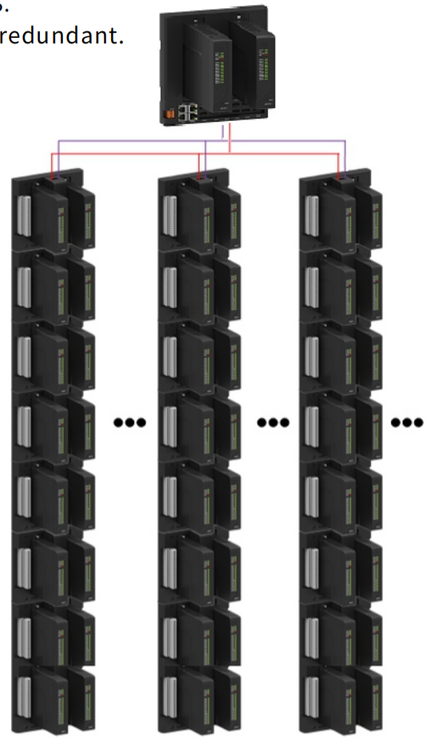


Figure 2-2 I/O bus

System Hardware

3.1 Engineer station

3.1.1 Feature description

Special engineering management software is installed in the engineer station, which integrates configuration function (including hardware configuration, strategy configuration and HMI configuration), commissioning function and diagnosis service function. The engineering software adopts global database and powerful cross-query function, which not only help users complete configuration work quickly and easily, but also do commissioning work safely and high efficiently.

Using engineer station, engineers can create, edit all the configuration information and control logics, and then download them to the related controllers. Engineering software includes:

※ Control algorithm configuration software: for hardware configuration, control strategy configuration and program downloading

※ Graphic editing software: for flow chart, operation panel and function pages configuration.

PAS300 engineer station can also have the function of operate station simultaneously.

3.1.2 Engineer station hardware requirement

※ CPU: Pentium G4560, Core i3, or higher
※ Hard Disk: 512GB(SATA or IDE)
※ Monitor: 24 inches or larger
※ others: standard keyboard, mouse
※ RAM: 8GB
※ Network card: 2 sets, 100M/1000M
※ Operating system: Windows 10

3.2 Operate station

3.2.1 Feature description

Operate station is a graphical human-machine interface, using for monitoring and controlling the produce processes, maintaining devices and handling emergencies. Its functions include graphical displaying of process, real-time data monitoring, hardware diagnosis indicating, trend displaying, process and system alarming, process recording, operation guiding, operation commanding, etc.

By setting operate authorities, operate stations can provide related information interface to specific users of different levels.

Specific real-time monitoring and controlling software is installed in operate station. Each operate station can support several monitors displaying in high resolution. It also provides standard monitoring and operating interfaces, such as group displays, operating panel, and system statue display, etc.

Using operate stations, users can obtain process information and event alarms, operate and control the field equipment. Operate station can provide multimedia alarm sound, form and store various reports, check and print historical trends from the historical database.

3.2.2 Computer hardware requirement

※ CPU: Pentium G4560, Core i3, or higher
※ Hard Disk: 512GB(SATA or IDE)
※ Monitor: 24 inches or larger
※ others: standard keyboard, mouse
※ RAM: 8GB
※ Network card: 2 sets, 100M/1000M
※ Operating system: Windows 10

3.3 Controller

3.3.1 Feature description

According to the required control strategies, Controllers can control the field objects in real time. It can implement various functions, such as data acquisition, information processing, logic and arithmetic calculation, Fault detection and alarm. The following types of control can be proceeded:



Each controller connects to upper computers (such as engineer station, operate stations, servers) by system level network SNet, transferring the real-time data from the field and receiving commands from upper computers.
Each controller connects to related I/O modules by I/O bus, implementing signal acquisition and control command output.
Controller provides various types of built-in functional modules, including logic and arithmetic calculation, continuous and sequence control, as well as advanced industrial control algorithm. This greatly reduces the complexity of control strategy configuration and helps users quickly create their control solutions.
According to the requirement, the running cycles of user programs can be set respectively between 10ms ~500ms.
Controller is designed as redundant. The controller performs periodic self-inspection on the network, RAM, data, etc. Once a fault being detected, the running controller will switch to its redundant standby controller non-disturbingly. When the controllers or I/O bus failed, the outputs of the output modules can keep holding the current values or set to safe values.

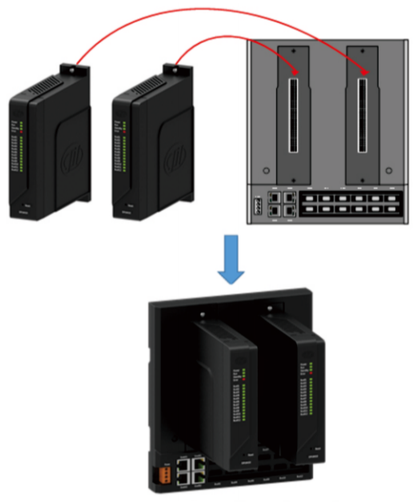


Figure 3-1 Controller

3.3.2 Controller parameters

Table 3-1 Controller parameters

PAS300 controller		
CPU	Processor model	ARM Cortex-A8
	CPU frequency	600 MHz
Capacity	The number of I/O modules	96
	Max. number of AI	768
	Max. number of AI	768
	Max. number of DI	1536
	Max. number of DO	1536
Redundancy	Type of redundancy	1:1 hot standby
	Redundant switching time	< 100 ms
Processing capacity	Control cycle	10 ms ~ 500 ms (configurable)
Network	The rate of process control network	100 Mbps/1000 Mbps self-adaptation
	The rate of I/O bus	691.2 Kbps
Power supply	Power supply	Redundant 24VDC ±10%
Maintainability	Hot swap	Yes
	The working mode of standby controller	Configuration obtaining automatically and hot standby
	Configuration update online	Yes

3.4 I/O modules

3.4.1 Feature description

PAS300 I/O modules are developed independently by CHONGQING CHUANYI Company, and have the features of intelligence, low power consumption and high performance. All kinds of field signals can be connected to the modules through flexible configuration and wiring. This greatly enhances the convenience of module installation and maintenance

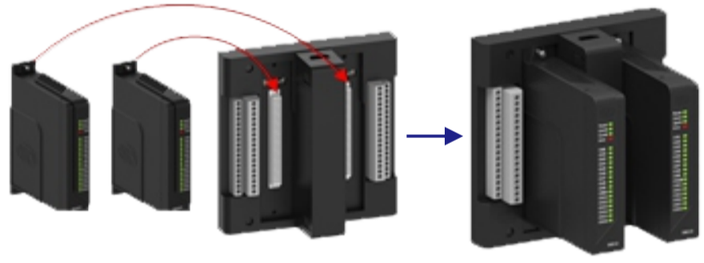


Figure 3-2 I/O modules

Redundancy

Redundant I/O modules are 1:1 hot standby. Self-diagnosis function monitors the working status of the modules and switch non-disturbingly once a fault is detected.

Hot swap

All I/O modules support self-recognition, self-detection, hot swap and plug-and-play.

HART communication

HART type I/O modules support redundancy. Field devices with HART or without HART can be mixed in a single HART type module. Each channel can connect the field device by 4~20mA signal, as well as dual communication by HART protocol.

Self-diagnosis

The self-diagnosis function of I/O modules includes starting diagnosis and running diagnosis. Users can obtain the running status and diagnosis information by the panel indicating LED, fault diagnosis graphic display or alarming display.

Fail safe

I/O modules have failed safe function. When the network failed, module's output will be hold or set to the presetting safety value to ensure the safety of personnel and equipment.

Over range

The inputs and outputs of analogue modules have the over measuring range function, which is convenient to adjust field equipment. H-, HH-, L-, LL-alarm functions and limitations can be set separately.

SOE functions

SOE modules can acquire digital signals with a resolution of 1ms to record the Sequence of Event (SOE).

Plentiful information display

I/O modules provide abundant LED status display, including power supply, fault, communication, channel, etc. It is convenient for maintenance work.

Power supply isolation

The power supply for the modules and field devices are separated. The disturbance from the field will not influence the communication and module circuits.

Various wiring methods

The I/O module has a variety of field signal wiring methods, supports terminal wiring, prefabricated signal cable methods, etc.

3.4.2 Type of I/O modules

Table 3-2 List of PAS300 analog modules

No.	modules		comments
	name	model	
1	8-Channel Analog Input Module	AI6210	Connect with 2/4-wire sensors
2	8-Channel Analog Input Module (with HART Protocol)	AI6610	Connect with 2/4-wire sensors with HART
3	8-Channel Redundant Analog Input Module	AI6410	Connect with 2/4-wire sensors
4	8-Channel Redundant Analog Input Module (with HART Protocol)	AI6810	Connect with 2/4-wire sensors with HART
5	8-Channel Analog Output Module	AO6210	Output 4~20mA current signal
6	8-Channel Analog Output Module (with HART protocol)	AO6610	Output 4~20mA current signal with HART
7	8-Channel Redundant Analog Output Module	AO6410	Output 4~20mA current signal
8	8-Channel Redundant Analog Output Module (with HART protocol)	AO6810	Output 4~20mA current signal with HART
9	8-Channel Thermal Resistance Input Module	RTD6210	Connect Thermal resistance
10	8-Channel Analog Input Module	TC6210	Connect Thermal couple or mV sensors

Table 3-3 List of PAS300 digital modules

No.	modules		comments
	name	model	
1	16-Channel 48VDC Digital Input Module	DI6212	48VDC query power supply voltage
2	16-Channel 24VDC Redundant Digital Input Module	DI6411	24VDC query power supply voltage
3	16-Channel 24VDC Digital Output Module	DO6210	Transistor output Contact capacity: 5A@250VAC Contact capacity: 3A@30VDC Contact capacity: 10A@250VAC
4	16-Channel 24VDC Redundant Digital Output Module	DO6410	Passive NO+NC output

Table 3-4 List of PAS300 SOE modules

No.	modules		comments
	name	model	
1	16-Channel 24VDC SOE Input Module	SOE6211	24VDC query power supply voltage
2	16-Channel 48VDC SOE Input Module	SOE6212	48VDC query power supply voltage



3.5 Field bus and Third-Party communication

PAS300 supports various field bus communication protocol, such as MODBUS, PROFIBUS, HART, etc. It provides related Field Bus communication models.
Photoelectric isolation measure is applied between the field side and the system side, ensuring minimum impact by the fault.
Field bus communication models connect to the controller through I/O bus. All field bus communication modules are installed in the standard system cubicle, easy to manage the devices.

