RSE1000 Series
Medium Voltage Soft Starter
user's manual

Prior to use, please read this User's Manual carefully.

CAUTION: Please keep this User's Manual for future reference.

Medium Voltage Soft Starter

USER MANUAL

V2025.01

- Before operating the device, read the user manual carefully and strictly follow the operation specifications in the manual.
- Installation and maintenance shall be conducted in strict accordance with this manual and relevant national standards and industry practices.
- The specifications are subject to change without prior notice.
- This user manual should be kept in the hands of the actual end user.

Table of Contents

1. Precautions for Safe Use

Before operating the device, read this user manual carefully and strictly follow the requirements.

 Wrong operation may cause Personal casualty and device serious damage.

 Wrong operation may cause may cause moderate or minor injury or property damage.

Installation

●Soft starting device should be installed on metal or other non-combustible materials, otherwise there is the risk of fire.

●Do not install in an environment containing explosive gas, otherwise there is a risk of explosion.

●Do not place inflammable and explosive objects near the soft starter, otherwise there may be the risk of explosion.

●Do not drop screws, gaskets and other metal objects into the soft starting device, otherwise there is the risk of explosion and fire.

●Soft starter device should be installed in an environment of free of conductive dust, corrosive gases and vapors.

●Installed in the place without violent vibration and impact;

●Please do not install and run the soft starter device when it is damaged or the wire is fallen off, otherwise there is the risk of fire or injury.

●After the product is connected to the main power supply, even after disconnecting the control power supply or stopping the soft start device, the output end of the soft start device will still appear the full voltage signal for sample.

Wiring

●Ensure that all input power supplies are completely disconnected before wiring or maintenance operations. Otherwise, electric shock may occur.

●Do not drop screws, gaskets and metal objects into the soft starting device, otherwise there is the risk of explosion and fire.

●Soft starter main loop terminal and wire nose must be firmly connected, otherwise there is the risk of property damage.

●Forbid to connect AC 220V or 380V power supply to the input control terminal of the control board; otherwise, the soft starting device will be damaged.

●The exposed part of the wiring cable nose must be wrapped with insulation tape, otherwise there is the risk of fire and property damage.

Maintain

●Replacement should be by professional qualified personnel. Forbid to leave wire ends or metal objects in the starting device. Otherwise there is the risk of explosion and fire .

●After replacing the control board, must adjust and match the parameters before powering on and running. Otherwise, there is the risk of property.

Our company reserves the right to improve the product design and modify the relevant technical specifications without prior notice.

2. Summary

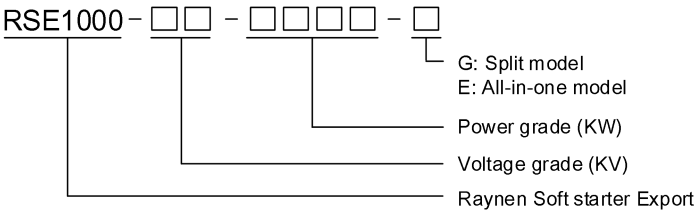
Medium voltage solid state soft starter is the latest generation of high-tech products which is perfect, reliable, convenient maintenance, mainly apply for squirrel cage asynchronous &synchronous motor to protect and control its start and stop, to provide the motor with the best current limiting torque reduction starting mode.

Medium voltage solid state soft starter adopts multiple SCR series connected together to meet different current and voltage requirements; The starting mode of the device is to provide gently increasing voltage to the motor, so as to realize the reduction of the motor starting motor and steady acceleration of the motor starting.

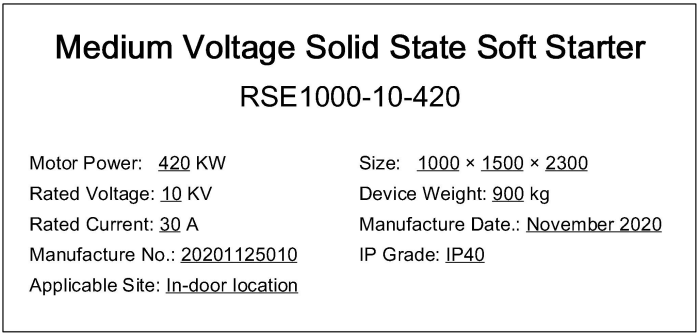
Medium voltage solid state soft starter is designed on the basis of the third generation digital microprocessor to provide comprehensive motor protection and analog input and output functions.

The device is widely used in metallurgy, mining, electric power, petroleum and petrochemical, building materials, chemical, paper and other industries, which rated voltage is 3000V~10000V. It can be well worked with compressor, water pump, fan, mixer, belt machine and other mechanical and electrical equipment, which is the ideal Medium voltage motor starting and protection equipment.

2.1 Product Model Description



2.2 Example of Product lable



Pic. 2.1 Example nameplate

2.3 Technical Specifications

Basicparm	
Load type	Three-phase Medium voltage squirrel cage asynchronous motor, synchronous motor
Rated voltage	3000-10000VAC
Operating frequency	50Hz、60Hz
Phase Sequence	Allows to work in any phase sequence (phase sequence detection can be set by parameter)
Main Loop Composition	12SCRS、18SCRS、30SCRS (Depending on the model and rated voltage)
Bypass contactor	Contactor with direct starting capacity

Control power	AC220V±15%
Transient voltage overload protection	dv,dt absorption of protection
Start time/hour	No more than 6 times
Environmental conditions	Ambient temperature: -10℃ to +50℃
	Relative humidity: 5%-95% no condensation
	Derating is required when the altitude exceeds 1500 meters
Protect function	
Open-phase protection	Any phase of the main power supply disconnects during startup or operation
Run overcurrent protection	Overcurrent protection setting: 100 ~ 500%Ie
Overload protection	Overload protection level: 10A, 10, 20, 30
Underload protection	Protection level: 50 ~ 100%; Underload protection: 0-10s
Star time Overtime	Start time limit: 0 ~ 120S
Phase order protection	Allows to work in any phase sequence (can be set by parameter)
Other Protection	See Protection Parameter Settings
Description of communication	
communication protocol	Modbus RTU
communication interface	RS485
Network connections	Each Medium voltage soft starter can communicate with 32 sets of devices
Operation interface	
Touch screen	standard configuration
Language	Chinese

Meter display	
MainPower Supply	Display three-phase main voltage
Main power current	Display three-phase main loop current
Data Logging	
Error Record	Record the fault information ≥ 100 times

2.4 Design Structure

Soft starter should be used together with incoming cabinet equipped with disconnecting switch.

Soft start device is an intelligent motor start and protection device, used to control and protect Medium voltage AC motor.

Products are mainly composed of the following components: Medium-voltage SCR module, SCR protection component, optical fiber trigger component, vacuum bypass contactor, signal acquisition and protection component, system control and display component.

■ SCR module: SCR modules with the same parameters in each phase are installed in series and parallel. The number of SCR series selected varies according to the peak voltage requirements of the power grid used.

■ SCR protection component: mainly include the over-voltage absorption network composed of RC absorption network and voltage sharing protection network composed of voltage sharing unit.

■ Fiber trigger component: strong trigger pulse circuit to ensure the consistency and reliability of trigger; Reliable Medium and low voltage isolation using fiber optic trigger.

■Vacuum bypass contactor: after starting, the three-phase vacuum

bypass contactor is automatically drawn and the motor is put into power grid operation.

■ Signal acquisition and protection components: collect voltage and current signals of the main circuit through voltage transformer, current transformer and lightning arrester, and the main CPU controls and protects them accordingly.

■ System control and display components: 32-bit ARM core microcontroller executive center control, touch screen display, which can display three-phase voltage, current, fault information, operation status, etc.

2.5 Overall Structure

■ The structure adopts the common technical requirements of GB11022-1999-T Medium voltage switching equipment and control equipment, and the sealing treatment is applied in the cabinet body to reduce the pollution to the machine interior, and the layout is reasonable. Advanced digital trigger system connects low voltage control to Medium voltage section via optical fiber. Easy maintenance design allows each phase module to be replaced individually and quickly. For safety operation, Medium pressure part and low pressure part are completely isolated

■ Overall structure is divided into three mutually insulated sections. The Medium voltage circuit is composed of Medium voltage SCR module, SCR protection component, vacuum bypass contactor, etc. The SCR trigger and signal gathering system protection unit is composed of optical fiber trigger component, signal acquisition and protection component; The System control and human-computer interaction unit is composed of system control and display components; The three units are insulated from each other to achieve reliable

isolation between Medium and low voltage.

