Safety Precautions

(1) Hazardous voltage exists once the main loop power supply is energized.

(2) Input ends 1L1, 3L2 and 5L3 are forbidden to be connected to output ends 2T1, 4T2 and 6T3.

(3) Output ends 2T1, 4T2 and 6T3 of soft starter are forbidden to be connected with compensating capacitor or piezoresistor.

(4) When soft starter and frequency converter backup each other, their output ends should be separated from each other.

(5) Do not attempt to repair damaged components. Please contact your supplier.

(6) The temperature of cooler is possibly high.

(7) Reverse power is forbidden to be fed on output ends of soft starter.

(8) When soft starter is in a state of starting or stopping, high voltage exists on output side.

Table of contents

Foreword

Foreword

Thank you for choosing CMC-L series motor soft starter manufactured by Xi'an Spread Electric Co., Ltd. In order to bring functions of soft starter into full play, please strictly operate and use this soft starter in accordance with operating instructions and ensure operator's safety. Please read through this manual before using this device. When solutions for trouble that you encounter in using this device are unavailable in this manual, please directly contact Xi'an Spread Electric Co., Ltd. or agent and dealer. We will do our best to provide excellent service for you.

Chapter1 Function and Feature of CMC-L Soft Starter

1.1 Function

CMC-L motor soft starter is a new type motor starting and protection device that is integrated with power electronic technology, microprocessor and automatic control. This soft starter is able to steadily start and stop motor without step change so as to avoid mechanical or electric impact resulted from using conventional starting modes such as direct starting, star-delta starting and auto voltage reducing starting, and effectively reduce starting current and distribution capacity for fear of more investment on capacity expansion.

1.2 Feature

Multiple starting modes

Current-limiting start, ramp current-limiting start and voltage ramp.start can meet the site requirements to the maximum extent and realize the best starting effect.

High reliability

High performance microprocessor conducts digital processing for signals in control system, avoiding the excessive adjustment to

analog line so as to obtain the best precision and execution speed.

Powerful anti-interference performance

All external control signals adopt optoelectronic isolation and are set with different anti-noise levels. The device is applicable for use in special industrial environment.

Optimized structure

The unique compact structure is designed to be easily integrated into user's existing system, saving expenses for restructuring of system.

Motor protection

Multiple motor protection functions such as over-current, input/output phase-failure, short circuit of thyristor and overheat protection can guarantee motor soft starter not to be damaged in case of fault or incorrect operation.

Easy maintenance

Chapter2 Receiving Inspection

Function and operation tests have been conducted on each soft starter before delivery. After receiving and unsealing the package, please check according to the following steps. For any problem, please contact your supplier immediately.

1.Check nameplate to confirm that the received model conforms to the one you ordered.

(1) Nameplate description of soft starter

CMC Series Motor Soft Starter

Product model: CMC-□□□/□ Applicable motor: □□□KW

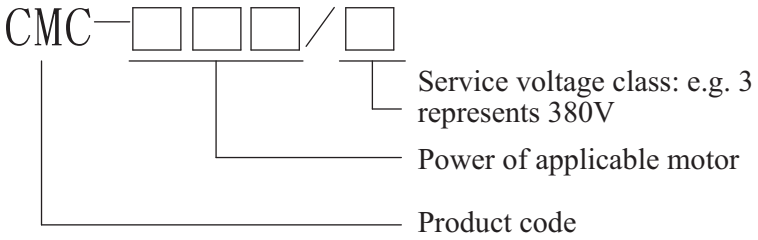
Input voltage: 380VAC Use category: AC-53b

National standard: GB14048. 6-2008

XI'AN SPREAD ELECTRIC CO., LTD.

TEL.:029-85692700/85692711

(2) Model description



(3) Number description of soft starter

NO:XXXXXXXXXXXXXXXXXCMC-XX□□□

L: Digital type
M: Digital intelligent type
SX: Chinese characters display intelligent type
M2: Machine tool type

2. Check if there are damages such as sunken housing, distortion, and loose of internal cables and connecting piece during the transport of the device.

