

VERICON



iSA3

Designed to performance

LOW VOLTAGE SOFTSTARTER

INSTRUCTION MANUAL



CATALOG

Content	Page
Safety & Warning	1-2
General	3
Model Description	4
Soft starter Control and Application	5-6
Installation	7
Wiring	9-11
Typical Application	12-13
Operation Panel Description	14
Parameter	15-17
Trouble Shooting	18
Appendix	19-20
Mechanical Installation	21
Typical Wiring	22-26

Safety & Warning



Caution

Remind user caution information.



Warning

If not avoided, could result in damaged to the equipment.



Avoid electrostatic

Warning. It is forbidden to touch the PCB with this symbol. Electrostatic charges could damage the components of soft starter.



High voltage warning

If not avoided, could result in damaged to the equipment and possible injury or death.



Warning- Indicates a risk of electric shock.

High voltage are presents at the input and output terminals of ISA3 series soft starter, might even not work when connect power supply. Only qualified electricians are allowed to install this product.



Do not carry out any work on the soft starter while the power is applied.

The installation electricians have the responsibility to ensure correct earthing connection. Do not connect the power factor correction capacitor to the output side of the ISA3 soft starter. If the static power factor compensation measures are to be taken, the related devices must be connected to the power supply side of the soft starter.

General

iSA3 series soft starter is a full digital product. Suitable for squirrel-cage asynchronous motors:

Rated voltage: 400V Rated power: 1.1kW to 75KW

The iSA3 series soft starter can control the motor to accelerate smoothly during the starting process and decelerate smoothly in the process of stopping. It also provides a comprehensive protection function for motors and itself.

Functions

- Start/stop slope and initial voltage set by 3 different built-in potentiometers
- Bypass relay built-in, No need for extra contactor
- Voltage slope startup mode
- The output torque can be maintained during the stop process (Continuous torque control), prevents water hammering effect
- External Δ , Y or Internal Δ Wiring mode
- Real-time data of communication (A, B, C phase current, average current)
- Reading history fault records by communication (10 history log)
- The statistical data can be read by Modbus communication.
- Modbus Communication Interface.
- Start/stop Digital Input
- Output relay (running relay, trip relay)
- Motor Protections:
 1. Instantaneous overcurrent protection.
 2. Extended time Overcurrent Protection.
 3. Overload Protection with classes 10A, 10, 20 and 30.
 4. Three phase current imbalance Protection.
 5. Under Voltage / No voltage protection.
 6. Phase Loss Protection.
 7. Phase Sequence Protection.
 8. SCR Overheating Protection

Model description

Technical parameters

- Rated Main Voltage: 400VAC 50/60Hz
- Control Source Voltage: 100~240VAC
- Rated Main Current: 2.2A.....150A
- Initial voltage: 30 ~ 70 ;
- Start Slope: 1~30 Sec;
- Stop Slope: 0~30 Sec;
- Overload: 3xle 7 Sec;
- Valid for 50 % on time and 50 % off time.
- Times of start per hour <5, 5-10 (light load or no-load)
- Overload grade: 10A;
- Operation Environmental temperature: 0°C to + 50°C
- Store temperature: -40°C to + 70°C
- Maximum altitude: 1000m (3280 ft)
- Ingress Protection grade: IP21

Model description

ISA3 - 0022 - XXXXK



Model description

Model	Motor power rating	Rated current	Structure	Weight
	400V (kW)	Ie A	F	kg
ISA3 - 0022-0011K	1.1	2.2	A	1
ISA3 - 0030-0015K	1.5	3	A	1
ISA3 - 0045-0022K	2.2	4.5	A	1
ISA3 - 0075-0037K	3.7	7.5	A	1
ISA3 - 0110-0055K	5.5	11	A	1
ISA3 - 0150-0075K	7.5	15	B	1.4
ISA3 - 0220-0110K	11	22	B	1.4
ISA3 - 0300-0150K	15	30	C	2.4
ISA3 - 0370-0185K	18.5	37	C	2.4
ISA3 - 0450-0220K	22	45	C	2.4
ISA3 - 0600-0300K	30	60	C	2.4
ISA3 - 0750-0370K	37	75	C	2.4
ISA3 - 0900-0450K	45	90	D	5
ISA3 - 1100-0550K	55	110	D	5.2
ISA3 - 1500-0750K	75	150	D	5.2