■ The power cable can be entered from the top or bottom of the cabinet, with enough space in the cabinet for the power cable to be connected, and the motor cable can be entered from the bottom of the cabinet to allow proper bending.

■ Ground cable: To ensure the reliable running of the device, the ground cables of each control unit in the cabinet are connected to the ground copper bar at the bottom of the cabinet.

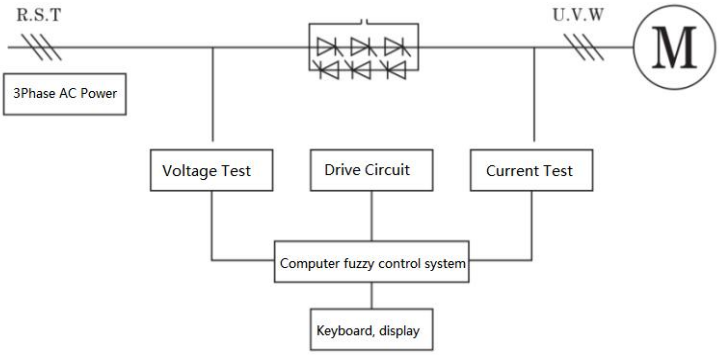
■ Transport regulations: The holes and corners on the cabinet can support the maximum weight of the entire cabinet structure.

2.6 Working Principles

Soft starter series control core is the microprocessor CPU; The microprocessor performs phase-shifting trigger control on THE SCR to reduce the voltage applied to the motor, and then increases the motor torque smoothly by controlling the voltage applied to the motor and until the motor accelerates to full speed. This starting mode can reduce the starting impact current of the motor and reduce the impact on the power grid and the motor itself; At the same time, it also reduces the mechanical impact on the mechanical load device connected to the motor, so as to extend the service life of the equipment, reduce the detection time of failure and shutdown, and improve the work efficiency.

When the motor reaches full speed operation, the motor current decreases to normal full speed operation current value. The soft starter controls the bypass output relay to close the bypass Medium pressure vacuum contactor.

As shown in the following picture.



2.7 Technical Features

■ Maintenance-free: SCR is a contactless electronic device, different from other types of products which needs regular maintenance of liquid and components, etc.. It changes the mechanical life into the service life of electronic components, which can continuous operation for several years without maintenance.

■ Easy to install and use: Device is a complete motor starting control and protection system. When in installation, it can operation just only connecting power line and motor line. Before adding Medium voltage operation, allow to use low voltage to electrical test of the whole system.

■ Standby characteristics: the device is equipped with a vacuum contactor which can directly start the motor. If the soft starting device fails, the vacuum contactor can be used to directly start the motor to ensure the continuity of production.

■ It owns voltage equalization protection and over voltage protection system with Medium voltage thyristor as the main circuit components.

■Soft starter is equipped with electromagnetic locking device, to avoid

straying into Medium voltage device under live condition.

■ Advanced optical fiber transmission technology realizes the isolation between Medium-voltage thyristor trigger detection and low-voltage control circuit.

■ Adopt 32 bit ARM core microcontroller to implement center control, keep the control real-time efficiency , high reliability, good stability.

■ Touch screen display system: simple operation, user-friendly interface.

■ With RS-485 communication interface, can communicate with upper computer or centralized control center.

3. Power Connection and Operation

3.1 Main Loop Connection

(1) Before wiring, please ensure that all switches are in the off position.

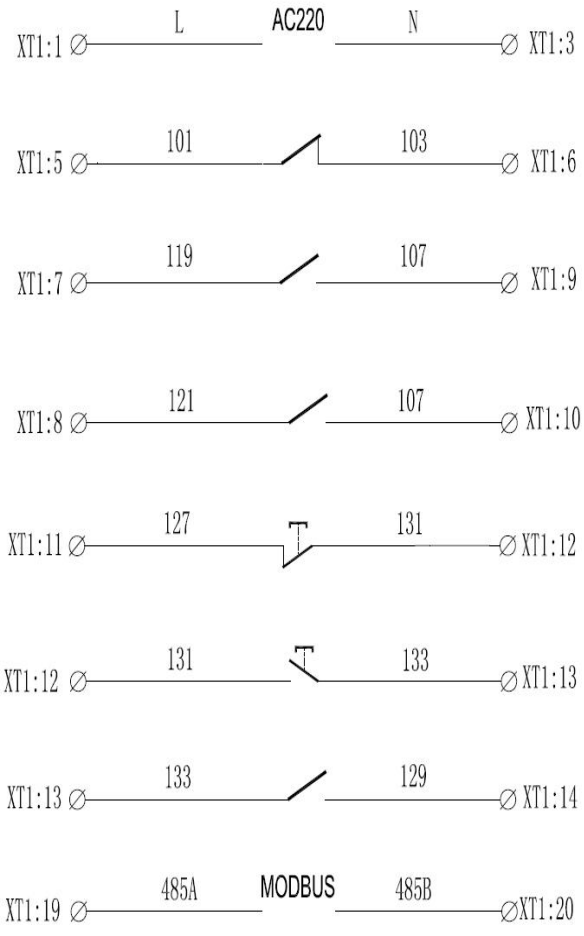
(2) Main loop connection: Terminals R, S, T are connected to the power terminal.

Terminals U, V ,W are connected to the motor end.

3.2 Connection of Control Terminals

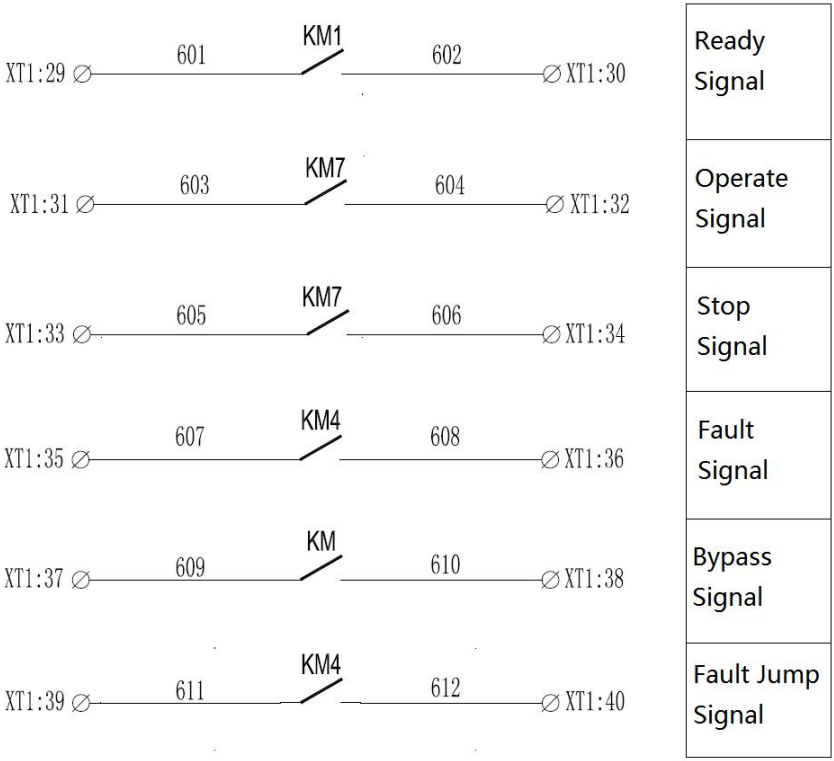
Users can select wiring according to requirement.

(1) External input signal terminal



Control Power
External emergency stop signal input
External fault signal input
External ready signal input
Remote stop signal input
Remote start signal input
DCS start&stop signal input
RS485 communication interface

(2) Output signal terminal of soft starter



(3) Connect to terminals L and N from AC220V/50HZ provided by the user.

(4) Grounding: connect the grounding cable to the ground bar of the cabinet.

Note: Please check whether the voltage of the main circuit and the voltage of the control circuit match the voltage level of the soft starting device. Part of the signal is reserved on the external control wiring terminal. Users can connect according to the requirement.

