SANTERNO
CARRARO GROUP

INDUSTRIAL AUTOMATION

USER MANUAL

Manuale d'uso
Manuel d'emploi
Bedienungsanleitung
Manual de uso
Manual do usuário
Руководство по эксплуатации

SOFT STARTER
ASA

Basic User Manual-Manuale d'uso Basic

EN

ASA series intelligent motor soft starter

Operation instruction manual

Language version: English

■ Please read the instruction manual carefully to understand the content so that it can be properly installed, connected, operated and maintained

■ The technical specifications of this product may be subject to change without notice

■ This manual should be kept until the product is scrapped

■ This manual should be kept in the hands of the actual end user

Foreword

Thank you for using SANTERNO product, ASA series intelligent AC motor soft starter.

ASA series of soft starter is the latest development of SANTERNO has an international leading technology of intelligent AC motor soft starter. ASA Series Soft Starter uses the power electronic technology, the microprocessor technology and the modern control theory technology, has the present international advanced level the new starting equipment. This product can effectively limit the starting current of asynchronous motor, which can be widely used in fan, water pump, compressor and other transportation and heavy equipment, is the star delta conversion, autotransformer, magnetron step-down start ideal replacement equipment.

ASA series of soft starter has excellent performance with the international high-end soft starter of the same, but also according to the application characteristics of ITALIAN, further strengthen the product reliability and environmental adaptability, humanization and professional design, can meet various application requirements.

Excellent performance

- **Multi start mode:**

  The maximum output torque can be obtained by the voltage ramp mode. The maximum current can be obtained by the constant current soft starter mode, which can be applied to the load with large static friction force

- **High reliability:**

  The high performance microprocessor is used to process the signal in the control system, so as to avoid the excessive adjustment of the analog circuit in the past, so as to obtain excellent accuracy and execution speed

- **High performance:**

  Programmable delay start mode, programmable interlocks control

  No sequence requirements for input power

  Starting time, parking time can be modified

  Dynamic fault memory function, easy to find the cause of the fault, up to ten faults can be recorded

- **Field bus full dynamic control monitoring starter, easy networking:**

  Bus type is MODBUS.

- **With a variety of protection functions:**

  Protection against over voltage, under voltage, over temperature, phase loss, motor overload, etc.。

- **English character display function:**

  LCD display a variety of operating parameters, programming and fault state with text prompts

- **Perfect humanized design:**

  Beautiful appearance and reasonable structure

  Perfect function and simple operation

  Solid, reliable and compact

  The artistic design of industrial products

- **Reliable quality assurance:**

  Computer simulation design

  STM patch production process

  Excellent electromagnetic compatibility

  High temperature aging, vibration test before the factory

- **Quick and thoughtful after-sales service:**

  Reliable performance and quality lay the foundation for quality service

Provide excellent and complete equipment design

Timely and thoughtful use of consulting

Continuously improve product performance according to user opinion

Typical application

- Water pump - use soft parking function to stop the pump when the water hammer phenomenon, saving the cost of system maintenance
- Ball mill - use of voltage ramp start to reduce the wear of the gear torque, reduce maintenance workload, saving time and saving expenses。
- Fan - reduce belt wear and mechanical impact, saving maintenance costs
- Compressor - use of current limiting, to achieve a smooth start, reduce motor heating, prolong service life
- Crusher - use of blocking protection and rapid protection to avoid mechanical failure or blockage caused by overheating of the motor burned
- Transport machinery - through soft starter to achieve smooth and gradual start process, to avoid product displacement and liquid spills

Use and environmental conditions

- Main circuit power supply: three-phase AC 380V or 660V (- 10%, + 15%),
  50Hz±0.5％, 60Hz±0.6％
  Note: the above data is only applicable to this specification
- Control loop power supply: AC380V, 50/60Hz
- Applicable motor: General squirrel cage asynchronous motor
- Starting frequency: Suggest start and stop not more than 20 times per hour
- Cooling: natural cooling
- Installation: wall mounted
- Protection level: IP00 ~ IP20, depending on the power rating, below 55kW is IP20, 55kW and above is IP00
- Environmental conditions: more than 2000 meters above sea level, should reduce the use of capacity, 5% capacity reduced per every 1000 meters higher.
- The ambient temperature between - 25 ~ 40 ℃.
- Relative humidity is not more than 95% (20c ~ 65C),
- No gel, flammable, explosive, corrosive gas, no conductive dust.
- Indoor installation, good ventilation, vibration less than 0.5g.

Safety precautions

 Please read the Descriptions before installing

 The soft starter must be installed by professional and technical personnel

 The specification of the motor must be matched with the soft starter

 It's strictly prohibited to connect the capacitor at the soft starter output (U, V, W)

 After e installation of the exposed terminal must be wrapped with insulating tape

 Soft starter or other related equipment shall be grounded reliably

 The input power must be cut off when the equipment is repaired

 Unauthorized disassembly, modification is forbidden of this product.

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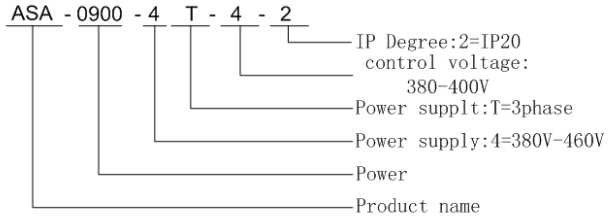
Chapter 1 Introduction of ASA series soft starter

1.1 Description of product model

When open the box, please confirm: whether there is damage or scratch damage phenomenon in transportation, the nameplate rating is consistent with your order, if there is please contact the supplier or direct contact with me bad.

The soft starting type column plate numbers and letters product series, power level, power level and other information.

Soft starter model description:

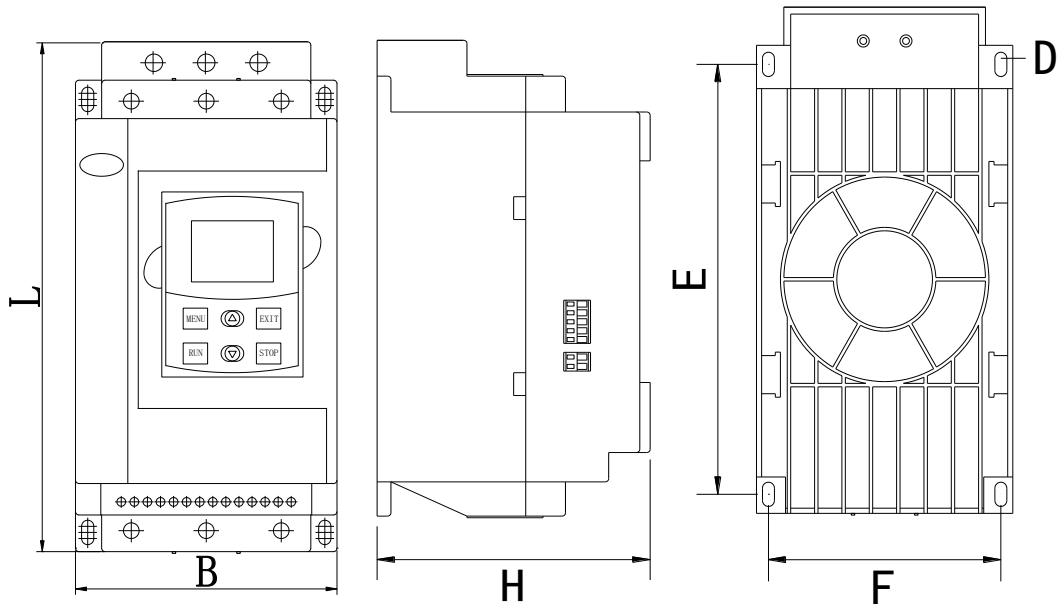


1.2 Nameplate specification

Please check the nameplate on the product to make sure that the goods you received are in conformity with the goods you ordered

1.3 Product appearance and installation

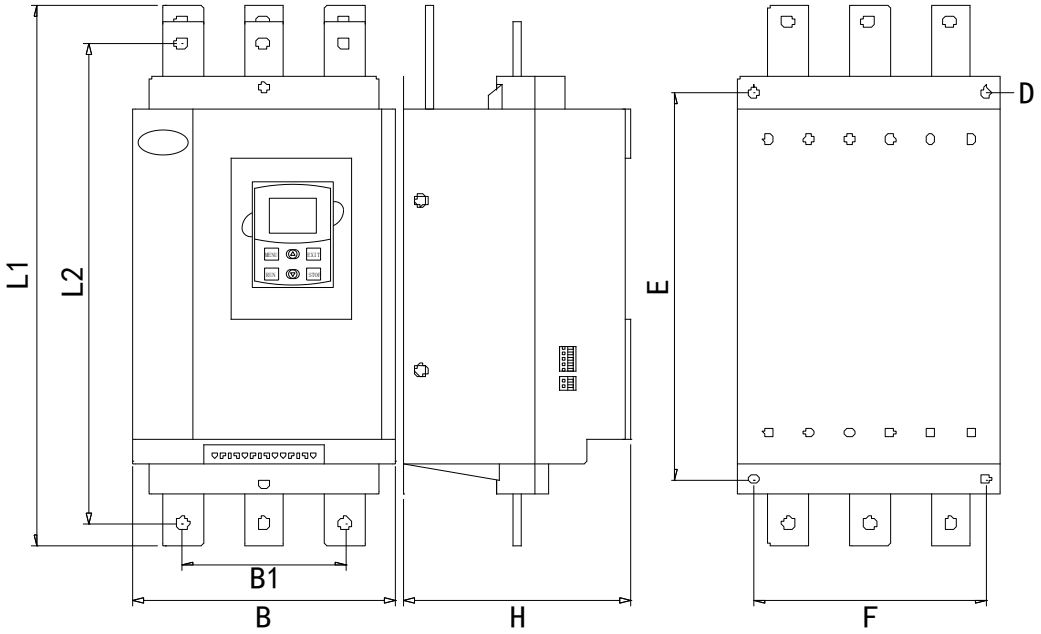
1、ASA series 5KW－55KW Product size



Specifications and models	Power rating（kw）	Rated current（A）	External dimensions（mm）			Installation size（mm）			Net weight（kg）
			L	B	H	E	F	D	
ASA-0055-4T	5.5	11	292	152	159	248	131	M7	4
ASA-0075-4T	7.5	15	292	152	159	248	131	M7	4
ASA-0110-4T	11	23	292	152	159	248	131	M7	4
ASA-0150-4T	15	30	292	152	159	248	131	M7	4
ASA-0185-4T	18.5	37	292	152	159	248	131	M7	4
ASA-0220-4T	22	43	292	152	159	248	131	M7	4
ASA-0300-4T	30	60	292	152	159	248	131	M7	4
ASA-0370-4T	37	75	292	152	159	248	131	M7	4
ASA-0450-4T	45	90	292	152	159	248	131	M7	4
ASA-0550-4T	55	110	292	152	159	248	131	M7	4