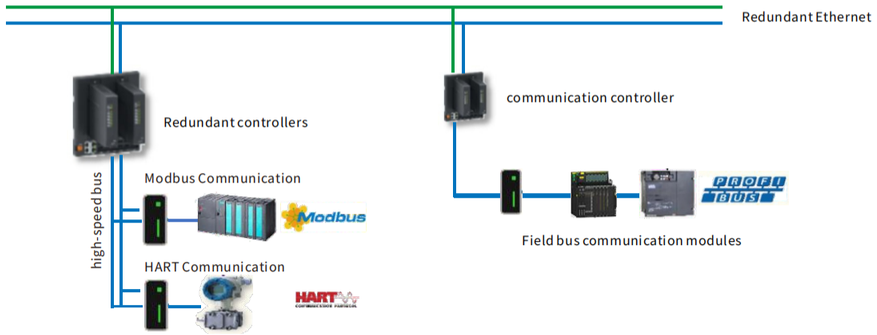


Figure 3-4 Schematic diagram of communication between PAS300 and third-party devices

To ensure the convenience of system expansion, PAS300 provides two kinds of methods to connect Third Party devices:

※ Third Party devices are connected through communication controller, after transferring the related Third Party protocol into MODBUS protocol

※ Third Party devices (with protocols of MODBUS or HART) are considered as parts of the PAS300 system and connected seamlessly through Field bus communication modules

3.5.1 MODBUS communication interface

Serial communication modules (COM6100, COM6200) provide communication ports between PAS300 system and Third Party devices meeting Modbus protocol.
All fieldbus communication modules are installed in standard system cubicles, easy for unified equipment management

Table 3-5 list of PAS300 MODBUS communication modules

No.	name	type	comments
1	MODBUS communication module	COM6100	Single bus communication module
2	MODBUS communication module	COM6200	Dual bus communication module
3	MODBUS communication module	COM6400	Redundant dual bus communication module

COM6100/COM6200/COM6400 modules' parameters, such as baud rate, communication protocol, can be set separately. Through expanded I/O bus, these modules can build the data communication between system controller and the Third-Party devices with protocols such as Modbus RTU.
COM6100/COM6200/COM6400 modules apply Master/Slave working method. PAS300 makes the communication request as master, the slaves (Third Party devices) response passively when required.

Table 3-6 Serial communication module technical parameters

COM6100/COM6200	
Power supply	
System power supply	1W@24VDC+/-10%
Input channel performance index	
Number of connected devices	1W@24VDC+/-10%
signal type	The communication rate is determined by the configuration
Common mode rejection ratio	⩾80dB (at 50Hz)
Differential mode rejection ratio	⩾60dB
communication	
Interface and protocol	RS-485, Modbus RTU
Baud rate	Configured according to the Third-Party devices
Channel protection	
Misconnection protection (+/- 30VDC)	Yes
Field short circuit or grounding protection	Yes
Hot Swap	Yes
COM6410	
Communication Interface	4
Redundant mode	Support card 1:1 redundancy, support 1:1 redundancy of communication interface
Communication method	RS232/RS485
Protocol	Modbus
Communication rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200bps
Transmission distance	1.2km/9600 bps
Wiring	screw connection
Memory	56M

3.5.2 PROFIBUS interface

Field devices following PROFIBUS standard protocol can connect to PAS300 system, after transferring into MODBUS protocol

※ Support communication with Field bus devices following PROFIBUS-DP fieldbus specification

※ Support communication with Siemens PLC Data Block (DB) following MPI (Siemens system internal communication protocol)

※ Support communication with PROFIBUS-PA devices

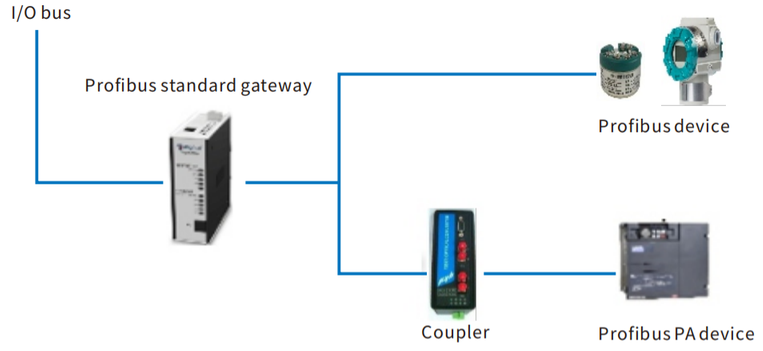


Figure 3-5 PAS300 and Profibus device connection

3.6 Cabinet (Cubicle)

Controller cabinet size: 2100mm x 800mm x 600mm (height x width x depth) or 2100mm x 800mm x 800mm
Several cabinets can be connected as a whole.

※ The controller, various signal connection units (I / O modules) and their related bases are installed on the front of the cabinet

※ The power supply unit, I / O module and their related bases are installed on the back of the cabinet, as well as the auxiliary equipment, such as safety barriers, relays, switches, terminals, etc.



Figure 3-7 Front/rear layout of I/O cabinet

3.7 System environment requirements

3.7.1 Power supply and grounding requirements

3.7.1.1 Power supply

The structure of PAS300 power supply can Isolate the disturbance to DCS system caused by site complex environment and greatly enhance the EMC performance. It passes the safety certification of UL508, TUV EN60950, provides over-current, over-voltage and over-temperature protection function, and ensures the stability and reliability of DCS system operation to the greatest extent.

Power supply requirements

PAS300 requires the supplying power must guarantee continuously power supply, and fulfills the following basic requirements:

1) Voltage: Single-phase 220VAC (-15% ~ +10%)
2) Frequency: 50+/-2Hz
3) Waveform distortion rate: <=3%

AC power input

Two circuit AC power inputs must be supplied to PAS300 cabinet power supply unit, one from UPS, the other from plant low-voltage distribution.

Dual power switching devices are used to switchover the UPS and plant power supply, ensuring the power supply for computers, switchover time ⩽ 50ms.

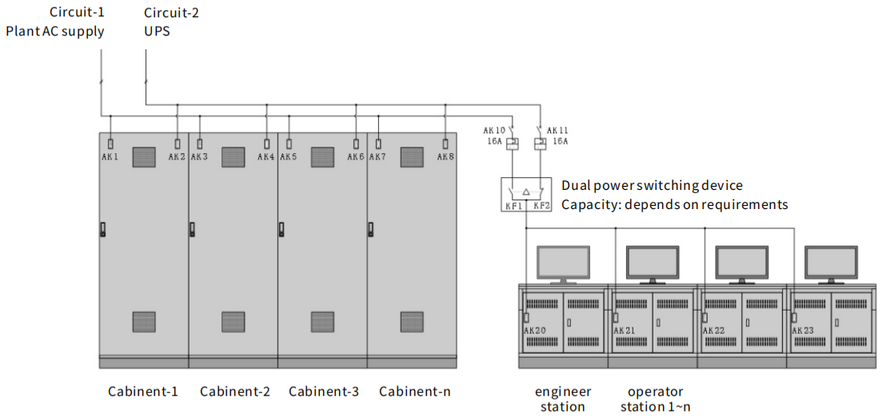


Figure 3-8 Power supply system diagram

3.7.1.2 Grounding requirements

PAS300 grounding includes protection grounding and work grounding. The grounding cables should be copper-core insulated cable (sectional area >=4.0 mm2), and connect to the plant electrical grounding summary copper bar.

Power supply performance	Power supply for controllers	220VAC+/-10%, 50Hz+/-5%	2 sets of power supply (Redundant)
	Power supply for computers	220VAC+/-10%, 50Hz+/-5%	1 sets of power supply
Grounding resistance	Ordinary occasions	⩽4Ω	transformer substation, power station and sites with Large electrical equipment
	Special occasions	⩽1Ω	



3.7.2 Electromagnetic compatibility (EMC) and related certification

System EMC performances include EMS and EMI. Its design follows the following international standards:

※ IEC61000-4-2
※ IEC61000-4-4
※ IEC61000-4-6
※ IEC61000-4-11
※ IEC61000-4-3
※ IEC61000-4-5
※ IEC61000-4-8

3.7.3 Environmental conditions

Table 3-8 PAS300 working environment

	operation	storage
Temperature	-10 ~ 70 ℃	40 ~ 80℃
Humidity	5%~95% relative humidity, no condensation	5%~95% relative humidity, no condensation
Altitude	-300 ~ +5000 meters	-300 ~ +5000 meters
Vibration	Amplitude: Max. 1mm (5~13.2Hz)	
	Pulse impact: Max. 7.5 m/S^2 (13.2 ~100Hz)	
Protection degree	IP20	

System software

4.1 System software overview

PAS300 software is comprised of engineering management software (SICCENG), real time monitoring software (SICCRUN) and control algorithm software (SICCTRL).



Engineering management software (SICCENG)

SICCENG software runs in engineer station and is the main interface of project management. It is used to deploy and manage the whole DCS system.
This software integrates a variety of engineering management functions, such as project managing, database editing, system configuration, user configuration, flow chart configuration, overview configuration, domain management, control grouping, trends grouping, report configuration, editing, download, etc.
SICCENG is installed in engineer station. Together with network and communication techniques, SICCENG constitutes a software platform for system structure and function configuration.

Real time monitoring software (SICCRUN)

SICCRUN software runs in operate stations to implements various functions such as data collection, dynamic data display, display and operation of automatic process control, alarm monitoring, trend view, log view, as well as data record, statistics and print.
SICCRUN software installed in each operate station can implement the functions of data displaying, operating and controlling, and history information management. According to the operator's authority, SICCRUN software can call flow charts, process parameters, data records, alarm information and many other data in the system, and can set the setting parameters and operate the output of the control loop.

Control algorithm software (SICCTRL)

SICCTRL software integrates module configuration, compilation, management, simulation and online commissioning of control algorithm. It adopts visual configuration method to deploy and design each individual function module and implement required control functions.