3.3 Control Mode Selection

(1) The device has three start-stop control modes: local control,remote control and DCS control. Users can convert through the switch on the panel to forbid switching during the operation of the device.

(2) The starting control of the device is divided into "soft start/direct start" two ways

Soft start mode: set the "soft start/direct start" switch to the "soft start" position and press the start button (green) to start the motor. The user can observe the current in the motor starting process and running process through the three-phase ammeter on the device. After the motor is started, it automatically switches to bypass operation state, and the operation indicator light will be on (red).

Press the red stop button on the panel during starting or running, the motor will stop and the panel stop indicator will be on (green).

When the device detects a fault, the fault indicator (yellow) will be on, and the motor will automatically stop.

The fault must be cleared before next operation (users can clear the fault display on the panel by cutting off the external control AC220V power supply or press the “reset” button more than 2s to reset).

Direct start mode: set the "soft start/direct start" switch to the "direct start" position, press the start button (green), and the vacuum contactor is connected. The user can observe the motor starting and running current through the three-phase ammeter on the device. The motor runs directly through the vacuum contactor, and the running indicator light is on (red). Press the red stop button on the panel during starting or running, the motor will stop and the panel stop indicator will be on (green).

When the device detects a fault, the fault indicator (yellow) on the panel will be on, and the motor will automatically stop running.

In case of emergency during starting or running, the emergency stop button on the device panel can be used for emergency stop.

The factory setting for the device is local control, soft start mode and circuit breaker cabinet electric interlock signal is in closed position.

3.4 Powering on and Operating

(1) Switch the control power supply (AC220V) MCB QF to the closed position. The touch screen on the soft start panel displays stop, and the stop indicator is on (green).

(2) In standby mode, set the related parameters of the soft starter to ensure that the parameter Settings match the actual load.

(3) Check whether the rated power of the soft starter matches the rated power of the motor; Test whether the insulation performance of the motor meets the requirements; check if the input and output wiring of the main loop is correct; check if all connections are reliably connected and the wiring nut is tightened;

(4) Put the main power circuit breaker in the closed position，which is at upper of the wire cabinet, and the voltmeter shows the voltage of the three-phase main power.

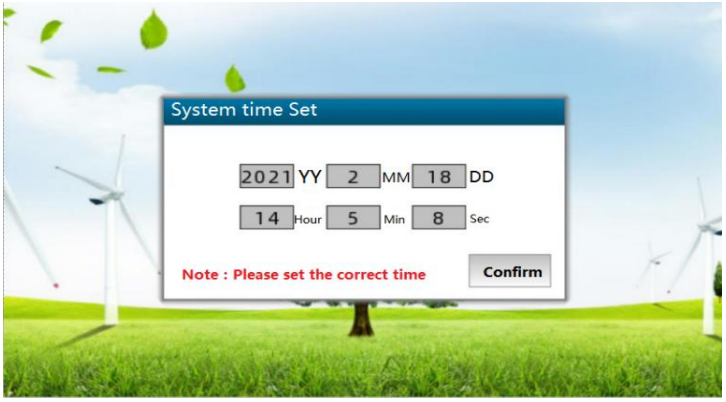
(5) Start the device through the operation button on the panel. If the device reports a fault during starting or running, please adjust parameter Settings or remove the fault according to the method of "Fault Detection and Elimination" in the manual.

Notes: Before operating, ensure that the three-phase power is normal.

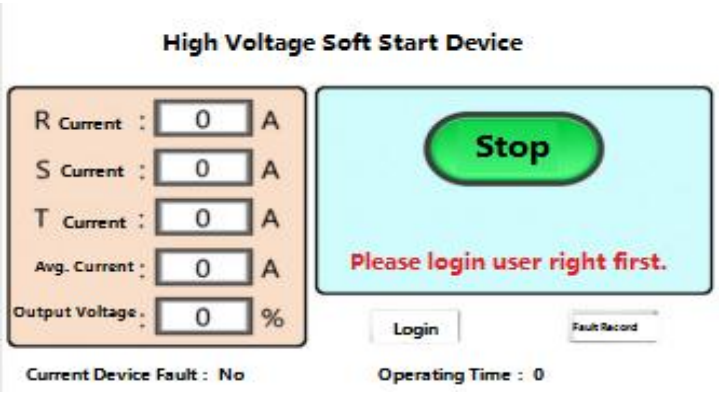
4. Touch Screen Operation Instructions

1. Start and enter the first screen

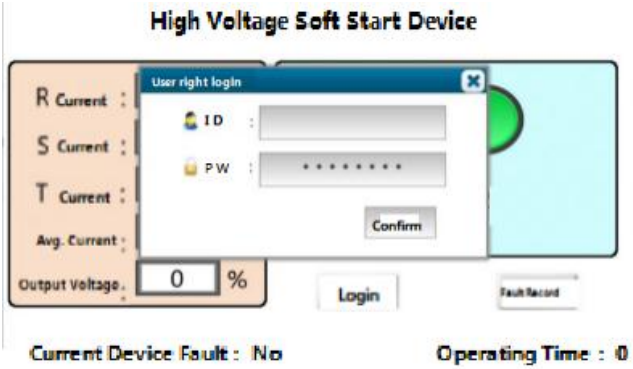
2. Click the screen pops to set the time, please set the system time correctly



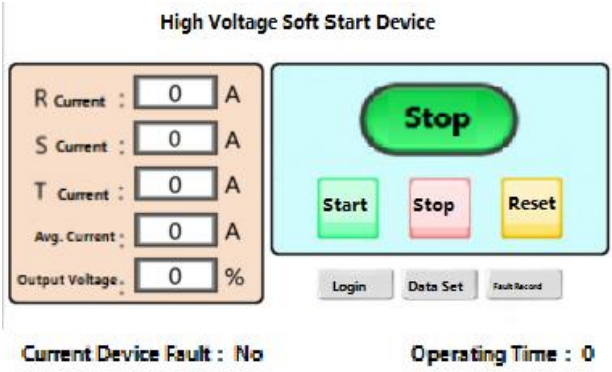
3. Click the screen into the monitoring interface, orange area on the left shows the output current and output voltage, and blue area on the right shows device status (after logining, it shows all state), the lower left corner shows the fault information, the lower middle area shows the accumulated running time of the device (in hours), the lower right corner shows the system time.



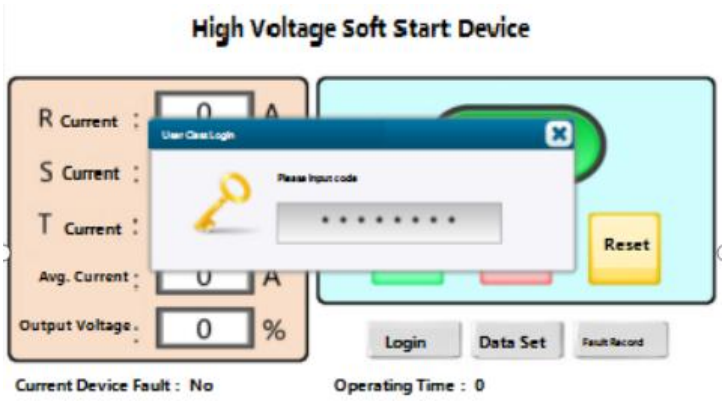
4. Click the login button to log in to common user rights or advanced user rights (common user rights: user1, password: 888888; Advanced user rights: user77, password: 888888. If needs increase rights or change password, check the following description.)



