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SS70 built-in bypass soft starter user manual

VEICHI

Address: No.1000 Songjia Road, Guo Lane Street, Wuzhong Economic and Technological Development Zone, Suzhou,China
Telephone: (0512) 66171988
Portraiture:400-600-0303
Zip code:215000
E-mail: zqb@veichi.com

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SS70 built-in bypass soft starter user manual

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PREFACE

Thank you for purchasing SS70 built-in bypass contactor soft starter. Thank you for yousupport of Thinkvert. We will repay your love with excellent product performance!

The SS70 built-in bypass contactor soft startercomponents, materials and the latest microcomputer control technology. This product is a star-stomanufactured using high-qualifdevice that integrates motor soft start, soft stop, energy saving and multiple protection functionsand is dedicated to use a constant speed AC motor as the driving power. Compared with thtraditional starting method, after using the SS70 built-in bypass contactor soft starter, thevoltage, torque and current on the motor can work smoothly, so the mechanical impact of the loadwill be completely improved; rich motor protection functions , lt has played a very important role irextending the service life of the motor; at the same time, it has the communication function with thehost computer control system, which can effectively implement the networking function of thesystem.

In order to facilitate your use, this manual will provide you with relevant precautions such asinstallation wiring, parameter setting, fault diagnosis and daily maintenance. In order to ensure thatyou can correctly install and use the SS70 built-in bypass contactor soft starter and give fulplay to its superior performance, please read this user manual carefully before installation and keepit properly.

As a power electronic device, during the operation and use of the soft starter, for the safety of youand the equipment,be sure to leave it to professional motor engineers to install and debug and setthe parameters. Thank you!

Reader object
This manual is suitable for reading by the following persons:
Equipment installation personnel, maintenance, care personnel, designers

Chapter 1 Safety Information

1.1 Statement of precautions

Statement

•Bofore operating this aquipment. please read theoperation user manual carefully and strictlyfollow theoperation specifications of the manual.

•During installation and maintenance operationsstrictly follow the rolevant national standards and industrypractices of the manual.

•The manufacturer is not responsible for anyadverse consequences caused by not following the corresponding guidelines and specifications.

• Make sure that the soft-start wiring is correct andthe safely measures are adequately prepared before closing.

• Before maintaining the soft starter or motor, allpower inputs must be disconnected.

• Do not place flammable materials near the softstarter, otherwise there is a danger of fire.

• it is strictly prohibited to install the soft starter inan environment containing explosive gas, otherwise thereis a danger of explosion.

• Wiring must be performed by qualified personnelotherwise there is a danger of electric shock.

• When optional accessories are required, it isrecommended to use special accessories for soft startersfrom Aikeweier Technology Co., Ltd. to avoid potentialsafety hazards.

• The main circuit terminal and the wire nose musbe firmly connected, and the exposed part of the cablenose for main circuit wiring must be wrapped with insulating tape to avoid potential safety hazards.

Cautions

•After the product is connected to the main powersupply, the voltage inside the local devices and locallocations on the PCB is equal to the main voltage. If it istouched in violation of the regulations, it will be verydangerous and may cause electric shock injury or death.

•After this product is connected to the mainpower, even after the control voltage is disconnected orthe starter is stopped, the sample full voltage signal willstill appear at the output of the soft starter.

• Pay attention to the danger of electric shock. Donot touch the soft starter with wet hands.

• In order to ensure your safe use and preventaccidental electric shock, please ensure that the product iswell grounded.

• It is strictly forbidden to connect the power factorcompensation capacitor to the output of the starter.

Implementation Standards

• This product is designed according to the requirementsof the starter product standard EN I IEC60947-4-2 classequipment level standard.

• For further information, please refer to other relatedtechnical notes of Thinkvert Technology Limited.

Cautions

• During transportation, do not pull the soft starterthrough the display unit and cover to avoid personal injuryor damage to objects.

• Do not drop foreign objects such as screws, gaskets, and metal rods into the soft start, otherwise there is adanger of fire and damage to the device.

• Do not install in places where water droplets maysplash, such as water pipes.

• If the soft starter is damaged or the parts areincomplete, please do not install or run it, otherwise there isa danger of fire and personal injury

• Do not install in direct sunlight.

1.2 About soft starter

Capacitors with improved power factor or varistors for lightningprotection can cause soft starter fault trips or damage to thecomponents. Be sure to remove them. As shown in Figure 1-1:

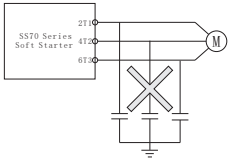


Figure 1-1 The use of capacitors at the output of the soft starter is prohibitec

Switching devices such as contactors at the output

If you need to install a switching device such as a contactorbetween the output side of the soft starter and the motor, makesure to switch on and off when the soft starter is output, otherwisthe soft starter may be damaged.

Input voltage exceeded

Use the soft starter within its rated voltage range. In speciaoccasions, please use a step-up or step-down device.

Lightning protection

The soft starter is equipped with a lightning overcurrentprotection device, which has a cetain self-protection ability forinduction lightning.

Altitude and derating use

In areas with an altitude of more than 1,000 meters, theheat dissipation effect of the soft starter becomes poor due to thethin air, so it must be derated. Figure 1-2 shows the relationshirbetween the rated current of the soft starter and the altitude.

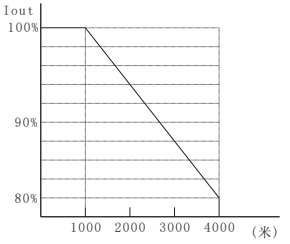


Figure 1-2 Relationship between rated output current of soft starter and altitude

Chapter 2 Product Specifications and Arrival Inspection

2.1 Product technical specifications

Table 2-1 Product technical specifications

Item		Descriptior
Applicable standards		GB14048.6-2016（IEC60947-4-2）
Adapted motor type		Three-phase asynchronous motor
Motor Power		11A…….1260A(5.5~630KW)
Input	Control voltage	AC220V±15%；AC110V±15%（Note when ordering）
	Rated voltage	AC380V±15%；50Hz/60Hz；690V±15%（Note when ordering）
Adjustable starting time		1～120S adjustable
Adjustable stop time		0～120S adjustable
Control Mode		1. Ramp voltage 2. Ramp current 3. Current limit mode
I/O	Digital input	3 channels(X1- X3)
	Analog output	1channel4~20mA/0-10V
	Relay output	2 relay outputs
	Run command input	Keyboard display unit setting, control terminal setting RS485 communication is given
Communication	Protocol	Standard Modbus protocol, 1 channel
Display unit	LCD display	Can display current, voltage, alarm and other motor parameters
Protection and monitoring		Short circuit overvoltag overlgad, undervoltage, phase loss, overcurrent, temperature protection
Environment	Use place	Indoor, free from direct sunlight, dust-free, corrosive and flammable gases, oil mist, water vapor, dripping water or salt, etc.
	Altitude	If the altitude exceeds 1000m, the capacity should be reduced accordingly For every 100m increase, the current decreases by 0.5%
	Ambient temperature	10 C ~+40C the change of air temperature is less than0.5 C / min; derating should be used above 40 C , and the outputcurrent will be derated by 2% for each exceeding 1 C, the maximum temperature is 50 C
	Humidity	Less than 95% RH,no condensation
	Storagetemperature	-40℃～70℃
Structure	Level of protection	IP20
	Cooling method	Radiator, natural cooling
Installation method		Vertical installation inside the cabinet

2.2 Product Series Introduction

2.2.1 Arrival inspection

Before leaving the factory, this product hasundergone strict quality inspection and is packed withantcollision and anti-shock packaging. Howeveraccidents may occur accidentally during transportation andhandling. Therefore, after you receive the product, pleaseimmediately check the arrival of the product.

① Check whether the soft starter caused damageduring transportation.

② Check the nameplate of the motor soft starter toensure that the product you receive is the product yoordered.

③The packing box contains a SS70 built-in bypass soft starter, a user manual, acertificate and a warranty card. If any of the above listed items is missing or damaged, please contact your local agent, dealer or our technical service center directly.

2.2.2Model and nameplate of SS70 built-in bypass contactor soft starter

The model description of the SS70 built-in bypass soft starter is shown in Figure 2-1a, and the nameplat- 05540description is shown in Figure 2-1b:

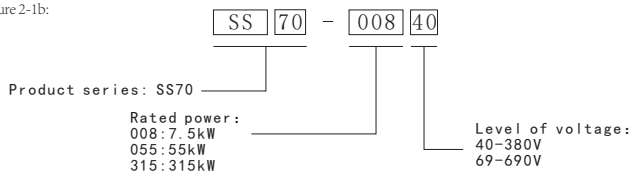


Figure 2-1a Model of SS70 built-in bypass contactor soft starter

Example instructions:

SS70-008-40 meaning: This SS70 built-in bypass soft starter has display function in Chinese and English, working voltage of 380V, rated power of 55KW.