The PAS300 software has the following features

- ※ The software platform is composed of standard and mature software modules
- ※ The configuration structure is clear and the operation interface is convenient
- ※ Support system-wide unified database management, suitable for large-scale data applications
- ※ Support multi-domain management
- ※ Support online download and online commissioning
- ※ Real time database with large capacity and high throughput
- ※ Abundant gallery, support various dynamic effects, make the flow chart more detailed, three-dimensional and beautiful
- ※ Flexible operation of real-time trend and historical trend; support history data offline browse.
- ※ Flexible and simple creation and edition of reports; support visual report function
- ※ Perfect alarm management function; support zone and degree classification of alarm information, support handling in groups, support shielding and forbidding functions.
- ※ Support for advanced scripting languages
- ※ Support high-resolution display; Support multi-screen and multi-window operation
- ※ Support system status alarm; providing online self-diagnosis
- ※ Provide user operation authority management based on security and partition policy
- ※ Excellent openness; providing access interfaces for multiple data types
- ※ Powerful fault tolerance; function of process daemon ensures rapid recovery in case of software exceptions; Redundant data server switching function based on self-diagnosis make the PAS300 software more reliable.
- ※ Software supports downward compatibility; The software upgrade has no impact on the production process and will not cause system operation interruption

Comply with OPC, DDE, COM/DCOM, ActiveX, Visual Basic Script, OLE DB, XML and other software standards

4.2 Engineering management software (SICCENG)

The Engineering management software, which is independently developed by CHONGQI CHUANYI, equips with friendly human-computer interface and integrates system configuration, controller configuration, operate station configuration, user configures and variables review function, etc.
Main functions include:

- ※ Domain management
- ※ Project management
- ※ User configuration and management
- ※ System knots configuration, including operation stations, controllers, servers and etc.
- ※ Flow charts configuration and management
- ※ Configuration related to operation, includes configuration of overview display, control group display, parameters group display, user authority, etc.
- ※ Multilingual configuration
- ※ User defined function block and operation interface management
- ※ Report configuration and management
- ※ Editing and download management



Fig 4-1 Engineering management HMI

4.2.1 System configuration

It implements the domain management, user management, authority setting, alarm setting, unit setting and report setting.

※ Domain management: add and manage the domain. It can assign different operation work to operators at different levels and different areas.
※ User management: add and manage operation users. It can set operation areas and operation authorities for different user – for individual users.
※ Authority setting: according to the requirements, set manage/operation authority for users at different levels – for levels of users
※ Alarm setting: set related alarm sounds and alarm display colors according to different levels of alarm
※ Unit setting: customize some special physical unit symbols



Fig 4-2 domain management Interface

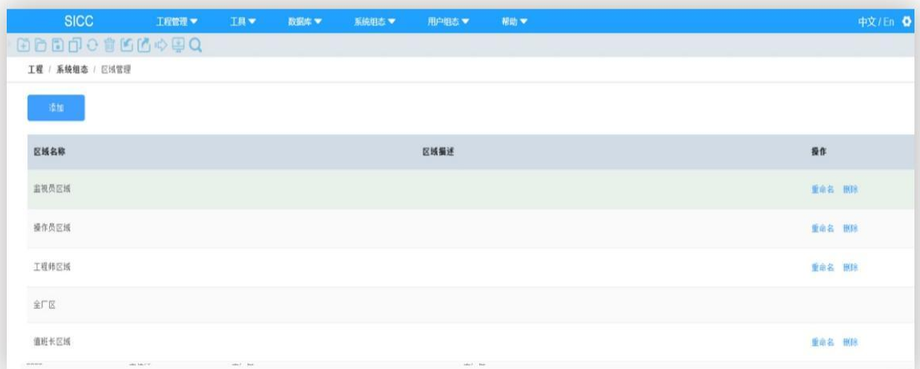


Fig. 4-3 User management and authority setting interface

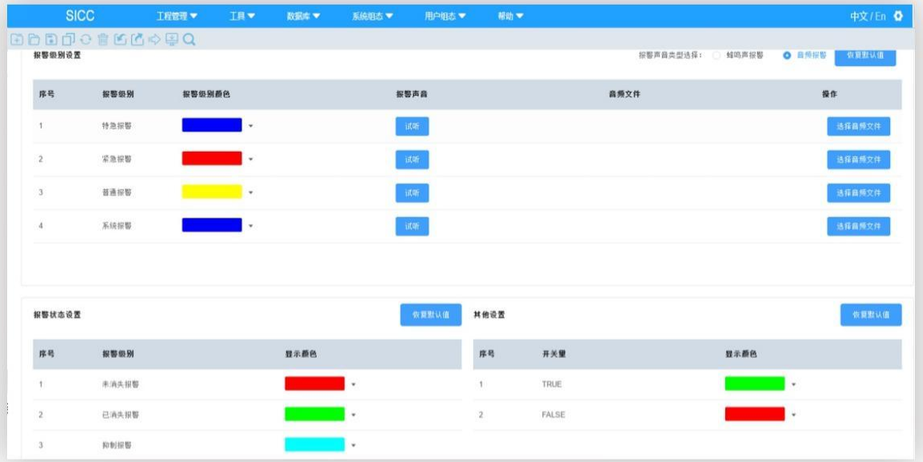


Fig 4-4 alarm setting interface

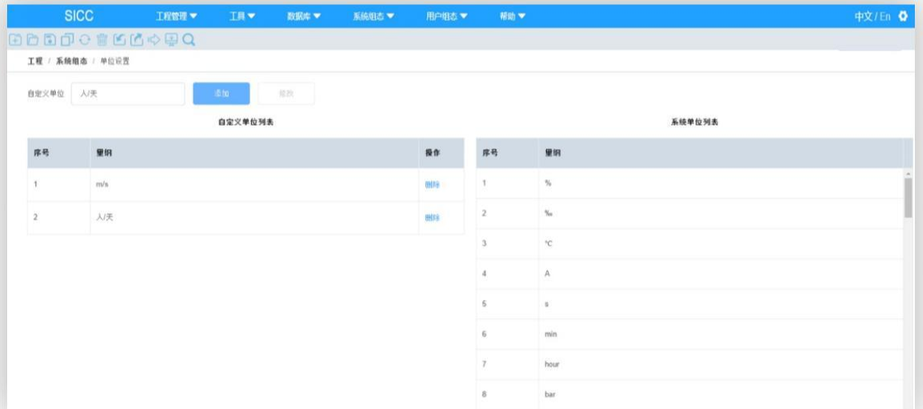


Fig 4-5 unit setting interface

4.2.2 Controller configuration

It is used to implement the configuration of controllers, including:

Controller (DPU) configuration → I/O modules configuration → I/O channels configuration

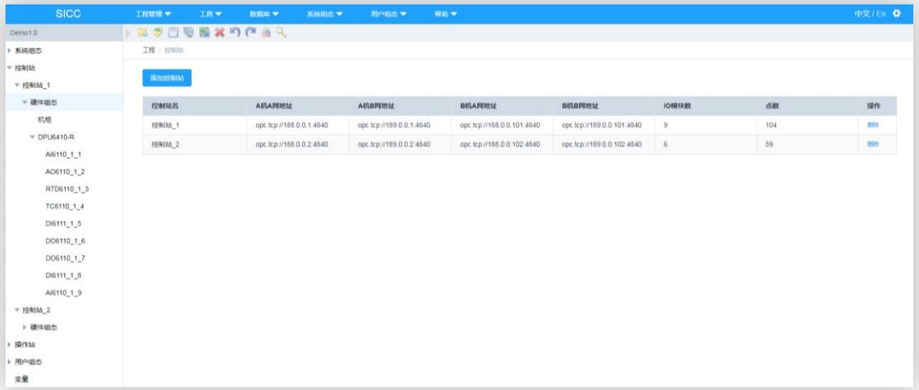


Fig. 4-6 interface of adding controllers

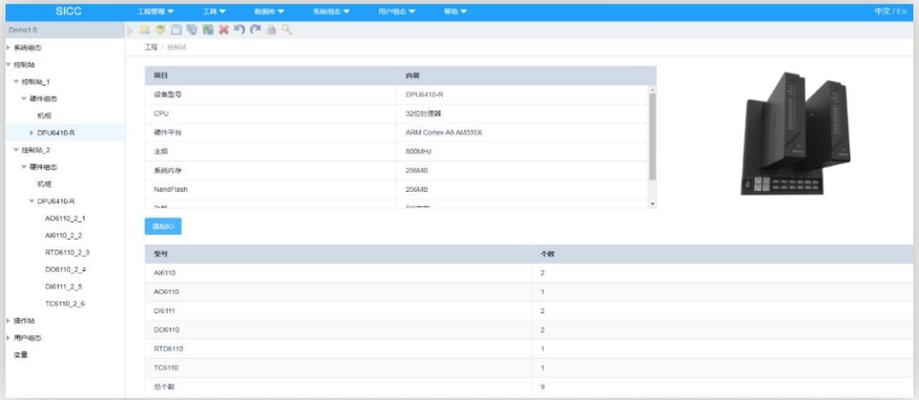


Fig. 4-7 Interface of adding I/O modules

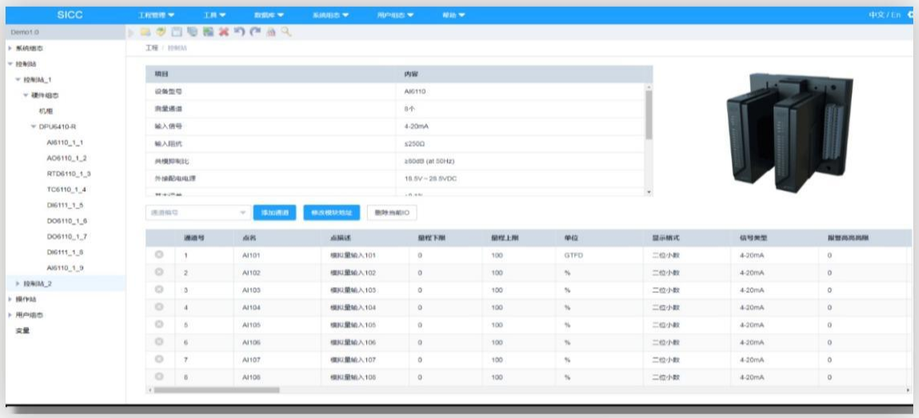


Fig. 4-6 interface of adding I/O channels

4.2.3 Operator station configuration

It is used to complete the configuration of the computers (PC), including:

Engineer station configuration → Server configuration → operator station configuration

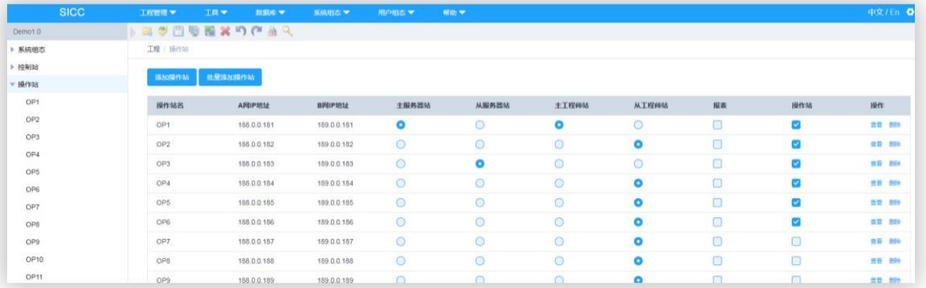


Fig. 4-9 interface of adding operate stations

4.2.4 Process configuration

Process flow chart and operation interface of the completed project

Flow chart configuration	Control group configuration	Trend group configuration	Report configuration
Draw the flow chart and configure display characteristics and interaction characteristics.	According to process requirements, several control devices have been combined in one control group for convenient operations (max. 8 operation panels in one group)	According to process requirements, several data variables needed to be compared have been selected in one trend for convenient checking and comparing (max. 8 data in one trend.)	According to the manufacture requirement, creates reports, using for data management