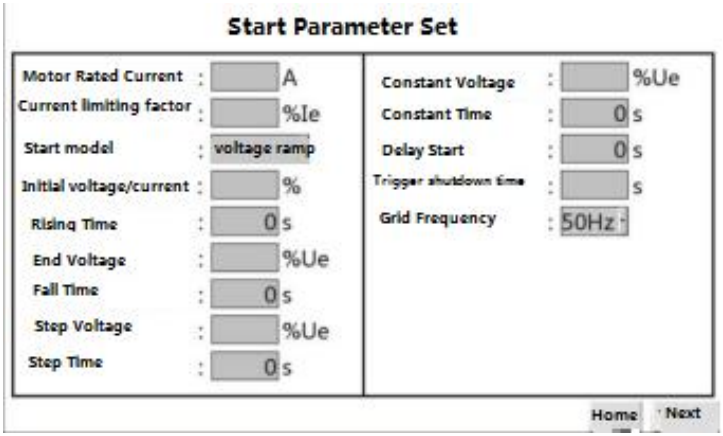
5. The complete monitoring interface is displayed after loginning



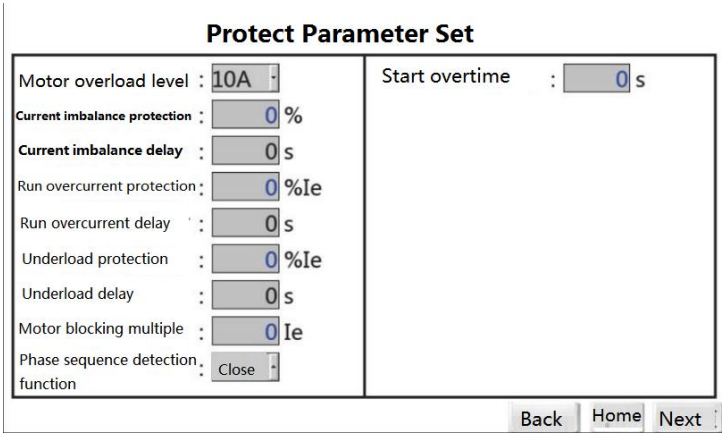
6. Click the parameter setting button to set the starting parameter (parameter setting menu password: 888888, it can modify through the function parameter setting page)



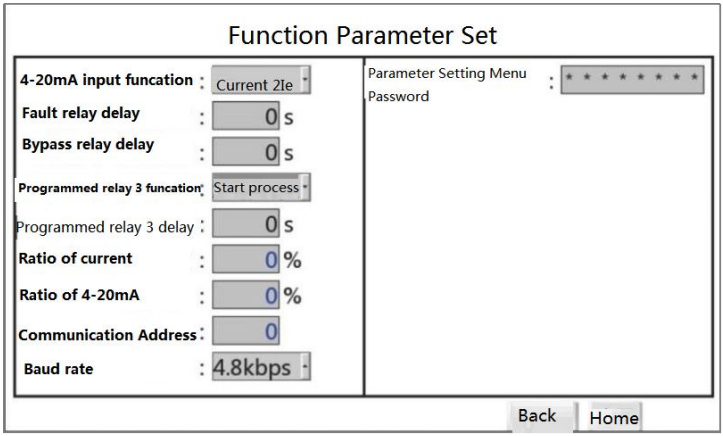
7. Enter into the starting parameter setting page to set relevant parameters (notes: parameter setting is effective in the stopped state)



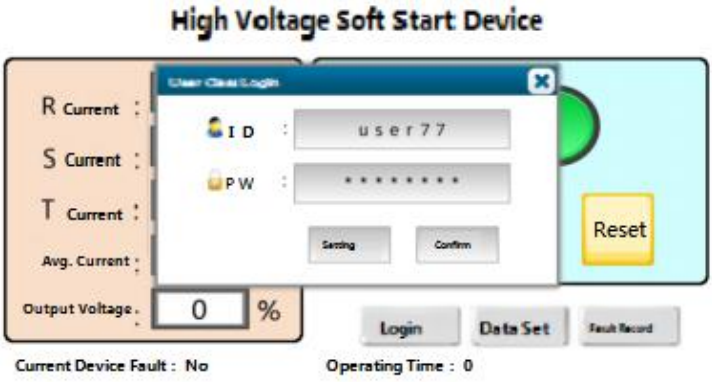
8. Click the next page on the starting parameter setting page to enter into the protection parameter setting page and set relevant parameters.



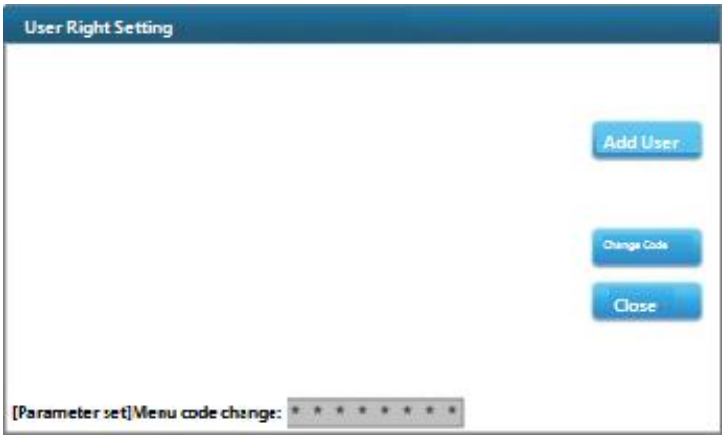
9. Click next on the protection parameter setting page to enter the function parameter setting page to set relevant parameters.



10. After you log in as an advanced user, click the login permission button, and the setting button will appear in the middle of the interface.

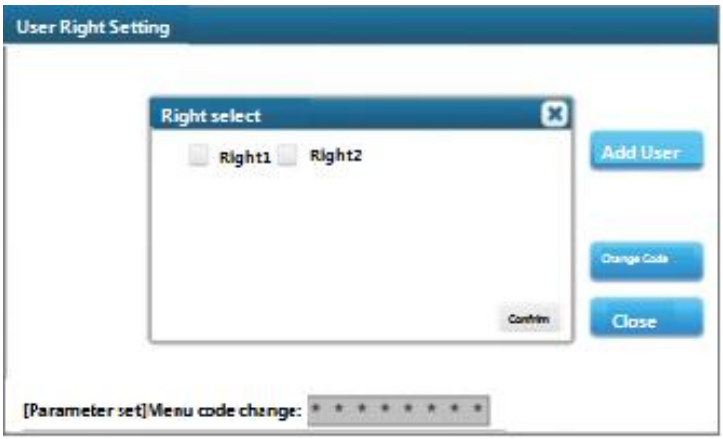


11. Click the Setting button to enter into the user permission setting interface (if you forget the password of the parameter setting menu, you can log in to the Advanced user and enter into the user permission setting page to modify it).

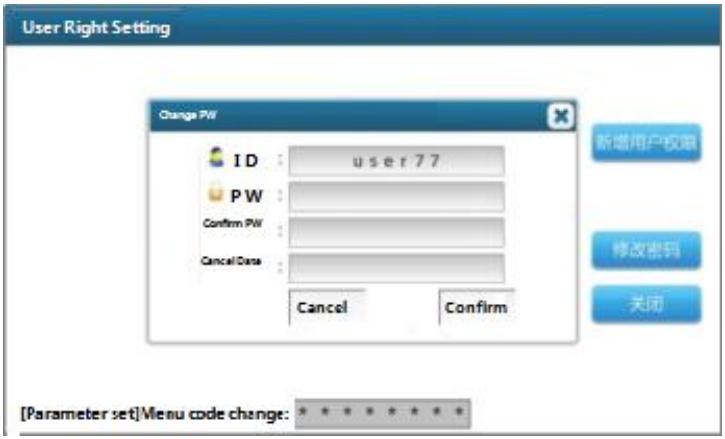


12. You can click the New User rights button to add user rights (logout time unit: minute).

13. Click Permission Settings to set permissions. For common users, select Permission 1, and for advanced users, select Permission 1 and 2.



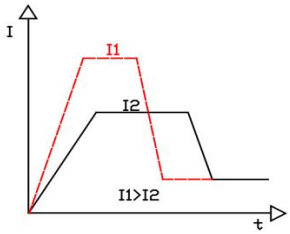
14. Click Password Change, you can change the password.



5. Spark-submit

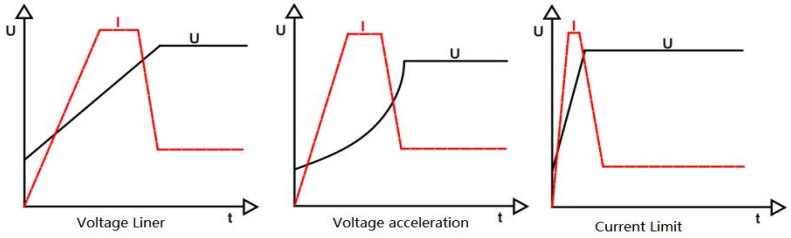
5.1 Starting Parameters

Name of parameter	Scope	Factory default
Motor Rated Current	15～9999A	
Current limiting factor	100～500%Ie	350%Ie



When this parameter is set to 500%Ie, current is no limit. The output of the soft-starter rises to full voltage according to the preset voltage curve.