SS70 built-in bypass contactor soft starter nameplate description as shown in Figure 2-1b

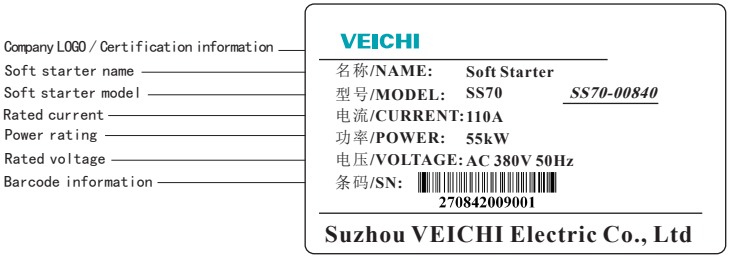


Figure2-1b SS70 series nameplate

2.2.3 Selection of specifications and accessories

The body type and matching power of the SS70 built-in bypass soft starter are shown in the table:

Size number and matching power of SS70-380V are shown below

Model	Adapt to the motor power (KW)	Rated current(A) 380V	Enclosure mode	One line specifications	Control power supply minimum capacity /VA
SS70-008-40	7.5	22	M-SS-01	6mm²	195
SS70-011-40	11	27	M-SS-01	10mm²	195
SS70-015-40	15	30	M-SS-01	10mm²	195
SS70-018-40	18.5	34	M-SS-01	16mm²	195
SS70-022-40	22	38	M-SS-01	16mm²	195
SS70-030-40	30	65	M-SS-02	25mm²	300
SS70-037-40	37	70	M-SS-02	25mm²	300
SS70-045-40	45	88	M-SS-02	35mm²	300
SS70-055-40	55	110	M-SS-03	50 mm²	400
SS70-075-40	75	140	M-SS-03	70 mm²	400
SS70-090-40	90	172	M-SS-04	25*3 Copper row	905
SS70-110-40	110	200	M-SS-04	25*3 Copper row	905
SS70-132-40	132	280	M-SS-05	40*3 Copper row	1600
SS70-160-40	160	320	M-SS-05	40*3 Copper row	1600
SS70-185-40	185	355	M-SS-05	40*5 Copper row	1600
SS70-200-40	200	380	M-SS-05	40*5 Copper row	1600
SS70-220-40	220	440	M-SS-05	40*5 Copper row	1600
SS70-250-40	250	480	M-SS-05	40*5 Copper row	1600
SS70-280-40	280	560	M-SS-06	50*5 Copper row	3678
SS70-315-40	315	600	M-SS-06	50*6 Copper row	3678
SS70-355-40	355	700	M-SS-06	50*6 Copper row	3678
SS70-400-40	400	780	M-SS-06	50*8 Copper row	3678
SS70-450-40	450	820	M-SS-06	50*8 Copper row	3678
SS70-500-40	500	960	Cabinet	50*10 Copper row	3678
SS70-630-40	630	1100	Cabinet	50*12 Copper row	3678

Note:

1. When ordering, please inform the supplier of the product model, specifications.load and use conditions in order to correctly select the product.
2. The standard soft start configuration of this model includes the bypass contactor and the current detection transformer.

The accessories in the above table are for reference only.

The body type and matching power of the SS70 built-in bypass soft starter are shown in the table:

Size number and matching power of SS70-690V are shown below

Model	Adapt to the motor power (KW)	Rated current(A) 690V	Enclosure mode	Control power supply minimum capacity /VA
SS70-030-69	30	31	M-SS-02	300
SS70-037-69	37	38	M-SS-02	300
SS70-045-69	45	46	M-SS-02	300
SS70-055-69	55	57	M-SS-02	300
SS70-075-69	75	77	M-SS-02	300
SS70-090-69	90	93	M-SS-03	400
SS70-110-69	110	114	M-SS-03	400
SS70-132-69	132	136	M-SS-04	905
SS70-160-69	160	165	M-SS-04	905
SS70-185-69	185	191	M-SS-04	905
SS70-200-69	200	207	M-SS-05	1600
SS70-220-69	220	227	M-SS-05	1600
SS70-250-69	250	258	M-SS-05	1600
SS70-280-69	280	289	M-SS-05	1600
SS70-315-69	315	325	M-SS-05	1600
SS70-355-69	355	367	M-SS-05	1600
SS70-400-69	400	413	M-SS-05	1600
SS70-450-69	450	465	M-SS-05	1600
SS70-500-69	500	517	M-SS-06	3678
SS70-630-69	630	651	M-SS-06	3678

Note:

1. When ordering, please inform the supplier of the product model, specifications.load and use conditions in order to correctly select the product.
2. The standard soft start configuration of this model includes the bypass contactor and the current detection transformer.

The accessories in the above table are for reference only.

Chapter 3 Installation and Wiring

3.1 Installation of the soft starter

The soft starter should be instaled indoors and in awel.ventilated place; vertical installation, do not install it upside down.obliquely or horizontally; install the base should be firm and flat. Leaveenough space around.

When choosing an installation environment, you should payattention to the following:

1) The ambient temperature should be in the range of -10 C+ 40 C. if the temperature exceeds 40 C, heat dissipation measuresor derating should be adopted;
2) The humidity requirement is lower than 95%, and no watercondensation occurs;
3) Install in a place where the vibration is less than 5.9m / s2(0.6g);
4) Avoid installation in direct sunlight;
5) Avoid installing in dusty and metal powder places;
6) It is strictly forbidden to install in places with corrosive orexplosive gas;

Notice:
If there are special installation requirements, pleaseconsult and confirm in advance.

Installation interval and distance requirements, as shown inFigure 3-1a:

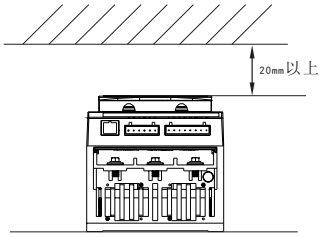


Figure 3-1a Installation space distance (mm)

When multiple soft starters are instaled, as shown in Figure3-1b, when the two soft starters are instaled up and down, a deflectorshould be added in the middle as shown in Figure 3-1c.

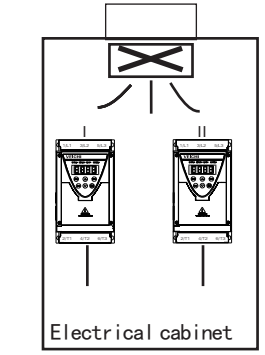
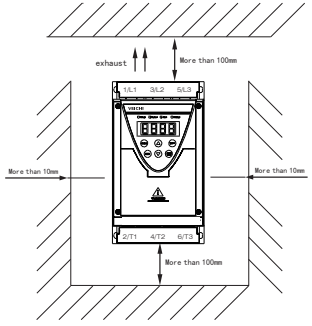
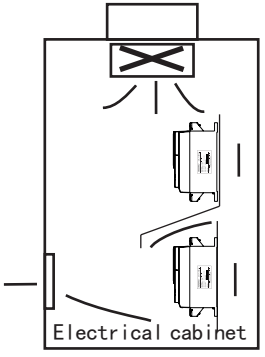


Figure 3-1b Multiple installatior





The ventilation direction is shown in Figure 3-1d:

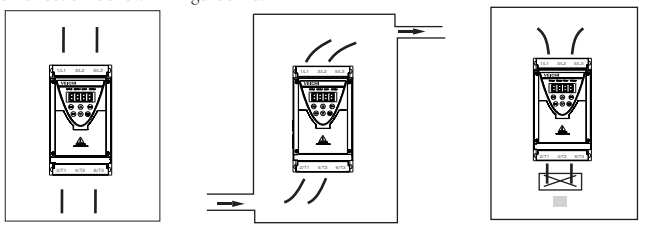


Figure 3-1d Ventilation direction

Please install according to the above installation space to ensure that this product can work normally in a good environment. For special installation requirements, please contact the manufacturer in advance.

3.2 Wiring of soft starter

Cautions

- Only after confirming that the power supply of the soft starter is reliably cut off and the ownership indicator of thedisplay panel goes out, wait 3 minutes before opening the panel.
- Only after confirming that the power of the main circuit of the soft starter has been reliably disconnected, the wiring of the main circuit and the control circuit can be performed.
- Please carefully check the voltage level of the soft starter before power on, otherwise equipment damage andpersonal injury may be caused.

3.2.1 Overview

SS70 series wiring part is divided into main circuit and control circuit. Users can choose different connectionsaccording to different needs.

The main circuit consists of three-phase input power cables and motor power cables, as shown in Figure 3-2b

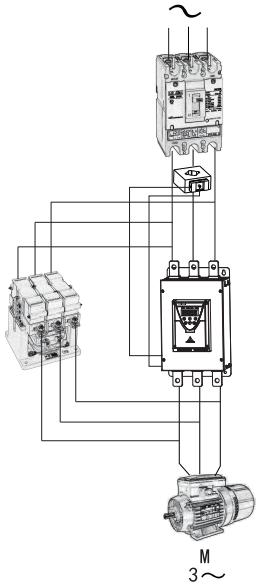


Figure 3-2a Conventional soft starter wiring diagram

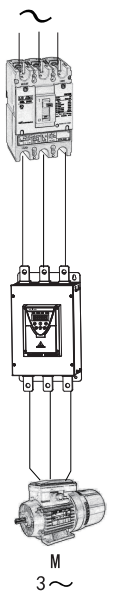


Figure 3-2b SS70 soft starter wiring diagram

3.2.2 1/O terminals of main circuit and external control terminals

The sequence of the input and output terminals of the main circuit is shown in Figure 3-3:
The main circuit input and output terminal functions are shown in Table 3-1

Table 3-1 Main circuit input and output terminal function table

Terminal symbol	Description
1/L1 3/L2 5/L3	3phase AC power input
2/T1 4/T2 6/T3	Motor input

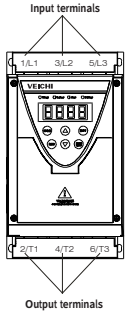


Figure 3-3 Input and output terminals

The control terminals of SS70 series soft starter as the Figure 3-4:

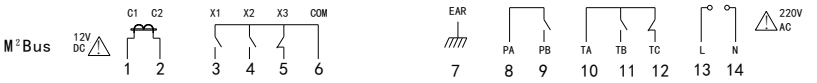


Figure 1-1 Arrangement of built-in soft starter control terminals of SS70 series

Control terminal function description:

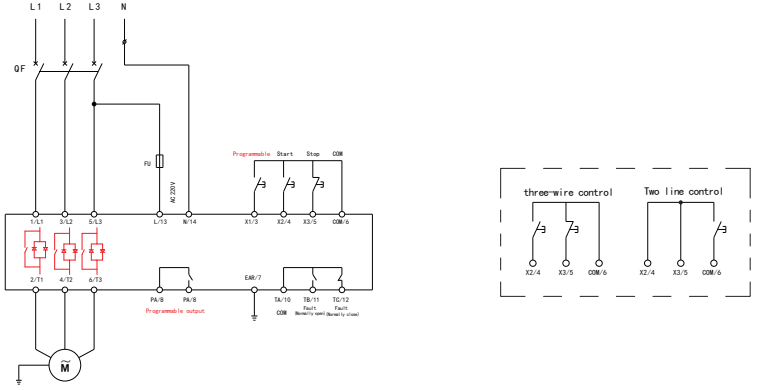
SS70 has 14 external control terminals for external signal control, remote control and systemcontrol, as shown in Table 3-5:

Table 3-5 External control terminal

Terminal number	Terminal name	Description
M²Bus	PIN1:COM	Isolated 12V output
	PIN8:Isolated 12V output	
	PIN4:485-A	Modbus-RTU
	PIN5:485-B	
CI/1	Analog output	Optional4～20mA/0～10V
C2/2		
X1/3	Programmable input	Programmable
X2/4	Extemnal control start terminal	X2/4 and COM /6 close to start
X3/5	Extemnal control stop terminal	X3/5 and COM/6 open to stop
COM/6	Common terminal	Logic input common

Terminal number	Terminal name	Description
EAR/7	PE	Ground
PA/8	Programmable relay	Programmable
PB/9		
TA/10	Fault output relay	Common terminal
TB/11		Fault output normally open terminal
TC/12		Fault output normally closed terminal
L/13	Control power input terminal	AC220V, 50Hz (opfional 110V, 60z)
N/14		

Figure 3-6 shows the standard wiring diagram of the SS70 built-in bypass soft starter:



Attention:
SS70 Series built-in soft starter adopts two start-stop control modes: panel, control terminal two lines and three lines
1. two-line control is hold signal three-line control is trigger signal.
2. With the two-line control, the panel control is invalid.
3. When using the three-line control, the panel control is effective
4. X3 and COM must be kept closed for panel control.

Figure 3-6 Standard wiring diagram of the SS70 built-in bypass soft starter

3.2.3 Control circuit configuration and wiring

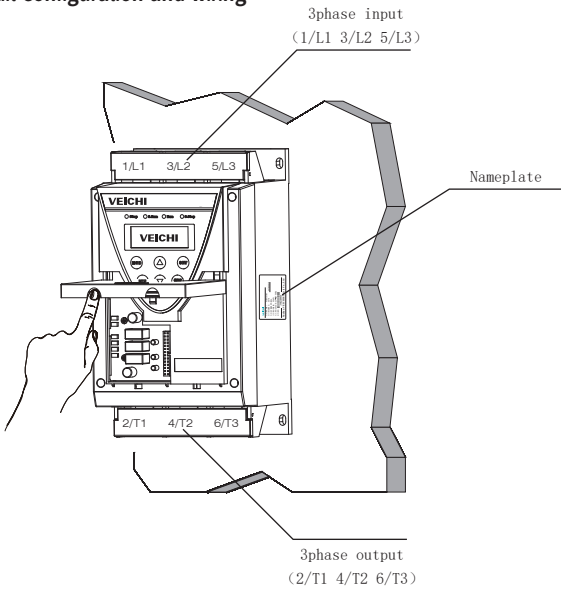


Figure 3-7 Overall structure of SS70 built-in bypass soft starter

Notice：

It is recommended to use a wire of 1mm? or more as the terminal connection wire.

3.2.4 Field wiring requirements and grounding requirements

1， Field wiring requirements：

In order to avoid mutual coupling and interference during the operation ofthe equipment, control cables, power cables, and motor cables should be instaledseparately. Generally, there should be a sufficient distance between them and asfar as possible, especially when the cables are instaled in parallel and extend tlong distance . When the signal cable must pass through the power cable or theotor cable, keep the two vertically crossed, as shown in Figure 3-7.

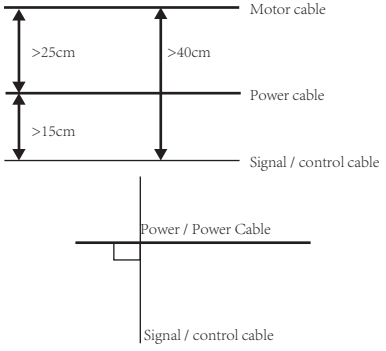


Figure 3-7 System wiring requirements

The main cable of the soft starter should be a cable with a specified areaThe control cable is generally a shielded cable, and the shielded metal wire messhould be connected to the ground terminal or ground point of the soft startethrough the cable clamps at both ends.

2. Grounding requirements:

Dedicated ground electrode (recommended), as shown in Figure 3-8a:

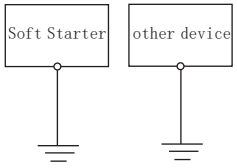


Figure 3-8a Grounding schematic 1

Common ground electrode (allowed), as shown in Figure3-8b:

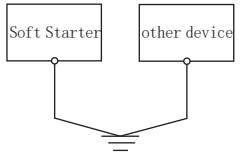


Figure 3-8b Grounding schematic 2

Common ground wire (not allowed), as shown in Figure3-8c:

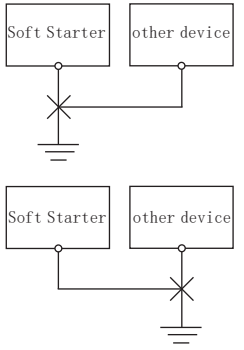


Figure 3-8c Grounding schematic 3

In addition, you should pay attention to the following:

a)In order to ensure that the impedance of differentgrounding systems is as low as possible, the largest standard sizeof the grounding cable should be used as much as possible.

b) It is better to use flat cables, because cables with thesame cross-sectional area have a lower high-frequencyimpedance than flat conductors.

c) One end of the grounding cable in the motor cable(4-core) between the motor and the soft starter is grounded on thesoft starter side, and the other end is connected to the motoground end; if the soft starter and the motor have a dedicatedgrounding end, the effect will be more good.

d) The grounding cable should be far away from the wiringto the 1 / 0 of the third device, and the grounding point should beas short as possible, and the grounding point should be as closeto the soft starter as possible.

3.2.5 Precautions

1) The soft starter should be instaled in an environment that meets therequirements of the standard, and should be kept away from dangerous places withflammable gas, explosive gas or dust to prevent fire or explosion.

2) After the soft starter is powered on, it is forbidden to contact the internaelectrical components and perform any inspection.

3) When connecting the input circuit of the soft starter, the power must be cut off first.

4) Do not connect the power supply voltage exceeding the allowable fluctuationrange to the soft starter, otherwise the device will be damaged.

5) Every time, check the circuit connection for errors, otherwise the soft starter wilbe damaged.

6) Make sure that the soft starter is safely grounded before running.

7) The control circuit wiring should be as far away as possible from the main poweicircuit connection cable to prevent malfunction due to interference noise.

8) If the control circuit connection line must pass through the main power line, itshould be made straight through; if the connection line is longer, twisted pair orshielded line should be used

Chapter 4 Soft Starter Operation Instructions

4.1 Terminology

The parameters of the SS70 are mentioned in this chapter. For details, please refer tothe chapter Fifth on page P19.

4.2 LCD keyboard display unit description

The SS70 LCD display description is shown in Figure 4-1:

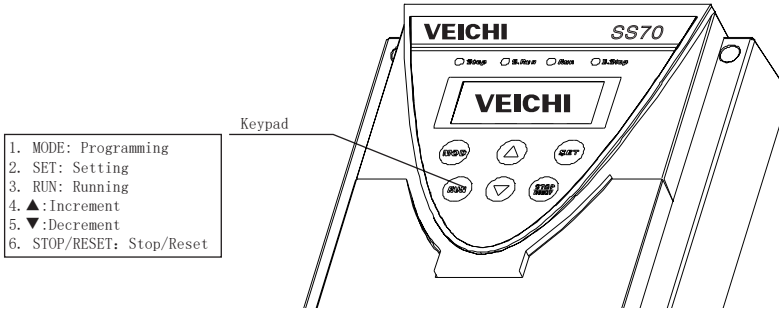


Figure 4-1 LCD keyboard display unit

4.2.1 Keyboard Function Description

There are 6 keys on the operation panel, and the function definition of each key is shown in Table 4-1.