Soft starter control and application

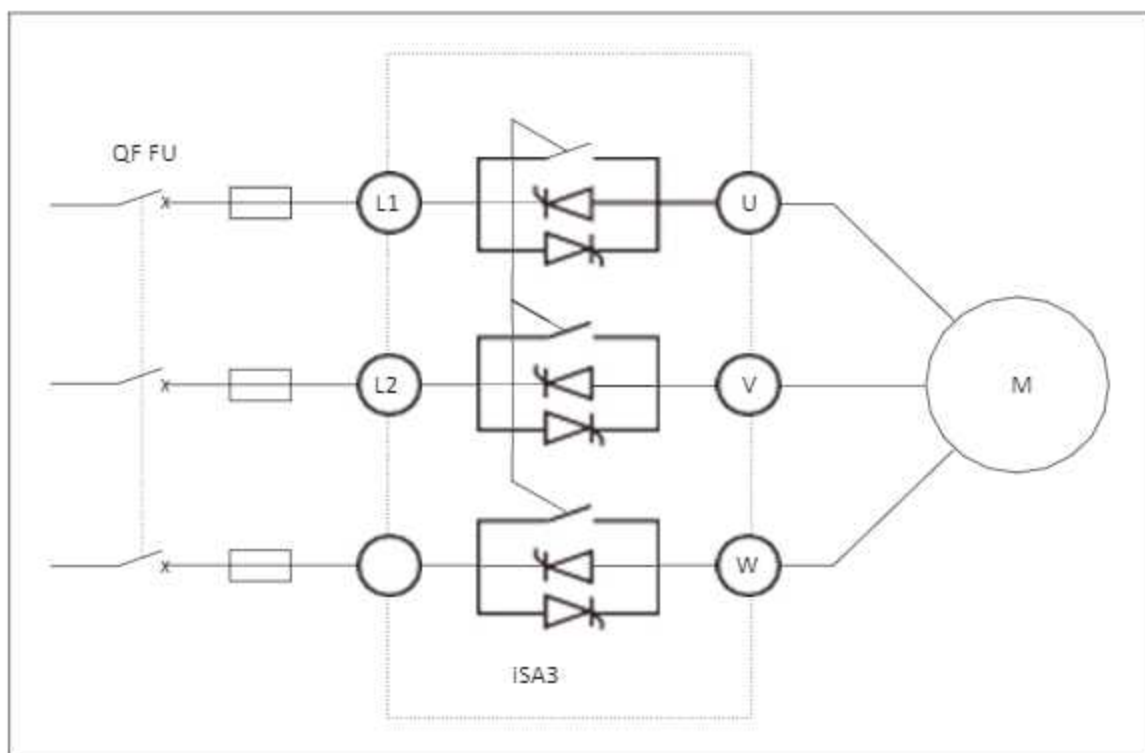
Rated Main Voltage

The rated main voltage of ISA3 is 400VAC. For other voltage please consult factory.

Control Source Voltage

Code	Control Source Voltage
Standard	100~240VAC 50/60Hz
Optional	24VDC

Internal Control Diagram



Options

Build In start/stop switch (option 1)

The operation panel of soft starter can be equipped with start / stop switch, and users can use the switch to operate motor start / stop directly.

Model selection

For example: Choose a 400V, 7.5KW soft starter with control source voltage of 230VAC

The type should be: iSA3-0150-0075K.

Model selection specification

- 1) For normal loads
The corresponding iSA3 soft starter models can be selected according to the rated current of motors marked on the motor nameplate, such as pumps, compressors, etc.
- 2) For heavy load (please consult VERICON Malaysia)
iSA3 soft starter model of larger power size can be selected according to the rated current of motor nameplate, such as centrifuge, crushing machine, mixer, blender, etc.
- 3) Frequent start/stop (please consult VERICON Malaysia)
For frequent starting/stopping loads. According to the rated current of the motor marked by the motor nameplate, choose a higher power size iSA3 soft starter.

Caution

- 4) When the ambient temperature is higher than 40 degrees, the current rating increases by 1 degree, and the current rating decreases by 0.8%.
- 5) When altitude is above 1000m, decrease as below:

$$I_n = 100 - (1000/150)$$

When the altitude is 2000m:

$$I_n = 100 - (2000-1000 / 150) = 93.3\%$$

The rated current capacity of soft starter should decrease to 93.3% of nominal current.

Installation

Mechanical installation (The method of installation)



Usually we suggest that the soft starter should be installed vertically, which is good for heat dissipation.



When two or more than two soft starters are installed vertically stacked, the distance between soft starters is not less than 100mm.



When two or more than two soft starters are installed horizontally side by side, the distance between soft starters is not less than 50mm.

Installation environment



Caution

- Do not install the soft starter near the heat source.
- Soft start must be reliably grounded and avoid dust or corrosive environment.
- Working temperature under rating 0 °C to + 50 °C
- Relative humidity is less than 95%

The rated loss power of the soft starter approximately about:

$$\text{Power Dissipation} \approx 3 \times I_e \text{ (W)}$$

I_e - Motor Rated Current (A)

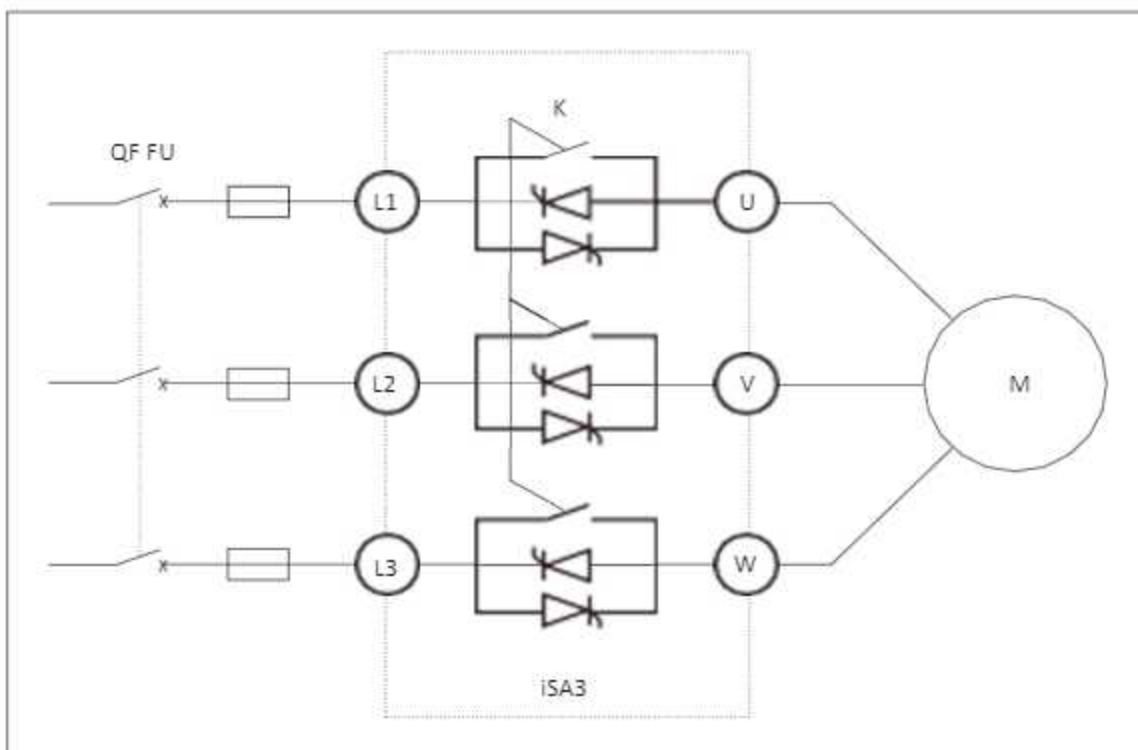
Installed in a metal cabinet without ventilation