Start mode	Voltage linearity, voltage acceleration, current limit	Voltage Linearity



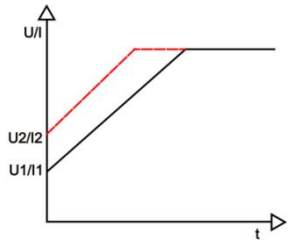
Voltage linearity: before entering the current limit, the voltage will rise uniformly in a slope linear way from the initial voltage value, while the output current will increase at a certain rate. When the starting current reaches the current limit value, the current will stay constant until the start is completed;

Voltage acceleration: before entering the current limit, the voltage will

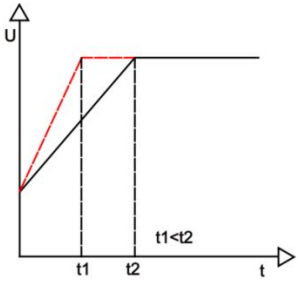
accelerate in a slope nonlinear way from the initial voltage value, while the output current will increase at a certain rate. When the starting current increases to the current limit value, the current will stay constant until the start is completed;

Current limit: the output current increases uniformly from the initial value. When the starting current reaches the limit value, the current will stay constant. After the motor accelerates for a period of time, the current begins to decline and the output voltage rapidly increases to the full voltage output until the start is completed. This start mode is the fastest of the three modes to reach the current limit.

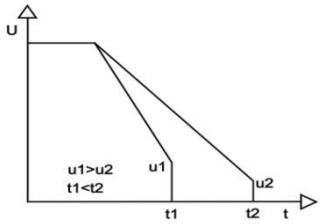
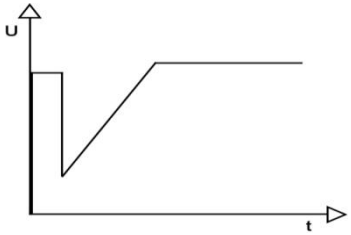
Initial voltage/current	25~100%	35%

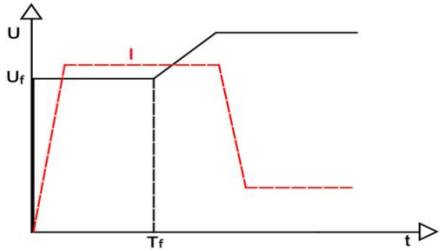


Rise time	0～60s	10s



The length of time determines when to rise the starting torque to the final torque; When rising for a long time, the accelerated torque is small during the motor starting, and the motor accelerates for a long time; The length of rising time should be appropriately selected according to the load condition, so that the motor can start smoothly; When the

torque acceleration finish before motor acceleration, the torque will reach the set limit torque in a certain time. Therefore, the rising time here represents the rate of speed change and is not exactly equivalent to the starting time of the motor.		
Over voltage	20~60%Ue	20%Ue
Fall time	0～60s	0s
		
Jump voltage	20～100%Ue	20%Ue
Jump time	0～5s	0s
		
The jump-start mode is mainly applied to motors loaded large static resistance, which can overcome large static friction torque by applying a large instantaneous starting torque. In this mode, the output voltage quickly reaches the set jump voltage, and when it reaches the preset jump time, it drops to the starting voltage, and then starts steadily according to the set start voltage/current and rise time until the start is complete.		
Constant voltage	30～80%Ue	30%Ue
Constant voltage time	0～30s	0s



Constant voltage mode is mainly for heavy load starting which needs set the appropriate constant voltage and time according to the actual load. When the constant voltage time is set to 0, turn off the constant voltage start mode.

Delayed starting time	0～60s	0s

Starting command and the motor will start according to the setting delay time.

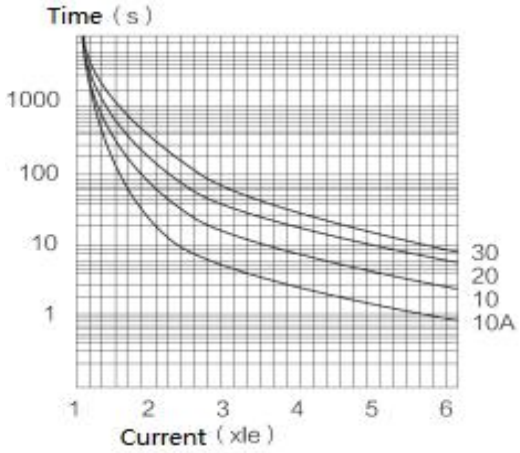
Trigger off time	5~60s	5s

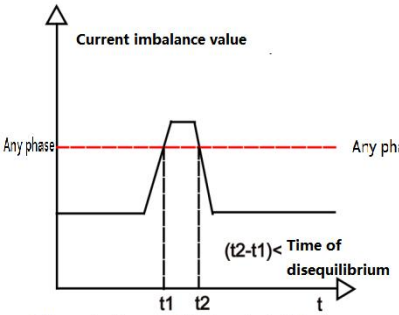
After the soft starter is started, delay the setting time to close the trigger.

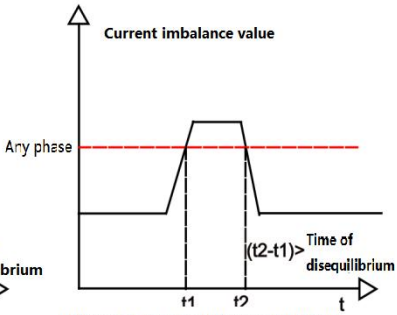
Power grid frequency	50Hz、60Hz,auto	50Hz

When it is set to 50Hz or 60Hz, the motor is started according to the set frequency without frequency detection. When it is set to automatic, it will detect frequency and start the motor according to the detected frequency. The grid frequency error is ±2%, if exceed, frequency failure will be reported.

5.2 Protection Parameters

Name of parameter	Scope	Factory default
Motor overload level	10A、10、20、30、close	30
 After the soft start device is powered on, electronic thermal overload detection starts in the whole process. When the soft start device fails because electronic thermal overload, it cannot be reset immediately. The internal device will release virtual heat of electronic thermal overload according to the actual overload situation, and can be reset after release.		
Differential unbalanced current protection	20～100%	40%
Current unbalance delay	0~10s	2s





Current unbalance = (Imax-Imin)*2/Iave. Imax means the maximum current value of the three phases; Imin means the minimum current value of the three phases, and Iave means the average value of the three phases. After the motor starts, when the current unbalance degree reaches the set value and continues to exceed the delay time of current unbalance, the soft starter will stop and failure will be reported. When the average current Iave>5A after starting, the current unbalance degree will be detected.

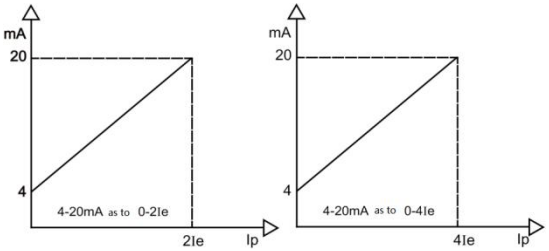
Run overcurrent protection	100～500%Ie	200%Ie
Overcurrent delay	0～10s	2s

After the motor runs, when the motor current value exceeds the set overcurrent protection value and continues to exceed the operation overcurrent delay time, the soft starter will stop and overcurrent fault will be reported.

Underload protection	50~100%Ie	100%Ie
Underload delay	0~10s	2s

After the motor runs, when the motor current value is lower than the underload protection value and exceed the underload delay time continuedly. The soft starter will stop and underload fault will be reported. Underload protection is closed if the value is set to 100%Ie.		
Multiple of motor locked-rotor	5~10Ie	6Ie
When the motor current value exceeds the set multiple value of motor locked-rotor and lasts for 200ms, the soft starter will stop and the locked-rotor fault will be reported. If the value is set to 5, the locked-rotor protection is disabled.		
Phase sequence detection function	Open/Close	Close
When phase sequence protection is opened, the phase sequence will be detected. If the phase sequence is abnormal, the phase sequence fault will be reported.		
Start overtime	10~120s	60s
When the starting time exceeds the setting time, the soft starter will stop and report the starting overtime fault.		

