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Raynen Makes Industry More Intelligent

Expert in industrial automation products and solutions



RSE1000 Series Medium voltage solid state Soft starter

Version: V25.01

Raynen® 睿能
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The sample version is constantly updated with product upgrades, please pay attention to the version number
For products and solutions marked with *, please contact us for detailed information

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Stock Code (Raynen Technology 603933)

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About Raynen

2007

Raynen Technology was established

Main Board Listing

Listed on the main board of Shanghai Stock Exchange in 2017
Stock Code: 603933

It is a high-tech enterprise specializing in the research and development, production, sales and service of industrial automation products.

Innovation Strength

The company is headquartered in Fuzhou, with nearly 20 subsidiaries and R&D centers in Shanghai, Wuhan, Fuzhou and Changzhou. It is a "Key High-tech Enterprise of the National Torch Program", "Fujian Provincial Enterprise Technology Center", "China Textile Machinery Industry Computerized Flat Knitting Machine Intelligent Control System Product R&D Center", "Fujian Textile Equipment Intelligent Control Enterprise Engineering Technology Research Center", etc. The company insists on driving the development of technology and products with scientific and technological innovation, and through years of accumulation, has formed a number of core technologies and patent technologies with domestic leading level.

Business Area

As a domestic technology-leading supplier of industrial automatic control products, Ruineng Technology focuses on the research of control and drive technology. After years of product and technology cultivation, it has completed the comprehensive expansion from industry-specific electronic control systems to general automation products. The company's general automation products include core products such as AC servo systems, frequency converters, programmable controllers, human-machine interfaces, and Internet of Things gateways. They are widely used in electronics, textile machinery, machine tools, printing and packaging machinery, logistics equipment, intelligent manipulators, woodworking machinery, laser processing equipment, metallurgy, petroleum, and chemical industries. It provides equipment manufacturing companies with competitive products and personalized solutions with leading technologies.

Mission and Vision

Raynen has always taken "making industry smarter" as its mission, adhering to "honest cooperation, open innovation, customer achievement, world-class intelligent industrial automation products and solutions suppliers, to achieve the common growth of enterprise value and customer value.



RSE1000

Series medium voltage solid state soft starter

Product summary

- AC asynchronous motors are widely used in various fields of the national economy. Direct starting of asynchronous motors has problems such as small starting torque, large starting current, large impact on the power grid, difficulty in starting, large impact on mechanical equipment, short motor service life, large maintenance workload, and high maintenance costs.

RSE1000 medium-voltage soft starter can reduce the voltage drop of the power grid caused by direct starting of the motor. The use of this product does not affect the normal operation of other equipment in the common network. It can reduce the impact current of the motor. The impact current will cause excessive local temperature rise of the motor and reduce the life of the motor; it can reduce the mechanical impact caused by direct starting, and the impact will accelerate the wear of the driven machinery; reduce electromagnetic interference. The impact current will interfere with the normal operation of electrical instruments in the form of electromagnetic waves. RSE1000 medium-voltage soft starter can start and stop freely and improve work efficiency.

- RSE1000 medium-voltage soft starter includes RSE1000-G standard 6kV solid-state soft starter, RSE1000-G standard 10kV solid-state soft starter and RSE1000-E series integrated medium-voltage solid-state soft starter.
- RSE1000 medium-voltage soft starter is suitable for starting AC motors with rated voltages of 6-10KV. The products are widely used in large-scale steel, petroleum, chemical, aluminum, fire protection, mining, sewage treatment, electric power and other industrial fields, and can be well matched with motor-driven equipment, such as water pumps, fans, compressors, crushers, mixers, belt conveyors and other electromechanical equipment.



Execution standards

- GB/T 4208-2017 <Degrees of protection provide by enclosure (IP code)>
- IEC 60470 <Medium Voltage AC Contactor>
- IEC 61000 <Electromagnetic Compatibility>
- GB/T 12173-2008 <Mining electrical apparatus for non hazardous area>
- GB 1207 <Inductive voltage transformers>
- IEC 60298 <AC Metal-Enclosed Switchgear and Control Equipment Above 1KV and Below 52KV>
- GB/T 3906-2020 <Alternating-current metal-enclosed switchgear and controlgear for rated voltages above 3.6 kV and up to and including 40.5 kV>
- GB/T 3859.2 <Guidelines for the application of semiconductor converters>
- GB/T 13422 <Electrical test methods for semiconductor power converters>
- GB/T3859.1 <Basic requirements for semiconductor converters>
- JB/Z102 <Technical conditions for the use of medium-voltage electrical appliances in high-altitude areas>
- JB/T10251-2001 <Power electronic soft starter for AC motors>

Working process and principle

- The operation process of RSE1000 medium voltage soft starter can be divided into four processes: start preparation completion, start process, operation and shutdown process. The CPU provides comprehensive protection for all processes.