$$\text{Area (m}^2\text{)} > 0.12 \times \text{Power Dissipation}$$

Wiring

Main circuit wiring for three-phase motor

iSA3 Main circuit wiring diagram



Caution



- QF Circuit breaker with a tripping device is recommended.
- K Built-in Bypass relay
- M Electric Motor

Caution



- Suggested that a circuit breaker with a tripping device is installed between input of the soft starter and the connection of the power source. The connection between the soft starter and the power source must be switch off before maintenance.

Caution



- Suggested to use flame retardant copper core PVC insulated wire to connect main circuit.

Wiring

Main circuit terminal



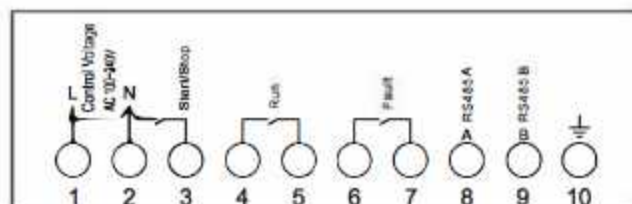
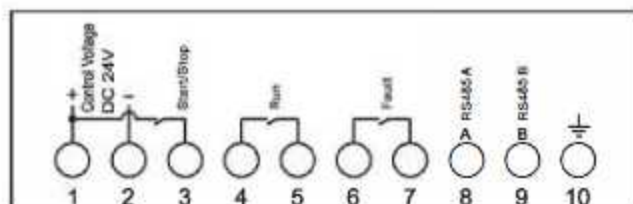
Main circuit terminal:

Recommended use: 6- 50mm² AWG: 10- 1/ 0

Recommended torque: 4N.m

Control terminal

Control terminal diagram

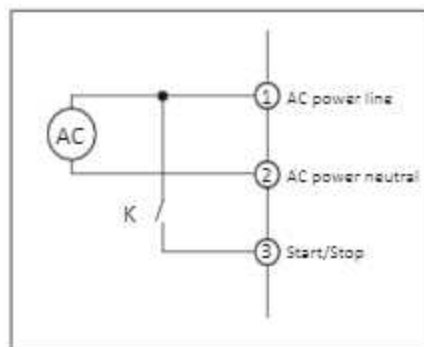


10 Input / Output terminals:

- ① Control power L or + input.
- ② Control power N or - input.
- ③ Start / Stop signal input. When terminal 3 is connected to terminal 1 the starter runs, When the terminal 3 and terminal 1 are disconnected, the stop softly until stop completely.
- ④ Running signal relay output.
When the soft start is in start, bypass and soft stop state, relay operation is closed.
- ⑤ Running relay output common.
- ⑥ Fault relay output. When the soft start is in a fault state, the relay is closed.
- ⑦ Fault relay output common.
- ⑧ RS-485 bus A-LINE.
- ⑨ RS-485 bus B-LINE.
- ⑩ Earthing terminal.

Wiring

Control power supply and control input



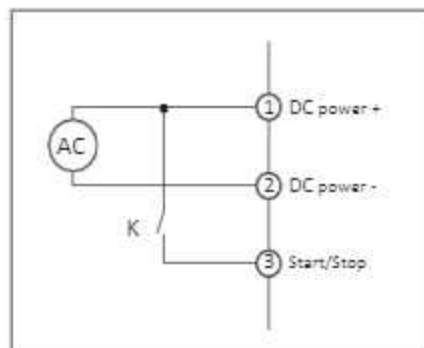
When using 100~240VAC as a control power,

- ① Connect AC power line,
- ② Connect AC power neutral
- ③ Join the contact K between ① and ③,

Soft starter runs when K is closed,

soft starter stops when K is disconnected;

If the control input cable too long or unseparated wiring with power supply, cause input signal with "induced voltage" Please add a relay at the input, to avoid the " induced voltage " which leads to malfunction or damage of the soft starter.



When using 24VDC as control power.

- ① connect to DC+;
- ② connect to DC-;
- ③ Join the contact K between ① and ③,

Soft starter runs when K is closed,

Soft starter stops when K is disconnected;

If the control input cable too long or unseparated wiring with power supply, cause input signal with "induced voltage" Please add a relay at the input, to avoid the " induced voltage " which leads to malfunction or damage of the soft starter.

Caution

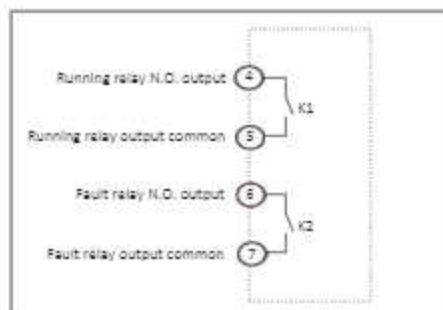


The control power supply voltage must be matched the products, otherwise the input of the control voltage will exceed the range, which will lead to soft starter damage.