5.3 Function Parameters

Name of parameter	Scope	Factory default
4-20mA output function	Current 2Ie, current 4Ie	Current2Ie
 The current value corresponding to this parameter refers to the average output current. The corresponding current output and motor current are not affected by the working state of the soft starting device, and always change actually.		
Fault relay delay	0~60s	0s
Bypass relay delay	0~60s	0s
Programmable relay 3 function	Starting process, full voltage, soft stop process, starting full voltage, failure, system error	system error
Starting process: the relay outputs during the starting process of the soft starter; Full voltage: after the motor starts, the relay outputs, which is equivalent to bypass output; Soft stop process: when the soft start device is in soft stop, the relay outputs;		

<table>
<tr><td colspan="3">Starting full voltage: the three states of starting, running and soft stop of soft starting device, the relay outputs the whole process;
Fault: when the soft starter has a fault, the relay outputs. This option is equivalent to fault output.
System error: when soft starter has system error, the relay outputs;</td></tr>
<tr><td>Programming relay 3 delay</td><td>0~60s</td><td>0s</td></tr>
<tr><td>Current proportionality</td><td>50~150%</td><td>100%</td></tr>
<tr><td colspan="3">This value is proportional to the display current (three-phase current and average current), display current = actual current * current proportionality factor /100.</td></tr>
<tr><td>Proportionality factor</td><td>50~150%</td><td>100%</td></tr>
<tr><td colspan="3">If the 4-20mA output function is set to “Current 2Ie”, the 4-20mA output is 8mA*I/Ie+4 in theory. If the actual output value is inconsistent with the theoretical value, you can adjust this parameter to the theoretical value. If the 4-20mA output function is set to “Current 4Ie”, the 4-20mA output is 4mA*I/Ie+4 in theory. If the actual output value is inconsistent with the theoretical value, you can adjust this parameter to the theoretical value. The factor is proportional to the output of 4-20mA. When the actual value is small, the factor can be appropriately increased; otherwise, it can be reduced.</td></tr>
<tr><td>Mailing address</td><td>1-32</td><td>1</td></tr>
<tr><td>Baud rate</td><td>4.8kbps、9.6kbps、19.2kbps</td><td>9.6kbps</td></tr>
<tr><td>Parameter Settings Menu password</td><td></td><td>888888</td></tr>
<tr><td colspan="3">If you forget the password, you can log in as an advanced user and change the password on the permission setting page.</td></tr>
</table>

6. Fault Detection and Elimination

6.1 Fault Description

The soft starter has various protection functions. When the protection function of the soft starter is activated, the soft starter will stop immediately.

The fault name	Failure cause	Handling method
Default phase	Main power supply Phase loss during startup or operation	Check whether the three-phase power supply is properly connected
Operation flow	Load suddenly increase or load fluctuation is too large, motor blocking, output short circuit, etc	Check the running status of the load, whether the output is short circuit, whether the load is blocked, and adjust the running overcurrent protection value appropriately
Phase current unbalance	Phase loss, phase voltage is unbalanced, or cable is loosen	Check the three-phase input voltage, check whether the wiring is loose, and properly adjust the current unbalance protection value
The power supply reverse	Reverse phase sequence	Adjust phase sequence or close phase sequence detection.
Parameter missing	Setting parameters missing	Contact the manufacturer immediately
Frequency abnormity	The input three-phase frequency exceeds the requirement	Check the input three-phase power frequency

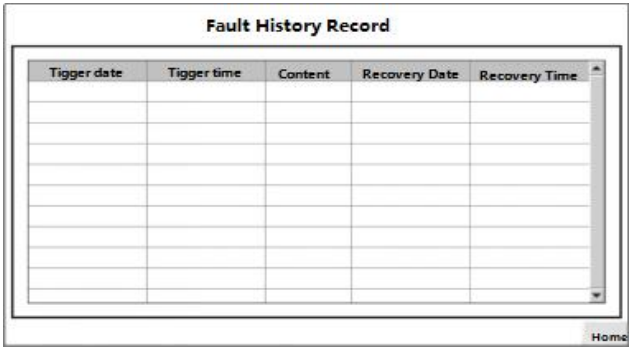
The fault name	Failure cause	Handling method
Star overtime	The load is too heavy, the ramp time is too short, the current limiting factor is too low	Adjust the rising time and current limiting factor appropriately
Underload	The motor is disconnected from the load, and the transmission system works abnormally	Check whether the motor load is off, check whether the transmission system is abnormal
Electronic thermal overload	Overloaded operation for a long time	Check whether the motor current setting is wrong, check whether the load is too heavy
Locked-rotor	Load blocking operation	Check whether the load is blocked and whether the load is overweight
System abnormity	Device system abnormity	Please contact the manufacturer immediately

6.2 Fault Display

The fault is displayed in the lower left corner of the monitoring interface.

6.3 Fault Records

Click the fault record button in the monitoring interface to enter the historical fault record and view all the historical faults of the device.



6.4 Fault Reset

Fault reset can reset by press the "Reset" button 2seconds.

7. Routine maintenance

1.Check periodically to confirm if the main loop terminal is poor contact and if copper bar connection is overheating.

2. Check periodically to confirm if the insulation of cable wiring nose is good and if the screw of control terminal is loosen.

3. If there is to much dust, it will reduce the insulation level of the soft starter and cause the soft starter not work properly. To brush the dust gently by clean and dry brush, or to blow dust by compressed air.

4.If there is condensation, it will reduce the insulation level of the soft starting device and cause the soft starting device not work properly. To dry by hair dryer or electric oven, or to install a dehumidifier in the distribution room. Check the cooling channels of the soft starter to make sure that there is no blocking by dirt and dust.

Notes: Before the maintenance check, cut off all power supplies on the incoming cables of the soft starter to avoid personal injury.

8. MODBUS communication protocol

Medium voltage soft starter provides RS485 communication interface and adopts international standard Modbus communication protocol for master-slave communication. In order to adapt to specific application requirements, users can realize centralized control through PC/PLC, control upper computer and so on.

8.1 Protocol Content

The Modbus serial communication protocol defines the frame content of asynchronous transmission and the format of slave reply frame in serial communication. The frame content of host organization includes slave address, execution command, data and error check, etc. The slave machine's response also adopts the same structure, including: operation confirmation, return data and error check. If the slave machine makes an error while receiving a frame, or cannot complete the action required by the host machine, it organizes a fault frame as a response to the host machine.

8.2 Bus Structure

(1) Interface method

RS485 hardware interface: interface pin using wiring terminal and cable connection. When multiple soft starter and host (as upper computer) connected, the farest soft starter’s 485 lead wire terminal should be incorporated into the terminal resistance. The Terminal resistance value normally is between 100 to150 ohm and power is 0.5W.

(2) Transmission mode

Asynchronous serial, half duplex transmission mode. Only one of host or slave can send data and the other can receive data, which can't send or received at the same time. In serial asynchronous communication, data is sent frame by frame in the form of messages.

(3) Topological structure

Single host with multi slave system. The slave IP address ranges from 1 to 32. Each slave IP address on the network is unique. This is the basis for serial communication with ModBus.

8.3 Protocol Description

Soft starter communication protocol is an asynchronous serial host-slave ModBus communication protocol. Only one device in the network can establish the protocol. Other devices can only respond to the query/command of the host by providing data, or take corresponding actions according to the query/command of the host. Host here refers to personal computer (PC), industrial control equipment or programmable logic controller (PLC), etc. Slave means CMC-SX soft starter or other control device with the same communication protocol.

8.4 Communication frame Structure

ModBus communication data of the soft starter is in RTU mode. In RTU mode, each byte is in the following format:

Encoding system: 8-bit binary hexadecimal 0-9, A-F, each 8-bit frame field includes two hexadecimal characters.