Table 4-1 Key functions

Key	Name	Functions
MODE	Programming	Enter and exit programming state
SET	Setting	Data write confirmation under parameter setting modification state
RUN	Running	When the keyboard mode is valid, press this key to start the output in the stop state
▲	Increment	Data and function code are incremented; information screen group is switched up
▼	Decrement	Data and function code are decremented; information screen group is switched down
STOP/RESET	Stop	When the keyboard mode is valid, press this key to stop output in the running state
	Reset	Return to initial screen when fault reset / parameter setting;

When an alarm occurs in the SS70 built-in bypass type soft starter, the four indicators flashsimultaneously. Please perform troubleshooting before starting. Press the increment key (▲) or decrement key (▼) in each message screen group. , You can switch up or down in the screen content of each group.

4.2.2 Indicator description

SS70 operation panel has 4 indicators, stop indicator, soft start indicator, runninindicator, soft stop indicator. The meaning of each indicator is shown in Table 4-2:

Table 4-2 Indicator function description

indicator	Meaning	Indicator color	Sign
Stop	Light on, stopped	Red	Stop
Soft start	Light on, soft start state	Green	S.Run
Run	Light on, running	Green	Run
Soft stop	Light on, soft stop state	Red	S.Stop
All lights off	Light on, fault state	No	All lights off

Note：
When an alarm occurs in the soft starter, all four indicators are off. Please perform troubleshooting before starting.

4.2.3 Information screen introduction and operation

The info of SS70 screen has nine items: 1, Average current; 2, Phase A current; 3,Phase B current; 4, Phase C current; 5, Input voltage;6,The output voltage;7,Module temperature;8,alarm record;9, Version Information. Power on the soft starter, enter themain information screen content after displaying the startup status screen, and you can view the, information in sequence by pressing the increment key (▲) or decrement key(▼)to view the information in turn.

The information screen is shown in Table 4-3:

Table 4-3 Main information screen display table

Name	Screen display	Introduction	
screen	Average current	Display motor terminal voltage display content is average current value	
	Phase A current	Display, phase A current	
	Phase B current	Display, phase B current	
	Phase C current	Display, phase C current	
	Input voltage	The displayed content is the average voltage value of the detected three-phase voltage	
	The output voltage	Display motor terminal voltage	
	Module temperature	The temperature value is the value detected by the soft starter temperature sensor to the thyristor radiator	
	alarm record	000□: First alarm	The last one alarms
		00□0: Second alarm	The last two alarms
		0□00: Third alarm	The last three alarms
		□000: Fourth alarm	The last four alarms
		The displayed code corresponds to page 23 of Chapter 6, Troubleshooting and Exception Handling	
	Version Information	The version information displayed on this screen is the version number of the operation display unit	

Press the increment key(▲)) or decrement key(▼)， in the operation panel to switch up or down in the screencontent. Figure 4-2 shows the screen content switching operation process:

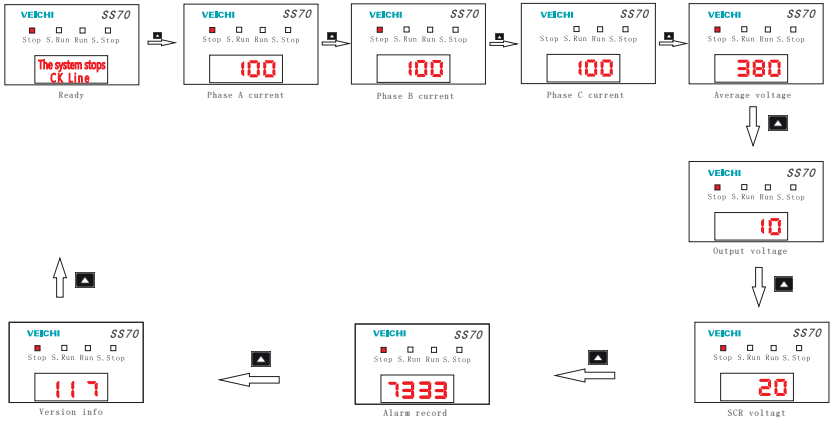


Figure 4-2 shows the screen content switching operation process

4.2.4 Function code parameter setting process

1) Soft starter function code mode

SS70 built-in bypass type soft starter has 36 function codes in total: F-00 ~ F-35. For example, "F-00"means the first function code.

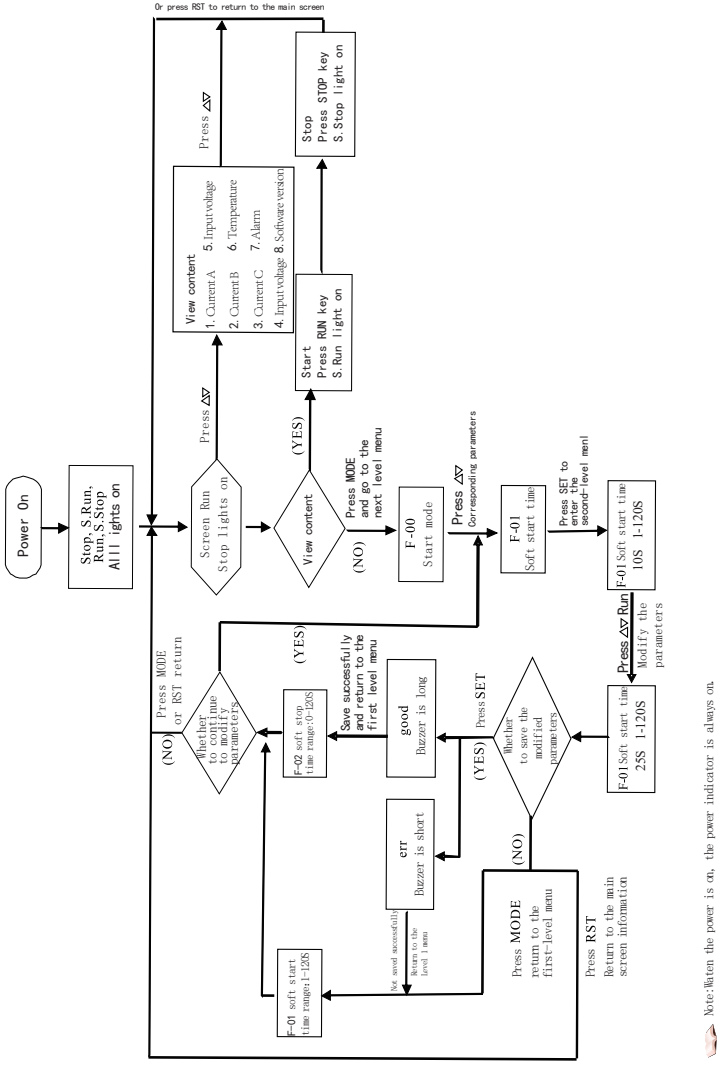
2) Menu structure of display unit

When setting the function code through the digital tube display unit, the function code number corresponds tothe first-level menu, and the function code parameter corresponds to the second-level menu.

3) Function code setting example

The built-in bypass soft starter of SS70 adopts decimal representation. Each of them is independeniwhen editing. The value range of some bits can be decimal (0-9). The parameter value has one, ten, one hundred,and thousand digits. Use the (Run) key to select the digit to be modified, and use the increase key (▲)or decrease key (▼) to increase or decrease the value. Take the parameter function menu to change the soft stop time from 10sto 25S (F-01 changed from 10S to 25S) as an example to explain the setting operation process, as shown in Figure4-3:

Figure 4-3 Application flowchart:



The specific steps are as follows:

1) The SS70 bypass type soft starter is in the boot state display screen "ANCHENWILL", Now the light status indicator light "Stop, S.Run, Run, S.Stop, " Full bright;
2) Display the main message screen: " Prompt: "提示: STOP SSLine ";
3) Press the MODE key to enter the programming state and display the current function code "F-00";
4) Press the▲key until the digital tube displays the function code "F-01".
5) Press the SET key to enter the "F-01" function code secondary menu, the flashing position is the first change position ("0" flashes):
6) Press the▲key five times to change the corresponding flashing digit from "0" to "5";
7) Press the Run key to move the flashing position to the second change position ("6" flashes);
8) Press the▼Key four times, change the corresponding flashing bit from "6" to "2";
9) Press the SET key, "good" is displayed and the buzzer is long and the data is saved successfully; if "Err" isdisplayed and the buzzer is short, the data is not saved successfully. When the value of "F-01" is saved, the nextfunction code is automatically displayed ("F-02" is displayed);
10) Press the MODE key to exit the programming state and return to the system main information screerdisplay to complete the task of editing the specified parameters.