When the control power supply is DC power, the positive and negative pole must be connected to the correct terminal.

Wiring

Relay Output



④ & ⑤ terminal for running relay output,

When iSA3 soft starter is on running (start / bypass / soft stop), K1 closes. ⑥ & ⑦ terminal is fault relay output,

When the iSA3 soft starter detects a fault, K2 closes. K1、K2 contact capacity 220VAC 5A

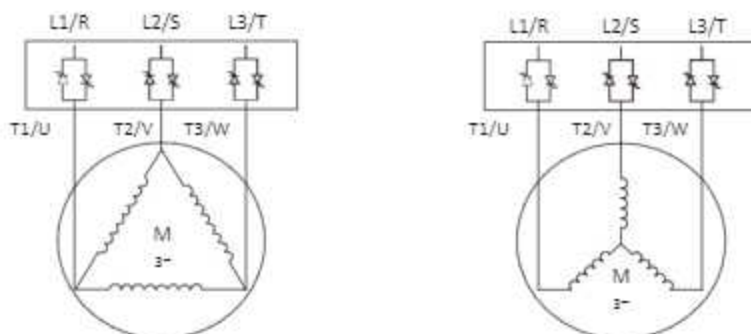
Caution



In order to use the iSA3 soft starter safely, the fault relay K2 should be connected in the circuit of the control (release) of the circuit breaker between the power source and the iSA3 main power terminal. When the soft starter detects the fault, the K2 action can disconnect the power breaker at the same time.

Motor Connection and Terminals

Motor Connections



When using the external mode of iSA3, the iSA3 power module is connected between the power source and the motor.

Caution



The motors with three terminals can only use the external wiring mode. The rated current of the soft starter in the external mode is selected according to the rated current of the motor.

Typical wiring

ISA3 soft starter rated current

Model	Motor power rating	Rated current	Structure	Weight
	400V (kW)	I _e A	F	kg
ISA3 - 0022-0011K	1.1	2.2	A	1
ISA3 - 0030-0015K	1.5	3	A	1
ISA3 - 0045-0022K	2.2	4.5	A	1
ISA3 - 0075-0037K	3.7	7.5	A	1
ISA3 - 0110-0055K	5.5	11	A	1
ISA3 - 0150-0075K	7.5	15	B	1.4
ISA3 - 0220-0110K	11	22	B	1.4
ISA3 - 0300-0150K	15	30	C	2.4
ISA3 - 0370-0185K	18.5	37	C	2.4
ISA3 - 0450-0220K	22	45	C	2.4
ISA3 - 0600-0300K	30	60	C	2.4
ISA3 - 0750-0370K	37	75	C	2.4
ISA3 - 0900-0450K	45	90	D	5
ISA3 - 1100-0550K	55	110	D	5.2
ISA3 - 1500-0750K	75	150	D	5.2

Fuse table

Model	$SCR^2 T(A^2 \cdot s)$	Fuse Value
ISA3 - 0022-0011K	150	10A
ISA3 - 0030-0015K	270	10A
ISA3 - 0045-0022K	610	16A
ISA3 - 0075-0037K	1700	25A
ISA3 - 0110-0055K	3630	32A
ISA3 - 0150-0075K	5000	40A
ISA3 - 0220-0110K	7500	50A
ISA3 - 0300-0150K	10000	63A
ISA3 - 0370-0185K	11000	100A
ISA3 - 0450-0220K	12000	160A
ISA3 - 0600-0300K	15000	200A
ISA3 - 0750-0370K	18000	250A
ISA3 - 0900-0450K	40000	315A
ISA3 - 1100-0550K	60000	315A
ISA3 - 1500-0750K	100000	400A

Caution

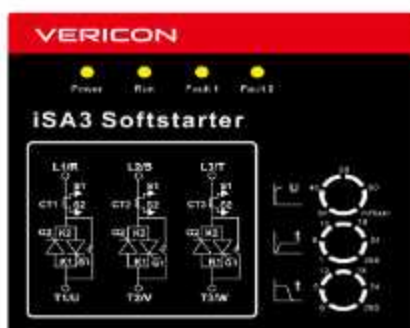


Using semiconductor protection fuse can achieve 2nd standard and reduce the risk of power module damage caused by transient overload current.

2nd standard: Under the condition of short circuit, the short circuit protection electric does not cause harm to the personal and installation equipment, and it can continue to be used.

Operation interface description

iSA3 soft starter diagram



1) State display LED: Show the working state of the soft starter.

Power (green)	When the soft starter is power on, the power supply LED on.
Run (yellow)	When the soft starter (motor) stop, running LED off.
	When soft starter (motor) is in soft start / soft stop state, running LED blink.
	When the soft starter (motor) is in bypass state, running LED on
Fault 1 (red)	When the soft starter is in fault state, fault LED blink or on. More details please check the page 18.
Fault 2 (red)	

2) Potentiometer setting



Adjustable potentiometer

Initial voltage

Set initial voltage

Start time

Set acceleration time

Stop time

Set deceleration time

Parameter setting

The main starting / stopping parameters of iSA3 soft starter can be set by the panel potentiometer. Default parameters are preset at factory, users do not need to set them. Other parameters can be adjusted by RS485 communication e.g. bi-directional motor application. Phase sequence set to OFF.