Start preparation is complete: During this process, control and power have been added to the starter, and its protection includes SCR short circuit and bypass contactor contact melting short circuit.

Other detection and protection features:

- Soft starter temperature rise
- Whether the fuse indicator light is on
- Whether the phase sequence is correct
- Power input frequency trip range
- External input fault

Starting process: When the soft starter receives a start command, the following protection functions start to work:

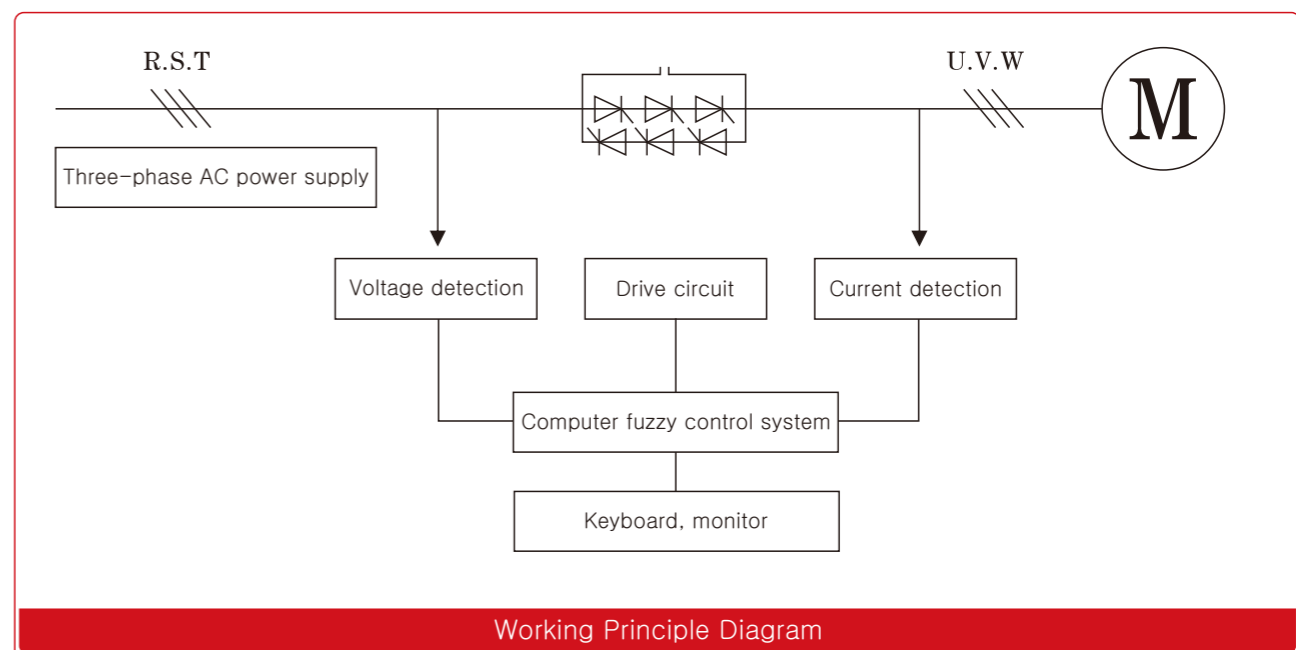
- Starting curve
- Acceleration time
- Phase balance
- Circuit short circuit/pre-load detection
- Phase leakage
- Starting current accumulation
- Overload detection
- Thermal capacity detection

Operation process: When the motor is running at full voltage and full speed, the motor current will drop below FLA. During operation, the following protection functions will take effect:

- Operation overload curve
- Phase loss
- Undercurrent/loss of load
- Overcurrent/electronic positioning pin detection

Stop process: Once the soft starter receives a stop command, different protection functions should be selected according to different stop methods, as follows:

- Soft stop mode: All protection features during operation will be maintained. At the end of the stop, the following coasting stop protection state will be entered.
- Coasting stop mode: The power supply is immediately disconnected from the motor and restored to "starting preparation completed", and the following protection functions will take effect:
 - Coasting deceleration/rotation deceleration count
 - Number of starts per hour
 - Start interval time



Function features

Multiple starting modes

Current limiting starting, voltage ramp starting, current ramp starting, current limiting + voltage ramp starting + jump, the corresponding starting parameters can be selected according to different loads to achieve the best starting effect and make the motor start smoother.

Soft starting direct starting

The whole machine is designed with the conversion function of "soft start/direct start", and the built-in bypass contactor has the continuity of production of direct start.

Friendly human-machine interface

The HMI LCD Chinese display panel makes programming and parameter adjustment more convenient. Fault and real-time monitoring are more intuitive, which improves work efficiency.