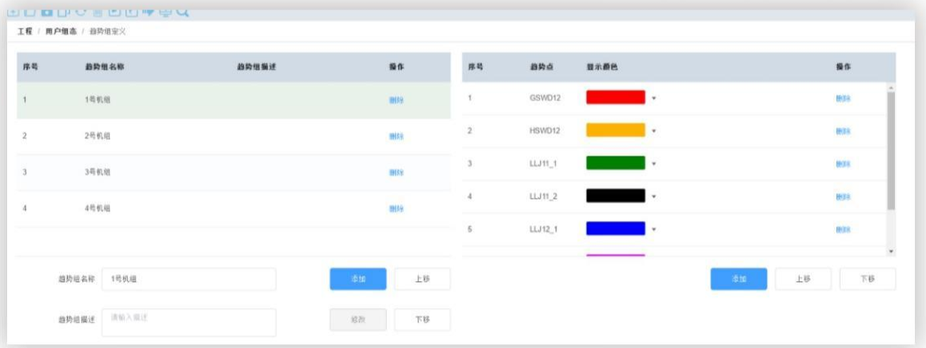


Fig. 4-10 control group interface

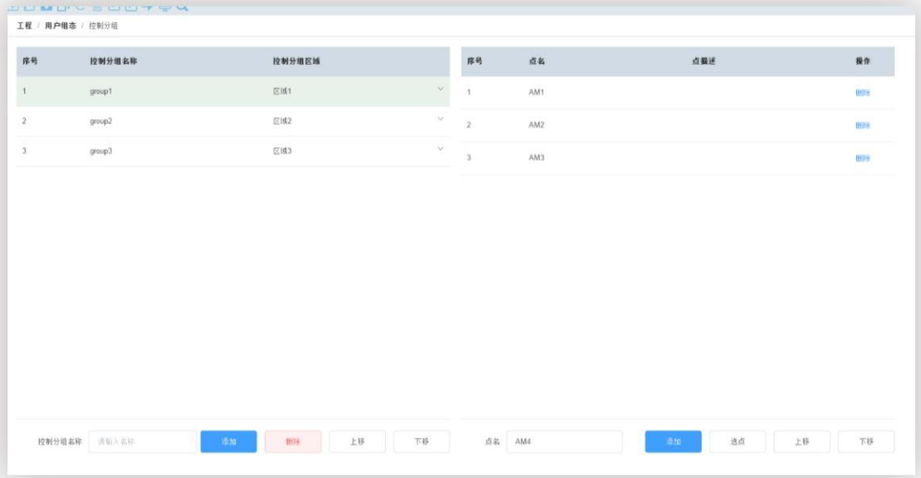


Fig. 4-11 trend definition interface

4.2.5 Graphic configuration



The graphic configuration software is a graphic dition tool of PAS300. It provides a graphic nvironment for engineers to edit real-time monitoring images, as well as a method to reate system statue display, flow charts, etc. Graphic configuration software will fulfill the ollow functions:

Basic graphic edition function

As an edition environment of flow chart, perate panel and other graphic displays, the raphic configuration tool provides various static raphic operate tools, including graphic creation, raphic combination, copy, cut and paste, etc. nd transform and process graphics flexibly.

Provides abundant drawing library and ymbol library

The graphic configuration software provides abundant graphic elements, including basic graphics, self-defined graphics, static symbol and dynamic symbol library. Through combining objects and defining characteristics, any configuration of complex objects and displays can be finished.

Support creation of page template and control panel

Users can customize different templates according to the requirement. It provides powerful and flexible tools for configuring and editing complex pages.

Provide abundant dynamic and interaction characteristics

The various dynamic characteristics include color change, text, flashing, Show / hide, filling, rotating, shifting, animation, etc. The interaction characteristics include window popup, page switching and online modification of parameters, which can be implemented by clicking the buttons.

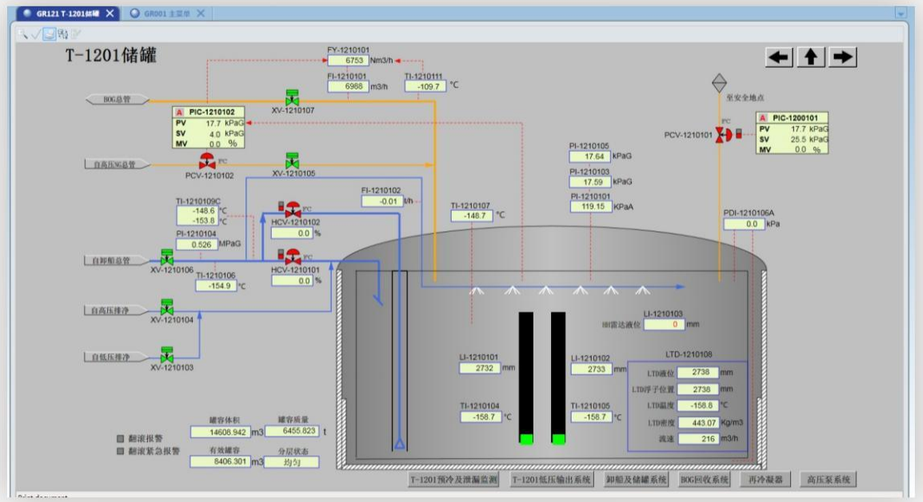


Fig. 4-12 flow chart configuration interface

4.3 Real time monitoring software (SICCRUN)

The real-time monitoring software integrates the features of the latest Windows operating system and the traditional instrument operation measures. It provides a familiar and convenient operating environment to the operators.

It provides traditional graphic displays of system overview, parameter overview, control groups, alarm pages, trends, reports, special panels, etc., and complete the functions of real-time data acquisition, data dynamic display, process automatic control, alarm and reports, enables operators to focus on monitoring and operating the manufacturing process of the plants. At the same time, it provides powerful and abundant flow chart displays, so that operators can work in a comfortable interface.



Figure 4-13 Process flow chart

PAS300 Real time monitoring software has the following functions:

※ Monitoring and operating, including call flow charts, operate group displays, data overview displays, fault diagnosis displays, etc.
※ Operate archive: record, archive, query and print the operation actions
※ Alarm management: operators can browse, query, confirm the alarms. It has flashing alarm, real-time alarm windows, history alarm windows, alarm priority setting, alarm sound setting, alarm confirmation, etc.
※ Trend management: call and query real-time trends and historical trends
※ Report management: generate daily reports, statistics reports and batch reports based on the data from the real-time database and historical database.
※ System real-time diagnosis and monitoring
※ Online help

4.3.1 Operation monitoring and controlling

Operation monitoring and controlling software provides standard graphic displays such as system status display, system overview, control group, data overview, flow charts, alarm page and trend page. Users can implement parameter adjustment, parameter browse and fault diagnosis.

※ Provide flow charts with various dynamic effects; support 2D-, 3D-graphic drawings; support color change, flashing, filling, text, animation, etc.
※ Provide expandable, abundant graphic template library; support ActiveX controls; support various kinds of drawing import; support graphic modification, layer setting, background template and use of shortcut keys; adopt configuration based on object properties; support template application, wide-screen display and multi-screen display.
※ Support parameter grouping; some parameters with interactive relationships can be grouped in one graphic display for convenient monitoring and operating.

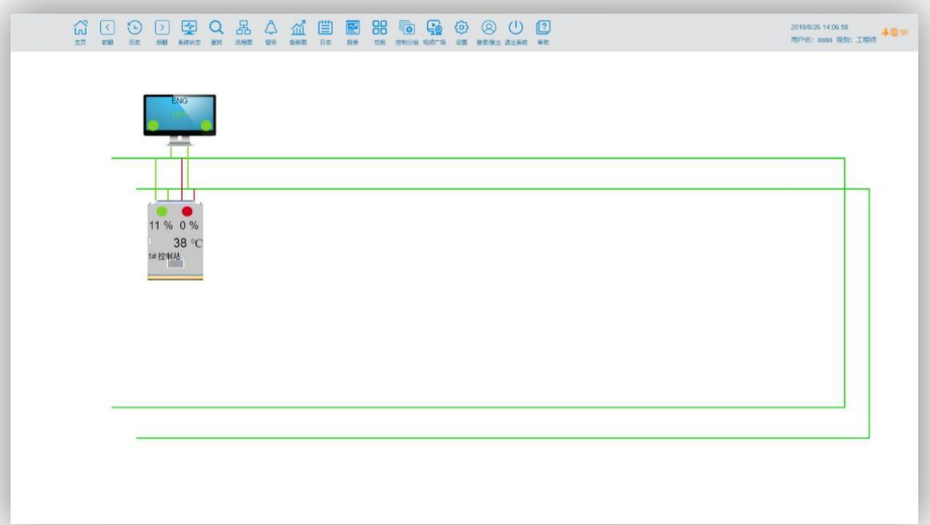


Fig. 4-14 real-time monitoring – system status display

4.3.2 Journal record

PAS300 Journal records all event information that happened, including the operating actions as well, and stores them according to the time sequence of the events. Users can query operating actions and show them on the operate stations or print output.

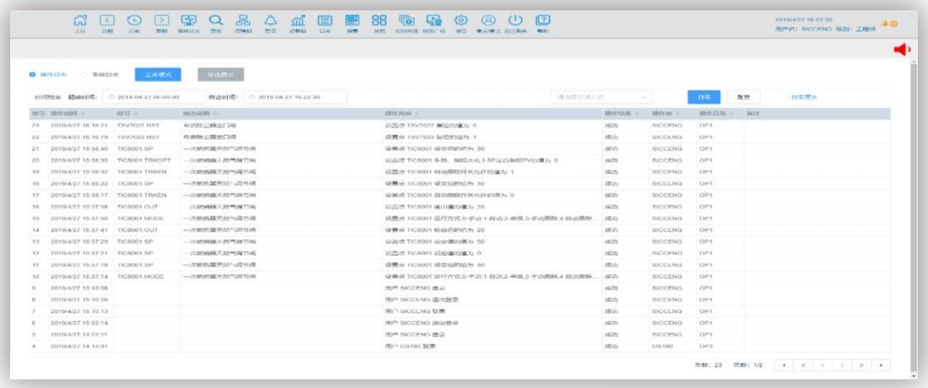


Fig. 4-15 real-time monitoring -- journal

4.3.3 Alarm management

PAS300 supports alarm browse, query, and confirm operation, and supports various kinds of alarm information.