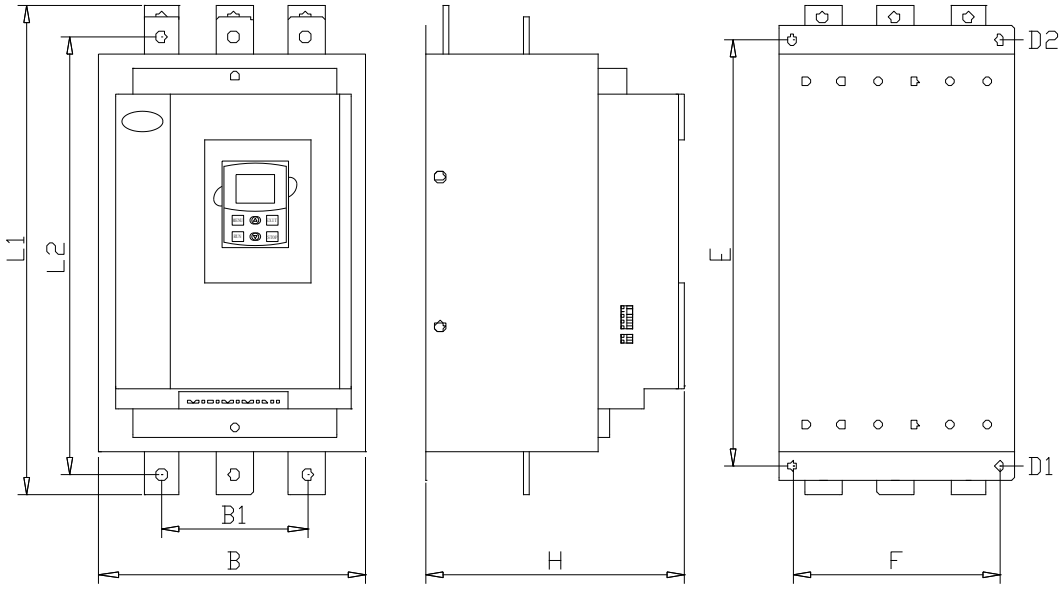
Note: Rated current refers to line connection.

2、ASA series 75KW and above product size



Specifications and models	Power rating（kw）	Rated current（A）	External dimensions（mm）			Installation size（mm）			Net weight（kg）	Copper hole distance	
			L1	B	H	E	F	D		B1	L2
ASA-0750-4T	75	150	530	260	203	380	196	M8	20	163	439
ASA-0900-4T	90	180	530	260	203	380	196	M8	20	163	439
ASA-1150-4T	115	230	530	260	203	380	196	M8	20	163	439
ASA-1320-4T	132	264	530	260	203	380	196	M8	20	163	439
ASA-1600-4T	160	320	530	260	203	380	196	M8	20	163	439
ASA-1850-4T	185	370	530	260	203	380	196	M8	20	163	439
ASA-2000-4T	200	400	530	260	203	380	196	M8	20	163	439

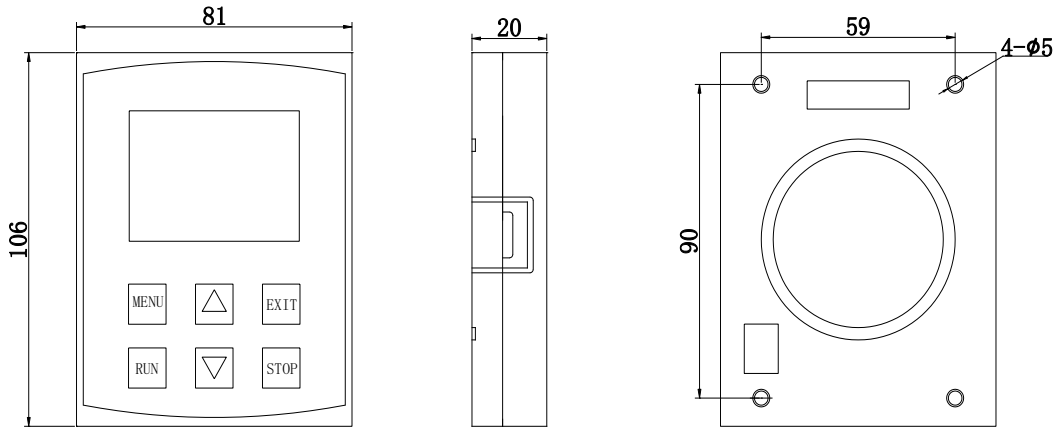
Note: Rated current refers to line connection.



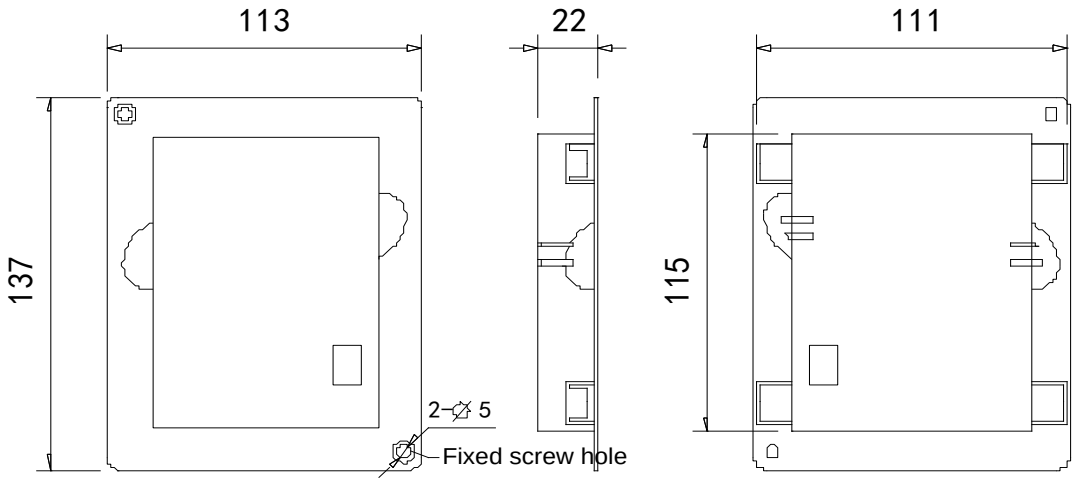
Specifications and models	Power rating（kw）	Rated current（A）	External dimensions（mm）			Installation size（mm）				Net weight（kg）	Copper hole distance	
			L1	B	H	E	F	D1	D2		B1	L2
ASA-2500-4T	250	500	570	290	251	465	260	M9	M13	25	180	510
ASA-2800-4T	280	560	570	290	251	465	260	M9	M13	25	180	510
ASA-3200-4T	320	640	570	290	251	465	260	M9	M13	25	180	510
ASA-3550-4T	355	710	570	290	251	465	260	M9	M13	25	180	510
ASA-4000-4T	400	800	660	410	251	550	370	M9	M13	30		
ASA-4500-4T	450	900	660	410	251	550	370	M9	M13	30		
ASA-5000-4T	500	1000	660	410	251	550	370	M9	M13	30		
ASA-6000-4T	600	1200	660	410	251	550	370	M9	M13	30		

Note: Rated current refers to line connection.

1.4 Operating panel shape and mounting dimensions



1.5 Pallet dimensions and mounting dimensions



Chapter 2 Installation

2.1 Installation direction

In order to ensure that the soft starter has good ventilation and heat dissipation conditions, the soft starter should be installed vertically

2.2 Installation notes

- Handling, installation, please holds at the bottom of the product, not only hold the shell, to prevent the injured foot or broken soft starter.
- Soft starter to be installed in metal and other flame retardant, away from flammable objects, away from the heat source
- Do not leave the drilling residue in the soft starter when installing the work, otherwise it may cause the soft start failure
- The soft starter is installed in the cabinet, the cabinet should be equipped with fan, air vents, and cabinet construction is conducive to heat the internal air duct.

2.3 Installation space

In order to ensure a good heat sink, there should be enough space for the installation of the soft starter, see Figure 2.1

2.4 Circuit installation

The main circuit adopts the way of going up and down, the wire should ensure sufficient current capacity, and the selection of wire and peripheral accessories refer to schedule two

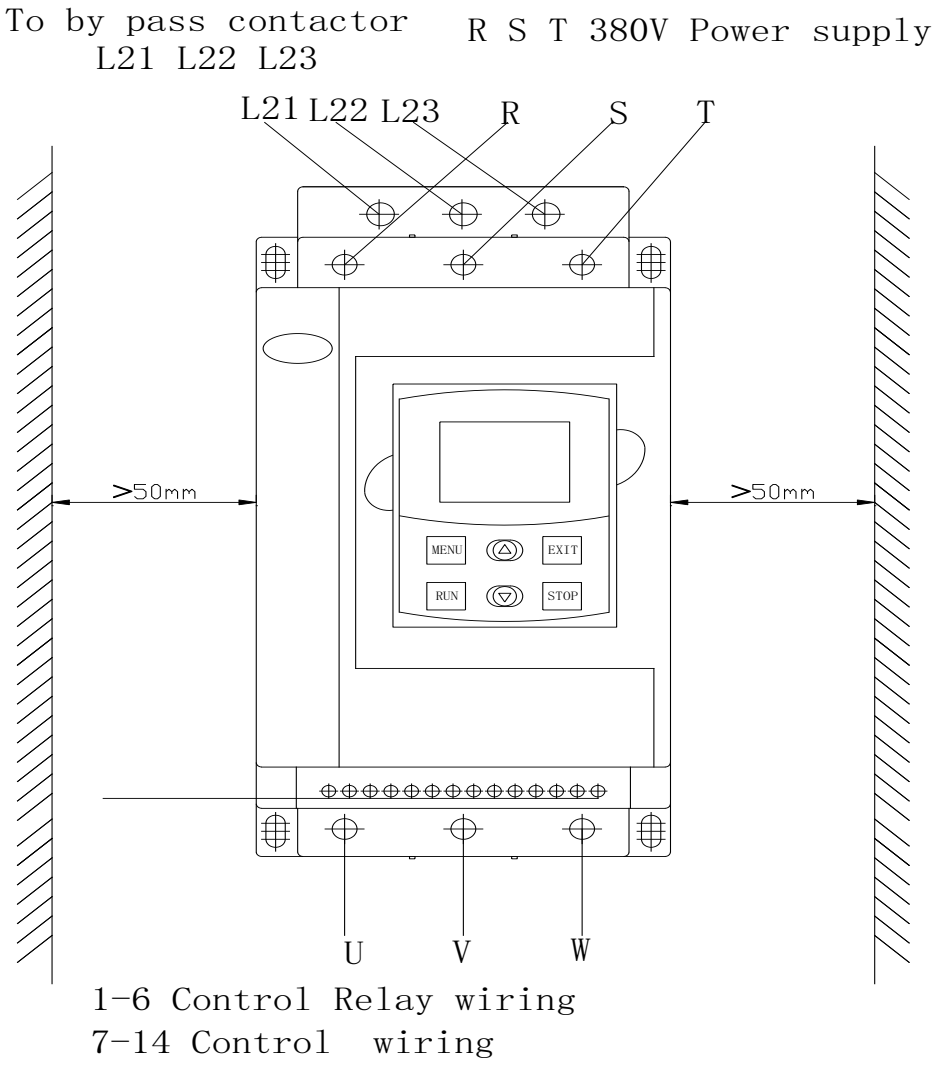


Fig 2.1

Note: As shown above fig 2.1, 1-6 and 7-14 are terminals, terminals 1-6 are for control relay wire, terminals7-14 are for control wire

Chapter 3 Circuit connection

3.1 Working principle of ASA soft starter

The main circuit of ASA motor soft starter with six anti parallel thyristor series stator circuit connected to the AC motor. The use of electronic switching thyristor, the microprocessor controls the trigger angle change to change the conduction angle of the thyristor, thus changing the input voltage of the motor, in order to control the purpose of motor soft starting. When completed, the soft starter output reaches the rated voltage. When the control bypass contactor km three-phase pull motor into service. (see Figure 3.1).