Analog signal output (optional function)

The whole machine can provide transmission of standard 4-20mA signals (pressure, temperature, flow, etc.).

Start control

The whole machine is equipped with local, remote (external dry contact), PLC, and communication (485 interface, Modbus) start and stop control functions.

Thyristor protection

The RC network absorbs the dynamic and static voltage balancing technology to ensure the reliable and safe operation of power devices in series at medium voltage.

Diversified inlet and outlet methods

According to the user's on-site requirements, the cable installation method can be selected from bottom-in and bottom-out, top-in and bottom-out, side-in and bottom-out, and side-in and side-out.

Communication interface (optional function)

RS-485 communication interface, embedded with standard MODBUS protocol, convenient for configuration connection. Can communicate with host computer or centralized control center.

High reliability

- Using solid-state medium-voltage and high-power components, it is small in size, low in heat, fast in response, good in starting consistency, and requires less maintenance;
- Provides BOD self-triggering protection function to reliably protect solid-state medium-voltage and high-power components;
- Provides multiple protection functions such as overcurrent, overload, undervoltage, and phase loss to comprehensively protect the start, stop, and operation of the motor;
- The specially designed electronic overload protection function with power-off memory is not affected by power-off and can replace the thermal relay protection function.

High security

- The electrical isolation between medium and low voltage uses optical fiber isolation and magnetic isolation;
- It has the function of pre-debugging low voltage (380V) motor;
- It uses a standard medium voltage cabinet with five protection functions.

Strong anti-interference

Adopting signal multi-level processing and isolation technology, the digital trigger with high anti-interference and the high and low voltage of the optical fiber isolation device can be reliably isolated.

Modular design

It adopts medium voltage power thyristor, component structure and modular design, which is easy to install and maintain the whole machine.

Advanced and perfect start-stop function

- Setting the starting current (1.5~5.0I_e) according to the load condition can effectively reduce the starting current and mechanical impact, reduce the distribution capacity, and avoid the investment in capacity expansion;
- The starting torque is controllable, realizing linear and smooth starting of the motor, reducing mechanical wear and increasing the service life of the transmission equipment;
- Smooth load acceleration can reduce mechanical impact and prevent production accidents or product damage;
- Provide pulse jump starting function to cope with heavy loads with large static friction at starting;
- Use the soft stop function to decelerate the load smoothly and eliminate the water hammer effect of pump loads;
- Use full digital control, starting and stopping are smoother and more stable, and the high reliability is competent for heavy loads in the industrial field.

Thyristor protection

- It can realize the start and stop function of multiple motors controlled by one soft starter;
- Adopt HMI panel operation display, rich interface, intuitive use and easy operation;
- With standard digital communication interface, it can remotely monitor and operate soft starters and motors;
- The daily maintenance workload is small.

Fault memory

Record 1,000 faults to help users find the cause of the most recent fault.



Structural features

General structure

The structure adopts the common technical requirements of GB11022-1999-T medium-voltage switchgear and control equipment, and applies sealing treatment in the cabinet to reduce pollution inside the machine, and the layout is reasonable. The advanced digital trigger system connects the pressure control to the medium-voltage part through optical fiber, and the convenient maintenance design allows each phase module to be quickly replaced separately. For the sake of operational safety, the medium-voltage part and the low-voltage part are completely isolated.

Unit classification

The overall structure of RSE1000 is divided into three mutually insulated parts. The medium voltage circuit consists of medium voltage thyristor module, thyristor protection components, vacuum switch components, etc.; the thyristor trigger and signal acquisition and system protection unit consists of optical fiber trigger components, signal acquisition and protection components; the system control and human-machine interaction unit consists of system control and display components; the three units are insulated from each other to ensure reliable isolation between medium and low voltage. The power cable can enter from the top or bottom of the cabinet, leaving enough space in the cabinet to facilitate the connection of the power supply line, and the motor cable enters from the bottom of the cabinet to allow appropriate bending.

Thyristor Module

The thyristors with the same parameters are installed in series and parallel in each phase. The number of thyristors connected in series is different according to the peak voltage requirements of the power grid used.

Signal acquisition and protection components

The voltage and current signals of the main circuit are collected through voltage transformers, current transformers and lightning arresters, and the main CPU controls and performs corresponding protection.

Fiber Optic Trigger Components

A strong trigger pulse circuit is used to ensure the consistency and reliability of the trigger: optical fiber triggering is used for reliable medium and low voltage isolation.

Ground wire

To ensure the reliable operation of RSE1000, the ground wires of each control unit in the cabinet are connected to the grounding copper bus at the bottom of the

Thyristor protection components

It mainly includes an overvoltage absorption network composed of an RC network and a voltage equalization protection network composed of voltage equalization units.