01 Real-time monitoring, operation and query of the alarm

02 Alarm forbidden: disable any individual alarm so that no related alarm will be generated.

03 Alarm confirmation: support to confirm any individual alarm

04 Offline query and analysis of alarm information

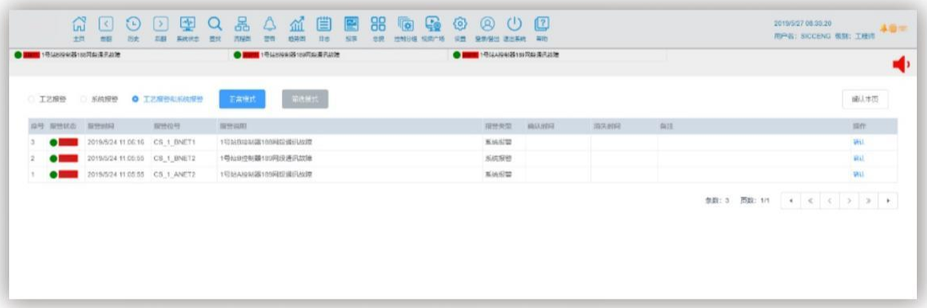


Fig. 4-16 real-time monitoring – alarm page

4.3.4 Trend management

According to configured information requirement, PAS300 system records real-time data values at defined intervals, update trend chart dynamically, so that the related data values can be shown at any point of the time axis.

Trends include real-time trends and historical trends. The display interface is the same. (According to the time span, system will automatically choose real-time trends or historical trends.)
Support online and offline trend browsing. The user can define the time span, the color of each trend, and the period of trend.

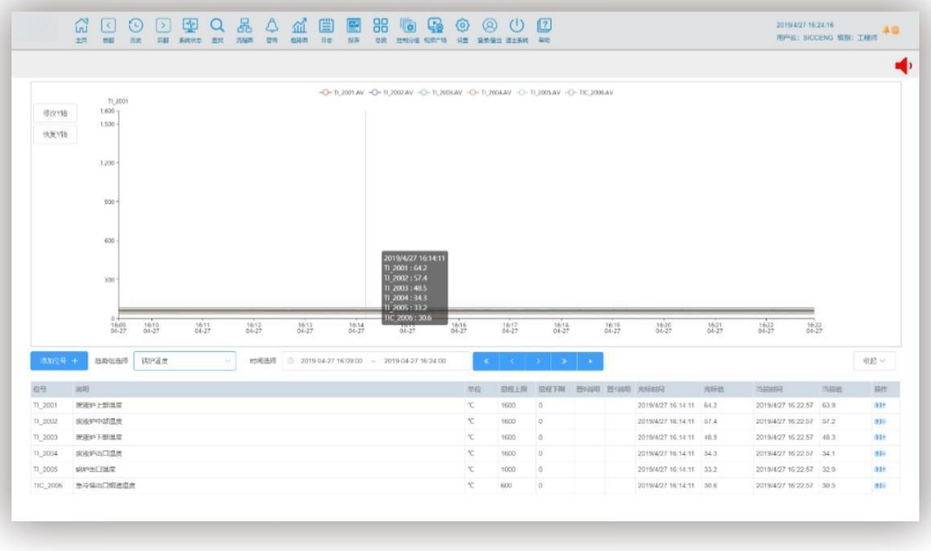


Fig. 4-17 real-time monitoring – trends

4.3.5 Report management

Report management is one part of the PAS300 real-time monitoring software. It is used to create desired reports, call reports display, reports historical archiving, and reports print output.

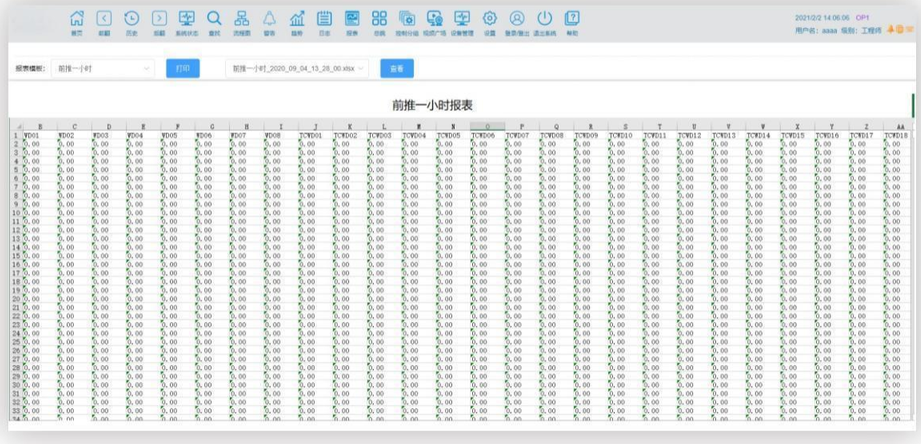


Fig. 4-18 real-time monitoring – reports

4.4 Control algorithm software

Control algorithm software (SICCCTRL) integrates the editing, managing, stimulating and online commissioning of the control algorithm. It supports several programming languages meeting IEC61131-3 standards, such as Structured Text (ST), Sequence function control (SFC), Functional block diagram (FBD), Ladder diagram (LD), and Instruction list (IL).
Control algorithm software applies project tree structure organization to manage the configuration information. Its interface is clear and convenient using.

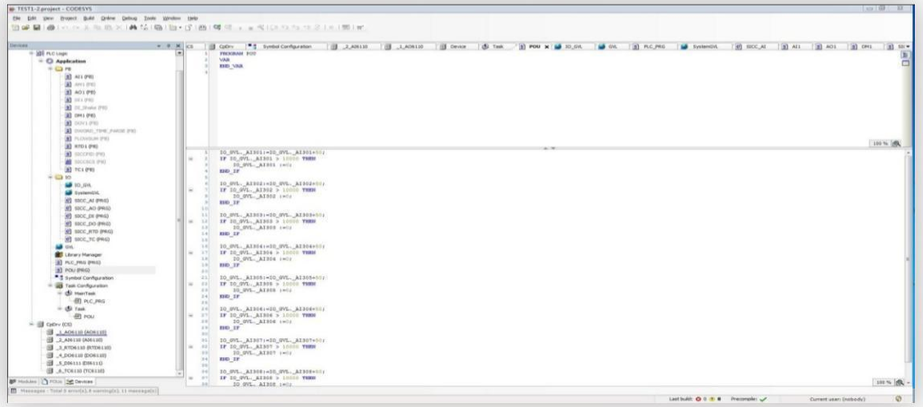


Fig. 4-19 Control algorithm configuration interface (ST)

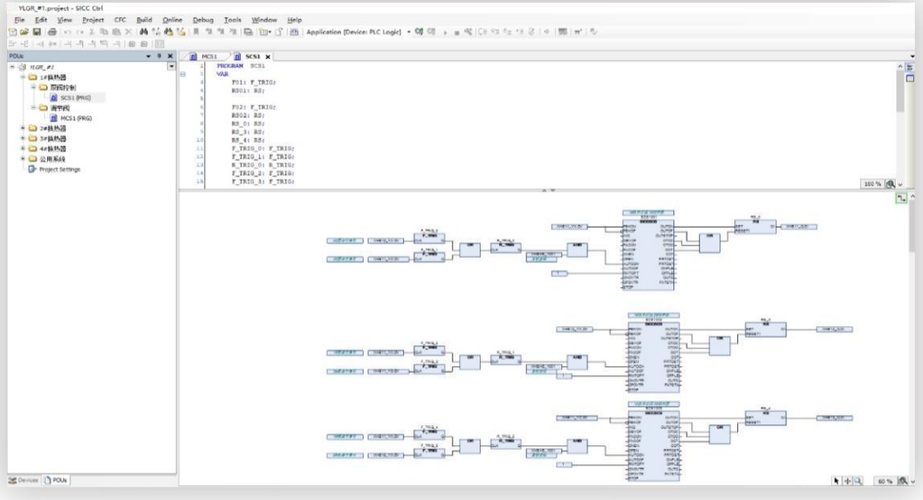


Fig. 4-20 Control algorithm configuration interface (CFC)

Control algorithm software is efficient and convenient for usage. All of its functions are transparent to engineering application engineers and end users. Control algorithm software includes real-time operating system, industrial control application packages, communication application packages, which constitutes a complete control application platform.
Engineers use engineering configuration software (SICCENG) to implement the application configuration. The configured control algorithm will be edited and downloaded to the controllers. The control algorithm software automatically calls the user application program according to the time sequence to execute its control function and communication function, so as to realize automatic control.

4.5 Advanced application software

4.5.1 AMS software

AMS software is a unified management platform used for maintenance, commissioning and diagnosis of field instruments and control valves. It is an important part of the Plant-wide intelligent instrument maintenance and fault diagnosis system. It can read and configure the remote data of intelligent instruments, monitor and diagnose the status, analyze, maintain and manage the devices, automatically generate loggings, etc. It will help intelligent devices maximize benefits and reduce maintenance costs.

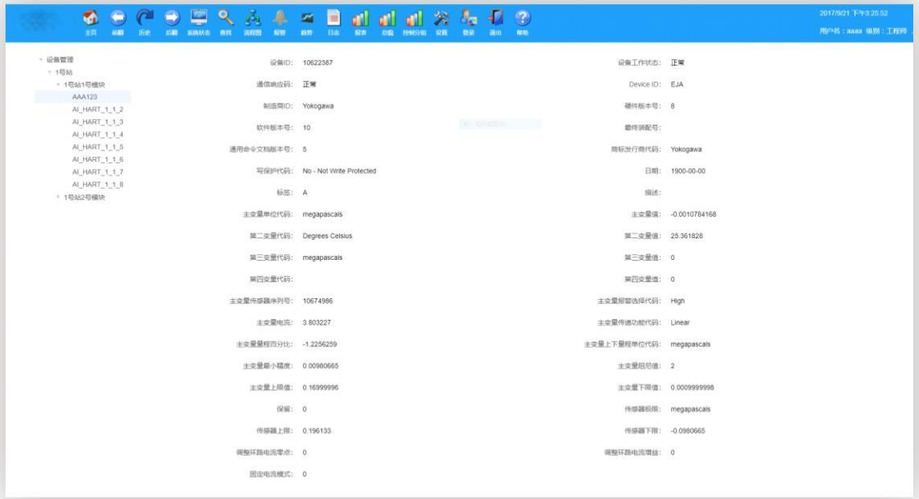


Fig. 4-21 AMS running interface

※ AMS supports intelligent devices meeting HART protocol. Using EDDL(Electronic Device Description Language) technology, AMS software can maximize the advantages of intelligent devices.
※ Support information acquisition and diagnosis of Hart intelligent devices;
※ Via I/O modules, the communication with Hart intelligent devices can be built directly.
※ Via gateway equipment such as Hart multiplexer, data information from the Third Party devices can be acquired.
※ Using standard OPC interface, allows communication with Third Party systems
※ Device self- diagnosis

AMS detects if there is any status alarm in the Hart device by polling method. Users can find these results quickly by the alarm indicators on the interface, and check the detailed alarm information in event list; Users can also open the detailed alarm interface, which contains all alarm information and current alarm status of the devices.