Parameter description

Main parameter

Parameter	Setting range	Default
FLC Full load current	0-100	Primary current of current transformer, factory setting

Parameter	Setting range	Default
FLA Full load current	0-100	Primary current of current transformer, according to rated current of soft starter factory setting

Protection parameters

Parameter	Setting range	Default
Over current protection value	500-850%	500%. Factory setting

Parameter	Setting range	Default
Over current trip delay time	0.1 ~ 1.0 sec	0.1 sec. Factory setting

Caution



- ISA3 has two different levels of over current breaking protection.
- When the current is greater than 850% soft starter rated current (FLA), the soft starter will trip immediately. Fault relay (K2) tripped.
- When the output current is greater than the over current protection set value (the motor rated current FLA 500%-850%) the soft starter is delayed for a period of time ("over current action delay time" specified time) then trip, the fault relay (K2) tripped.

Parameter	Setting range	Default
Overload protection	100 - 200%	110%. Factory setting

Parameter	Setting range	Default
Overload protection Class	0 - Class 10 A 1 - Class 10 2 - Class 20 3 - Class 30	0 - Class 10 A, Factory setting

Caution



- Thermal protection of ISA3 motor.
It is recommended that users set overload protection to (level 10A),
When the setting less than "overload protection value", the soft starter detects overload protection.

Parameter description

Parameter	Setting range	Default
Phase sequence protection	0 - OFF 1 - ON	1 - ON

Caution



More protections of iSA3:

- 1) Over temp protection. When the heat sink temperature is above 80 degrees, the soft start trip.
- 2) When the soft starter input terminal/output terminal missing phase, the soft start trip.
- 3) When the power module is short circuited, soft start tripped.
- 4) when the three-phase current of the soft starter is unbalanced (three-phase current difference > 20%FLA), soft starter trip.

Start / Stop parameters

Parameter	Setting range	Default
Starting time	1-30 Sec.	Panel potentiometer setting

Caution



The starting time is set through the panel or the communication.

Parameter	Setting range	Default
Stopping time	0-30 Sec.	Panel potentiometer setting

Caution



The stopping time is set through the panel or the communication.

Parameter	Setting range	Default
Initial Voltage	30 - 70%	Panel potentiometer setting

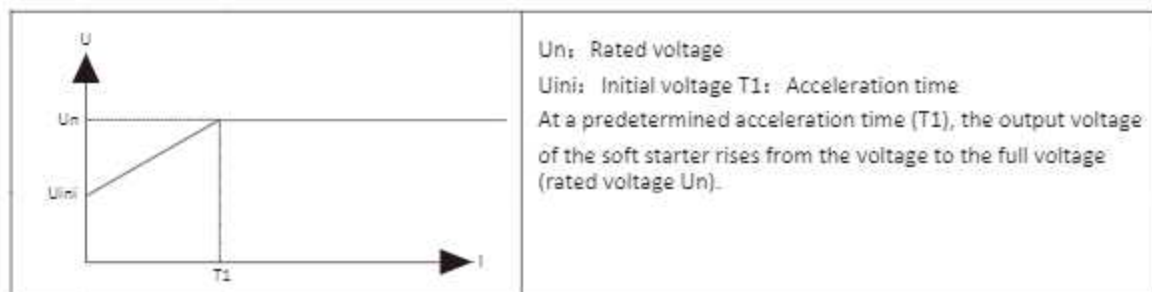
Caution



The initial voltage is set via the panel or communication.
When the initial turn Moment = initial voltage 2×TN (TN: rated torque)

Parameter description

Voltage slope starting mode



Caution

The motor can't start (Locked-Rotor) if the voltage is too low. It is suggested that set initial voltage from high to low or use the Recommended setting.

Relay parameters

Parameter	Setting range	Default
Bypass relay type	0 – Electric self-holding relay 1 – Magnet self-holding relay	Depending on the specific model. Factory setting



Caution

The type of bypass relay is not allowed to be changed !

Communication parameters

Parameter	Setting range	Default
Slave machines address	1 – 127	Factory setting

Parameter	Setting range	Default
Baud rate	0- 1200BPS 1- 2400BPS 2- 4800BPS 3- 9600BPS 4- 19200BPS	3 - 9600BPS Factory setting

Parameter	Setting range	Default
Parity check	0-ECC 1-ODD 2-None	0-ECC



Caution

After setting up the communication parameters must restart the ISA3 soft starter. Incorrect settings cause communicate fault, it could cause cannot setting again. ISA3 cannot restore the default parameter, so please be careful when setting communication parameters.

Troubleshooting

Fault list

Fault	Fault reason	Not working	Start/stop process	Bypass
Phase sequence trip	The sequence of three phase voltage is wrong	×	√	√
Missing phase trip	Missing one phase or two-phase voltage in three phase voltage	×	√	√
No voltage trip	NO voltage input	×	√	√
Over current trip	Current value exceeding over current setting value	√	√	√
Overload trip	Current value exceeds overloading set value	×	×	√
Unbalanced current trip	The unbalanced three-phase current is larger than the unbalanced current setting value	√	√	√
Over temp trip	The temperature of the heatsink is higher than the temperature setting value	√	√	√