System control and display components

The 32-bit ARM core microcontroller executes central control and HMI LCD display, which can display three-phase voltage, current, fault information, operating status, etc.

Vacuum switch components

After starting is completed, the three-phase vacuum bypass contactor is automatically closed and the motor is put into grid operation.

Transport regulations

The openings and corners on the cabinet can bear and support the maximum weight of the entire cabinet structure.

Technical features

Maintenance-free

Thyristors are contactless electronic devices. Unlike other types of products that require frequent maintenance of liquids and components, they convert mechanical life into the service life of electronic components and can run continuously for several years without the need for downtime for maintenance.

Simple installation and use

RSE1000 is a complete motor starting control and protection system. When installed, you only need to connect the power line and the motor line to put it into operation. Before adding medium voltage operation, you can use low voltage to test the entire system electrically.

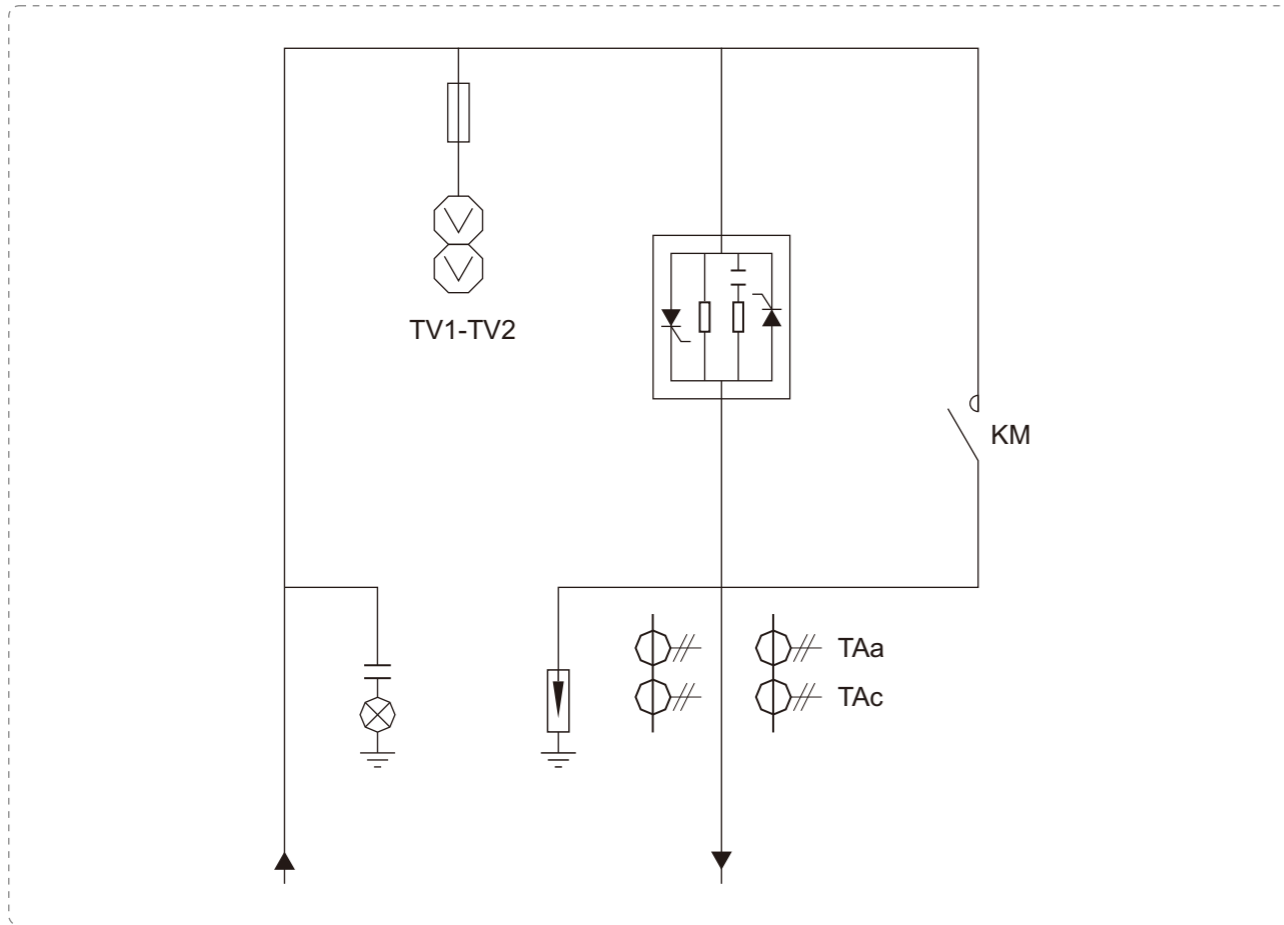
Spare Features

- The device is equipped with a vacuum contactor that can directly start the motor. If the RSE1000 fails, the vacuum contactor can be used to directly start the motor to ensure the continuity of production.