3. Check if product certificate, warranty card, packing list and user's manual are attached to the device.

4. This product will be guaranteed for repair according to warranty card after delivery. After receiving this product, please carefully complete this warranty card and mail it back to Xi'an Spread Co., Ltd. or your supplier.

Chapter3 Service Condition and Installation

3.1 Service condition

Control power	AC110V—220V+15%
Three-phase power supply	AC380V, 660V, 1140V±30%
Nominal current	15A—1000A, totally 22 kinds of rated values.
Applicable motor	General squirrel cage asynchronous motor
Ramp starting mode	Current-limiting soft start, voltage ramp start, voltage ramp + current-limiting start
Stop mode	Free stop and soft stop
Logic input	Impedance 1.8KΩ， Power supply +15V
Starting frequency	Frequent or non-frequent start. The number of starting is suggested to be not more than 10 times per hour.
Protection function	Phase failure, over current, short circuit, SCR protection, over heat, etc.
Protection degree	IP00、IP20
Cooling method	Natural cooling or forced air cooling
Installation method	Wall mounting type
Ambient condition	When altitude is above 2000m, the capacity should be correspondingly reduced.Ambient temperature: -25~+45℃Relative humidity less than 95%(20℃±5℃)No inflammable, explosive and corrosive gas and no conducting dust. Indoor installed with good ventilation. Vibration less than 0.5G.

3.2 Installation direction

To ensure good atmospheric and cooling conditions for normal operation, soft starter should be vertically installed.

3.3 Installation space

Sufficient space should be arranged around the device for cooling. Please keep device certain distance away from wall for ease of maintenance (see attached table 3). If you need an air blower, please log on our website www.xichi.cn to download the size of relevant air blowers.

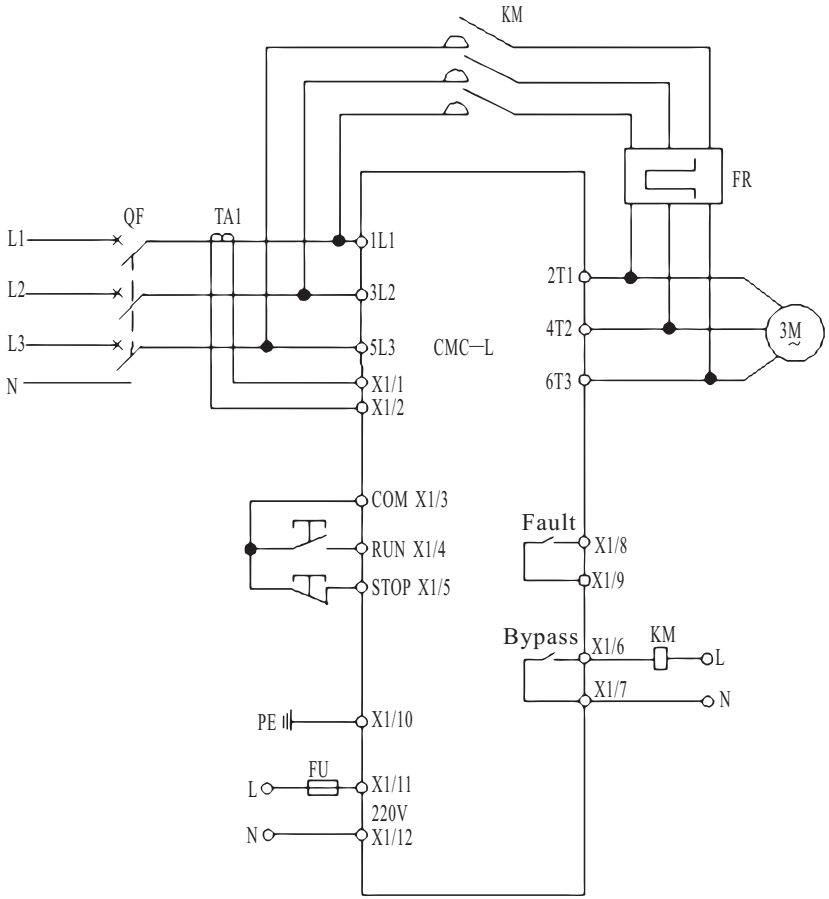
3.4 Circuit installation

Main loop adopts over-entering and down-out wiring method and cables should be guaranteed with enough current-carrying capacity. Please see attached table 1 for selection of spare parts.

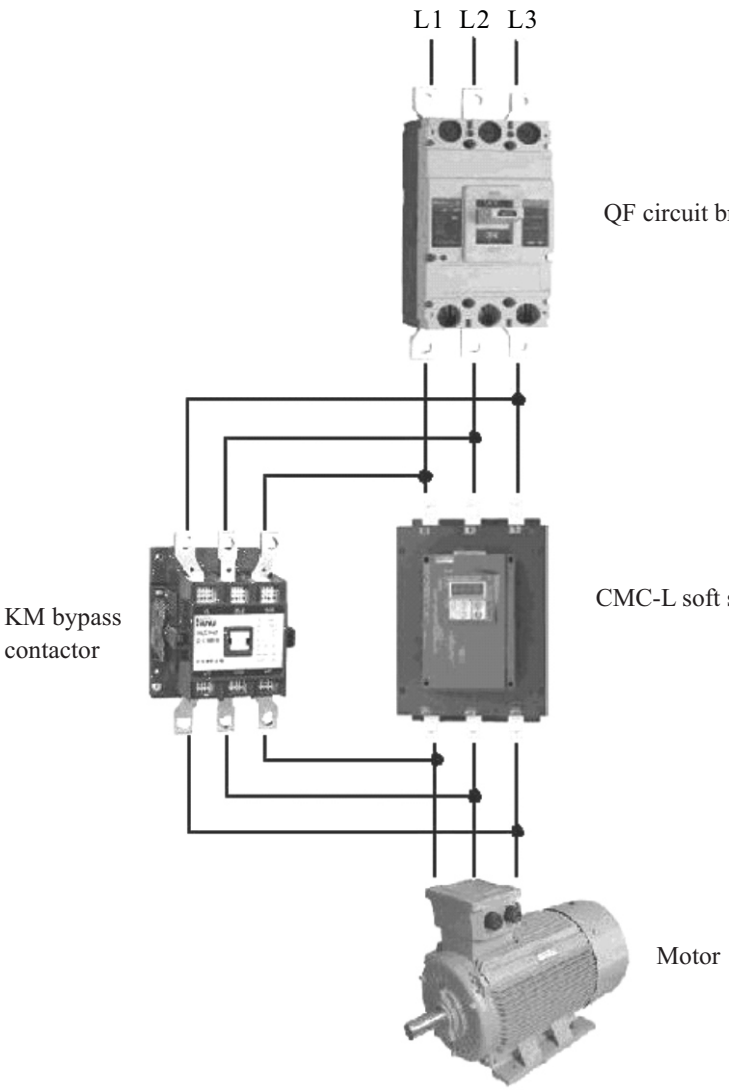
Chapter 4 Circuit Connection

4.1 Basic wiring schematic diagram

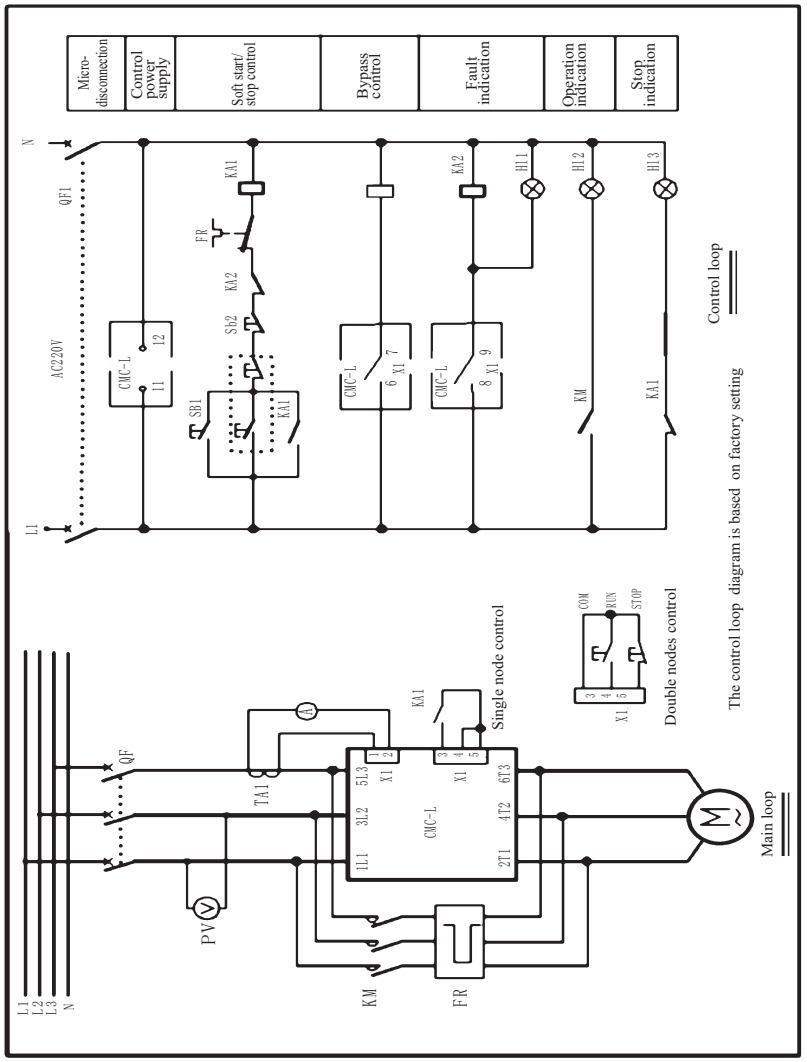
The terminals 1L1, 3L2 and 5L3 of soft starter are connected with three-phase power supply and 2T1, 4T2 and 6T3 are connected to motor. When using a bypass contactor, it is can be controlled by an in-built signal relay K2.



4.2 Basic wiring diagram



4.3 Typical applied wiring diagram



Note:

1. The above diagram shows a single node control mode. When connection point closes, soft starter starts, and when connection point opens, soft starter stops. It needs to note that with this wiring method, the start-up operation through LED panel is invalid. The terminals 3, 4 and 5 start/stop signal is a passive node.

PE grounding wire should be as short as possible and connected to the nearest ground point away from soft starter. The appropriate ground point should be on the mounting plate abutting against soft starter, and the mounting plate should be grounded, which is functional grounding rather than protective grounding.

3. The diameter of secondary side line of current transformer should be no less than 2m m2.

4.4 Terminal description

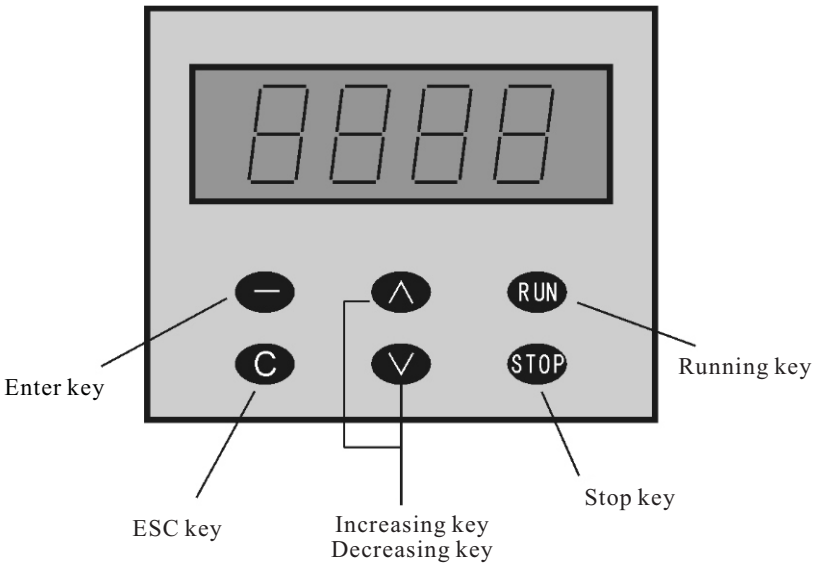
CMC-L series soft starter has 12 external control terminals providing convenience for users to realize external signal control, remote control and system control.

Terminal No.		Name of terminal	Description
Main loop	1L1、3L2、5L3	Input terminal for AC power supply	Connected with three -phase AC power supply
	2T1、4T2、6T3	Output terminal for soft start	Connected with three-phase asynchronous motor

Control loop	X1/1	Input terminal for current detection	Connected with current transformer
	X1/2		
	X1/3	COM	Common terminal of logic input
	X1/4	External control start terminal (RUN)	Start when X1/3 is short -circuited with X1/4
	X1/5	External control stop terminal （STOP）	Stop when X1/3 breaks with X1/5
	X1/6	Relay of bypass output	When outputting effectively, K21-K22 close, and contact rating AC250V/5A，DC30V/5A
	X1/7		
	X1/8	Relay of fault output	When outputting effectively, K11-K12 close, and contact rating AC250V/5A，DC30V/5A
	X1/9		
	X1/10	PE	Functional earthing
	X1/11	AC110V—AC220V +15% 50/60Hz	Input terminal of control power supply
	X1/12		

Chapter5 Display and Operation Description

5.1 View of panel



5.2 Function description of keys

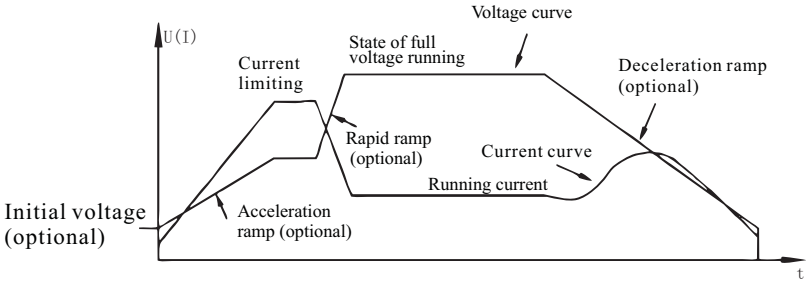
Symbol	Item	Function description
——	Enter key	Enter the parameter menu, and confirm the data of parameter items to be altered
∧	Increasing key	Increase parameter or data
∨	Decreasing key	Decrease parameter items or data
C	ESC key	Confirm the altered parameter data and escape from the parameter items and parameter menu
RUN	Running key	This key can be used for running operation when being effectively operated, and at this time the terminal 3 and 5 on the terminal block X1 are short-circuited.
STOP	Stop key	This key can be used for stopping operation when being effectively operated. Pressing the stop key for four seconds in the state of fault can reset the current fault.

5.3 Description of display status

No.	Symbol displayed	Status description	Remark
1	STOP	State of rest	The device is in state of rest
2	P020	State of programming	It is allowed to view and set parameters
3	AUA⁷	State of running 1	The device is in state of starting
4	AUA⁻	State of running 2	The device is in state of full voltage running
5	AUA⌟	State of running 3	The device is in state of soft stopping
6	Err 1	State of fault	The device is in state of fault

Chapter6 Control Mode of Soft Starter

CMC-L series soft starter has several starting modes including current-limiting start, ramp current-limiting start and voltage ramp start, and several stopping modes including soft stop and free stop. Users can choose different starting and stopping modes based on different load and specific service conditions.



Characteristic Curve of Soft Start/Stop Voltage (current)

6.1 Current-limiting start

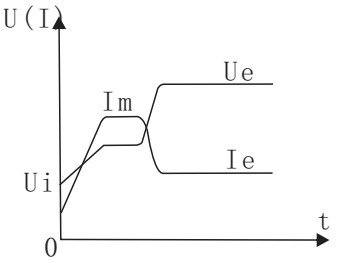
When using current-limiting starting mode, the starting time is set to zero. After soft starter receives starting command, output voltage will quickly increase till output current reaches current clipped value Im that has been set, and output current will stop to increase. After motor runs and accelerates continuously for a period of time, current begins to decrease and output voltage quickly increases till full voltage output, then a starting process completes.

Parameter	Item	Range	Set value	Factory default
P1	Starting time	0~60S	0	10
P3	Current-limiting magnification	（1.5~5）Ie 8-grade adjustable	—	3

Note: "—" means that user can set based on individual requirements.

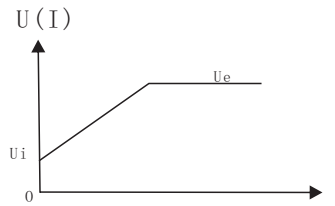
6.2 Ramp current-limiting start

Output voltage increases based on linear characteristics in starting time that has been set, meanwhile, output current increases at certain speed. When starting current increases to clipped value Im, current holds constant till the completion of start.



6.3 Voltage ramp start

This starting mode is applicable to large inertia load. As for the situation that requires higher stationarity of start, it can largely reduce starting impact and mechanical stress.



Parameter	Item	Range	Set value	Factory default
P0	Initial voltage	(10%-70%)Ue	—	30%
P1	Starting time	0~60S	—	10

6.4 Free stop

Free stopping mode is enabled when stopping time is set to zero. After soft starter receives stopping command, it firstly lockout the control relay of bypass contactor and consequently lockout the output of thyristor on main loop. Motor stops freely according to inertia load.

Parameter	Item	Range	Set value	Factory default
P2	Stopping time	0~60S	0	0

6.5 Soft stop

When stopping time is not set to zero, stopping under condition of full voltage is soft stop. To stop by this mode, soft starter firstly disconnect bypass contactor and output voltage of soft starter decreases to zero within stopping time.

Parameter	Item	Range	Set value	Factory default
P2	Stopping time	0~60S	—	0

Chapter7 Parameter and Description

7.1 Parameter

Param.	Item	Range	Factory default
P0	Initial voltage	（10%-70%）Ue Full voltage start enabled when setting to 99%	30%
P1	Starting time	0~60S current-limiting soft start enabled when selecting 0 second	10
P2	Stopping time	0~60S Free stop enabled when selecting 0 second	0
P3	Current-limiting magnification	（1.5~5）Ie 8-grade adjustable	3
P4	Overcurrent prot ection in operation	（1.5~5）Ie 8-grade adjustable	1.5
P5	Undefined parameter	—	—
P6	Selection of control	0—terminal control 1—keyboard control 2—keyboard and terminal control	2
P7	SCR protection selection	0—SCR protection is allowed 1—SCR protection is forbidden	0
P8	Double ramp start	0—double ramp start is invalid Non-zero—double ramp start is valid Set value is the first starting time (range: 0~60S)	0

7.2 Function description

The duration of starting time of parameter P1 can decide when the starting torque is raised to the final torque. When the starting time is long, a smaller accelerating torque will be produced in the course of starting motor, which is possible to realize soft acceleration of motor for a long time. It is necessary to appropriately choose the duration of starting time so as to make motor be able to have soft acceleration until the rated speed is reached. When the acceleration time ends before the completion of motor acceleration, the torque will be limited to the set extreme torque in certain time. Therefore, the starting time here represents the velocity of rotating speed variation and doesnot completely equal the starting time of motor.

Chapter8 Fault Detection and Troubleshooting

8.1 List of fault code

When protective functions of soft starter act, soft starter stops immediately and display screen displays the current fault. User can conduct fault analysis according to fault description.

Display	State description	Troubleshooting
StOP	Soft starter in standby	1.Check whether bypass contactor is on position. 2.Check whether thyristor is brokendown or damaged.
	Motor has no response after starting signal is sent out	1.Check whether terminals 3, 4 and 5 are connected. 2.Check whether control circuit is properly connected and control switch is normal. 3.Check whether control power supply is too low.

No display		1.Check whether terminals 11 and 12 are connected. 2.Check whether control power supply is normal.
Err1	Phase failure when motor starts	Check whether each phase voltage of three-phase power supply lacks phase, if any, troubleshoot it.
Err2	Temperature of thyristor	1.Check whether installation environment of soft starter has good ventilation and is vertically installed. 2.Check whether soft starter is directly shined by sunshine. 3.Check whether cooler is overheated or overheat protection switch is switched off. 4.Decrease frequency of starting. 5.Check whether control power supply is too low.
Err3	Starting failure	1.Check set value of each working parameter and verify whether the set parameter values match the actual parameter values of motor. 2.For starting failure (starting uncompleted in 80 seconds), check whether current-limiting magnification is set too low or verify the transformation ratio of transformer.
Err4	Short circuit on input and output ends of soft starter	1.Check whether bypass contactor is on position. 2.Check whether thyristor is brokendown or damaged.
	Motor connection line opens (P7 set to 0)	1.Check whether output end of soft starter is properly connected to the motor. 2.Judge whether there is broken circuit inside motor. 3.Check whether thyristor is brokendown or damaged. 4.Check whether incoming line lacks phase.
Err5	Current-limiting function invalid	1.Check whether current transformer is connected to terminals 1 and 2. 2.Check whether current-limiting protection setting is correct. 3.Check whether the transformation ratio of current transformer matches motor.
	Motor overcurrent	1.Check whether there is short circuit on connection of output end of soft starter. 2.Motor overload or short circuit. 3.Check whether motor circuit lacks phase. 4.Check whether current transformer matches motor.

8.2 Troubleshooting

As fault has memory, after fault is cleared, press STOP key for over 4 seconds to reset soft starter, making it recover to the ready state for starting.

Chapter9 Maintenance

Dust: If there is too much dust, it may reduce the insulation grade of soft starter and make it unable to work normally.

Use clean and dry brush to lightly brush away dust.

Use compressed air to blow away dust.

oisture condensation: If there is moisture condensation, it may reduce the insulation grade of soft starter and make it unable to work normally.

Use electric blower or electric furnace to dry it.

Dehumidify power distribution room.

egularly check the intactness of elements to ensure there are in good condition.

Heck the cooling channel of soft starter for fear of being blocked by sundries and dust.

Maintenance inspection must be made after all power supplies of line side of soft starter are switched off.

Chapter10 Description of Attached Table

Attached table 1 Specification Model and Selection of Accessories

Motor (KW)	Model of soft starter	Rated current(A)	Model of bypass contactor	Current transformer	Spec. of Primary line (copper line)
7.5	CMC-008-3	18	CJX4-25	50\5	6 mm^2
11	CMC-011-3	24	CJX4-32	50\5	10 mm^2
15	CMC-015-3	30	CJX4-32	100\5	16 mm^2
18.5	CMC-018-3	39	CJX4-40	100\5	16 mm^2
22	CMC-022-3	45	CJX4-50	100\5	16 mm^2
30	CMC-030-3	60	CJX4-63	100\5	25 mm^2
37	CMC-037-3	76	CJX4-80	200\5	25 mm^2
45	CMC-045-3	90	CJX4-95	200\5	35 mm^2
55	CMC-055-3	110	CJX4-115F	300\5	50 mm^2
75	CMC-075-3	150	CJX4-150F	300\5	70 mm^2
90	CMC-090-3	180	CJX4-185F	400\5	20×3 Copper row
110	CMC-110-3	218	CJX4-225F	500\5	20×3 Copper row
132	CMC-132-3	260	CJX4-265F	500\5	25×3 Copper row
160	CMC-160-3	320	CJX4-330F	600\5	30×3 Copper row
185	CMC-185-3	370	CJX4-400F	600\5	30×4 Copper row
220	CMC-220-3	440	CJX4-500F	800\5	30×4 Copper row
250	CMC-250-3	500	CJX4-500F	1000\5	40×4 Copper row
280	CMC-280-3	560	CJX4-630F	1000\5	40×4 Copper row
315	CMC-315-3	630	CJX4-630F	1500\5	40×5 Copper row
400	CMC-400-3	780	JWCJ20-800	1500\5	50×5 Copper row
470	CMC-470-3	920	JWCJ20-1000	1500\5	50×5 Copper row
530	CMC-530-3	1000	JWCJ20-1000	1500\5	50×6 Copper row

Ordering instructions

Ø To choose appropriate product, please provide your required product model, specification, load conditions and application conditions for supplier in ordering.

The standard configuration of soft starter does not contain bypass contactor and current detection transformer. Users may choose rational bypass contactor and current detection transformer (each soft starter requires one transformer) according to the model and specification listed in above table.

The selection of accessories is based on the current of controller when main power supply is AC660V, AC1140V. The selection of relevant current transformer and contactor is based on the current of controller.

Accessories in above table are used for reference only.

Attached table 2 Basic Setting for Different Application (for reference only)

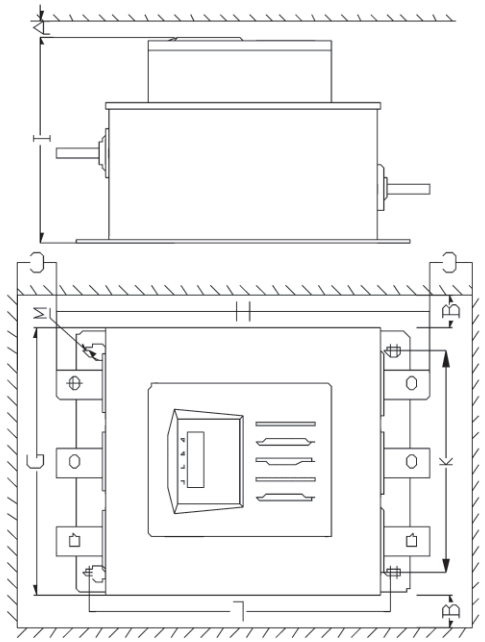
Types of load	Initial voltage (%)	Ramp starting time (sec.)	Ramp stopping time (sec.)	Current limiting ILIM
Propeller	20	10	0	2.5
Centrifugal fan	15	20	0	3.5

Centrifugal pump	20	6	6	3
Piston compressor	20	15	0	3
Lifting machine	30	15	6	3.5
Mixer	40	15	0	3.5
Crusher	30	15	6	3.5
Screw compressor	20	15	0	3.5
Spiral conveyor	15	10	6	3.5
Idling motor	20	10	0	2.5
Belt conveyor	20	15	10	3.5
Heat pump	20	15	6	3
Auto ladder	20	10	0	3
Gas pump	20	10	0	2.5

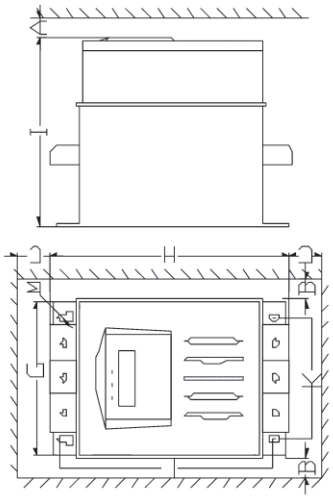
Attached table 3 Appearance of Soft Starter and Perforate dimension

(Unit: mm, with 380V as example)

Model	G	H	I	K	L	M	A	B	C
CMC-008~075	173	286	203	133	250	7	20	10	100
CMC-090~185	286	440	220	240	357	9	20	10	100
CMC-220~315	325	480	220	279	386	9	20	10	100
CMC-400~530	407	620	220	350	481	9	20	10	100



Products of 90KW and above



Products of 75KW and below

Attached table 4 Model Selection of Soft Starter

No.	Rated urrent（A）	380V		660V		1140V	
		Power (KW)	Size (mm)	Power (KW)	Size (mm)	Power (KW)	Size (mm)
1	18	7.5	F001	15	F001		
2	24	11		22			
3	30	15		30			
4	39	18.5		37			
5	45	22		45			
6	60	30		55			
7	76	37		75			
8	90	45		90	F002		
9	110	55		110			
10	150	75		132			
11	180	90	F002	160		280	F002
12	218	110		200		344	
13	260	132		250		400	
14	320	160		300		505	F003
15	370	185		350		584	
16	440	220	F003	400	F003	695	
17	500	250		456		789	
18	560	280		500	F004	884	F004
19	630	315		560		995	
20	780	400	F004	700			
21	920	470					
22	1000	530					

Note: Size F001:173×286×203 F002:286×440×220, F003:325×480×220, F004:407×620×220(W×H×L)