4.5.2 Batch software

Batch software is used for produce management control, suitable for process control with intermittent and batch characteristics in fine chemical, food, cosmetics and pharmaceutical industries. It will implement the management, monitoring and traceability of formulation and batch production.
Batch software is based on IEC61512 standard (S88), supports functions such as recipe management, version management, production scheduling, order changing, and step skipping. It is applicable to recipe volume ratio, recipe group, simple sequential process, and complex process including parallel and selection.

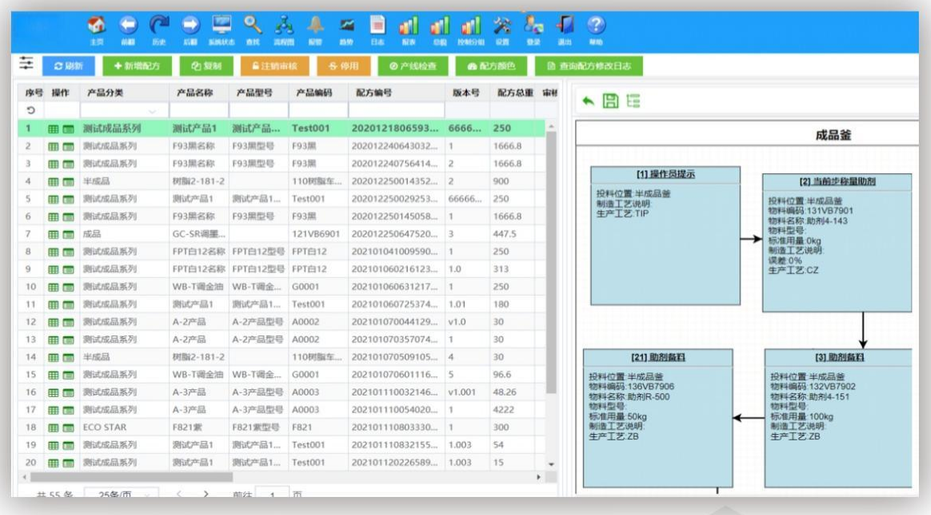


Fig. 4-22 Batch software

Batch software features:

※ Graphical configuration and operation interface; using this tool, Process engineer can independently complete the transformation from process to control program.
※ Recipe management, version management
※ Batch production management
※ Ease to make complex production change and modification
※ Historical comparison and analysis tools based on batch
※ Support user-defined reports
※ Comprehensive batch production records
※ Flexible and simple deployment
※ Seamless connection with PAS300 system



4.5.3 Modbus communication software

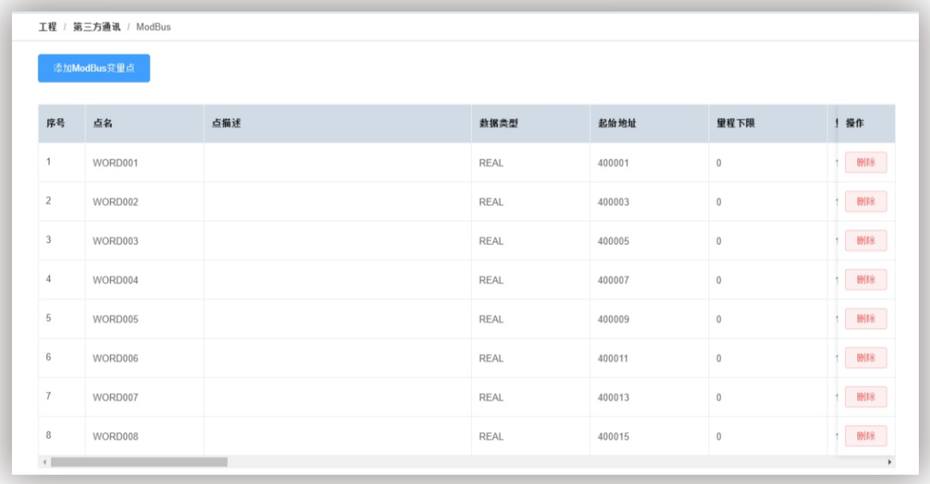


Fig. 4-23 Modbus communication software interface

PAS 300 Modbus software follows the standard Modbus Protocol, and can be used for master and slave communication stations. As master station, PAS300 can collect data from several Third-Party Modbus devices and send command to them. PAS300 can also build communication with upper system as a Modbus slave station.

Modbus software basic functions:

※ Working as Modbus master station or slave station
※ Support Modbus RTU and Modbus ASCII code
※ Support serial port, Ethernet and GPRS communication links
※ Support 1,2,3,4,5,6,15,16 function code; supports parts of customized extend function code
※ Support transmission of Modbus device data
※ Flexible measure range transferring, such as zoom in / out, linear transformation, and square root，etc.
※ Collecting real-time link status and device status, providing diagnosis of link and device.
※ Support communication interface redundancy

4.5.4 OPC communication software

The OPC server software can provide the real-time data of the control system to each OPC client in the form of OPC tag number. OPC software can release real-time data on MIS network to realize the interaction between process control and information management. It is characterized by good interactivity, large amount of communication data and high communication speed. It can connect with multiple OPC client programs at the same time, and each connection can simultaneously exchange multiple dynamic data (tag numbers) in real time.

OPC server software support OPC Data Access V 2.0 interface meeting OPC International Foundation standard (OLE for Process Control)

Support local and remote connection.



OPC server software can provide following services for OPC clients:

※ Dynamic data (tag) reading, modifying and refreshing
※ Tag browsing
※ Tag data attribute query
※ Tag parameter query
※ status query

OPC communication data types include: AI, AO, DI, DO, customized analog variable, customized digital variable, function block (including PID module, etc.)



Fig. 4-24 OPC communication configuration interface

Appendix

PAS300 System Module list

Type	Description
DPU6310	Non-redundant process controller
DPU6410	Redundant process controller
COM6310	Communication controller
AI6210	8-Channel Analog Input Module
AI6410	8-Channel Redundant Analog Input Module
AI6610	8-Channel Analog Input Module (with HART Protocol)
AI6810	8-Channel Redundant Analog Input Module (with HART Protocol)
AO6210	8-Channel Analog Output Module
AO6410	8-Channel Redundant Analog Output Module
AO6610	8-Channel Analog Output Module (with HART protocol)
AO6810	8-Channel Redundant Analog Output Module (with HART protocol)
RTD6210	8-Channel Thermal Resistance Input Module
TC6210	8-Channel Thermocouple Input Module
DI6211	16-Channel 24VDC Digital Input Module
DI6212	16-Channel 48VDC Digital Input Module
DI6411	16-Channel 24VDC Redundant Digital Input Module
DO6210	16-Channel 24VDC Digital Output Module
DO6410	16-Channel 24VDC Redundant Digital Output Module
SOE6211	16-Channel 24VDC SOE Input Module
SOE6212	16-Channel 48VDC SOE Input Module

PAS300 System Module General Performance Index

Common performance index	
CE certification – EMC Instruction 204/30/EU	EN 61010-1:2010
	EN 61326-1:2013
	EN 61000-3-2:2014
	EN 61000-3-3:2013
Electromagnetic compatibility (EMC)	Electrostatic discharge immunity(IEC61000-4-2)
	Radiated immunity (IEC61000-4-3)
	Fast transient/ burst immunity (IEC61000-4-4)
	Impulse Surge immunity (IEC61000-4-5)
	Conducted Immunity (IEC61000-4-6)
	Impulse magnetic field immunity (IEC61000-4-8)
	Voltage drop immunity (IEC61000-4-11)
Safety certification	CE certification – LVD Instruction 2014/35/EU
	UL508, TUV EN60950-1

DPU6310/DPU6410/COM6310 Controller

Controller	
Core	ARM Cortex A8
Basic frequency	600 MHz
System memory	256 MB
Working memory	256 MB
Data Protection for Power-fail	Built-in nonvolatile SRAM, max to 10 years
Power supply	
Voltage	24VDC±10%
Rated power	5w
Upward communication	
Protocol	High speed Ethernet
Redundant mode	Support dual network redundancy
Communication rate	Two 100/1000 adaptive Ethernet port
Downward communication	
Protocol	Modbus RTU Extended protocol
Redundant mode	Support redundancy
Communication rate	691.2 kbps
Max number of modules	96

AI6210 --- 8-Channel Analog Input Module

Power supply	
System power supply	1W@24V±10%
Field power supply	5W@24V±10%
Channel performance index	
Number of channels	8
Signal type	4-20mA current input
Accuracy	±0.10 % F.S.
Limitations of current over-range alarm	Open circuit alarm: input current ⩽ 0.8 mA
	Low limitation of over-range alarm: 0.8mA < input current ⩽ 3.6 mA
	High limitation of over-range alarm: 23.2 mA ⩾ input current > 20.4 mA
	Short circuit alarm: input current > 23.2 mA
External supply current for each channel	30 mA max.
ADC resolution	24 bits
CMRR	⩾ 80 dB (at 50Hz)
DMRR	⩾ 60 dB
Communication	
Communication port and protocol	RS-485, Modbus RTU Extended protocol
Communication rate	691.2 kbps
Protection for channels	
Wrong connection of ±30VDC	Yes
Short circuit or grounding on field side	Yes
Hot swap	Yes
Withstand voltage of isolation	
The insulation resistance and dielectric strength between input signals (including distribution power), bus power, protective earth, and communication interfaces are as follows:	
Insulation resistance	⩾ 100 MΩ
Insulation strength	1500 VAC@1 min@5mA