In this mode, new ones always start with a transfer time silence of at least 3.5 bytes. On networks where transmission rates are baud rates,

3.5 bytes of transmission time can be easily grasped. The following data fields are transmitted: slave address, operation command code, data and CRC check word, each field transmission byte is a hexadecimal 0... 9, A... F. The network device always monitors the activity of the communication bus, even during silent intervals. When the first field (address information) is received, each network device check this byte. Following the completion of the transmission of the last byte, a similar 3.5-byte transmission interval is used to indicate the end of the frame, after which the transmission of a new frame begins. The information of a frame must be transmitted in a continuous data stream. If the interval exceeds 1.5 bytes before the entire frame transmission ends, the receiving device will clear the incomplete information.

8.5 Description of Status Control Words

Position	Value	Description
0	1	stop
1	1	scram
2	1	delay-action starter
3	1	In starting
4	1	operation
5	1	In the soft stop
6	1	malfunction

The state control word reflects the state of the soft start device and is represented by a word.

8.6 Address Description

(1) start-up parameters

name	types of variables	Register number	data type	R/W peculiarity
Initial voltage/current	IO integer	0	Uint	R/W
Rise time	IO integer	1	Uint	R/W
Current limiting factor	IO integer	2	Uint	R/W
Start-up mode	IO integer	3	Uint	R/W
Motor Rated Current	IO integer	4	Uint	R/W
Fall time	IO integer	5	Uint	R/W
End voltage	IO integer	6	Uint	R/W
Step voltage	IO integer	7	Uint	R/W
Kick the time	IO integer	8	Uint	R/W
Delayed starting time	IO integer	9	Uint	R/W
Grid frequency	IO integer	10	Uint	R/W
Trigger off time	IO integer	11	Uint	R/W
Constant voltage	IO integer	13	Uint	R/W
Constant voltage time	IO integer	14	Uint	R/W

(2)protection parameter

Name	types of Variables	Register Number	data type	R/W Peculiarity
Motor overload level	IO integer	15	Uint	R/W
Current unbalance protection	IO integer	16	Uint	R/W
Current unbalance mask	IO integer	17	Uint	R/W
Over current protection	IO integer	18	Uint	R/W
Over current delay	IO integer	19	Uint	R/W
Under load protection	IO integer	20	Uint	R/W
Underload delay	IO integer	21	Uint	R/W

Name	types of Variables	Register Number	data type	R/W Peculiarity
Multiple of motor blocking	IO integer	22	Uint	R/W
Phase sequence detection function	IO integer	23	Uint	R/W
Startup overtime	IO integer	24	Uint	R/W

(3)functional parameter

Name	Types of variables	Register number	Data type	R/W peculiarity
Output function	IO integer	32	Uint	R/W
Fault relay delay	IO integer	33	Uint	R/W
Bypass relay delay	IO integer	34	Uint	R/W
Programmable relay 3 function	IO integer	35	Uint	R/W
Programming relay 3 delay	IO integer	36	Uint	R/W
Communication address	IO integer	39	Uint	R/W
Baud rate	IO integer	40	Uint	R/W
Current proportionality	IO integer	43	Uint	R/W
4-20mA proportionality factor	IO integer	44	Uint	R/W

(4) real-time parameter

Name	Types of variables	Register number	Data type	R/W peculiarity
Soft start running status	I/O integer	80	Uint	R
Present fault	I/O integer	81	Uint	R
average current	I/O integer	83	Uint	R
R phase current	I/O integer	84	Uint	R
S phase current	I/O integer	85	Uint	R

Name	Types of variables	Register number	Data type	R/W peculiarity
T phase current	I/O integer	86	Uint	R
Delay start time	I/O integer	87	Uint	R
output voltage value %	I/O integer	88	Uint	R

(5) control command data

Name	Types of variables	Register number	Data	R/W peculiarity
Restoration	I/O integer	102	102	W

8.7 Examples of Communication

1.command

Data format	Number of bytes	Stop	Start	Restoration
Slave address	1	01H	01H	01H
Function code	1	06H	06H	06H
Initial address	2	0064H	0065H	0066H
Read-in data	2	0064H	0065H	0066H
CRC	2	C9FEH	59FEH	E9FFH

2.read data

Read "0" address data

Data format	Number of bytes	The upper computer delivers data
Slave address	1	01H
function code	1	03H
initial address	2	0000H

Data format	Number of bytes	The upper computer delivers data
data length	2	0001H
CRC	2	840AH

Data format	Number of bytes	Soft - up returns data
Slave address	1	01H
function code	1	03H
Number of bytes returned	1	02H
Date 1	2	0019H
CRC	2	798EH

3. Write the data

Address 0 writes 50 data

Data format	Number of bytes	The upper computer delivers data
Slave address	1	01H
function code	1	06H
initial address	2	0000H
read-in data	2	0032H
CRC	2	081FH

Data format	Number of bytes	Soft - up returns data
Slave address	1	01H
function code	1	06H
initial address	2	0000H
read-in data	2	0032H
CRC	2	081FH

Notes:

(1) A maximum of 50 registers can be read at a time.

(2) When modifying the parameters of the soft start device by using the control command, the soft start device must be in the editing stop state, or the modification will fail. When modifying a parameter, the parameter must be within the range of specification. If the parameter is beyond the range, the modification will fail.

(3) When multiple devices communicate, the address of Medium-voltage soft starts is unique. That is, the address of any two soft starter cannot be the same (set by parameter P16).

(4) The communication baud rate of Medium voltage soft starter must be the same as the controller.

(5) When multiple Medium-voltage soft starters communicate with the host, the farthest soft starter's 485 lead wire terminal should be incorporated into the terminal resistance. The terminal resistance is normally between 100 to150 ohm, and the power is 0.5W.

(6) Interval for reading multiple registers = (17+ Number of registers X2) X8/ baud rate x1000x1.2 ms.

For example: 9600 baud rate, read a register value, interval = (17+1X2) x8/9600x1000 X 1.2=20ms.

(7) Interval of writing a one register command =20X8/ baud rate x1000x1.2 ms.

For example, 9600 baud rate, interval = 20x8/9600x1000x1.2 =20ms

(8) byte format

Check bit: No data bit: 8; Stop bit: 1

9. Installation

9.1 Product Specifications and Dimensions

Voltage classes	Specification and model	Rated current (A)	Width (mm)	Height (mm)	Depth (mm)
3000V	400	100	1000	2300	1500
	630	150			
	1600	400	1200	2300	1700
	2500	600	Customization		
6000V	420	50	1000	2300	1500
	630	75			
	1250	150			
	1600	200			
	2500	300			
	3300	400	1200	2300	1700
	4150	500			
	5000	600	Customization		
10000V	420	30	1000	2300	1500
	630	45			
	800	60			
	1250	90			
	1500	110			
	1800	130			
	2250	160			
	2500	180			
	2800	200			
	3500	250			
	4000	280			
	4500	320			

Voltage classes	Specification and model	Rated current (A)	Width (mm)	Height (mm)	Depth (mm)
10000V	5500	400	1200	2300	1700
	6000	430			
	7000	500			
	8500	600	Customization		
	10000	720	Customization		

Notes: the above is the standard product model. If the model you need is not in this table, please contact the factory. The above cabinet size is for reference only, please contact the factory for accurate size, or consider the cabinet size comprehensively according to the actual installation space of customers. Net side contactor is optional. If you need to add net side contactor, please specify when ordering.

9.2 Receiving and Unpacking

All functions and operation tests of each Medium voltage soft starter have been carried out before delivery. After receiving and unpacking the equipment, please follow the following steps to check. If there is any problem, please contact the supplier immediately.

■Please confirm whether the product model received is consistent with the product model ordered;

■Check whether there are the product certificate, factory inspection report, warranty card, product specification, wiring drawings, etc.

■Observe whether the exterior is damaged during transportation and handling.

■Check whether the mechanical parts are loose or broken, and whether the wiring is loose.