- The medium-voltage thyristor is the main circuit component, and it has a voltage equalization protection and overvoltage protection system.
- The RSE1000 is equipped with an electromagnetic locking device to prevent it from accidentally entering the medium-voltage device under power.
- Advanced optical fiber transmission technology realizes the isolation between the trigger detection of the medium-voltage thyristor and the low-voltage control circuit.
- The 32-bit ARM core microcontroller is used to perform central control, which is real-time and efficient, intuitive, reliable and stable.
- Touch screen display system, humanized operation interface.
- It has an RS-485 communication interface and can communicate with the host computer or centralized control center.
- All circuit boards have undergone rigorous aging tests.



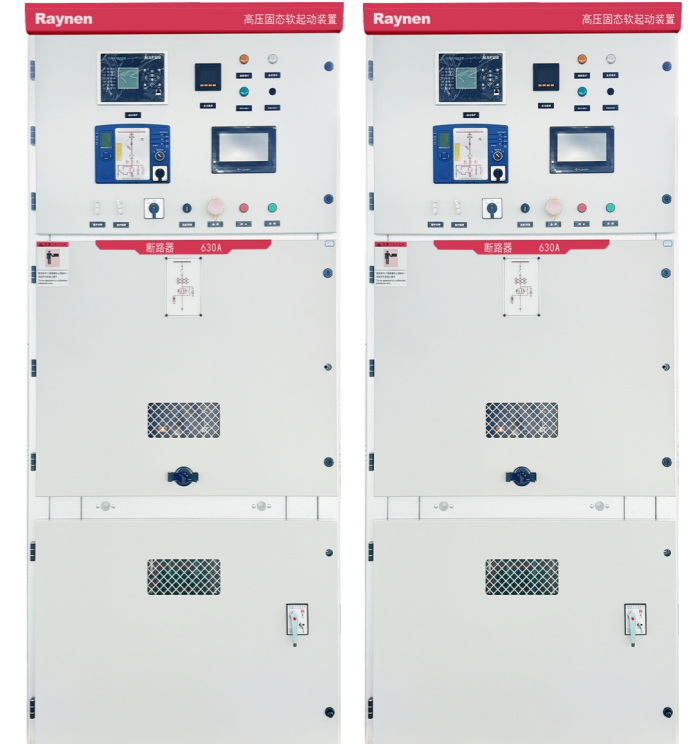
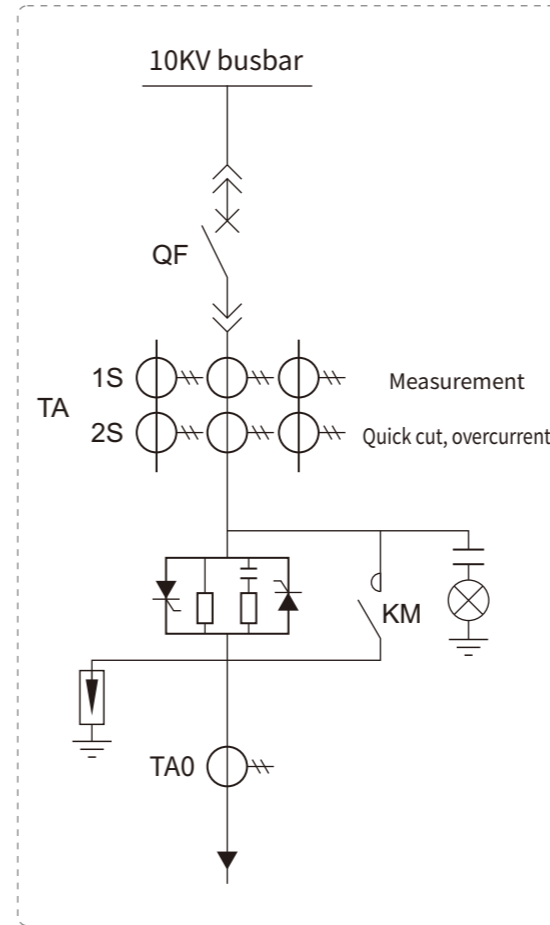
Medium voltage soft starter – Split model (need to be used with feeder cabinet)

Main circuit diagram



Medium voltage soft starter – All-in-one model (can be used with other switch cabinets through busbars)

Main circuit diagram



*The product is under continuous iteration, the appearance picture is for reference only, please refer to the actual product.