The screen of each step is shown in Figure 4-4:

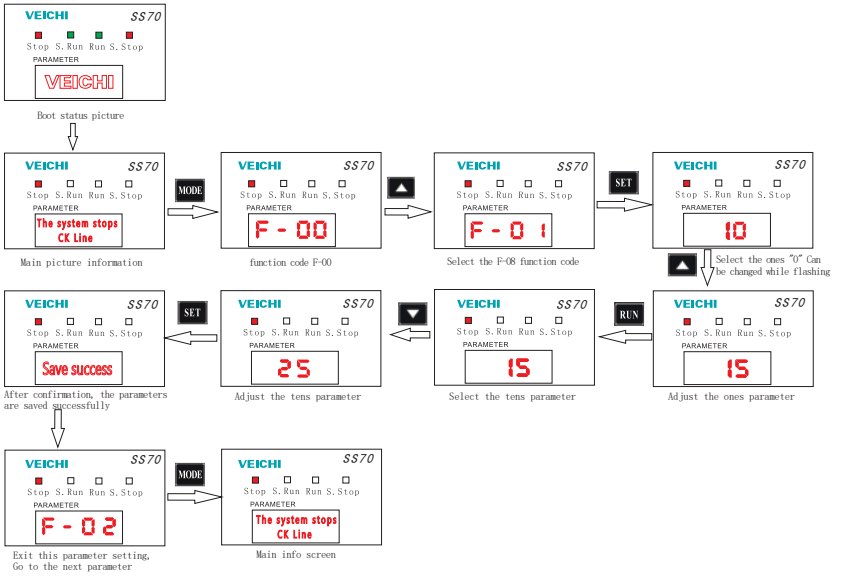


Figure 4-4 Screen schematic diagram

Chapter 5 Detail Function Description and Settings

This chapter mainly explains the function parameters of SS70 built-in bypass type soft starter in detail. According to the function, it is divided into 33 function codes, which are:

F-00: Starting mode; F-01: soft start time;
F-02: soft stop time; F-03: start-stop voltage;
F-04: current limiter; F-07: Spike voltage;
F-08: Jump time; F-09: Jump interval;
F-10: number of hops; F-11: Run over stream;
F-12: Overload protection; F-13: Overload mode;
F-14: Display mode; F-15: motor over-temperature;
F-16: Overvoltage protection; F-17: undervoltage protection;
F-18: phase-out; F-19: module over-temperature;
F-20: timeout protection; F-21: unbalanced;
F-22: Fire count; F-23: Start delay;
F-24: mailing address; F-25: Baud rate;
F-26: Parity check; F-27: K1 programming;
F-29: X1 programming; F-30: Analog output;
F-31: Fire mode; F-32: Initialization;
F-33: Language selection; F-34: Motor current;
F-35: manufacturer's code;

The function code described as follows:

Code	Name	Setting Range	Defaults

5.0 Start Mode (F-00)

F-00	Start Mode	范围: 0-2	Defaults: 0

0: Ramp current
1: Current limiting
2: Ramp voltage

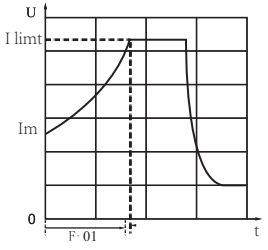


Figure 5-1 Initial voltage and time

The current in F-01 is the ramp current

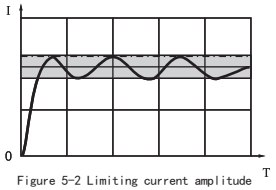


Figure 5-2 Limiting current amplitude

The shaded area is the set current limit

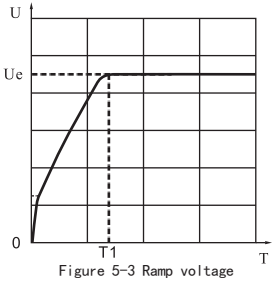


Figure 5-3 Ramp voltage

0-T1 is the ramp voltage

5.1 Soft Start Time (F-01)

F-01	Soft start time	scope: 1-120S	Defaults: 10

The soft start time is the time required from thestart of the startup to the completion of the startupprocess.

In order to obtain the best start-stop effect.different starting voltages and times can be set foradjustment. See Figure 5-1 for start mode for details.

5.2 Soft Stop Time (F-02)

F-02	Soft stop time	scope: 0-120S	Defaults: 0

In order to enable the mechanical load to stopsmoothly without generating secondary impact and tominimize mechanical and electrical damage, F-02 andF-03 can be combined to achieve a stable stop of themechanical load, as shown in Figure 5-4. As shown:

Note:
When the soft stop time is set to 0, the motor will stop freely.

5.3 Stop and start voltage (F-03)

F-03	Start-stop vollage	scope: 20-75%Ue	Defaults: 25

The start-stop voltage refers to the voltage value at whichthe initial output voltage of the soft start and the output controvoltage at the time of stopping are reduced to the minimum. lnorder to obtain the best start-stop effect, different start / storvoltages and times can be set to adjust. Set the percentage of therange value based on Ue.

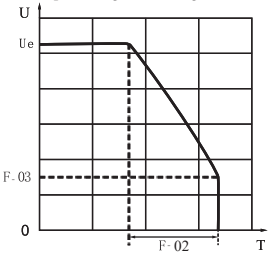


Figure 5-4 Stop voltage and time

Ue in the figure shows the stop voltage valuethe soft stop time is determined by F-02.

5.4 Current Limit Amplitude (F-04)

F-04	Current limit	scope: 150-600%Ie	Defaults: 350

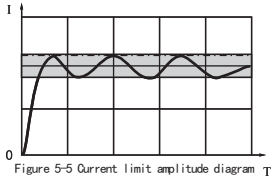


Figure 5-5 Current limit amplitude diagram

The starting current of the soft starter is limited to a settingrange based on the rated current, as shown in Figure 5-5.

5.5 Jump voltage (F-07)

F-07	Jump voltage	scope: 20%~100%	Defaults: 100
F-08	Jump time	scope: 0T~500T	Defaults: 0

Jump time is the time for one jump
Unit: period (grid frequency)

Note:
When set to 0, the jump time is turned off.

F-09	Jump interval	scope: 0~50T	Defaults: 0

Jump interval is the time between two jumps.
During the jump interval meter, the thyristor is turned off. without output. Unit: period (grid frequency).

Note:
When set to 0, the jump interval is turned off.

F-10	Jump times	scope: 0~100	Defaults: 0

Note :
When set to 0, the jump interval is turned off.

5.6 Running over current (F-11)

F-11	Run over current	scope: 0-400%Ie	出厂值: 150

The soft starter detects that the running current exceeds theset value of F-11 during the running process. After the duratiorreaches T, the system makes an overcurrent protection actionstops and displays an overcurrent alarm, as shown in Figure 5-6

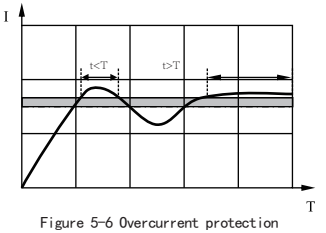


Figure 5-6 Overcurrent protection

Note:
When set to 0, no operation overcurrent protection is performed.
When the overcurrent time t is less than the set overcurrent detection time T overcurrent protection is triggered.
When the overcurrent time t is greater than the set overcurrent detectior time T, an alarm is issued.

5.7 Overload protection (F-12)

F-12	overload protection	scope: 0-4	Defaults: 3

Select different protection levels according to the load of thesoft starter. Table 5-1 shows the corresponding current multiplesand trip times of different levels.

Overload protection level 1 is light load, level 2 is light load,Level 3 is standard and level 4 is heavy load.

Time gear / Delay time / Tuning current / Overload current	1	2	3	4
1.2	40~60S	1~2m	2~3m	3~6m
1.5	20~40S	20~40S	1~1.5m	1.5~3m
4	2~5S	5~8S	8~11S	11~20S
6	1~2S	2~4S	4~5S	4~8S

Table 5-1 Overload level current multiple and trip time

When the running current value exceeds the currentmultiple of the corresponding protection level, it will act within thisprotection level trip time, and the protection level coefficients aredownward compatible. The overload level curve is shown inFigure 5-7.

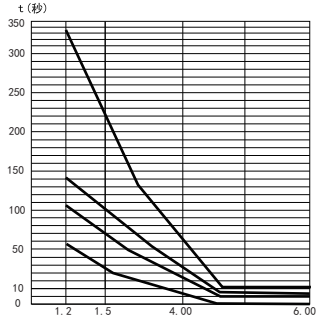


Figure 5-7 Overload level curve

F-13	Overload mode	Range: 0~1	Defaults: 0

0: Soft start, the running process is valid.
1: The running process is valid.

5.8 Display Mode (F-14)

F-14	Display Mode	Range: 0~2	Defaults: 0

0: Temperature interface displays module temperature
1: Temperature interface displays motor temperature
2: Switch motor temperature and module temperature display at the same time

5.9 Electric over temperature (F-15)

F-15	Electric over temperature	Range: 0-100℃	Defaults: 0℃

0: Closed

Note:
This feature requires the installation of a PT100 temperature expander

5.10 Overvoltage protection (F-16)

F-16	Overvoltage protection	Range: 0-1000V	Defaults: 480

For the three-phase voltage is too high, the soft starter widetect whether the voltage value exceeds the set value of the F-16function code, and after the system alarm time continues, the sofstarter will perform over-voltage protection and alarm.

Note:
When the over - voltage protection setting value is 0, the over - voltage protection does not work.

5.11 Undervoltage protection (F-17)

F-17	Undervoltage protection	Range : 0-1000V	Defaults: 280

The soft starter performs protection operation when it detects that the input three-phase voltage is lower than the set value.

when it is lower than the set value of the F-17 function code and continues to exceed the set time,the soft starter performs undervoltage protection and alarms.

Note:
When the under voltage protection setting value is 0, the soft starter does not perform under voltage protection operatior.

5.12 Output phase loss (F-18)

F-18	Output phase loss	Range: 0~30%	Defaults: 5%

0: off

Others: lf there is less than setting% le in three phases, it islack of phase and undercurrent.

5.13 Module Overtemperature (F-19)

F-19	SCR Over Temperature	Range: 0-90℃	Defaults: 85

The soft starter detects that the temperature of the modulis higher than the set value of F-19, and performs protectionoperation after continuously exceeding the set time

Note:
When the module over - temperature protection setting value is 0, the soft starter does not performover - temperature protection operation.

5.14 Timeout protection (F-20)

F-20	Timeout protection	Range: 0-120S	Defaults: 20

During the start of the soft starter, when the time of the startprocess exceeds the value set by this function code, it will outputa start timeout alarm.