Note: ×: Not working; √: working

Fault solution

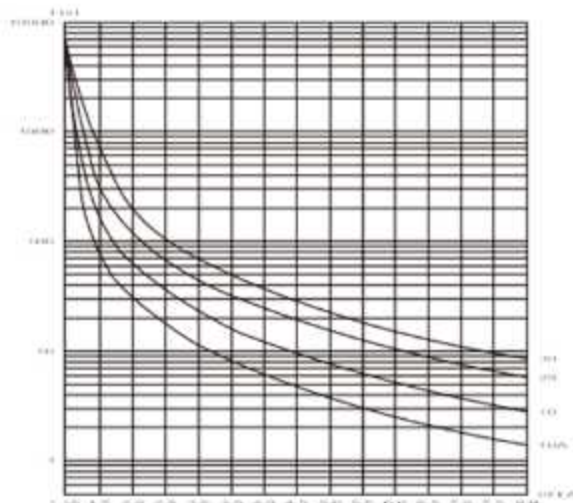
Fault	Fault 1	Fault 2	Fault reason	Solution
Phase sequence trip	○	○	The sequence of three phase voltage is wrong	Change the sequence of three phase.
Missing phase trip/No voltage trip	○	○	Missing one phase or two-phase voltage in three phase voltage /NO voltage input	The connection between the soft start and the main power supply is open.
Over current trip	○	●	Current value exceeding over current setting value	Check whether the connection between soft start and motor is short circuited.
Overload trip	●	○	Current value exceeds overloading set value	Check whether the load is too large or whether the selection of soft starter power is too small.
Unbalanced current trip	●	○	The unbalanced three-phase current is larger than the unbalanced current setting value	Check the winding of the motor and the connection between soft starter and motor
Over temp trip	○	●	The temperature of the heatsink is higher than the temperature setting value	Check whether the connection between soft start and motor is short circuited. Check whether the load is too large or whether the selection of soft starter power is too small.

◎ Blink; ● On; ○ OFF

- The frequency protection is built-in, ISA3 can work with 50/60HZ voltage.
- The single-phase soft starter has no unbalanced current trip, but have no voltage trip.

Electronic overload and tripping curve

A Class 30; B Class 20
C Class 10; D Class 10A



Appendix

Overload time

$$\text{Overload trip time} = \frac{1375000}{I\%^2 - 110^2} \times \frac{T_x}{6}$$

Among:

I% is the ratio of the actual current to the rated current

Tolerance time of T * 500% overload current (X=5)

Minimum overload tolerance time

Overload Class	Minimum overload tolerance time						
	X=8	X=7	X=6	X=5	X=4	X=3	X=2
10A	1.6	2	3	4	6	12	26
10	3	4	6	8	13	23	52
20	5	6	9	12	19	35	78
30	7	9	13	19	29	52	112

Parameter setting list

Parameter	Setting range	Default
FLC Soft starter full load current	1-100A	Factory setting
FLA Motor full load current	1-100A	According to soft starter name plate
Connection mode	0 - External 1 - Internal	0 - External
Over current protection value	500% - 850% FLA	500% FLA
Over current trip delay time	0.5... 1Sec	1 Sec.
Overload protection value	100- 200 FLA	115% FLA
Overload protection Class	0 - Class 10A 1 - Class 10 2 - Class 20 3 - Class 30	0 - Class 10A
Phase sequence protection	0- OFF 1- ON	1- ON
Starting time	1- 30 Sec.	Panel potentiometer setting
Stopping time	0.5... 10 Sec.	Panel potentiometer setting
Initial voltage	10... 50% FLA	Panel potentiometer setting
Bypass relay type	0-Electric self-holding relay 1-Magnet self-holding relay	Depending on the specific model
Slave machines address	1-127	1
Baud rate	0-1200BPS 1-2400BPS 2-4800BPS 3-9600BPS 4-19200BPS	3-9600BPS
Parity check	0 - ECC 1 - ODD 2 - None	0-ECC

Appendix

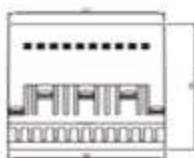
Common load and parameter setting

Ramp starting mode

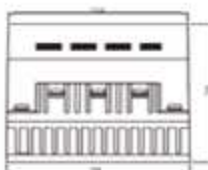
Load	Start time	Stop time	Initial voltage
Boat propeller	15	0	45%
Centrifugal fan	15	0	45%
Centrifugal pump	15	5	45%
Piston compressor	15	0	45%
Rotary converter	15	0	45%
Mixer	20	0	45%
Crusher	20	0	45%
Spiral air compressor	15	0	45%
No-load motor	15	0	45%
Band conveyor	15	0	45%
Hot water pump	15	5	45%
Air pump	15	0	45%

Mechanical installation

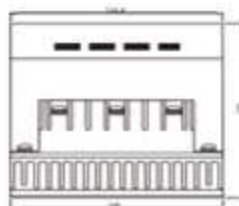
ISA3 1.5~11A
Model A



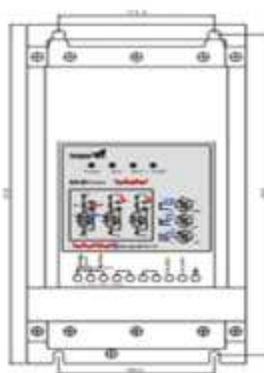
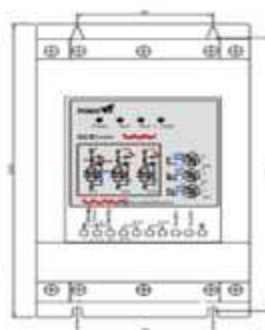
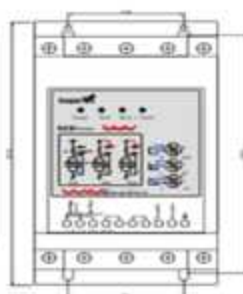
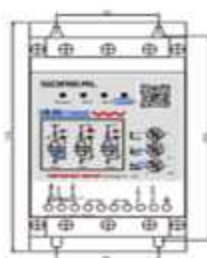
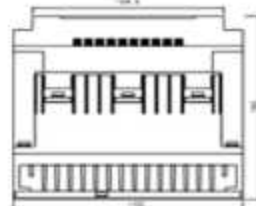
ISA3 15~22A
Model B



ISA3 30~75A
Model C



ISA3 90~150A
Model D



Model	Frame Size	Width	Height	Depth
	Model	mm	mm	mm
ISA3 - 0022-0011K	A	92	175	95
ISA3 - 0030-0015K	A	92	175	95
ISA3 - 0045-0022K	A	92	175	95
ISA3 - 0075-0037K	A	92	175	95
ISA3 - 0110-0055K	A	92	175	95
ISA3 - 0150-0075K	B	108	200	105
ISA3 - 0220-0110K	B	108	200	105
ISA3 - 0300-0150K	C	125	222	135
ISA3 - 0370-0185K	C	125	222	135
ISA3 - 0450-0220K	C	125	222	135
ISA3 - 0600-0300K	C	125	222	135
ISA3 - 0750-0370K	C	125	222	135
ISA3 - 0900-0450K	D	155	310	160
ISA3 - 1100-0550K	D	155	310	160
ISA3 - 1500-0750K	D	150	310	160

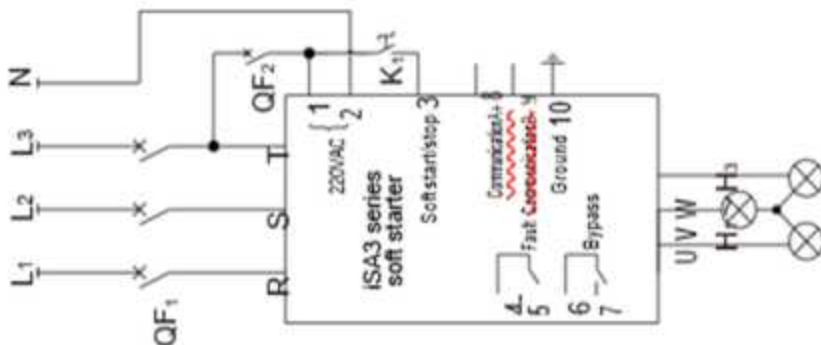
Dear customer:

After receiving the products sent by our company, please do not install and run directly. First, it should make a simple test according to the wiring drawings of experimental methods and steps provided by our company. After ensuring the operation of the soft starter, the wiring of the cabinet and not correct. Then the test of whole system can be carried out.

Test steps:

1. Connect 3 200W/220V lamps (H1~H3) with Y connection then connect to the output of the soft starter U, V and W, and also can test by connect the small motor.
2. Close the QF1, connect the 380V AC to R, S and T of the soft starter's input terminal
3. Close the QF2 to make the 220V control power connect to the control terminals 1 and 2 of the soft starter.
4. Soft start: closed knob switch K1 (connect terminal 1, 3), bulb slowly lighten up. After the bulb is bright up, the bypass KM closes the soft start process.
5. Soft stop: disconnect K1 (disconnect terminal 1, 3), bypass runs continuously, bulb slowly extinguish, after bulb is completely off, soft stop process is completed.

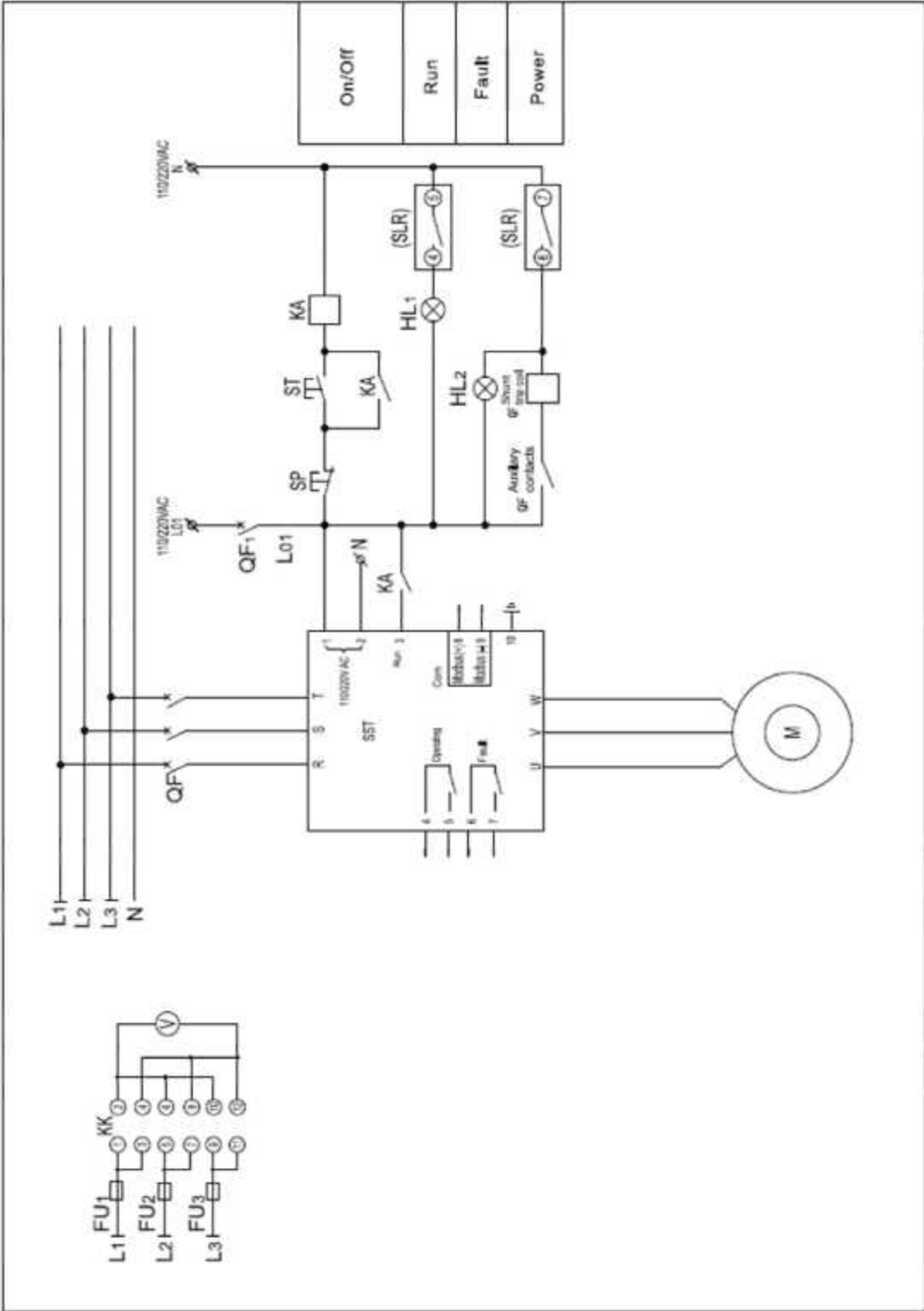
*If the above experimental steps can not be carried out normally, we can preliminarily judge that the soft starter has been damaged. For more details, please contact the technical service department.



Basic parameter setting	
Overload Trip	10
Start	8~12S
Stop	2~4S
UINI	50%

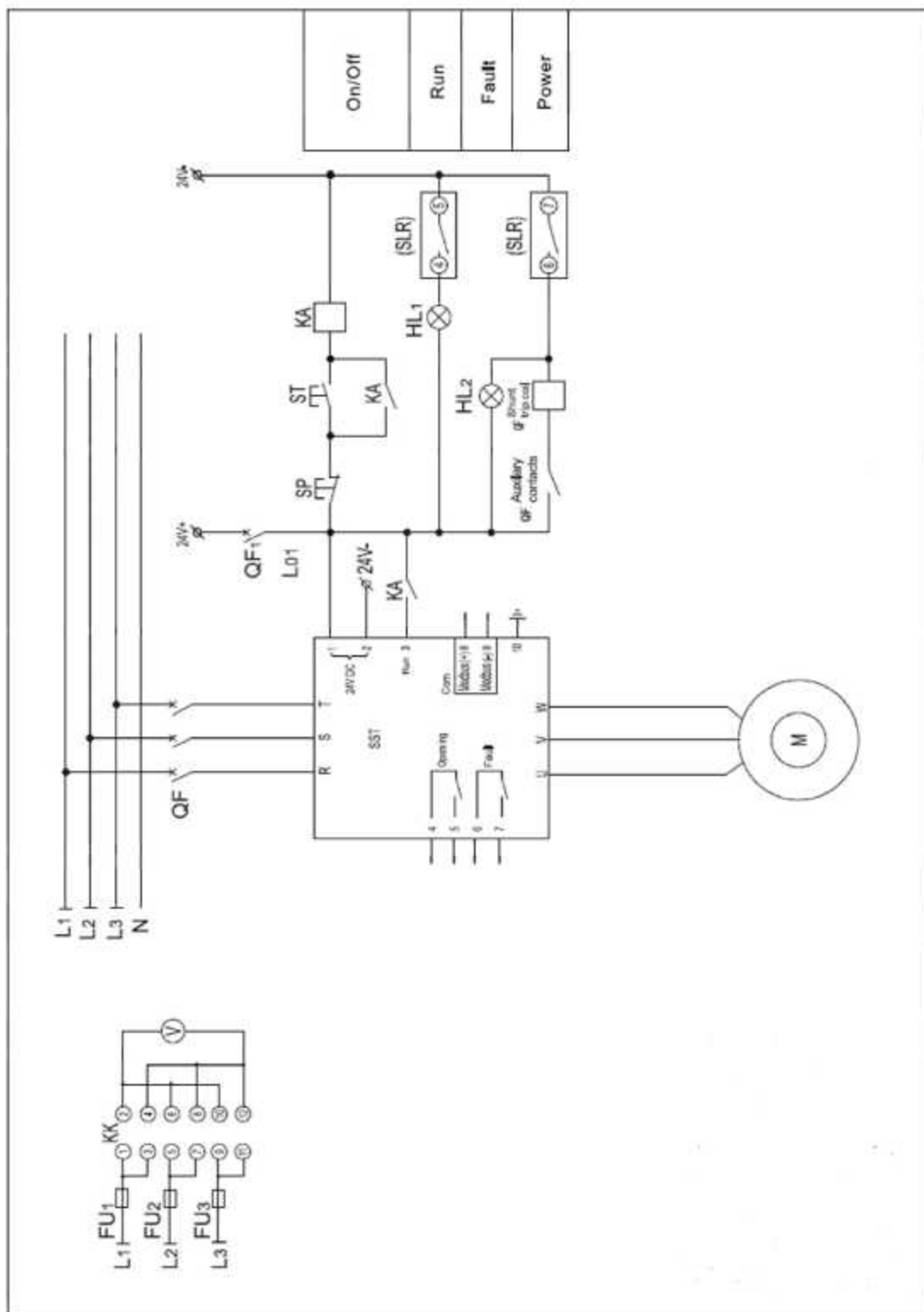
Wiring Connection

Control Voltage: 110 – 240VAC



Wiring Connection

Control Voltage: 24VDC



Notes