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Protection of thyristors

- The integrated design of switch cabinet, soft start cabinet and bypass cabinet is small in size and easy to install;
- The standard configuration includes grid-side vacuum circuit breaker and bypass vacuum contactor, and there is no need to configure operation cabinet or switch cabinet, so high design cost is gone;
- It is small in size, 50%~60% of other soft starters at the same power, easy to install and save space;
- The cabinet body is made of imported aluminum-zinc plate, processed by CNC machine tools, fully metal armored, assembled structure, wide combination scheme, advanced multiple folding process, connected with rivet nuts and bolts, with high precision, corrosion resistance, light weight, high strength, and strong parts versatility;
- It can be equipped with domestic ZN63A-12 (VSI) series or imported VD4 series vacuum circuit breakers have wide applicability, high reliability, and long-term maintenance-free;
- All types of trolleys are changed according to the modular building blocks to ensure that trolleys of the same specifications can be freely interchanged, and trolleys of different specifications are absolutely not allowed to enter;
- Highly reliable interlocking devices fully meet the "five protection" requirements;
- Each medium-voltage room has a pressure relief channel to ensure personal safety;
- The front door is equipped with an observation window to observe the working status of the indoor components;
- Suitable for installation at any location, no distance requirement from other equipment;
- Antennas can be installed in the bracket room and cable room respectively to prevent condensation and corrosion;
- Protection level: IP40.

Technical Parameters

Basic parameters	
Load type	Three-phase medium voltage squirrel cage asynchronous motor, synchronous motor
AC voltage	6-10KVAC
Operating frequency	50HZ/60Hz±2Hz
Phase sequence	RSE1000 allows operation in any phase sequence (can be set by parameters)
Bypass contactor	Contactors with direct starting capacity
Control power supply	AC220V±15%
Transient overvoltage protection	dv/dt absorption network
Starting frequency	1-6 times (per hour)
Environmental conditions	Ambient temperature: -20℃~+50℃
	Relative humidity: 5%~95% without condensation
	Altitude less than 1500 meters (more than 1500 meters need to be reduced)

Operation interface	
Language	Chinese, English

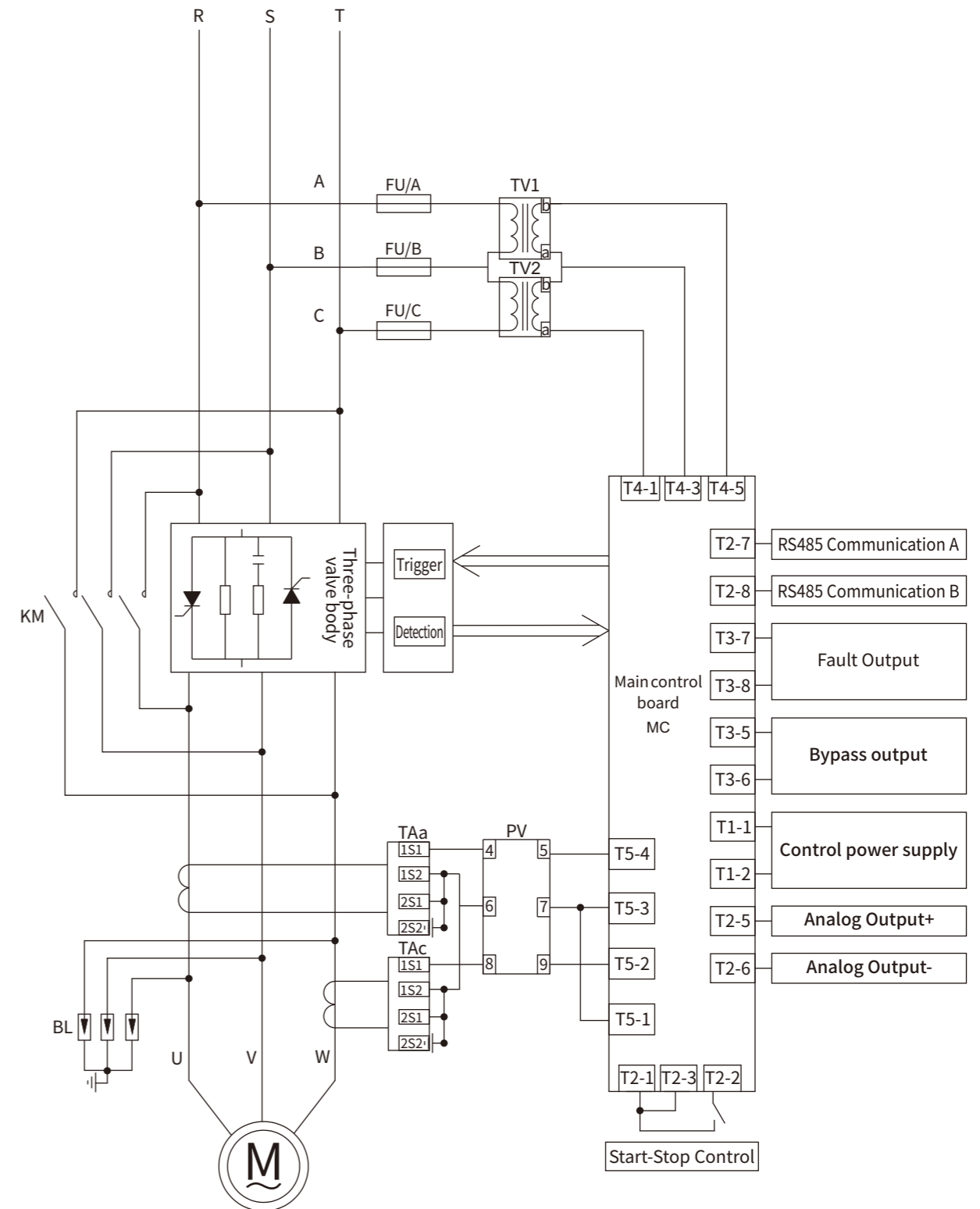
Data Recording	
Fault Record	Record the latest 1000 fault information