Note:
When set to 0, no timeout alarm protection is performed.

5.15 Imbalance (F-21)

F-21	lmbalanced	Range:0%n-100%	Defaults:50%

Maximum and minimum current values in %Ie basis for three-phase current

The difference is greater than the read set value Ie, the system alarm.

Note:
When set to 0, unbalance protection is not performed

5.16 Fire counting (F-22)

F-22	Fire counting	Range:0~999	Defaults:0

Enter fire mode once and count once

5.17 Communication &control (F-23-F-29)

F-23	Delayed start	Range: 0~60s	Defaults: 0

0: off

F-24	Communication	Range: 0~255	Defaults: 1

F-25	Baud rate	Range: 0~2	Defaults: 0

0: 4800bps
1: 9600bps
2: 19200bps

F-26	Parity check	Range: 0-2	Defaults: 0

0: No parity
1: odd
2: even

F-27	K1 Programming	Range: 0-11	Defaults: 0

1: Bypass state output
11: Fire mode output
Others: Closed

F-29	X1 program	Range: 0-11	Defaults: 0

1: Reset
2: Emergency stop
11: Fire mode input
Other: Closed

5.18 Analog output (F-30)

F-30	Analog output	Range: 0~9999	Defaults: 0

0: off
Others: Set current corresponding to analog 20mA output

5.19 Fire Mode (F-31)

F-31	Fire Mode	Range: 0~9999A	Defaults: 0

119: Fire mode
120: Fire mode, no counting mode
Others: Closed

5.20 Initialization (F-32)

F-32	lnitialization	Range: 0-2	Defaults: 0

0: Invalid
1: Restore factory settings
2: Clear alarm records

5.21 language selection (F-33)

F-33	language selection	Range: 0:1	Defaults: 0

0: Chinese
1: English

5.22 Motor current (F-34)

F-34	Motor current	Range: 1-9999A	Defaults: 11A

Motor rated current.

5.23 Factory Password (F-35)

F-35	Factory Password	Range: 0-9999	Defaults: ****

The factory password is only used by the manufacturelto set. The end user does not need to set it.

Chapter 6 Fault countermeasures and Exception Handling

Warning/Danger

- The fault technical troubleshooting and maintenance operation should be carried out only when the disconnected power supply soft starter display (LCD or status indicator) goes off and confirms that the bus voltage is below 36V, otherwise it may cause personal injury, electric shock, fire and other dangers.
- Only professional personnel can replace the parts. lt is strictly forbidden to leavewire ends or metal objects in the machine, otherwise it may cause fire and otherdangers.
- After replacing the control motherboard, it must be confirmed that the motherboard is working normally before the power operation, otherwise the property damage.

SS70 built-in bypass soft starter not only reflects superior performance when starting and stopping, but also accurate and reliable in product protection. SS70 built-in bypass soft starter has various protection functions to comprehensively protect motor and drag equipment, such as phase absence, overvoltage, underpressure, underpressure, overtemperature, imbalance, overtime, overload, overcurrent, and external fault input. When the system detects alarm signal, the LCD display the relevant alarm information, and the system will prohibit output within a weekly wave to protect the products and equipment and personal safety. Complete product common fault types and handling methods are shown in the following table:

Arror alarm Display type	Possible reason	Solutions	Operating status			
			Soft start	Running	Soft stop	Stop
X3 and COM are not connected	External control terminal X3 and COM are not connected during panel control	Connect external control terminal X3 and COM correctly				√
Er01 Run overcurrent	in the normal running process, when themeasured runningcurrent> F-04 setvalue, the system willgive an alarm within acycle.	1、Check whether the motor model is consistent with the nameplate of the soft starter: whether the rated power, the voltage is consistent, whether the rated power exceeds the rated power of the nameplate of the soft starter. If not, please replace the match before debugging. 2、Check whether there is a short circuit or grounding phenomenon between the motor and the soft starter. 3、Check for an overload. 4、Increase the setting value of function code F-11. 5、Check part of the application setting and whether the load type is within the scope of the soft starter. 6、Turn off the overcurrent protection function and change the F-11 settings to 0.		√		
Er02 Module overtemperature	When the system monitors the temperature of the drive module> F-19 setting value through the sensor, the system submits the overtemperature alarm.	1、Check whether the ambient temperature is too high (if there is direct sunlight, whether it is installed in the closed environment), resulting in the temperature of the radiator module in the soft starter can not drop in time, exceeding the set value of the function code (F-19) over temperature protection, the corresponding cooling treatment (such as air cooling or shutdown cooling treatment). 2、Check whether the soft starter accessories has heat source (such as electric furnace, heater, etc.), remove the heat source and use the soft starter. 3、If the soft starter starts and stops frequently in a short time, the internal power device 1 will be in a high current running state, and the radiator module will be overwarm. Please wait for a period of time (> 5 minutes) until the radiator module cobefore operating.	√	√	√	
Er03 Start timeout	During the motor starting process, when the starting time does not accelerate to full speed (namely operation, state) in F-20 time, the system output alarm.	1、Please check whether the rated power of the user motor exceeds the rated power of the soft starter. 2.Please check the heavy load, and please increase the soft start time.	√			
Er04 System phase loss	The system has three-phase power supply, any phase is missing or connected, and the output end of the motor is missing, and the phase, the system will implement alarm output in the first time	1、Check whether the three-phase input power supply has any phase deficiency phenomenon. 2、Check the good contact of the three-phase power input to the soft starter. 3、Check the connection between motor to soft starter for disconnection. 4、Check the connection between motor to soft starter for poor contact or grounding.	√	√	√	

Fault alarm display type	Cause of action	Solution	Operating status			
			Soft start	Running	Soft stop	Stop
Er05 Power supply overvoltage	When the system detects the grid voltage> F-16 setting value of the input three-phase power supply, the system will submit the alarm within one cycle.	1、Check whether the three-phase input voltage value exceeds the set value of the overvoltage protection of function code (F-16). If the set value is exceeded, disconnect the power supply and wait for the power voltage value to return to the normal value (below the set value of the overvoltage protection of function code (F-16)). 2、Check the voltage level consistent with the nameplate on the machine. 3、This protection is closed when the function code (F-16) is set to 0.	√	√	√	√
Er06 Power supply undervoltage	The grid voltage of the three -phase input power supply is <the set value of F-17, and the system will alarm the output within one cycle.	1、Check whether the three-phase input voltage value is below the set value of undervoltage protection of function code (F-17). If it is below the set value, disconnect the power supply and wait for the power supply voltage value to return to the normal value (above the set value of undervoltage protection of function code (F-17)). 2、Check the voltage level consistent with the nameplate on the machine. 3、This protection is closed when F-17 is set to 0.	√	√	√	
Er07 Overload protection	When the operating current reaches the overload level set by F-12, the system makes a fault alarm (see the relevant overload protection curve).	1、Check whether the motor power exceeds the rated power of the soft starter. If so, please replace the match and try again. 2、Check whether the load of the fruit motor is too heavy, or the load has a mutation during operation. 3、The value of the function code F-12 to change the system operation overload protection curve to operate the device in the normal area. 4、Modify the F-12 setting value to 0, and turn off the system overload protection function.	√	√		
Er08 Voltage imbalance	When the difference between the maximum and the minimum operating current reaches the product of the F-21 set value and the rated current, the systemalarms within a period.	1.Check the motor for aging. 2.Check whether the three-phase input voltage is unbalanced. 3.Check whether the power supply input and output wiring is secure.	√	√	√	

Chapter 6 Maintenance and Maintenance

Due to the influence of environmental temperature, humidity, dust and vibration, aging and wear inside the soft starter, will lead to the potential failure of the soft starter, it is necessary to carry out daily and regular maintenance and maintenance of the soft starter.

Note：
Before inspection and maintenance, please first confirm that the soft starter has cut off the power supply and the power indicator light is off, otherwise the risk of electric shock will occur.

7.1 Product routine maintenance and inspection

The soft starter must operate according to the operating environment specified in this book. In addition, there may be some accidents in the operation, users should follow the following below, daily maintenance work, to maintain a good operating environment. It is a good way to extend the service life of the soft starter and early detection of abnormal causes for recording the daily operation data. See Table 7-1:

Table 7-1 Daily inspection tips

Check object	Check the essentials		judaing critena
	Check content	Inspection means	
Operating environment	temperature humidity	thermometer humidometer	-10℃ ~ + 40℃ exceeds 40 C should derating be used
	Dust, water and drips	Visually	No water leaks
	vibration	DeVibration Meter	Less than 5.9 m / s (0.6g)
	gas	Sniff	odorless
Soft starter	heat	Touch case	Smooth, normal air
	sound	listen	No abnormal sound
	Output current	Current clamp meter	In the rated value range
	The output voltage	Voltmeter	In the rated value range
Motor	heat	houch	No abnormal fever
	sound	listen	No abnormal sound

7.2 Regular maintenance

Depending on the use environment, the user can conduct regular inspection of products for 3 or 6 months.

Note：
1)) Personnel responsible for maintenance work must have professional training.
2)Do not leave metal parts in the machine, otherwise there is a danger of damaging the equipment.

General inspection content:

1) Whether the control terminal screws are loose, tighten with a screwdriver;

2) Whether the main circuit terminals are badly connected; whether there are overheating marks on the screw position.

3)) Whether the power cables and control cables are damaged, especially whether there are cuts on the skin that is in contact with the metal surface;

4) Whether the insulation bandage of the power cable nose has come off;

5) Clean the dust on the circuit board and air duct thoroughly. it is best to use a vacuum cleaner.