AI 6220---8-channel high-speed analog input module

Power supply	
System power supply	1W@24V±10%
Field power supply	5W@24V±10%
Channel performance index	
Number of channels	8
Signal type	4-20mA current input
Accuracy	±0.10 % F.S.
Limitations of current over-range alarm	Open circuit alarm: input current ⩽ 0.8 mA
	Low limitation of over-range alarm: 0.8mA < input current ⩽ 3.6 mA
	High limitation of over-range alarm: 23.2 mA ⩾ input current > 20.4 mA
	Short circuit alarm: input current > 23.2 mA
External supply current for each channel	30 mA max.
ADC resolution	24 bits
CMRR	⩾ 80 dB (at 50Hz)
DMRR	⩾ 60 dB
Communication	
Communication port and protocol	RS-485, Modbus RTU Extended protocol
Communication rate	691.2 kbps
Protection for channels	
Wrong connection of ±30VDC	Yes
Short circuit or grounding on field side	Yes
Hot swap	Yes
Withstand voltage of isolation	
The insulation resistance and dielectric strength between input signals (including distribution power), bus power, protective earth, and communication interfaces are as follows:	
Insulation resistance	⩾ 100 MΩ
Insulation strength	1500 VAC@1 min@5mA

AI6410 --- 8-Channel Redundant Analog Input Module

Power supply	
System power supply	1W@24V±10%
Field power supply	5W@24V±10%
Channel performance index	
Number of channels	8
Signal type	4-20mA current input
Accuracy	±0.10 % F.S.
Limitations of current over-range alarm	Open circuit alarm: input current ⩽ 0.8 mA
	Low limitation of over-range alarm: 0.8mA < input current ⩽ 3.6 mA
	High limitation of over-range alarm: 23.2 mA ⩾ input current > 20.4 mA
	Short circuit alarm: input current > 23.2 mA
External supply current for each channel	30 mA max.
ADC resolution	24 bits
CMRR	⩾ 80 dB (at 50Hz)
DMRR	⩾ 60 dB
Communication	
Communication port and protocol	RS-485, Modbus RTU Extended protocol
Communication rate	691.2 kbps
Protection for channels	
Wrong connection of ±30VDC	Yes
Short circuit or grounding on field side	Yes
Hot swap	Yes
Withstand voltage of isolation	
The insulation resistance and dielectric strength between input signals (including distribution power), bus power, protective earth, and communication interfaces are as follows:	
Insulation resistance	⩾ 100 MΩ
Insulation strength	1500 VAC@1 min@5mA

AI6610 ---- 8-Channel Analog Input Module (with HART Protocol)

Power supply	
System power supply	1W@24V±10%
Field power supply	5W@24V±10%
Channel performance index	
Number of channels	8
Signal type	4-20mA current input
Accuracy	±0.10 % F.S.
Limitations of current over-range alarm	Open circuit alarm: input current ⩽ 0.8 mA
	Low limitation of over-range alarm: 0.8mA < input current ⩽ 3.6 mA
	High limitation of over-range alarm: 23.2 mA ⩾ input current > 20.4 mA
	Short circuit alarm: input current > 23.2 mA
External supply current for each channel	30 mA max.
ADC resolution	24 bits
CMRR	⩾ 80 dB (at 50Hz)
DMRR	⩾ 60 dB
Communication	
Communication port and protocol	RS-485, Modbus RTU Extended protocol
Communication rate	691.2 kbps
Protection for channels	
Wrong connection of ±30VDC	Yes
Short circuit or grounding on field side	Yes
Hot swap	Yes
Withstand voltage of isolation	
The insulation resistance and dielectric strength between input signals (including distribution power), bus power, protective earth, and communication interfaces are as follows:	
Insulation resistance	⩾ 100 MΩ
Insulation strength	1500 VAC@1 min@5mA

AI6810 ---- 8-Channel Redundant Analog Input Module (with HART Protocol)

Power supply	
System power supply	1W@24V±10%
Field power supply	5W@24V±10%
Channel performance index	
Number of channels	8
Signal type	4-20mA current input
Accuracy	±0.10 % F.S.
Limitations of current over-range alarm	Open circuit alarm: input current ⩽ 0.8 mA
	Low limitation of over-range alarm: 0.8mA < input current ⩽ 3.6 mA
	High limitation of over-range alarm: 23.2 mA ⩾ input current > 20.4 mA
	Short circuit alarm: input current > 23.2 mA
External supply current for each channel	30 mA max.
ADC resolution	24 bits
CMRR	⩾ 80 dB (at 50Hz)
DMRR	⩾ 60 dB
Communication	
Communication port and protocol	RS-485, Modbus RTU Extended protocol
Communication rate	691.2 kbps
Protection for channels	
Wrong connection of ±30VDC	Yes
Short circuit or grounding on field side	Yes
Hot swap	Yes
Withstand voltage of isolation	
The insulation resistance and dielectric strength between input signals (including distribution power), bus power, protective earth, and communication interfaces are as follows:	
Insulation resistance	⩾ 100 MΩ
Insulation strength	1500 VAC@1 min@5mA

AO6210 ---- 8-Channel Analog Output Module

Power supply	
System power supply	1W@24V±10%
Field power supply	5W@24V±10%
Channel performance index	
Number of channels	8
Signal type	4-20mA current output
Accuracy	±0.10% F.S.
Load capacity	< 750Ω
Output step response	10%~90%, step <100 ms
DAC resolution	12 bits
Resetting the output status	
Cold start-up	1. Output is 0 after power on
	2. Module not configured, so the channel output is not enabled.
	3. Module is configured and power on, the failure preset value is output when the communication is not built
Hot start-up	1. If 'Hold' mode is configured, the output will hold the last value
	2. If 'default' mode is configured, the channel will output the failure preset value
Communication	
Communication port and protocol	RS-485, Modbus RTU Extended protocol
Communication rate	691.2 kbps
Protection for channels	
Wrong connection of ±30VDC	Yes
Short circuit or grounding on field side	Yes
Hot swap	Yes
Withstand voltage of isolation	
The insulation resistance and dielectric strength between input signals (including distribution power), bus power, protective earth, and communication interfaces are as follows:	
Insulation resistance	⩾ 100 MΩ
Insulation strength	1500 VAC@1 min@5mA

AO6410 ---- 8-Channel Redundant Analog Output Module

Power supply	
System power supply	1W@24V±10%
Field power supply	5W@24V±10%
Channel performance index	
Number of channels	8
Signal type	4-20mA current output;while enable the bias, the output range is 0.6 mA ~23 mA
Accuracy	±0.10% F.S.
Load capacity	＜750Ω
Output step response	10%~90%, step <100 ms
DAC resolution	12 bits
Resetting the output status	
Cold start-up	1. Output is 0 after power on 2. Module not configured, so the channel output is not enabled. 3. Module is configured and power on, the failure preset value is output when the communication is not built
Hot start-up	1. If 'Hold' mode is configured, the output will hold the last value 2. If 'default' mode is configured, the channel will output the failure preset value
Communication	
Communication port and protocol	RS-485, Modbus RTU Extended protocol
Communication rate	691.2 kbps
Protection for channels	
Wrong connection of ±30VDC	Yes
Short circuit or grounding on field side	Yes
Hot swap	Yes
Withstand voltage of isolation	
The insulation resistance and dielectric strength between input signals (including distribution power), bus power, protective earth, and communication interfaces are as follows:	
Insulation resistance	⩾ 100 MΩ
Insulation strength	1500 VAC@1 min@5mA

AO6610 ---- 8-Channel Analog Output Module (with HART protocol)

Power supply	
System power supply	1W@24V±10%
Field power supply	5W@24V±10%
Channel performance index	
Number of channels	8
Signal type	4-20mA current output while enable the bias, the output range is 0.6 mA ~23 mA Normal HART function is not guaranteed outside the range of 4~20mA
Accuracy	±0.10% F.S.
Load capacity	＜750Ω
Output step response	10%~90%, step <100 ms
DAC resolution	12 bits
Resetting the output status	
Cold start-up	Output is 0 after power on
Hot start-up	1. If 'Hold' mode is configured, the output will hold the last value 2. If 'default' mode is configured, the channel will output the failure preset value
Communication	
Communication port and protocol	RS-485, Modbus RTU Extended protocol
Communication rate	691.2 kbps
Protection for channels	
Wrong connection of ±30VDC	Yes
Short circuit or grounding on field side	Yes
Hot swap	Yes
Withstand voltage of isolation	
The insulation resistance and dielectric strength between input signals (including distribution power), bus power, protective earth, and communication interfaces are as follows:	
Insulation resistance	⩾ 100 MΩ
Insulation strength	1500 VAC@1 min@5mA

AO6810 ---- 8-Channel Redundant Analog Output Module (with HART protocol)

Power supply	
System power supply	1W@24V±10%
Field power supply	5W@24V±10%
Channel performance index	
Number of channels	8
Signal type	4-20mA current output while enable the bias, the output range is 0.6 mA ~23 mA
Accuracy	±0.10% F.S.
Load capacity	＜750Ω
Output step response	10%~90%, step <100 ms
DAC resolution	12 bits
Resetting the output status	
Cold start-up	1. Output is 0 after power on 2. Module not configured, so the channel output is not enabled. 3. Module is configured and power on, the failure preset value is output when the communication is not built
Hot start-up	1. If 'Hold' mode is configured, the output will hold the last value 2. If 'default' mode is configured, the channel will output the failure preset value
Communication	
Communication port and protocol	RS-485, Modbus RTU Extended protocol
Communication rate	691.2 kbps
Protection for channels	
Wrong connection of ±30VDC	Yes
Short circuit or grounding on field side	Yes
Hot swap	Yes
Withstand voltage of isolation	
The insulation resistance and dielectric strength between input signals (including distribution power), bus power, protective earth, and communication interfaces are as follows:	
Insulation resistance	⩾100 MΩ
Insulation strength	1500 VAC@1 min@5mA

RTD6210 ---- 8-Channel Thermal Resistance Input Module

Power supply		
System power supply	1W@24V±10%	
Field power supply	0.8 W@24V±10%	
Channel performance index		
Number of channels	8	
Signal type	Resistance input	
Accuracy	±0.2% F.S.	
Sensor wiring	Support 2-wire/ 3-wire wiring	
Sensor wiring	Pt100:	-200 ~ 800 ℃
	Cu50:	-50 ~ 150 ℃
	Cu100:	-50 ~ 150 ℃
ADC resolution	24 bits	
CMRR	⩾80 dB (at 50Hz)	
DMRR	⩾60 dB	
Communication		
Communication port and protocol	RS-485, Modbus RTU Extended protocol	
Communication rate	691.2 kbps	
Protection for channels		
Wrong connection of ±30VDC	Yes	
Short circuit or grounding on field side	Yes	
Hot swap	Yes	
Withstand voltage of isolation		
The insulation resistance and dielectric strength between input signals (including distribution power), bus power, protective earth, and communication interfaces are as follows:		
Insulation resistance	⩾100 MΩ	
Insulation strength	1500 VAC@1 min@5mA	