Protection function	
Phase loss protection	During the start-up or operation process, disconnect any phase of the main power supply
Overcurrent protection	Overcurrent protection setting: 100~500%Ie
Phase current imbalance protection	Phase current imbalance protection: 20~100%
Overload protection	Overload protection level: 10A, 10, 20, 30
	Underload protection level: 50~100%
Underload protection	Underload protection action time: 0~10S
	Start timeout
Overvoltage protection	When the main power supply voltage is higher than 120% of the rated value, overvoltage protection
Undervoltage protection	When the main power supply voltage is lower than 70% of the rated value, undervoltage protection
Phase sequence protection	Allows operation in any phase sequence (can be set by parameters)
Ground protection	Protection when the ground current is greater than the set value

Communication Instructions	
Communication protocol/interface	Modbus RTU
Network connection	Each RSE1000 can communicate with 32 RSE1000 devices
Function	The communication interface can be used to observe the operating status and programming

Instrument Display	
Main power supply voltage	Display three-phase main power supply voltage
Three-phase current	Display three-phase main circuit current

Product principle diagram



Model description

RSE1000 - XX - X...X - X
 ① ② ③ ④

① Product series RSE1000: Raynen Soft starter Export	② Rated input voltage 6 : 6kV 10 : 10kV	③ Adaptive motor power	④ G: Split model E: All-in-one model
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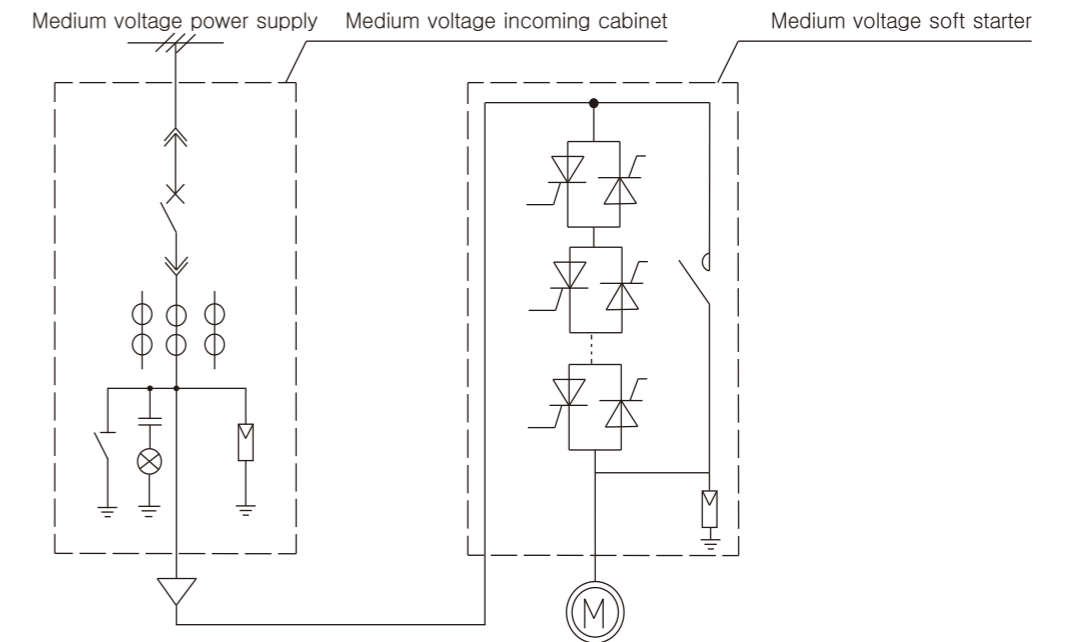
Model selection