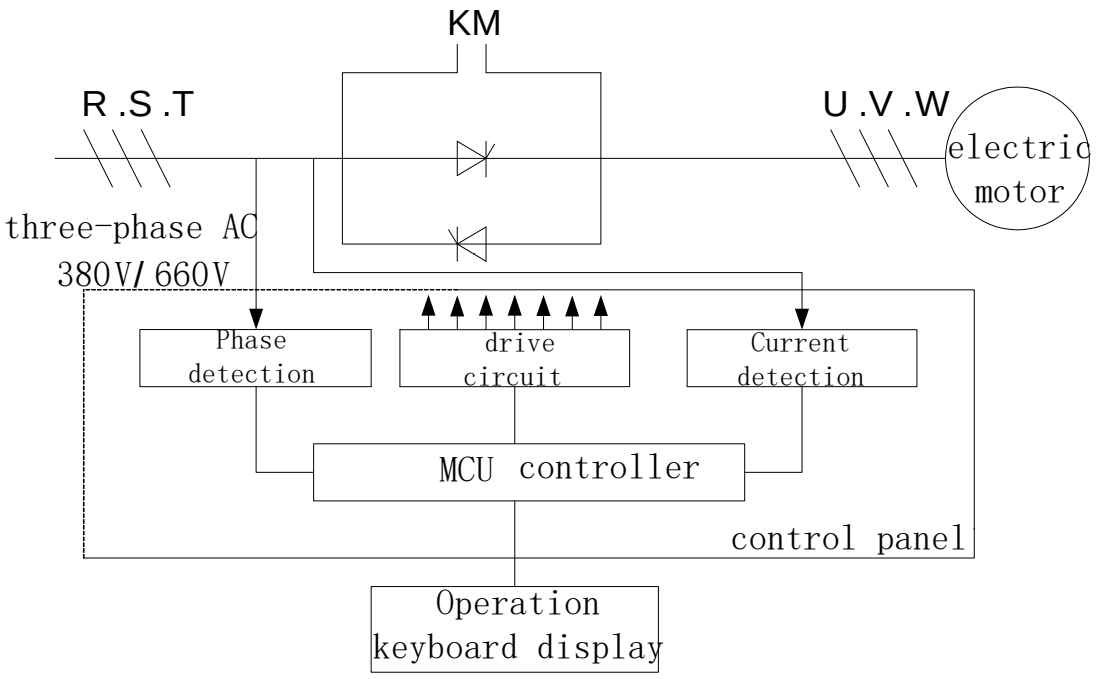


Figure 3.1

3.2 Wiring

Figure 3.2 is the ASA series motor soft starter for the user to use all of the external terminals, detailed functions are shown in table 3.2.4 "external control terminal Descriptions."

3.2.1 Terminal wiring

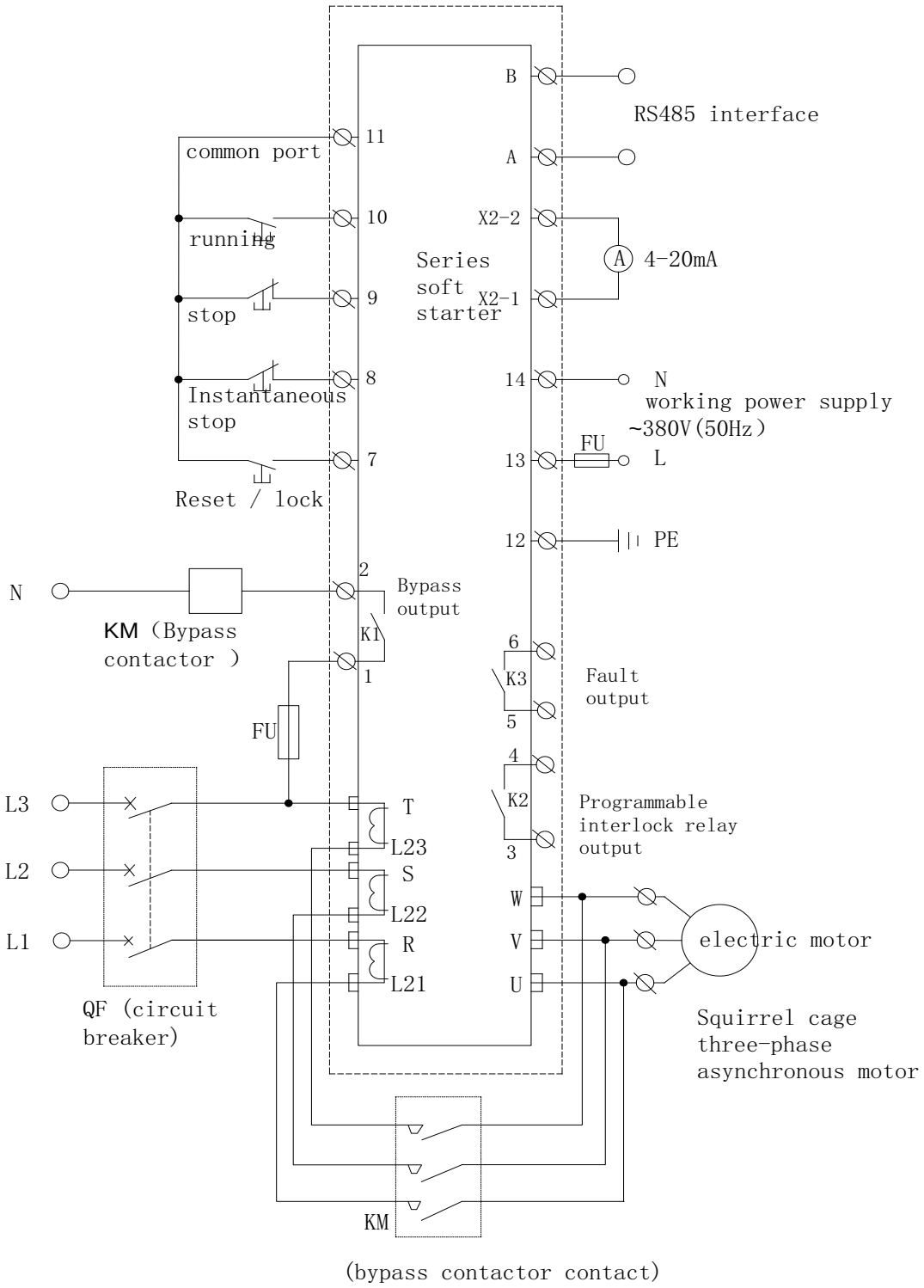


Figure 3.2

3.2.2 Connection between product and peripheral devices

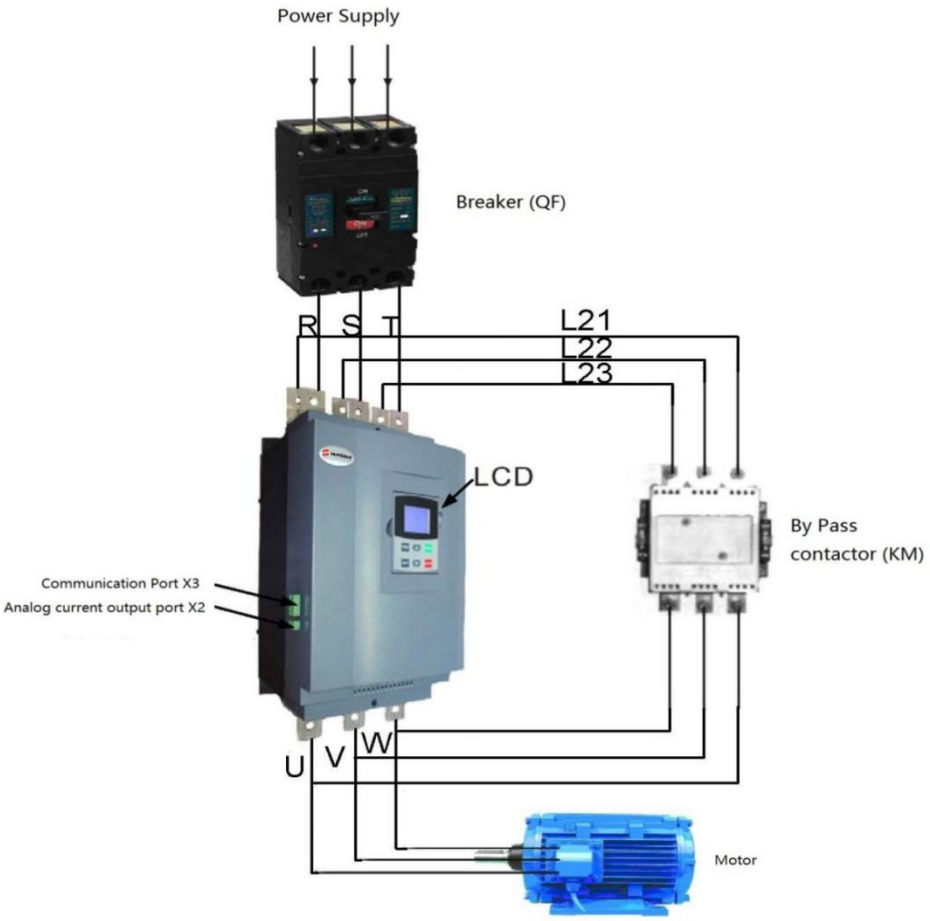


Figure 3.3

3.2.3 External control terminal instruction

Table 3－1

Terminal symbol			Terminal name	Description
main circuit		R.S.T	AC main circuit power input	Three phase AC power supply connected by circuit breaker
		U.V.W	Soft starter output terminal	Three phase asynchronous motor
		L21.L22.L23	Special terminal for external bypass contactor	Refer to figure 3.3 for wiring
control source		X1-13	control AC power input terminal	AC380V
		X1-14	control AC power input terminal	
control circuit	relay output	X1-12	Ground input terminal	ground connection
		X1-1	Bypass contactor input terminal	After the start of the closing capacity of AC220V 5A This output is not adjustable.
		X1-2	Bypass contactor input terminal	
		X1-3	Programmable relay output terminal	See 4.3.11 capacity AC220V 5A by programming control
		X1-4	Programmable relay output terminal	
		X1-5	Fault relay output terminal	Capacity AC220V 5A This output is not adjustable.
		X1-6	Fault relay output terminal	
	digital input	X1-7	External reset terminal	Fault reset
		X1-8	External control E-Stop terminal	Stop when the stop and the common end are disconnected, see 4.3.1. It's effective also when start the soft starter from keypad
		X1-9	External control stop terminal	disconnect Stop and the public then Stop effectively
		X1-10	External control starting terminal	The start and the common end short connection
		X1-11	External digital signal common terminal	
	Analog current output	X2-1	Current signal output terminal Positive	4-20mA can program selected, see 4.3.9
		X2-2	Current signal output terminal negative	

Modbus terminal specification: Table 3.1 continued

Terminal symbol		Terminal name	Description
Modbus terminal	X3-1	GND	Power supply terminal
	X3-2	A	Signal non inverting input
	X3-3	NC	Idle terminal
	X3-4	B	Signal inverting input
	X3-5	5V	Positive power terminal

Note: The matching resistance is less than 200 ohms

3.2.4 Connection and use of control terminals

（1） Wiring preparation

If the user uses the external terminal, it is recommended to use the shielded wire from the terminal row, the shield wire should be connected to the earth.

In order to avoid the interference of electromagnetic interference, the control lead should avoid the motor cable and other inductive electrical wiring

（2） The connection of the outer terminal x1

The 14 terminal is located at the bottom of the starter, with a dangerous voltage when it is used, and the power must be disconnected before disconnecting

- Bypass relay terminal 1,2

When the start-up process is completed, the built-in contacts will be closed, so that the bypass contactor km closed; and when the stop command is issued, the built-in contacts will open (see Figure 3.4)

It is suggested that the two ends of the coil of the contactor are connected with a series circuit of resistance capacitance, which is beneficial to absorb the peak voltage generated when the contactor coil is broken, and reduce the interference to the control circuit of the starter

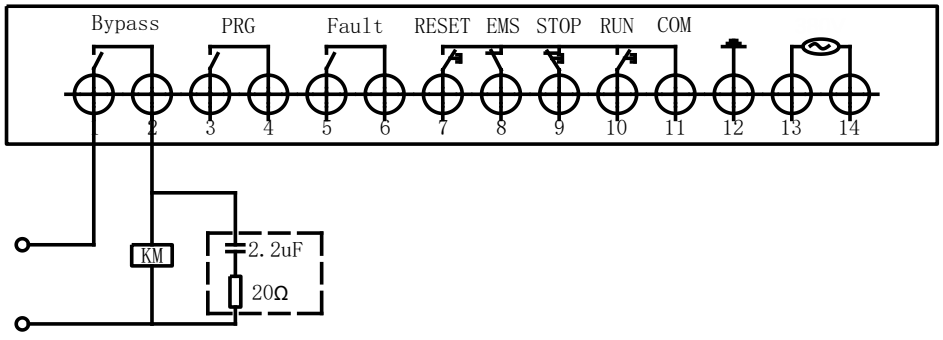


Fig. 3.4 Bypass relay terminal

- Programmable relay output terminal 3,4

  This contactor is mainly used to connect with other control equipment, can be programmed to select the output, see 4.3.11. contactor capacity AC 250V 5A

- Fault output terminal 5,6

  This contactor represents the starter or motor failure, normally open, contact capacity AC 250V 5A

- Reset input terminal 7,11

  When the external reset terminal 7 is connected with the public terminal 11, the fault state can be contacted

- Instantaneous stop input terminal 8,11

  Belong to the external fault signal input, can be used for external thermal relay and other switch quantity protection, only 8 and 11 when connected to the starter can be run, otherwise the instantaneous stop failure

- Control terminal 9 (stop), 10 (start), 11 (com)

  These three terminals are used for external start and stop buttons, which must be programmed when used (see 4.3.1)

Following figure 3.5 shows a three wire connection, often used for external buttons

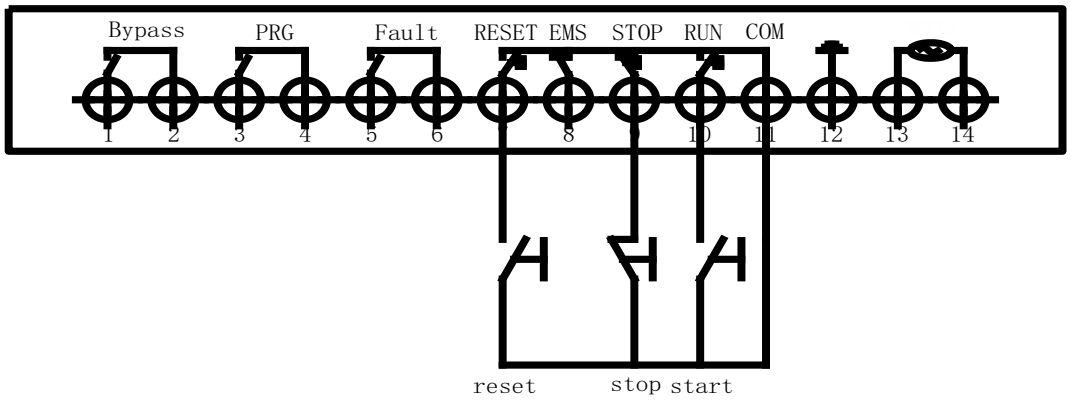


Figure 3.5 three wire connection

But the following scenarios should be two wire connections: (see Figure 3.6)

（1） when a user needs a switch to control the stop of the starter, such as a control point of pc/plc J

（2）when the automatic restart function of the soft starter is used, when the j is closed to start to fail, after a certain period of time, the automatic reset of the starter can be carried out simultaneously (see 4.3.16)

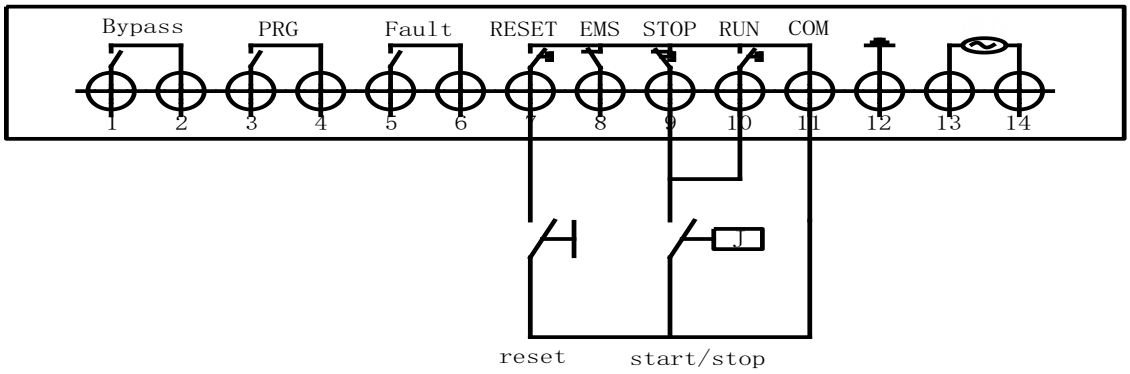


Figure 3.6 two wire connection

- Ground terminal 12

When the ground is installed, the device can be connected to the mounting plate nearby, and the device above 75kW adopts the shell and the 12 terminal to be grounded at the same time

- Working power supply terminal 13,14

External 380V power grid voltage, if the 660V soft starter is the main circuit through the isolation transformer step-down to obtain. (See Figure 3.7)

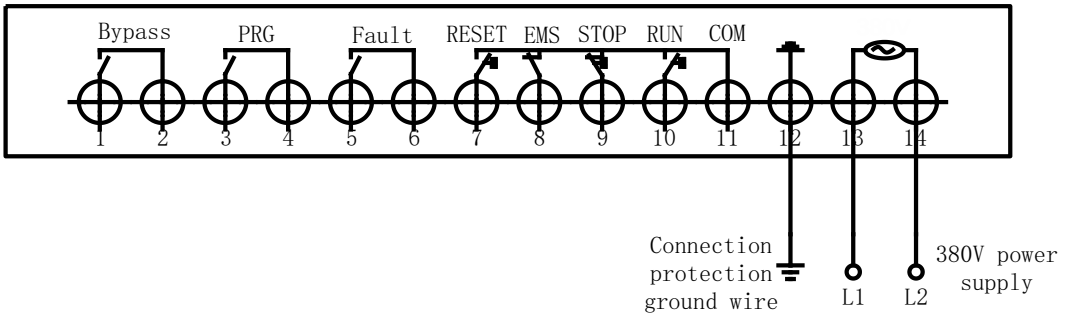


Fig. 3.7 working power supply terminal

- Analog current signal terminal X2

On the left side of the starter, there is a two pin terminal, which is used to reflect the current signal of the main loop current, which is 4 - 20mA, and the output mode can be programmed (see 4.3.9)

Figure 3.8 shows the use of reference

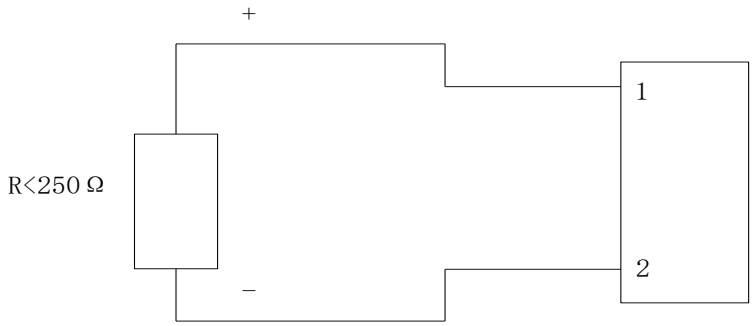


Figure 3.8

- Bus terminal x3

  Select a dedicated field bus cable

Chapter 4 Programming instructions

4.1 Display and keyboard Description

ASA Series of soft starter with LCD display, easy to set up the user, read the parameters, as well as the status of real-time display soft starter

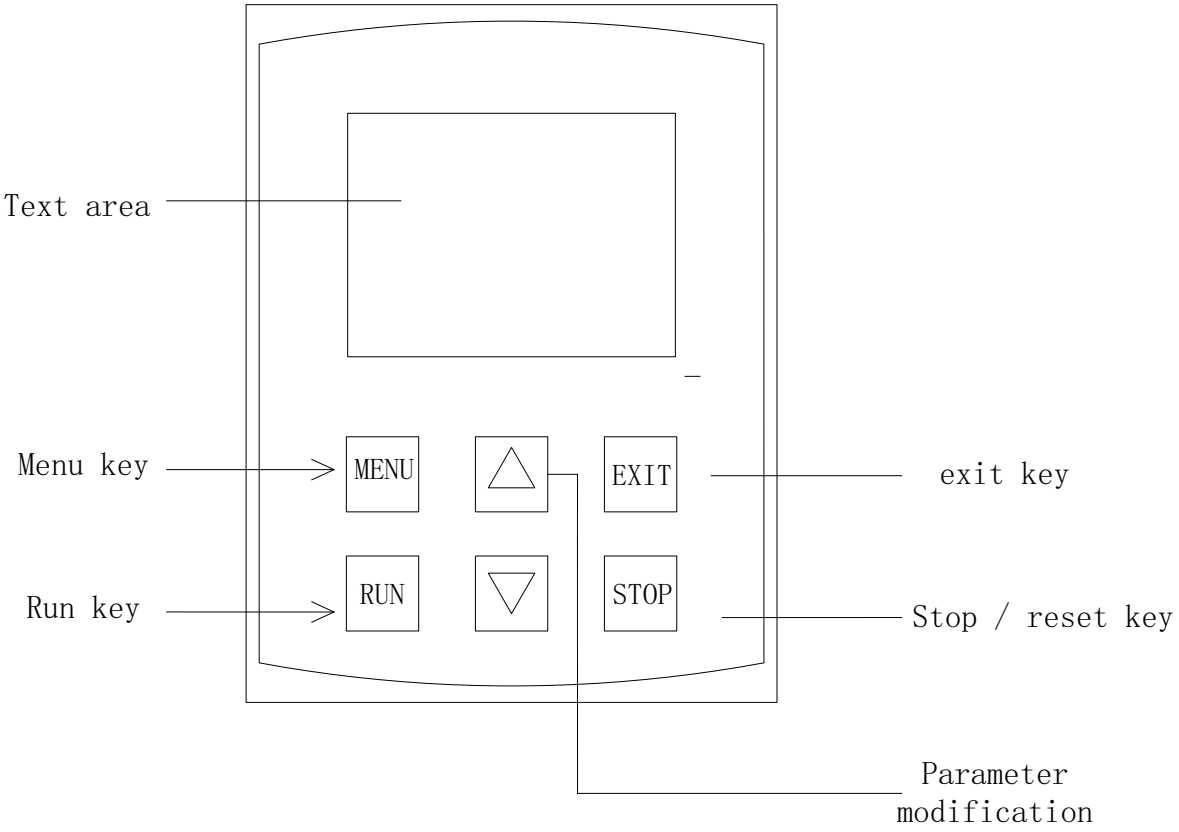


Figure 4.1

Figure 4.1 shows the location of each key, as follows:

Key name	Key function description
RUN –Run key	Use this key to enable the motor to run in the ready state
STOP - Stop / reset key	When the motor is running, press this key to enter the parking。When the fault condition, press this key to return to the ready state
MENU - Menu key	Used to go to the next menu or store parameter settings
EXIT - return key	Used to return to the previous menu
▲ - Up key	Used to add data
▼ - Down key	Used to reduce data

4.2 Function code table and description

Table 4.1

Function code	Function name	Setting range	Default value	Description
00	Control mode	0－5	0	0: keyboard 1: Terminal 2: Modbus 3: Keyboard + terminal 4: Keyboard + bus 5: Terminal + bus
01	Starting mode	0－1	1	0: Current limit 1: Voltage
02	Current limit	150%－500%	210%	Valid in Current limit mode
03	Initial voltage	25%－80%	30%	Valid in Voltage mode
04	Rise time	1－120S	10S	Valid in Voltage mode and Invalid in current limit mode
05	Down time	0－60S	0S	0 means free stop
06	Starting delay	0－240S	0	0 means “starting delay” off
07	Jump starting	0－1	0	0: Disable 1: Enable (Valid in voltage mode)
08	Jump voltage	50－80%	50%	When Pa07 = 1, this parameter is valid
09	Jump time	0.1－1.0S	0.3S	When Pa07 = 1, this parameter is valid
0A	Instantaneous stop setting	0－1	0	0: Disable 1: Enable
0B	Current signal selection	0－3	2	0: 0-20mA 500% 1: 0-20mA 150% 2: 4-20mA 500% 3: 4-20mA 150%
0C	Current display	0－1	0	0: current value 1: percentage
0D	Programming delay	0－240S	0	0 is immediate output, for programmable relay output

0E	Programming output	0－9	7	0 From starting command moment 1 From starting moment 2 bypass running status 3 From stop command moment 4 delay status 5 fault status 6 starting and running 7 ready status 8 starting status 9 running status
0F	Phase loss protection	0－1	0	0: Enable 1: Disable
10	Light load protection	0－1	1	0: Disable 1: Enable
11	Light load rate	50-100%	50%	Start protection after full voltage running, valid when Pa10 = 1
12	Over voltage protection	100-130%	120%	Protection when actual voltage is higher than the setting value
13	Under voltage protection	40－90%	80%	Protection when actual voltage is lower than setting value
14	Trip level	0－4	2	Primary, light load, standard, heavy load, advanced
15	Self-starting	0－1	0	0: Disable 1: Enable (Valid on Two wire type mode)
16	Bus address	1－247	1	
17	Baud rate	0－4	3	0: 1200； 1: 2400； 2: 4800； 3: 9600； 4: 19200
18	Parity check	0－2	0	0: None 1: odd 2: even
19	Load regulation rate	50-100%	100%	
1A	write protection	0-1	0	0: Disable 1: Enable
1B	Language selection	0-1	1	0: reserved 1: English
1C	Current coefficient	60%-160%	100%	100% is rated current of soft starter, if rated current of motor is different. You can change this value to make them same

1D	Parameter Restore Default settings	0-1	0	0: Disable 1: Enable
1E	Bypass function	0-1	0	0: Enable 1: Disable

Note: 1.This function code is keep after power off until next modification.

2. Function code can be modified by the 4.4.2 method to the Default value

3. Function code may vary with the version upgrade, please note that the latest version of the note

4.3 Function code description

4.3.1 Code 00 (control mode)

0: Keyboard, only Control by RUN and STOP key to start or stop on the panel

1: Terminal, only by the terminal RUN/STOP/COM two wire or three wire starting mode

2: Modbus, (X3 terminal) control monitoring operation

3: Keyboard + terminal (Suitable for 3 wire control mode)

Both the terminal and keyboard can operate, but when the keyboard starting, STOP terminal

Must be connected to COM

4: Keyboard + bus, both the keyboard and bus can control

5: Terminal + bus, Both X1 terminal RUN, STOP and BUS terminal X3 can control

4.3.2 Code 01 (start mode)

0 is current limit mode, starting current limit see 4.3.3

1 is voltage mode, see 4.3.4

4.3.3 Code 02 (current limit)

When using this function, the code 01 must be set to 0, the starting current starter operation below the set value (150%-500%). When starting after the current drops below the rated value, the greater the set value, the starting time will be shorter.

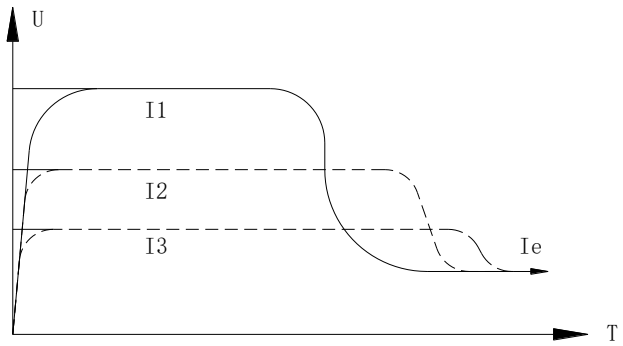


Figure 4.2

4.3.4 Code 03 (initial voltage) 04 (rise time)

They are the starting control parameters in the voltage mode, and increasing the starting voltage is beneficial to overcome the static friction force of the load starting, and the longer the load inertia is, the longer the rise time (see Figure 4.3)

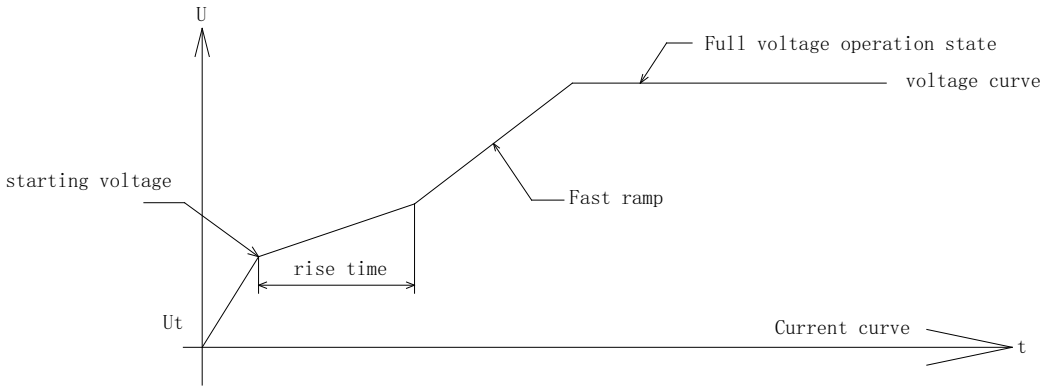


Figure 4.3

4.3.5 Code 05 (Down time)

When the down time is set to 0, it means free stop, and the long downtime will bring instability to the system (see Figure 4.4)

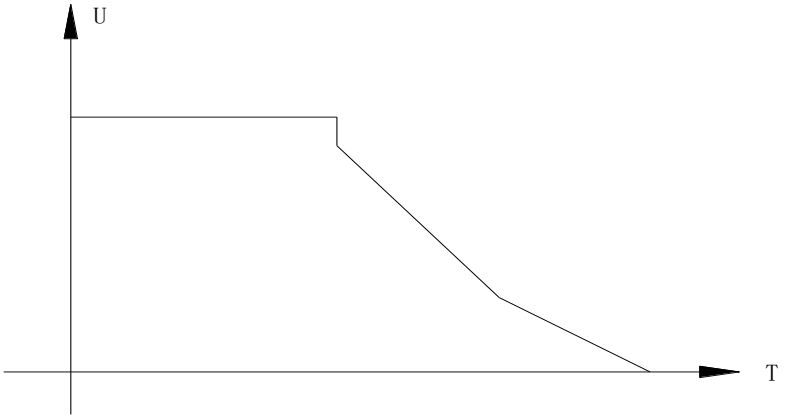


Figure 4.4

4.3.6 Code 06 (Starting delay)

The time between the starting command being sent and the starter starts, The soft starter starts when the countdown shows 0

4.3.7 Code 07 (Jump starting) code 08 (Jump voltage) code of the 09 (Jump

time)

When Code 07 is set to 1, Jump starting is effective. In some heavy occasions, due to the influence of mechanical static friction and not starting motor, can choose this mode. In this mode, you should shut down the Jump startinging, If the motor caused by the static friction force is too large to rotate, and then choose this mode .Otherwise we should avoid using Jump startinging, in order to reduce the large current impact is not necessary.

4.3.8 Code 0A (instantaneous stop setting)

You can open or close the external control instantaneous stop input EMS, set when 0 is closedthis function, 1 is activate this function

4.3.9 Code 0B (current signal selection)

Terminal X2 can be measured the current signal along with the change of load, the user can according to the situation, there are four options, such as table 4.2

table 4.2

set value	0	1	2	3
Output current mA	0~20	0~20	4~20	4~20
calibration value（1）	500%	150%	500%	150%
computational formula ％（2）	D=25Ix	D=7.5Ix	$D=\frac{500}{16}(lx-4)$	$D=\frac{150}{16}(lx-4)$

（1）the percentage of maximum load current output current corresponding to the number of 20 mA

（2）Ix measured current actual value (mA), D motor load current (%)

Formula interpretation:

1、D=25Ix: When the motor current is 0%, Ix=0; When the motor current is 100%, Ix=4mA, When the motor current is 500%, Ix=20mA;

2、D=7.5Ix: When the motor current is 0%, Ix=0; When the motor current is 30%, Ix=4mA, When the motor current is 150%, Ix=20mA;

3、$D=\frac{500}{16}(lx-4)$:When the motor current is 0%, Ix=4mA; When the motor current is 500%, Ix=20mA;

4、$D=\frac{150}{16}(lx-4)$: When the motor current is 0%, Ix=4mA; When the motor current is 150%, Ix=20mA;

4.3.10 Code 0C (current display)

0: The actual current value is displayed in the form of current value after starting

1: After the start of the display of the current display by a percentage, that is, 100% of the current on behalf of the motor rated current rating

4.3.11 Code 0D (Programming delay) Code 0E (Programming output)

The programmed output of the starter (terminal 5,6) is controlled by the two programming codes, see table 4.3

0E setting value	0	1	2	3	4
Program timing output time	From Starting command moment	From Starting moment	Bypass running status	From Stop command moment	Delay status
0E setting value	5	6	7	8	9
Program output indication status	fault status	Start +running status	Ready status	Starting status	running status

Table 4.3

0: From Starting command moment: the programable relay output from the moment of starting command, and stop output after soft starter stops

1: From Starting moment: the programable relay output from the moment of soft starter starts, and stop output after soft starter stops

2: Bypass running status: the programable relay output when bypass contactor running, and stop output after bypass contactor stops

3: From Stop command moment: the programable relay output when stop command given to the starter, and and stop output after soft starter stops fully

4: Delay status: the programable relay output from starting delay (Pa06) starts, and and stop output after the delay time finish

5: Fault status: the programable relay output when the starter has fault, and and stop output after the soft starter reset

6: Starting and running: the programable relay output in starting and running stage

7: Ready status: the programable relay output when the starter is ready without alarm before starting

8: starting status: the programable relay output in starting stage

9: running status: the programable relay output in running stage

If you set the item 0D is not 0, from the top of the table at the time as the starting point according to the 0D set time to start the delay. Delay termination, the delay output contact closure, otherwise if 0D is 0 closed immediately

The output of the reset (the contact is broken) at the time of the 0D is set up by the end of time delay and ready for the state, flexible use of programmable relay output function, can effectively simplify the peripheral control logic circuit

0E=49 programmable output function, set at this time 0D delay is invalid.

4.3.12Code 0F (phase loss protection)

0: phase loss function enable, the lack of any phase of the motor will stop running, and display the fault status

1: phase loss function disable, will not stop even lacking phase

4.3.13 Code 10 (light load protection) and code 11 (light load rate)

Light load protection can be used to check the belt tripping accident, Pa10 set start light load (0 is off), 1: beyond the set value to stop running starter and send out alarm signals through fault relay, light load rate control with light load size, the definition of light load rate of kv:

Kv=Iv/Ie*100% Ie: Rated current value, Iv: Average value of three-phase current

4.3.14 Code 12 (overvoltage protection)

Used to set the protection voltage value, if the input voltage is higher than the set value, protection occurs

4.3.15 Code 13 (under voltage protection)

Used to set the protection voltage value, if the input voltage is lower than the set value, protection occurs

4.3.16 Code 14 (Trip level)

In order to adapt to different applications, ASA series soft starter has five levels, respectively, 0: primary, 1: light load, 2: standard, 3: heavy load, 4: senior, set by the function code 13: as follows

Primary protection prohibits the external instant stop function, while retaining only the overheating, short circuit and the input lacking phase of protection, suitable for the occasion of the need for emergency, such as fire pumps

The light load, the standard, the heavy load protection levels have the complete protection function, the

difference is that the motor overload thermal protection time curve is different .See table 4.4 and figure 4.5. for the thermal protection time of the motor

Advanced protection at the start of the protection of the standard is more stringent, other protection parameters and standard protection settings

According to the function code 14 set different protection levels and thermal protection time is as follows:

Table 4.4

14set	0（primary）	1（light load）			2（standard）			3（heavy load）			4（senior）			Description
Overload protection level	No	2level			10level			20level			10level			According to the lec6094742 standard
Run overload trip time list	Current multiple（I/Ie）	3	4	5	3	4	5	3	4	5	3	4	5	The values in the table are typical values
	tripping time（s）	4.5	2.3	1.5	23	12	7.5	46	23	15	23	12	7.5	

Function code 14 set load adjustment rate is lower, the protection tripping sensitivity error will increase. According to the motor thermal protection tripping time curve IEC60947-4-2 standards are as follows:

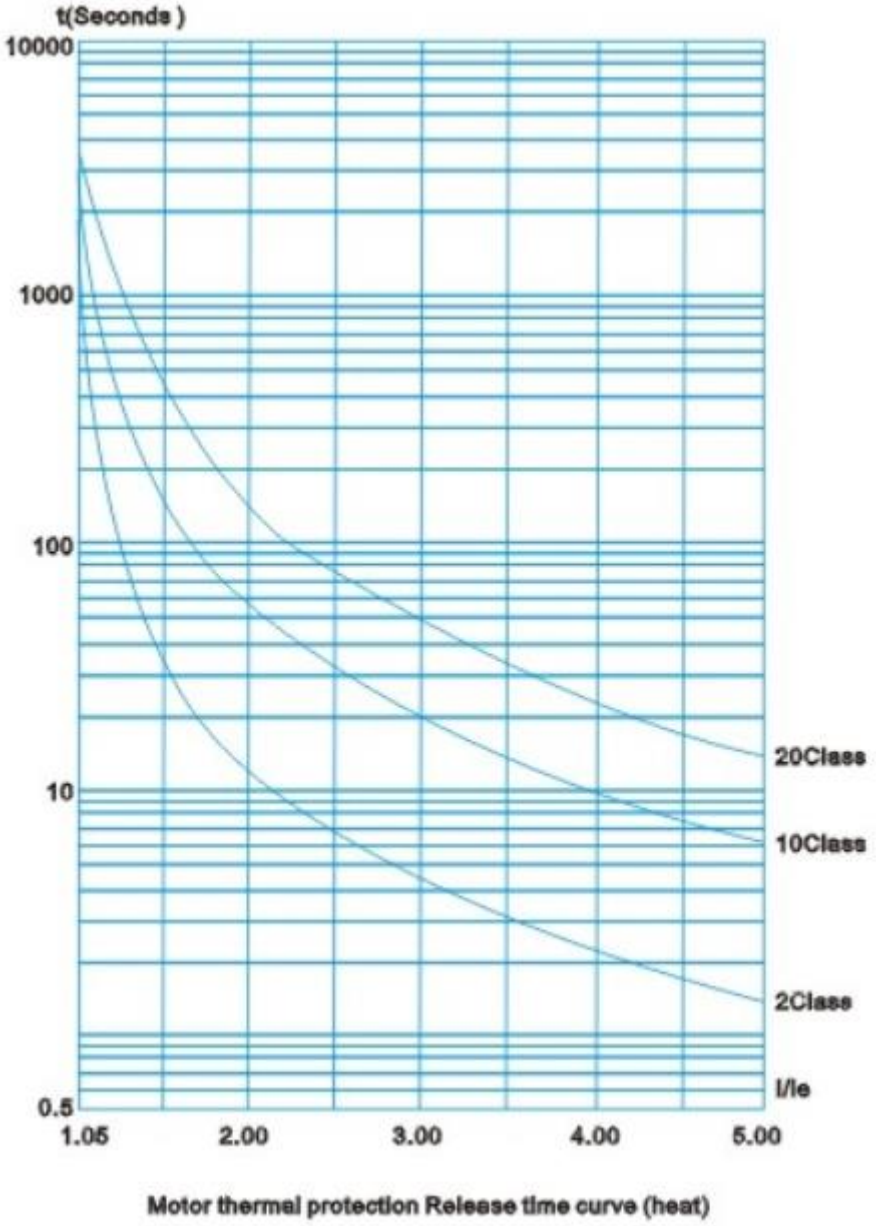


Fig. 4.5 curve of thermal protection tripping time (thermal state)

4.3.17 Code 15 (Self-starting)

After the start of the failure of the starter, it can be put into operation automatically by setting the code 15 to 1 for the delay of about 6 seconds. If it is set to 0, it can only be restart after the reset, and this function is only used in the two wire mode.

4.3.18 Code 16 (bus address)

Used to set the slave station address of the field bus, on the same station for each slave station address is unique, set the principle of 7.2 field bus communication section

4.3.19 Code 17 (baud rate)

Select the communication rate for Modbus communication. Selectable ranges from 1200 to 19200, see also 7.1

4.3.20 Code 18（parity check)

When used for Modbus communication selection check, should be set according to the requirements of the Master.

4.3.21 code 19 (load regulation rate)

In order to make the protection function and display parameters correct, the load regulation rate should be reset when the user selects the soft starter rated parameters which do not match the actual motor

Load regulation rate KT = ps/pr% PS actual motor power, PR soft starter power

For example: the user of the motor is 55kW, select the soft start power of 75kW, the code 19 set to 73%.

4.3.22 Code 1A (write protection)

When the function code 1A is set to 1, the parameter modification is locked, the user can not modify the parameter value, the value must be changed to 0, the user can modify the parameters

4.3.23 Code 1B (language selection)

0: reserved
1: English

.4.3.24 Code 1C (Current coefficient)

60%~160%

100% is rated current of soft starter, if motor rated current is different. You can set this value to make them same

.4.3.25 Code 1D (Restore factory settings)

0: Disable
1: Restore factory settings

.4.3.26 Code 1E (Bypass function)

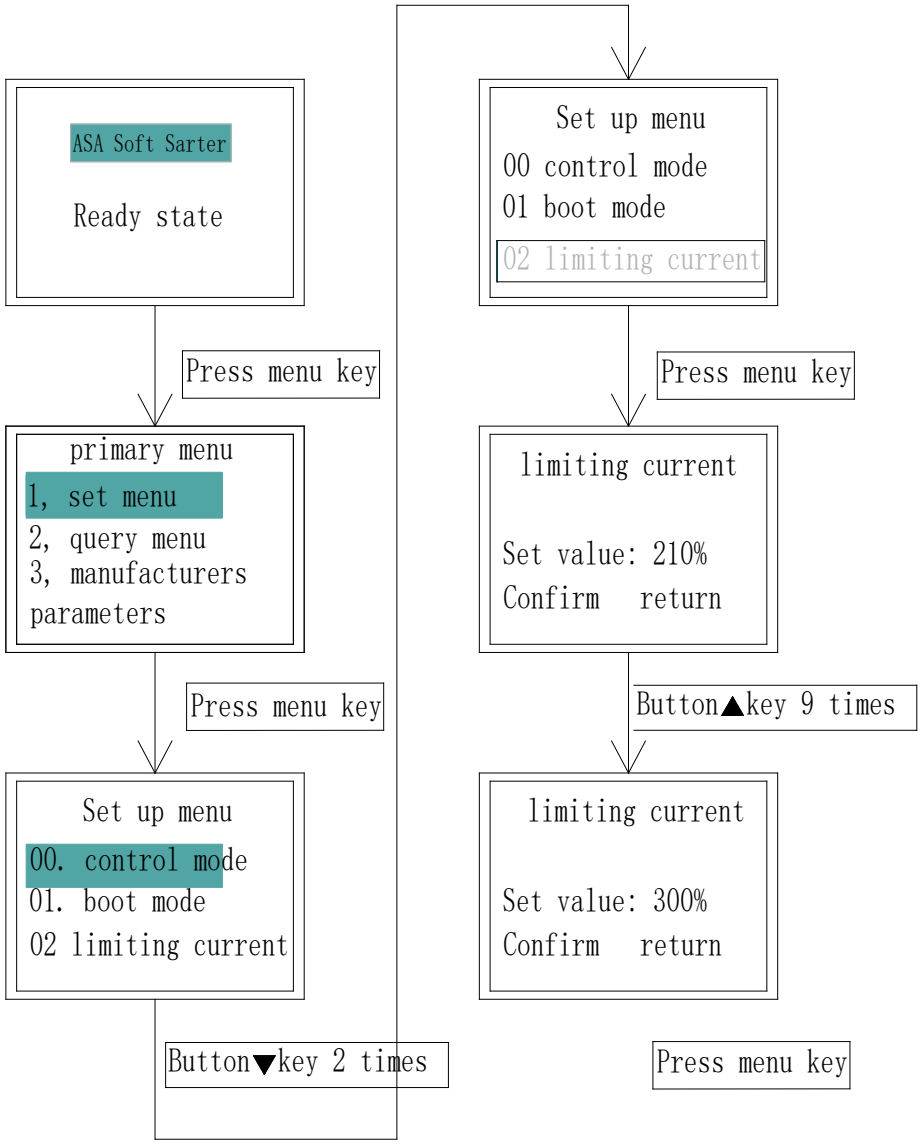
0: Soft starter works in Bypass mode. After the motor starts, it switches to the grid power.

1. Soft starter works without bypass. After the motor starts, the soft starter provides power to the motor.

4.4 How to program

4.4.1 Programming settings

Setting the parameters of the soft starter correctly is the premise of the full implementation of its performance, and the following is to modify the current limit value as an example to introduce the parameter setting method of the ASA series soft starter panel



Note: once the data is written, it will remain in place until the next modification, not affected by power failure.

Chapter 5 Electric operation

5.1 Test run

The main purpose of the test is to allow the user to confirm whether the direction of rotation of the motor and the turning is normal

（1）To control the power supply, the panel should be displayed the company's LOGO for 2 seconds.

（2）The text area shows the ready state

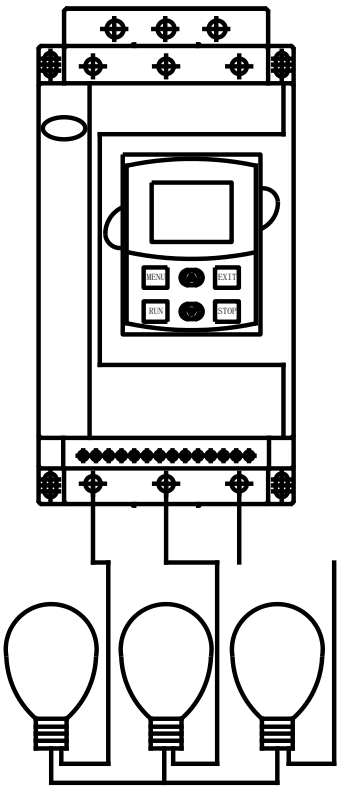
（3）According to the situation of the motor load in the field, the parameters of the soft starter can be adjusted reasonably, so that the motor can reach the optimal starting torque

（4）according to the run key at the same time to observe the direction of rotation of the motor is in line with the requirements, if there is an exception can press the stop key to stop, such as motor rotation can improve the starting voltage value, increase the starting torque

（5）The following methods can also be used to check whether the starter is normal, under normal circumstances, the three light bulbs should be smooth

5.2 Running

- Refer to table 1 for starting parameters
- According to the panel RUN key, the starter starts to run, the motor is stable and no current mutation shows that the parameter is set, the STOP key can be used to stop the machine
- After the failure, press 6.2 to find the cause of the failure
- Can not start, check the value of the code 00 and external control wiring: terminal STOP and COM disconnect when the starter cannot start
- Press the STOP key or close the external control terminal RET to reset the fault state
- When the starting time for a drag two parking time must be set to 0, such as the need for external control terminals RUN and STOP start operation, please set the code 00 to 1or 3。



Light Power
Rating＞200W

You can also check whether the starter is normal by using the figure above. Under normal circumstances, the three bulbs should be steadily lit up

5.3 Running time data display

The average value of three-phase current when running is shown in figure 5.2:

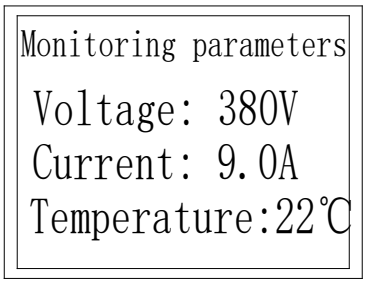


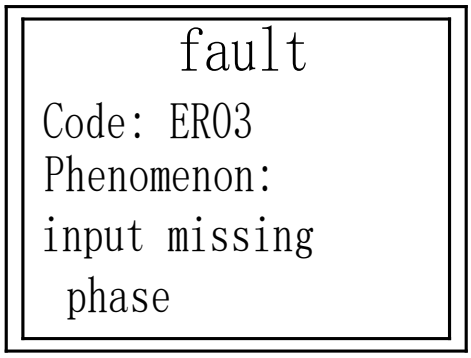
Figure 5.2 Figure 5.3

The operation can also press the MENU key to enter the menu in the main menu, select the monitoring parameters, you can view the voltage, current and SCR temperature, as shown in Figure 5.3

Chapter 6 Fault display

ASA soft starter has protection function; any fault will be shut down, and display and memory fault code. Only with the stop key or the external control reset terminal remove the fault state to reboot. (which can be self starting function, in the two line method to start)

6.1 Panel display



6.2 Fault code table

Fault phenomenon	fault code	Causes and troubleshooting
Instantaneous stop broken circuit	ER01	Instantaneous stop terminal EMS open circuit to COM
Start timeout	ER02	Current limiting value is too low or too heavy
Input phase defect	ER03	Check whether the input circuit and the bypass contactor is stuck in the closed position and whether the SCR is open or not
Output lacking phase	ER04	Check motor wiring and SCR damage
Parameter error	ER05	Restart or re enter the Default value
Starting over current	ER06	Whether the load is too heavy or the motor power does not match with the soft starter

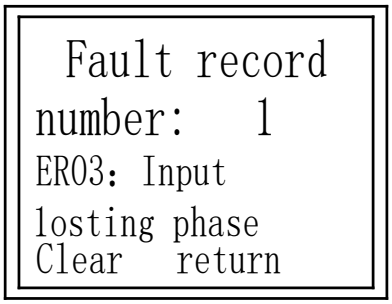
Operating overload	ER07	Check whether the load is too heavy
Running light load	ER08	Check if the load is too light
SCR overload	ER09	Starting too often or motor power does not match the soft starter
Load short circuit	ER10	Check whether the load or thyristor is short circuited or the load is too large
Bus fault	ER11	485 communication failure, check the external connection terminal
Low Voltage	ER12	Check the input power supply voltage or set the item 12
Voltage high	ER13	Check the input power supply voltage or set the item 11
wiring error	ER14	When the control mode is 3 or 4, the external control terminal is in the open state
Communication failure	ER15	Keyboard communication failure

6.3 Fault memory

Enter the query menu fault records can view the fault, the starter can remember 10 faults for the user to analyze, the user can clear the stored fault

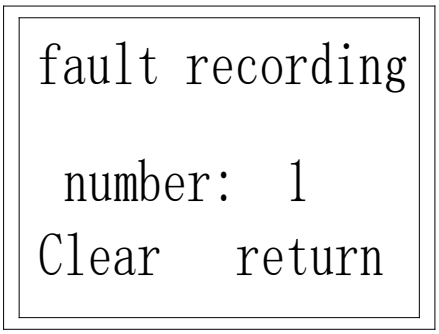
6.3.1 Display memory failure

- The number 1 represents the most recent failure, and the new fault will wash away the previous memory
- You can view the▲▼ key to see all of the fault records.



6.3.2 Fault clearing

After the failure of the query, the boot is best to clear the previous fault memory, the method is in the case of the fault query, press the menu key can be cleared



Chapter 7 Communication protocol

When selecting bus control, the function code 00 must be set to 2,4,5 to activate the bus

7.1 ASA Modbus Protocol Part

This section describes how to use Modbus communication to control the various operations of ASA

7.1.1 Overview of Modbus

Modbus is a serial asynchronous communication protocol. The physical interface for rs485.modbus is designed for Modicon PLC, with PLC structure characteristics of the. Modbus in the network control, ASA can be likened to a soft starter PLC to read and write. ASA will start stop control, state information (fault current, etc.) to keep register area and function parameter mapping (4xxx). Through the use of PLC to read and write control of the master station.

Table 7.1

Register address	action code	Register function specification
40001	06	control word
40002	03	status word
40003	03	Average current (%)
40004	03	Fault code
40257－40281	03&06	Soft starter function code

（1）In addition to the above listed registers are illegal and cannot be read or written. Otherwise, ASA will report an exception code to the controller

（2） All data addresses are based on the reference of 0, i.e., the address of the coil relay 40001 is 000040257 () of 0100

7.1.2 Exception code

ASA supports the standard MODBUS exception code (see table 7.2)

Table 7.2 exception code

code	name	Description
01	Illegal function	Function code cannot be executed, THS1-8000 does not support
02	Invalid data address	The received data address cannot be executed, the address overflow
03	Invalid data value	Received data cannot be executed 1.Parameter out of range

		2.Parameter cannot be modified 3.Parameters cannot be modified at run time

ASA only supports the function code listed in Table 3. If you use the other code, you will give the exception code 1, MODBUS

code	03	06
Function description	Read storage register	Preset single register

Code 03 reads only a single word (word)

7.1.3 Register declaration

- **40001 command register**

bit	value	description
0	1	Starter starting
	0	hold mode
1	1	Starter stop
	0	hold mode
2	0—1	Reset the starter
3—15	0	Unused

For example: from the soft starter station address 02, the controller sends out 020600000001, such as command normal execution, return code 20600000001 to check whether the normal starting starter status register. If a fault exists, should be given 020600000004 reduction.