TC6210 ---- 8-Channel Thermocouple Input Module

Power supply	
System power supply	1W@24V±10%
Field power supply	0.5W@24V±10%
Channel performance index	
Number of channels	8
Signal type	Signals of raduation K,E, J, S, R, B, N, T, and mV signal
Accuracy	±0.2% F.S.
Accuracy	K: -250 ~ 1300 ℃
	S: -50 ~ 1700 ℃
	N: -250 ~ 1300 ℃
	E: -250 ~ 1000 ℃
	R: -50 ~ 1700 ℃
	T: -250 ~ 400 ℃
	J: -200 ~ 1200 ℃
	B: -200 ~ 1800 ℃
	mV: -60~60 mV
ADC resolution	24 bits
Cold-junction compensation	
ADC resolution	1. Using Pt100 or Cu50 Thermal resistance to measure the temperature in the cubicle and make the cold-junction compensation by software. 2. Using "preset cold-junction temperature" set by users as the cold-junction compensation temperature
Rang of the acquisition compensation temperature	-30 ~ 70 ℃
Accuracy of the acquisition compensation temperature	±0.5℃@-20 ~ 60 ℃
Communication	
Communication port and protocol	RS-485, Modbus RTU Extended protocol
Communication rate	691.2 kbps
Protection for channels	
Hot swap	Yes
Channel fault isolation and diagnosis	
1. Anyone channel fault will not influence the other channels.	
2. Open circuit of any field input signal will generate a broken-line fault alarm	
3. Wrong grounding at site side will not cause channel damage; once the wrong grounding has been removed, the channel will work normally.	
4. In case of channel failure, the corresponding LED will display; After the fault is eliminated, the channel returns to normal operation and the LED returns to normal	
Withstand voltage of isolation	
The insulation resistance and dielectric strength between input signals (including distribution power), bus power, protective earth, and communication interfaces are as follows:	
Insulation resistance	⩾ 100 MΩ
Insulation strength	1500 VAC@1 min@5mA
Module fault and detecting	
Fault isolation	Yes
Module fault detecting	Include Modbus network fault, field power supply fault, module ROM/RAM fault, and calibration factor reading error.
Channel fault detecting	Thermocouple break fault, over measure range fault

DI6211 ---- 16-Channel 24VDC Digital Input Module

Power supply	
System power supply	1W@24V±10%
Field power supply	5W@24V±10%
Channel performance index	
Number of channels	16
Signal type	Dry contact signal
Signal query voltage	24VDC
Range of query voltage	21.6V ~26.4VDC
Signal query current	5mA@24VDC
ON/OFF status	Contact without power; R(off)>100K, R(on)<1k
Channel scan cycle	1ms
Communication	
Communication port and protocol	RS-485, Modbus RTU Extended protocol
Communication rate	691.2 kbps
Protection for channels	
Overvoltage protection	If ±60VDC is wrongly connected to the terminals, the channel will not be damaged
Grounding protection	On the condition that the query voltage is correct, wrongly grounding will not damage the channel.
Hot swap	Yes
Withstand voltage of isolation	
The insulation resistance and dielectric strength between input signals (including distribution power), bus power, protective earth, and communication interfaces are as follows:	
Insulation resistance	⩾ 100 MΩ
Insulation strength	1500 VAC@1 min@5mA

DI6212 ---- 16-Channel 48VDC Digital Input Module

Power supply	
System power supply	1W@24V±10%
Field power supply	5W@24V±10%
Channel performance index	
Number of channels	16
Signal type	Dry contact signal
Signal query voltage	48VDC
Range of query voltage	43.2V ~52.8VDC
Signal query current	5mA@48VDC
ON/OFF status	Contact without power; R(off)>100K, R(on)<1k
Channel scan cycle	20ms
Communication	
Communication port and protocol	RS-485, Modbus RTU Extended protocol
Communication rate	691.2 kbps
Protection for channels	
Overvoltage protection	If ±60VDC is wrongly connected to the terminals, the channel will not be damaged
Grounding protection	On the condition that the query voltage is correct, wrongly grounding will not damage the channel.
Hot swap	Yes
Withstand voltage of isolation	
The insulation resistance and dielectric strength between input signals (including distribution power), bus power, protective earth, and communication interfaces are as follows:	
Insulation resistance	⩾ 100 MΩ
Insulation strength	1500 VAC@1 min@5mA

DI6411 ---- 16-Channel 24VDC Redundant Digital Input Module

Power supply	
System power supply	1W@24V±10%
Field power supply	5W@24V±10%
Channel performance index	
Number of channels	16
Signal type	Dry contact signal
Signal query voltage	24VDC
Range of query voltage	21.6V ~26.4VDC
Signal query current	5mA@24VDC
ON/OFF status	Contact without power; R(off)>100K, R(on)<1k
Channel scan cycle	1ms
Communication	
Communication port and protocol	RS-485, Modbus RTU Extended protocol
Communication rate	691.2 kbps
Protection for channels	
Overvoltage protection	If ±60VDC is wrongly connected to the terminals, the channel will not be damaged
Grounding protection	On the condition that the query voltage is correct, wrongly grounding will not damage the channel.
Hot swap	Yes
Withstand voltage of isolation	
The insulation resistance and dielectric strength between input signals (including distribution power), bus power, protective earth, and communication interfaces are as follows:	
Insulation resistance	⩾ 100 MΩ
Insulation strength	1500 VAC@1 min@5mA

DO6210 ---- 16-Channel 24VDC Digital Output Module

Power supply	
System power supply	24VDC±10%; max. 20W
Channel performance index	
Number of channels	16
Signal type	Transistor output with common negative
Channel type	With power supply
Load capacity	Max. load current 50mA@24VDC, load start-up voltage ⩽ 19.2V, load resistance 700~3200Ω
Leakage current in off state	Max. 2mA/single channel
Channel output in case of failure	1. Each channel can be configured as hold or outputting safety preset value
	2. Safety preset value: open(default), closed
	3. Safety preset value will be output within 2s (time adjustable) after the fault
Channel fault isolation	Fault in any channel will not influence the others
Communication	
Communication port and protocol	RS-485, Modbus RTU Extended protocol
Communication rate	691.2 kbps
Resetting	
Cold start-up	Before communication built up, channel output "open" status; after communication built up and before the control command issuing, channel output safety preset value.
Hot start-up	Before control command issuing, channel output safety preset value; after control command issuing, channel output the command value.
Hot swap	Yes
Withstand voltage of isolation	
The insulation resistance and dielectric strength between input signals (including distribution power), bus power, protective earth, and communication interfaces are as follows:	
Insulation resistance	⩾ 100 MΩ
Insulation strength	1500 VAC@1 min@5mA

DO6410 ---- 16-Channel 24VDC Redundant Digital Output Module

Power supply	
System power supply	24VDC±10%; max. 20W
Channel performance index	
Number of channels	16
Signal type	Transistor output with common negative
Channel type	With power supply
Load capacity	Max. load current 50mA@24VDC, load start-up voltage ⩽ 19.2V, load resistance 700~3200Ω
Leakage current in off state	Max. 2mA/single channel
Channel output in case of failure	1. Each channel can be configured as hold or outputting safety preset value
	2. Safety preset value: open(default), closed
	3. Safety preset value will be output within 2s (time adjustable) after the fault
	4. Default configuration as “hold”
Channel fault isolation	Fault in any channel will not influence the others
Communication	
Communication port and protocol	RS-485, Modbus RTU Extended protocol
Communication rate	691.2 kbps
Resetting	
Cold start-up	Before communication built up, channel output "open" status; after communication built up and before the control command issuing, channel output safety preset value.
Hot start-up	Before control command issuing, channel output safety preset value; after control command issuing, channel output the command value.
Hot swap	Yes
Withstand voltage of isolation	
The insulation resistance and dielectric strength between input signals (including distribution power), bus power, protective earth, and communication interfaces are as follows:	
Insulation resistance	⩾ 100 MΩ
Insulation strength	1500 VAC@1 min@5mA

SOE6211 --- 16-Channel 24VDC SOE Input Module

Power supply	
System power supply	1W@24V±10%
Field power supply	10W@24V±10%
Channel performance index	
Number of channels	16
Signal type	Dry contact signal
Signal query voltage	24VDC
Range of query voltage	21.6V ~26.4VDC
Signal query current	5mA@24VDC
ON/OFF status	Contact without power; R(off)>100K, R(on)<1k
Channel scan cycle	1ms
Communication	
Communication port and protocol	RS-485, Modbus RTU Extended protocol
Communication rate	691.2 kbps
Protection for channels	
Overvoltage protection	1. If ±30VDC is wrongly connected to the power terminals, the channel will not be damaged; Recover to normal after fault is removed. 2. On the condition of correct wiring, if ±30VDC is wrongly connected to the channel terminal, it will not influence other channels. Recover to normal after fault is removed.
Grounding protection	On the condition that the query voltage is correct, wrongly grounding will not damage the channel.
Hot swap	Yes
Withstand voltage of isolation	
The insulation resistance and dielectric strength between input signals (including distribution power), bus power, protective earth, and communication interfaces are as follows:	
Insulation resistance	⩾ 100 MΩ
Insulation strength	1500 VAC@1 min@5mA

SOE6212 ---- 16-Channel 48VDC SOE Input Module

Power supply	
System power supply	1W@24V±10%
Field power supply	10W@48V±10%
Channel performance index	
Number of channels	16
Signal type	Dry contact signal
Signal query voltage	48VDC
Range of query voltage	43.2V ~52.8VDC
Signal query current	5mA@48VDC
ON/OFF status	Contact without power; R(off)>100K, R(on)<1k
Channel scan cycle	1ms
Communication	
Communication port and protocol	RS-485, Modbus RTU Extended protocol
Communication rate	691.2 kbps
Protection for channels	
Overvoltage protection	1. If ±30VDC is wrongly connected to the power terminals, the channel will not be damaged; Recover to normal after fault is removed. 2. On the condition of correct wiring, if ±30VDC is wrongly connected to the channel terminal, it will not influence other channels. Recover to normal after fault is removed.
Grounding protection	On the condition that the query voltage is correct, wrongly grounding will not damage the channel.
Hot swap	Yes
Withstand voltage of isolation	
The insulation resistance and dielectric strength between input signals (including distribution power), bus power, protective earth, and communication interfaces are as follows:	
Insulation resistance	⩾ 100 MΩ
Insulation strength	1500 VAC@1 min@5mA