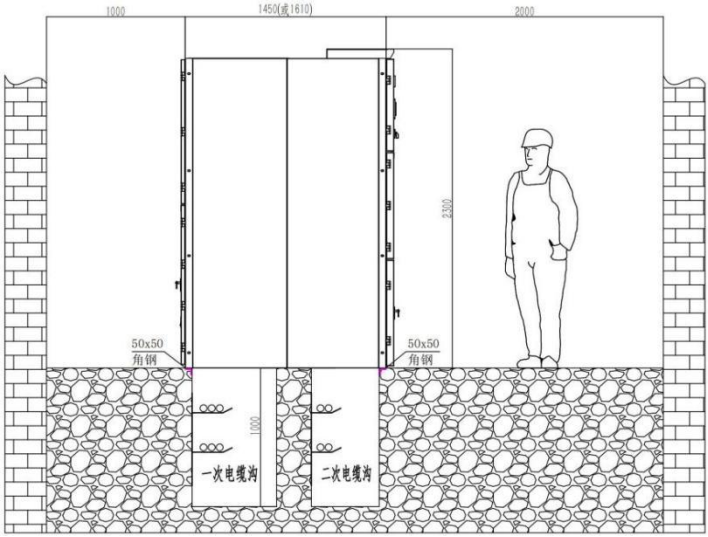
9.3 Installation

■The soft starter must be installed vertically.

■Do not install the soft starter in the heat source.

■Disconnect all power supplies before installation.

■Installation must comply with local electrical regulations and standards, and comply with IEEE standards.



Medium voltage solid state soft starter installation base drawing

9.4 Additional Equipment Modification

If the cable entering the cabinet is not in an appropriate position, drill additional holes on the cabinet. Cover the electrical components and other institutions inside the cabinet to prevent metal shavings from remaining in the cabinet to avoid serious short-circuit accidents. Clean the cabinet carefully after drilling. And check the work area whether there is any damage.

10. Low-voltage Test

Warning: Medium voltage soft starter has a potential injury voltage and must be operated by authorized trained personnel. Medium voltage soft starter only needs to connect the power line and motor line to put into operation when it is installed. Before adding Medium voltage test, low voltage (AC380V) must be used to test the whole system.

10.1 Low Voltage Test Procedure

■ Make sure there is no voltage on electrical components.

■ Check that all wires are properly connected.

■ Connect the input power supply (three-phase AC380V) to the input wiring terminals (R, S, T) of the soft starter.

■ Plug in the low-voltage synchronous test line, and connect the other end of the line to the main loop inlet end R, S, and T (Notes: R connects with terminal XT2:18, S connects with terminal XT2:20, and T connects with terminal XT2:22. Please note,the test line must pass by series resistance then it can be used! .

■ Connect the AC220V power supply to L and N of the external control terminal.

■ Connect the low voltage test load to U, V and W terminals of Medium voltage soft starter.

■ Turn off the under voltage protection function inside the device (refer to the device internal wiring diagram).

■ After checking that all serials are correct, close the QF circuit breaker in the cabinet.

■ Close cabinet door and prepare for low voltage test.

■ Turn on the power supply of AC380V and observe whether the starting control is normal through the start and stop buttons on the operating device panel.

■ After the test, remove the wiring and prepare for Medium voltage test.

10.2 Medium Voltage Test Procedure

■ Connect the AC220V power supply to L and N of the external control terminal.

■Connect the input Medium-voltage power supply to the input wiring terminals R, S, T of the soft starter.

■ Connect the Medium voltage motor to the output wiring terminals (U, V, W) of the soft starter.

■ After checking all connections are correct, close the QF circuit breaker in the cabinet.

■ Close cabinet door and prepare for Medium voltage test.

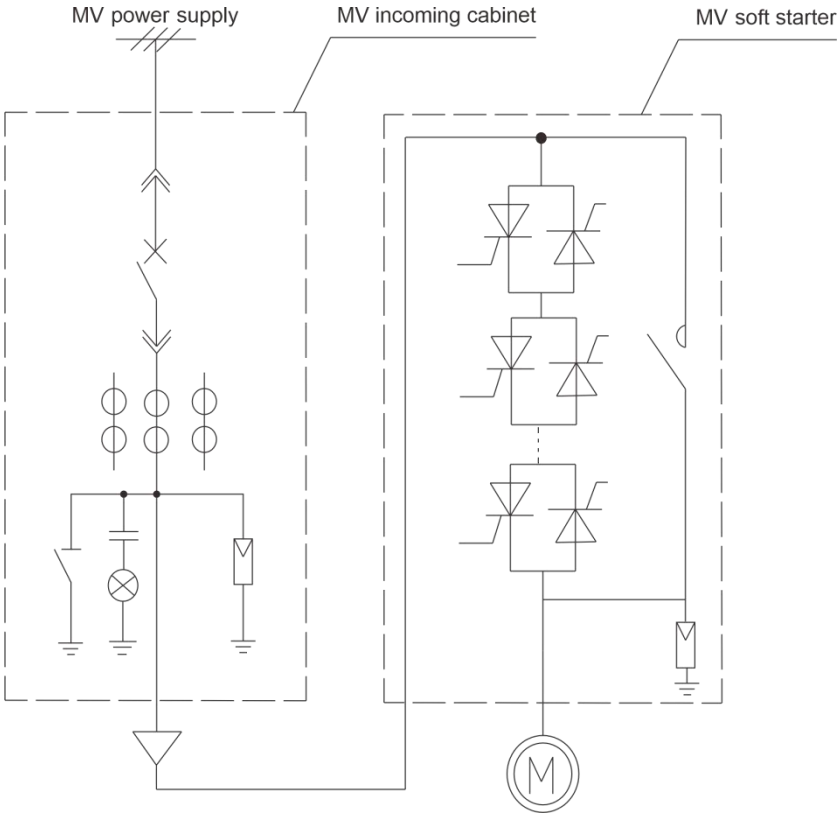
■ Check whether the setting current of the soft starter matches the actual motor rated cable.

■ Check the motor starting control parameters. If you need to modify them, please refer to the detailed instructions in the programming section of Chapter 5.

■ Observe whether the load starts normally by operating the start and stop buttons on the lift panel.

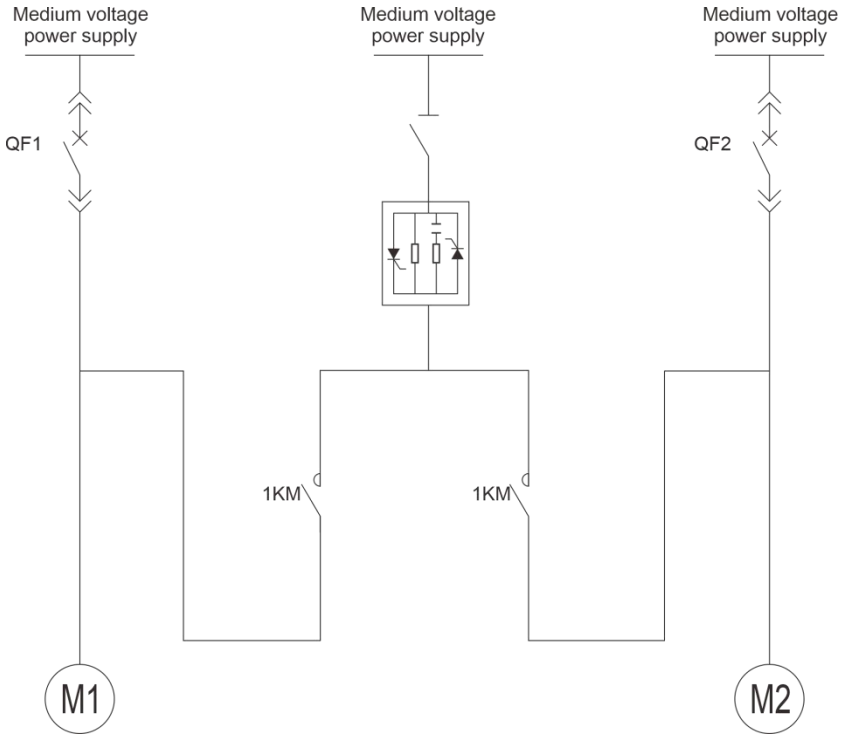
11. Cabinet Scheme

11.1 Cabinet Scheme of One Driving One



Cabinet Scheme of one driving one

11.2 Cabinet Scheme of One Driving Two



Cabinet Scheme of one driving two

Multi-application in one soft starter means that a Medium voltage solid state soft starter is used to drive several motors in turn. The performance parameters of motors should be basically the same. It is not recommended the multi-soft start application scheme with different parameter motors(consult with the manufacturer when selecting). In this scheme, one soft starter can't protect all motors, so another motor protection device is needed.