6) The soft starter stored for a long time must be powered on once within half a year. When the power is powered on, the voltage regulator is slowly raised to the rated value, for nearly 5 hours, and can be carried out without load.

7) In the insulation test of the soft starter, all the input and output terminals must be short connected with wires to test the protective area. It is strictly prohibited to test the single terminal, otherwise there is a risk of damage to the soft starter.

8) If the motor is tested for insulation, the connection between the motor and the soft starter must be disconnected, and the motor must be tested separately, otherwise the soft starter will be damaged.

Note：
The withstand voltage test has been passed before leaving the factory. The user does not need to perform withstand voltage test, otherwise the device will be damaged.

7.3 Soft starter storage

After the user purchases the soft starter, the temporary storage and long-term storage must pay attention tcthe following points：

1) Avoid storage in places with high temperature, humidity, and dust or metal dust. Keep the storageenvironment well ventilated.

2) Long-term storage will cause the deterioration of electrolytic capacitors. lt must be ensured that it isenergized once within 2 years, and the energization time is at least 5 hours. The input voltage must beslowly increased to the rated value with a voltage regulator.

7.4 Product warranty

The quality guarantee of this product shall be subject to the following provisions

Quality assurance of the specific content:
This product is guaranteed within 18 months from the factory date
Guaranteed... for eighteen full mouths

(1) Whenever and where the company motor soft starter, all enjoy lifetime paid service.

(2) If the fault is caused by the following reasons, the company shall provide the paid repair service during the warranty period:

①Problems caused by incorrect operation (subject to this use manual) or self-repair and modification without permission

②Problems caused by the use of a motor soft starter beyond the standard specification requirements

③Damage resulting from improper handling or storage

④Device aging or failure caused by the environment

⑤Damage caused by earthquake, fire, flood, lightning strike, abnormal voltage or other natural disasters

⑥Intentionally damage the nameplate, mark and production serial number of the motor soft starter, which can not be identified separately

(3) In case of quality problems or product accidents, the company will only bear the responsibilities mentioned in the specific content of the quality assurance in this chapter. If users need more liability guarantee, please insure the insurance company by yourself.

(4) The relevant service fee shall be calculated according to the actual cost. If there is a contract, it shall be dealt with on the principle of contract priority. Safety assembly line specification parameters safety information operation instructions detailed fault countermeasures maintenance and maintenance application.

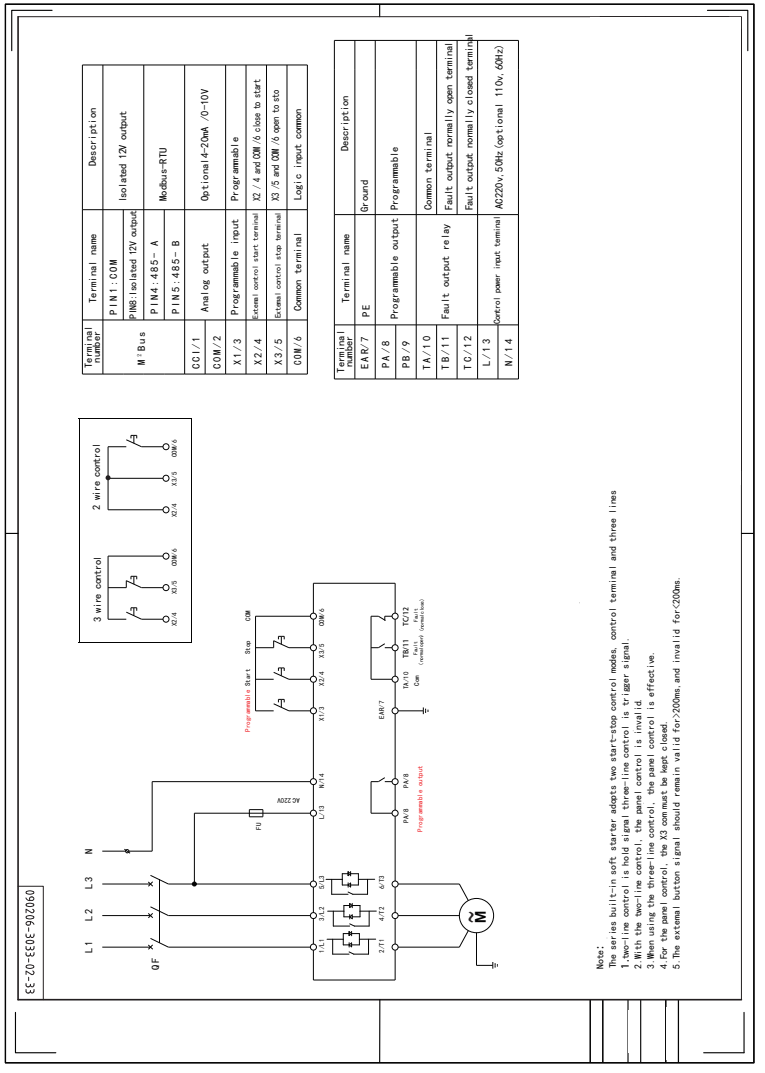
⚠Scrapped

a) The electrolytic capacitor of the main circuit and the electrolytic capacitor on theorinted board may explode when incinerated.

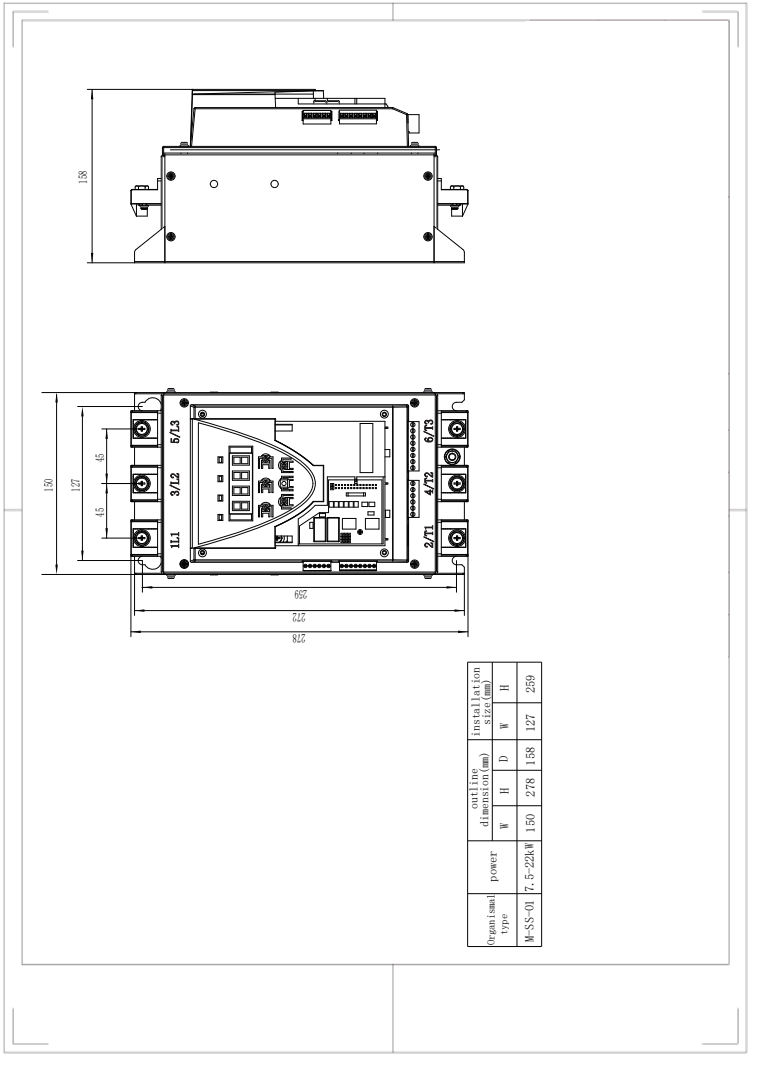
b) Toxic gas will be generated when plastic parts such as the front panel and theplastic case are incinerated.

c) Please dispose as industrial waste.