Model	Rated voltage (kV)	Rated power (kW)	Rated output current (A)	Overall dimensions (W*H*D) mm	
				(-G) Split model	(-E) All-in-one model
RSE1000-6-420	6kV	420	50	1000*2300*1500	1000*2300*1500
RSE1000-6-630		630	75	1000*2300*1500	1000*2300*1500
RSE1000-6-1250		1250	150	1000*2300*1500	1000*2300*1500
RSE1000-6-1600		1600	200	1000*2300*1500	Customized model
RSE1000-6-2500		2500	300	1000*2300*1500	Customized model
RSE1000-6-3300		3300	400	1200*2300*1700	Customized model
RSE1000-6-4150		4150	500	1200*2300*1700	Customized model
RSE1000-6-5000		5000	600	Customized model	Customized model
RSE1000-10-420		10kV	420	30	1000*2300*1500
RSE1000-10-630	630		45	1000*2300*1500	1000*2300*1500
RSE1000-10-800	800		60	1000*2300*1500	1000*2300*1500
RSE1000-10-1250	1250		90	1000*2300*1500	1000*2300*1500
RSE1000-10-1500	1500		110	1000*2300*1500	1000*2300*1500
RSE1000-10-1800	1800		130	1000*2300*1500	1000*2300*1500
RSE1000-10-2250	2250		160	1000*2300*1500	Customized model
RSE1000-10-2500	2500		180	1000*2300*1500	Customized model
RSE1000-10-2800	2800		200	1000*2300*1500	Customized model
RSE1000-10-3500	3500		250	1000*2300*1500	Customized model
RSE1000-10-4000	4000		280	1000*2300*1500	Customized model
RSE1000-10-4500	4500		320	1000*2300*1500	Customized model
RSE1000-10-5500	5500		400	1200*2300*1700	Customized model
RSE1000-10-6000	6000		430	1200*2300*1700	Customized model
RSE1000-10-7000	7000		500	1200*2300*1700	Customized model
RSE1000-10-8500	8500		600	Customized model	Customized model
RSE1000-10-10000	10000		720	Customized model	Customized model

Note: When ordering, please add the suffix -G or -E after the model to distinguish the ordered model. For higher power, please contact customer service for confirmation.

Electrical scheme

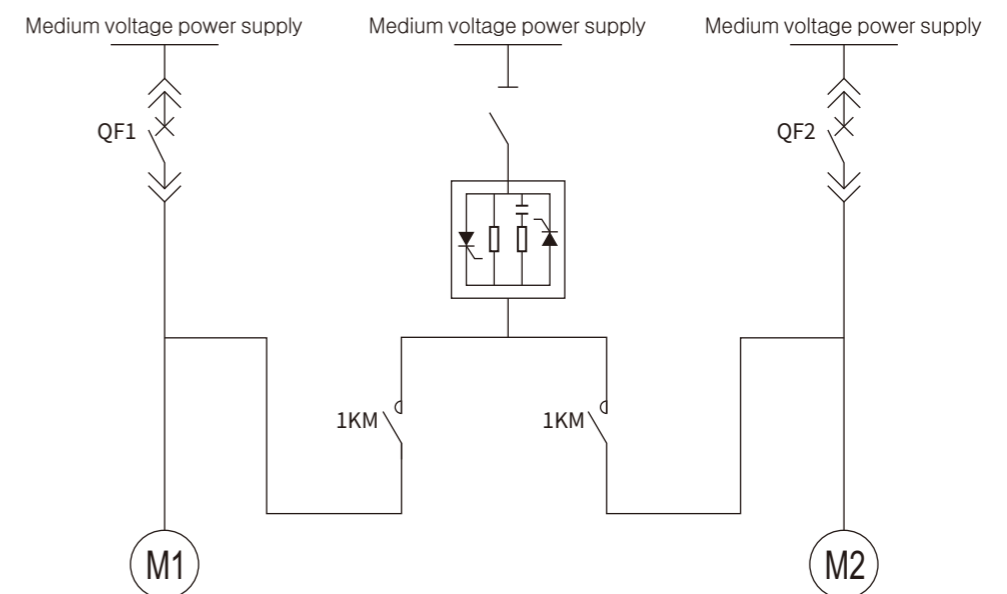
One to one wiring diagram



Network Communication

This device is equipped with a standard RS-485 communication interface (using MODBUS communication protocol), which can be connected to the factory automation system, such as PLC, DCS, to achieve integrated automatic control of factory equipment. It can also be connected to a remote monitoring computer to achieve remote intelligent control.

One-to-two wiring diagram



One-to-more application

The RSE1000 medium voltage soft starter can start multiple motors at one time, i.e. one-to-more applications. The performance parameters of the motors being towed are basically the same. We do not recommend one-to-many soft starter applications with greatly different performance parameters. If necessary, please contact us in advance.