- **Register address 40002 status register**

The status register reflects the state of the soft starter, represented by a bit

Bit	value	description
0	1	Starting state
	0	Parking state
1	1	running state
	0	Parking state
2	1	Soft stop state
	0	Parking state
3	1	fault condition
	0	normal condition
4—15		Unused

Example: read status code 02 03 00 01 00 01

If the starter is starting, the return code 02 03 02 00 01

Returns 02 03 02 00 08 if the starter fails and the fault type can be read in accordance with 4

- **40003 Average current (sixteen)**

This value indicates the average value of the three-phase actual current of the ASA, according to the setting

of the function code 0C, or the current percentage or the actual current value

Example: read current size

Send Code 02 03 00 02 00 01

If the current is 235A, return 02 03 02 00 EB

- **40004 Fault code (sixteen)**

When the status register 40002 bit 3 is 1, the ASA is represented in a fault state. The fault code is consistent with the 7.2

For example: send code 02 03 00 03 00 01

if returns 02 03 02 00 04, the current input is missing, description current input losing phase (fault code 03)

- **Soft starter function parameter register 40xxx**

Among them (xxx-1) with sixteen hexadecimal as 1YY, YY and table 3 - 1 code value is corresponding; for example, with the function code 08 (sudden Jump voltage) corresponding to these functions can be read and write code, the following are examples of its use:

Example 1 read function code 02 (current limit value) size

Controller gives 02 03 01 02 00 01

Returns the value of the 02 function code read. 02 03 02 01 5E indicates the current limit value is 350%

Example 2 read function code 13 (protection level)

Send code 02 03 01 13 00 01, return to 02 03 02 00 03, read the protection level of 3

Example 3 rewrite the soft starter function code 02 (limiting current) to 250%

The host sends the code 02 06 01 02 00 FA, ASA returns the code to 02 06 01 02 00 FA; if returns the 02 86 03 to indicate cannot write, possibly the starter is running

Example 4 the function code 09 is stored at a value of about 10 times, such as the read function code number (Jump time)

Send code 02 03 01 09 00 01, return of 02 03 02 00 03, read the Jump time is 3, the actual value of 0.3s. is the contrary, write Jump time 0.3s, just send the 02 06 01 09 00 03

7.1.4 Connection and setting

The following set of functional code and communication related to the use of the panel must be set

ASA function code	content	set value
16	Bus address	1－247
17	Baud rate	1200~19200bps
18	even-odd check	0: NO 1: odd 2: even

7.1.5 Precautions for use

（1）The address of the ASA (function code 16) must be in accordance with the control address of the controller; the baud rate (function code 17); even-odd check (function code 18) is the same as the controller; the parameter must be reset to power up

（2）If not receiving the response data, the parameters should be set to check the above, the 485 terminal connection is correct, the CRC effect is correct.

（3）More than one ASA communication, should be at the end of the last AB on both ends of the 120 ohm resistance

（4）In connection with other MODBUS devices, as shown in Figure 7-1

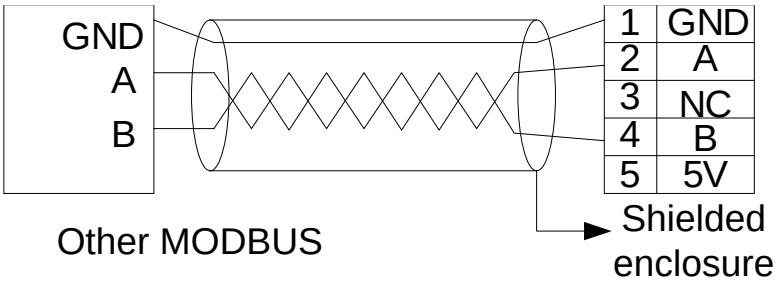


图 7.1

7.1.6 Establishment of communication network

（1）Connection a soft start and a computer connection

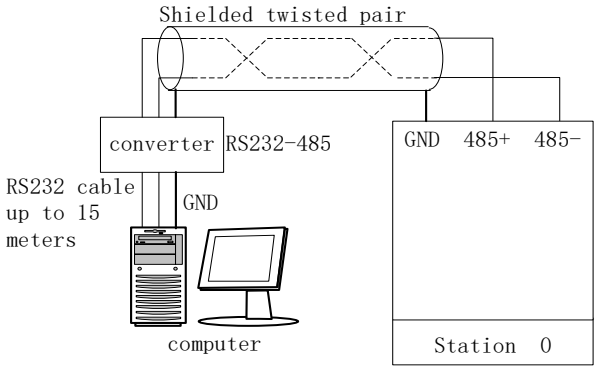


Figure 7.2 the connection between a soft start and a computer

（2）Multiple soft start and computer connections

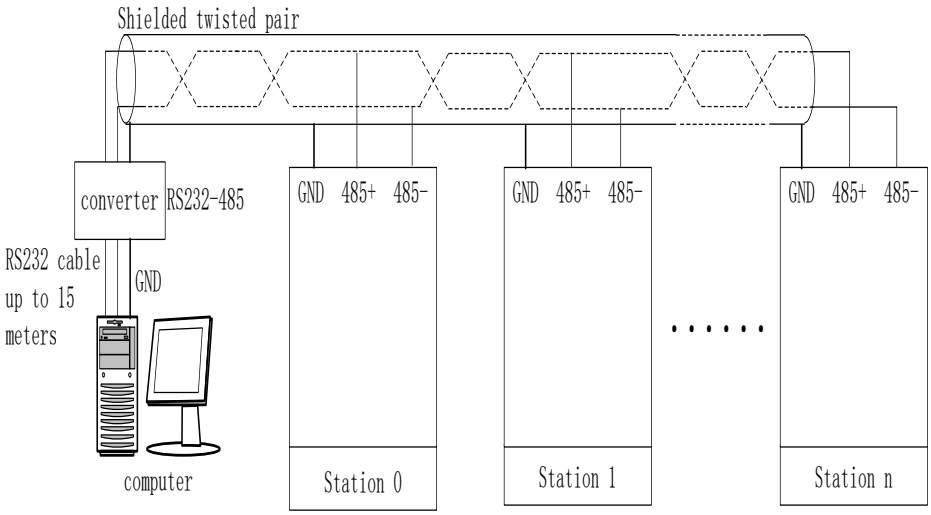


Figure 7.3 the connection between a soft start and a computer

Chapter 8 ASA use precautions and routine maintenance

8.1 Precautions for use

- **Prevent electric shock**

  The input power of ASA soft starter, when the load or open phase, even in the stopped state, its output will still have a very high voltage induction. The output end of the no contact of the soft starter, otherwise there will be the risk of electric shock.

  ASA soft starter control circuit board with 380V voltage, the electric shock risk when debugging

- **Induction voltage**

  Induction voltage soft starter ASA output at no-load is normal phenomenon, does not affect the use of induction voltage by leakage of SCR (silicon controlled rectifier, GTR, IGBT and other solid-state semiconductor devices have different degrees of leakage) exchange pathway and dv/dt resistance capacitance filter loop. Voltage meter to zero measurement, about 100~220v (related to the internal resistance of the voltmeter). The induction voltage of load capacity is very small, disappeared in the output connection after load.

- **Compensating capacitor**

  The reactive power compensation capacitor used to improve the power factor must be connected to the input of the ASA soft starter, not to be connected to the output, otherwise it will damage the SCR power device in the soft starter

- **Meg-ohmmeter**

  The insulation resistance between the input and output of the ASA soft starter shall not be measured with the Meg-ohmmeter, Otherwise the thyristor and the control board of the soft starter may be damaged due to excessive pressure

  ASA can be used to measure the soft phase of the soft starter and relatively insulated, but should be in advance with three short lines will be the three-phase input and output shorted, and unplug all the plugs on the control panel

  Measurement of motor insulation, should also follow the above principles

- **Input and output**

  Do not connect the input and output terminals of the main circuit of the ASA soft starter, otherwise it will result in the unintended action of the soft starter, which may damage the soft starter and the motor

- **Bypass phase sequence**

  When the bypass contactor is used, the phase sequence of the starting circuit should be consistent with the phase sequence of the bypass circuit. Otherwise, the bypass switch will cause an interphase short circuit, which will cause the air circuit breaker to trip or even damage the equipment

- **Low voltage level**

  Terminals 7,8,9,10,11 shall not be connected to other external power sources on the terminals, or they will damage the internal circuit of the soft starter

- **Soft starter voltage rating**

  Terminals 13,14 use external AC380V operating voltage, not on these terminals connected to other voltage rating power supply, otherwise it will damage the internal circuit of the soft starter

8.2 Daily maintenance of soft starter

- **Dust content**

If there is too much dust, the insulation level of the soft starter will be reduced, and the soft starter may not work properly

a.primary circuit creepage, pulling arc, hazard equipment;

b.two circuit leakage, short circuit, control failure;

c.heat sink thermal resistance, SCR temperature rise

- **Cleaning dust**

a.clean and dry brush gently brush the dust;

b.use compressed air to blow away the dust

- **Dew condensation**

If frosting, the insulation level of the soft starter will be reduced, and the soft starter may not work properly

a.primary circuit creepage, pulling arc, hazard equipment;

b.two circuit leakage, short circuit, control failure;

c.aggravates seat corrosion of metal parts

- **Drying up**

a.With electric or electric stove drying;

b.Wwet distribution room

Schedule 1, Application

Mechanical type	Load type	Starting mode			Numerical setting		Rise time
		voltage	current	over loading	voltage（%）	current（%）	
centrifugal pump	standard termination		•			250	5
draught fan	Biased load		•	•		400	40
Compressor (piston type)	standard termination		•			300	10
Compressor (centrifugal)	standard termination	•			30		20
transport	standard termination		•			250	10
agitator	standard termination		•	•		350	5
ball crusher	Heavy load		•	•	70	400	50
breaker	Heavy load	•			60		45

Schedule 2, Peripheral parts specification parameters

ASA series soft starter (5.5kw-75kw)

Model	Power rating（kw）	Rated current (A)	SCPD specification	Primary line specification	Note
ASA-0055	5.5	11	20	2.5mm^{2}cable conductor	55kW and below with the cable lead out wiring, the way into the three out of six. Rated power rated current is the maximum value of soft starter。
ASA-0075	7.5	15	30	4mm^{2}cable conductor	
ASA-0110	11	23	50	6mm^{2}cable conductor	
ASA-0150	15	30	80	10mm^{2}cable conductor	
ASA-0185	18.5	37	80	10mm^{2}cable conductor	
ASA-0220	22	43	80	16mm^{2}cable conductor	
ASA-0300	30	60	100	25mm^{2}cable conductor	
ASA-0370	37	75	150	35mm^{2}cable conductor	
ASA-0450	45	90	200	35mm^{2}cable	

				conductor	
ASA-0550	55	110	200	35mm^{2}cable conductor	

Note: the specifications of peripheral accessories list for reference

ASA series soft starter (75kw-320kw)

Model	Rated power (kw)	Rated current (A)	SCPD specification(A)	Primary line specification	Note
ASA-0750	75	150	300	35mm^{2}cable conductor	75kW and above is used to lead the cable wiring, six to the way out of the three. Rated power rated current is the maximum value of soft starter
ASA-0900	90	180	320	30×3mm^{2}Copper bar	
ASA-1150	115	230	480	30×3mm^{2}Copper bar	
ASA-1320	132	260	600	30×4mm^{2}Copper bar	
ASA-1600	160	320	600	30×4mm^{2}Copper bar	
ASA-1850	185	370	700	40×4mm^{2}Copper bar	
ASA-2000	200	400	700	40×4mm^{2}Copper bar	
ASA-2500	250	500	800	40×5mm^{2}Copper bar	
ASA-2800	280	560	1000	40×5mm^{2}Copper bar	
ASA-3200	320	640	1000	40×5mm^{2}Copper bar	
ASA-3550	355	710	1000	40×5mm^{2}Copper bar	

Note: the specifications of peripheral accessories list for reference

ASA series soft starter (400kw~600kw)

Model	Rated power (kw)	Rated current (A)	SCPD specification	Primary line specification	Note
ASA-4000	400	800	/	50×6mm^{2}Copper bar	400KW and above is used to lead the cable wiring, six to the way out of the three. Rated
ASA-4500	450	900	/	50×6mm^{2}Copper bar	
ASA-5000	500	1000	/	60×8mm^{2}Copper bar	
ASA-6000	600	1200	/	60×8mm^{2}Copper bar	

						power rated current is the maximum value of soft starter

Note: the specifications of peripheral accessories list for reference.

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