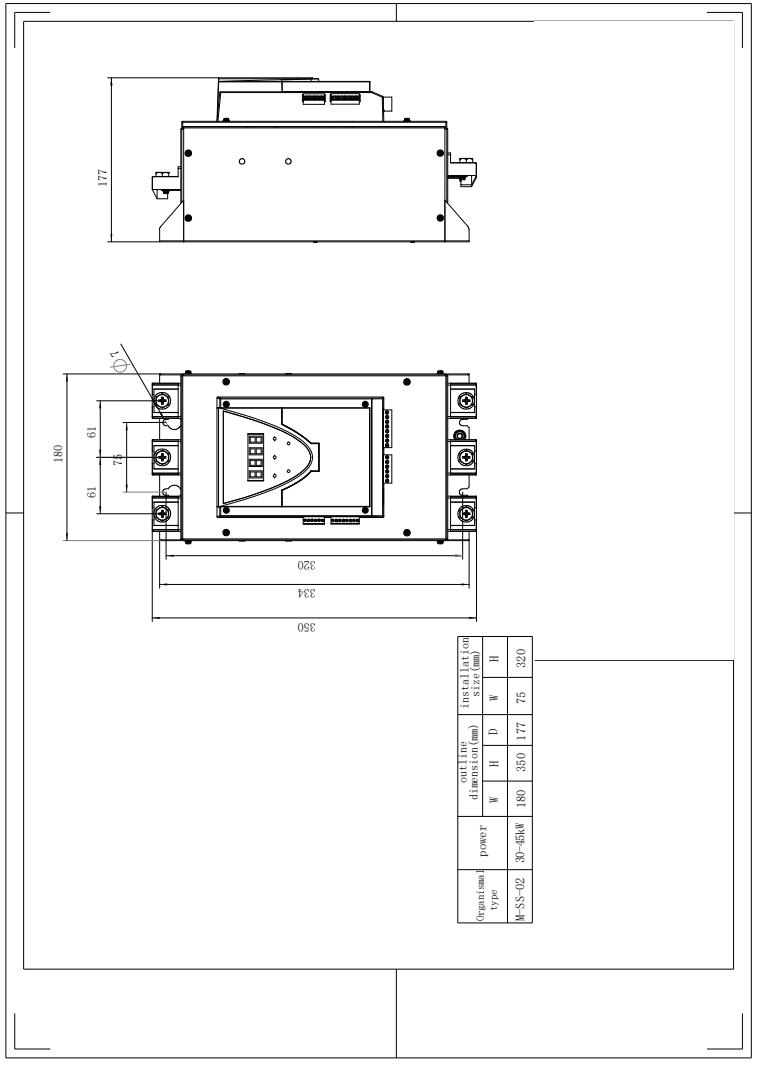
Appendix 1: Application example diagram



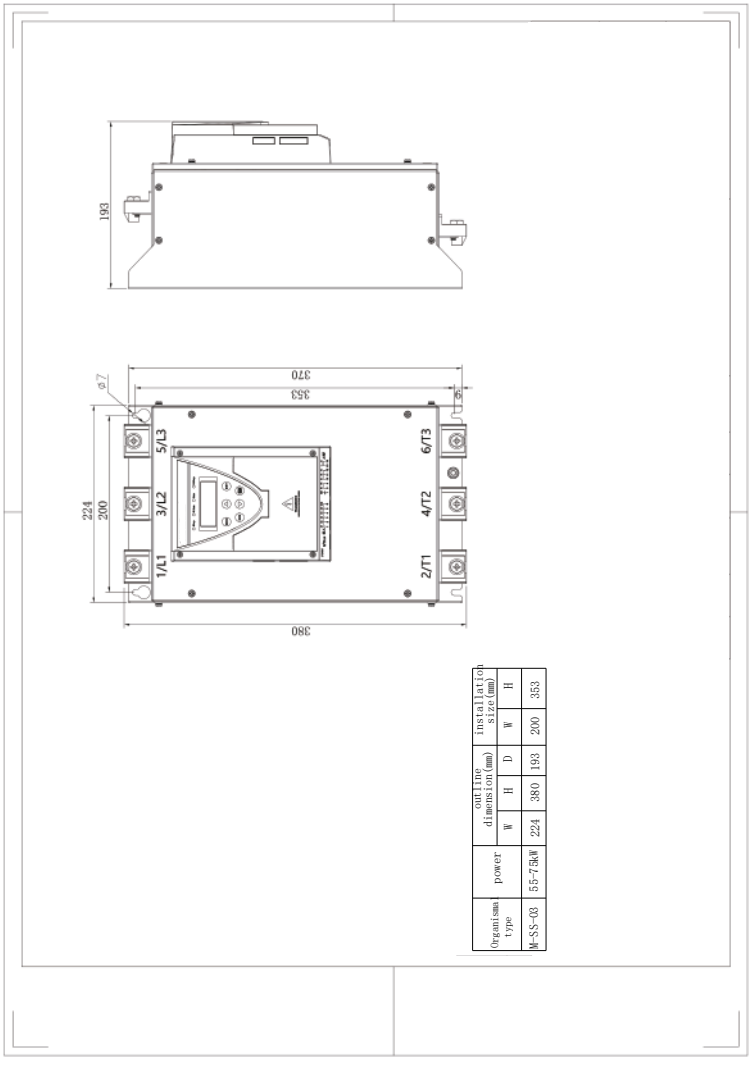
Appendix 2: Dimensional drawing



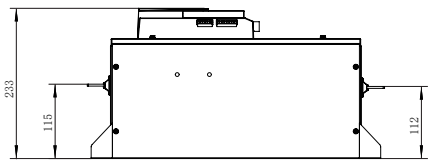
Organismal type	power	outline dimension(mm)			installation size(mm)		
		W	H	D	W	H	
M-SS-01	7.5-22kW	150	278	158	127	259	

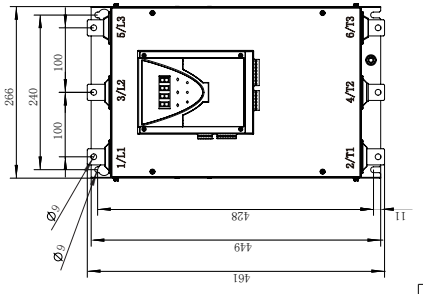


Organism type	power	outline dimension(mm)			installation size(mm)	
		W	H	D	W	H
M-SS-02	30-45kW	180	350	177	75	320

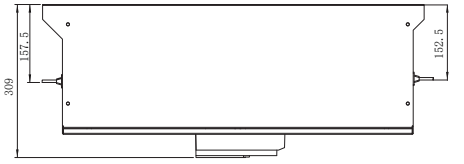


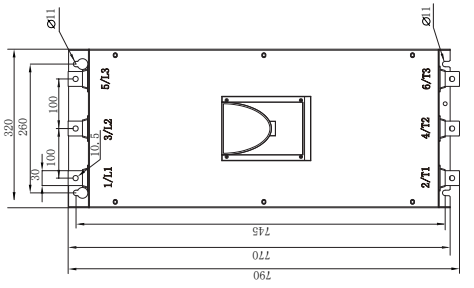
Organism type	power	outline dimension(mm)			installation size(mm)	
		W	H	D	W	H
M-SS-03	55-75kW	224	380	193	200	353



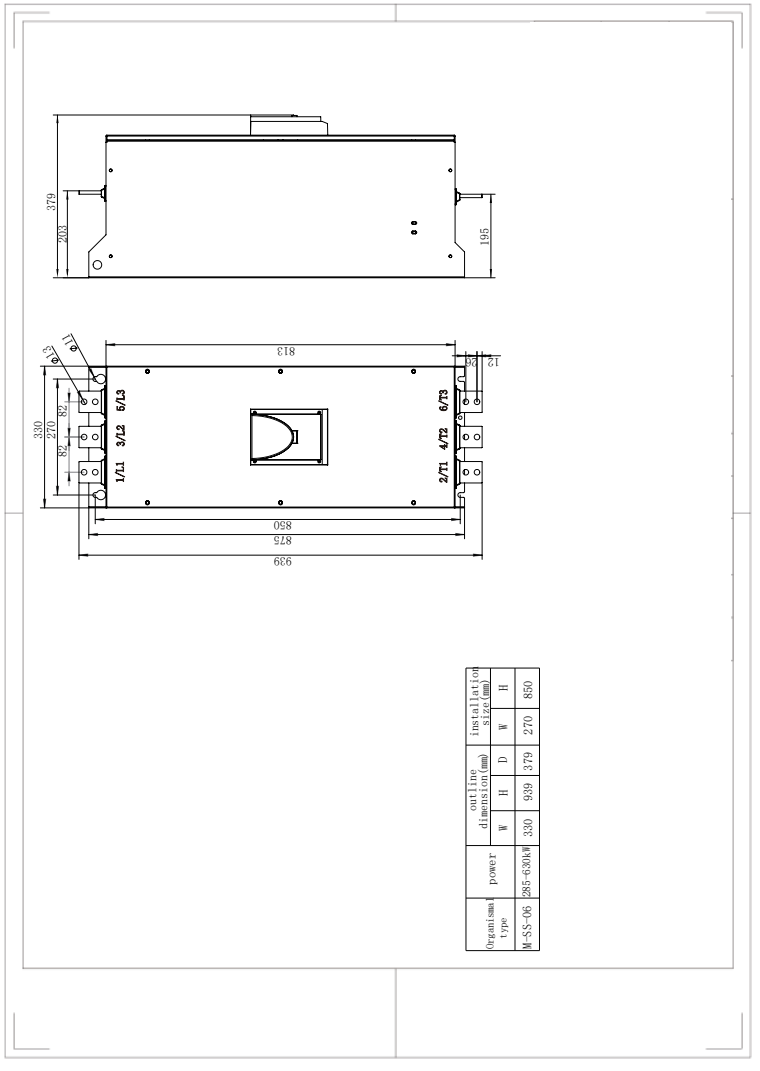


Organismal type	power	outline dimension(mm)			installation size(mm)	
		W	H	D	W	H
M-SS-04	90-110kW	266	461	233	240	428

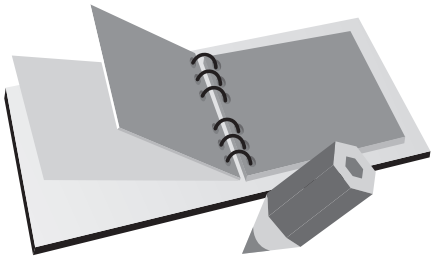




Organismal type	power	outline dimension(mm)			installation size(mm)	
		W	H	D	W	H
M-SS-05	132-250kW	320	790	309	260	745



Organism type	power	outline dimension(mm)			installation size(mm)	
		W	H	D	W	H
M-SS-06	285-630kW	330	939	379	270	850



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NOTE: