安全注意事项
CAUTIONS

1) 主回路电源得电后即存在危险电压。
   There is dangerous voltage when main circuit is energized;
2) 不允许将输入端(1L1、3L2、5L3)接到输出端(2T1、4T2、6T3)或(B1、B2、B3)。
   It is forbidden to connect input terminal (1L1, 3L2, 5L3) to output terminal (2T1, 4T2, 6T3) or (B1, B2 and B3);
3) 不允许软起动器输出端(2T1、4T2、6T3) 和(B1、B2、B3)接补偿电容或压敏电阻。
   It is forbidden to connect compensation capacitor or piezoresistor to output terminal (2T1, 4T2, 6T3) of soft starter;
4) 软起动器与变频器互为备用时，二者输出端要彼此隔离。
   When soft starter and frequency converter are mutually in standby, their output terminals should be isolated from each other.
5) 不要试图修理损坏的器件，请与供货商联系。
   Do not attempt to repair damaged components. Please contact your supplier.
6) 散热器的温度可能较高。
   Radiator’s temperature maybe much higher.
7) 严禁在软起动输出端反送电。
   Do not reversely feed power at output terminal of soft starter.
8) 软起动器在起动或停止状态时，输出侧都存在高压。
   Output terminal remains high voltage either when soft starter is active or in state of rest.

Foreword

Thank you for choosing the CT motor soft starter manufactured by Xi'an Spread Electric Co., Ltd. In order to properly use this soft starter, please read through this User's Manual before starting operation. Please do operate this soft starter in accordance with the instructions for the purpose of ensuring the personal safety. When you have any problem to which the solution is not described in this manual, please contact our agent or dealer. We are always at your service.

Chapter 1 The Functions and Characteristics of CT Soft Starter

The CT soft starter is a new type of starting equipment produced with advanced international technology, incorporating power electronics, microprocessor technology, and modern control theory. It achieves stepped frequency conversion, stepless voltage regulation, low starting current, and large starting torque through thyristor control. It integrates starting, display, protection, and data acquisition into one unit. Users can achieve more complex control functions with fewer components. Additionally, the display in both Chinese and English interfaces makes operation even simpler.

1.1 Functions

- Reduce the motor starting current, reduce the distribution capacity, and avoid capacity investment;
- Reduce the starting stress, extend the life of the motor and related equipment;
- Smooth start and soft stop avoid the surge problem and water hammer effect of traditional start-up equipment;
- A variety of start-up modes and a wide range of current, voltage and other settings can adapt to a variety of load conditions;
- Perfect and reliable protective function protects motor and related equipment in a more effective manner.

1.2 Characteristics

◆ **Unique load application parameters**

There are ten built-in load types for users to choose, each of which is provided with a unique starting control curve to maximize the matching between the soft starter and the load, achieving the best starting and stopping effects.

◆ **Multiple starting modes**

Voltage ramp start, linear torque control start, square torque control start, and stepped frequency control start. Programmable in-rush start torque and start current limitation can be applied under each mode. The unique basic algorithm makes motor starting and stopping more accurate and smooth.

◆ **Advanced communication function**

Equipped with an RS485 communication interface, it facilitates user network connection control, improving system automation levels and reliability. It embeds the Modbus standard protocol for convenient configuration connection.

◆ **Analog signal control**

The user can input standard signals of 4-20mA or 0-20mA, and set the upper and lower limits of analog quantities on the operation panel to realize the start, stop control, and alarm of the motor. Data (pressure, temperature, flow rate, etc.) transmission can also be achieved through the soft starter. It has a standard analog signal output function of 4-20mA or 0-20mA.

◆ **Powerful anti-interference property**

All external control signals are subject to optoelectronic isolation, and different anti-noise levels are set to adapt to the application in special industrial environments.

◆ **Dual parameter function**

The soft starter has two sets of control parameters for motors of different power ratings, allowing it to control two motors with different power ratings.

◆ **Self-adaption of power frequency**

The power supply features a 50/60Hz auto-adaptive function, providing convenience for users.

- **Dynamic fault memory**

Up to 15 failures can be recorded, making it easy to find the cause of the malfunction.

- **Perfect protective function**

It continuously monitors current and load parameters, featuring microprocessor-based protection functions such as Over-voltage, Under-voltage, three-phase voltage imbalance, overcurrent, overload, underload, overheating, phase loss, short circuit, three-phase current imbalance, phase sequence detection, leakage current detection, zero sequence detection, system abnormality, and crystal oscillator abnormality.

- **Friendly human-machine interface**

The LCD liquid crystal display and navigation-style operation mode make parameter setting and adjustment more convenient, and fault and real-time monitoring more intuitive. It has both Chinese and English display interfaces.

Chapter 2 Goods Acceptance and Inspection

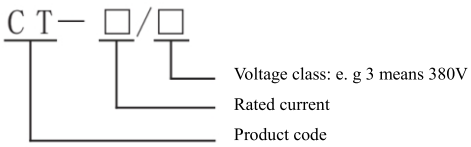
Each soft starter has been functionally tested for normal operation before delivery. After user receives the equipment, please carry out inspection as per the following procedures. For any problem found in inspection, please contact your supplier as soon as possible.

1. Check nameplate to confirm that the equipment you receive is consistent with the one you ordered.

(1)Description of soft starter's nameplate



(2)Description of soft starter's model



2. Check whether product is damaged during transport, such as housing sunken and deformed and inner wiring and connecting fittings are loose.

3. Check whether product certificate, warranty card, package list and user's manual are attached.

4. After delivered, the product's after-sale service shall be subject to warranty card. After receiving the product, please fill in warranty card and mail it back to Xi'an Xichi Electric Co., Ltd. or your supplier.

Chapter 3 Conditions off Use and Installation

3.1 Conditions of use

Control power	AC110V--AC220V ±15%　50/60Hz
Three-phase power	Standard wiring AC380V, 660V, 1140V±15%
Nominal current	18A-1000A, 22 rated values in total
Applicable motor	Ordinary squirrel cage asynchronous motor
Starting ramp mode	Voltage ramp start, linear torque control start, square torque control start, stepped frequency conversion control start
Stop mode	Free stop, soft stop, pump stop, internal and external brakes
Logical input	Impedance 1.8 KΩ, power supply +24V
Start frequency	Frequent or infrequent start available, and internal setting is allowed
Protective function	Over-voltage, Under-voltage, three-phase voltage imbalance, overcurrent, overload, underload, overheating, phase loss, short circuit, three-phase current imbalance, phase sequence detection, leakage current detection, zero-sequence detection, motor temperature protection, etc.
Protection level	IP00. IP20
Cooling type	Natural cooling or forced air cooling
Installation type	Wall mounted
Environmental condition	When the sea altitude is above 2,000m, soft starter should be derated for use. Ambient temperature: -25-+45°C Relative humidity: less than 95%(20°C±5°C) Free of flammable, explosive and corrosive gas or conductive dust. Good ventilation for indoor installation and vibration is less than 0.5G

3.2 Installation direction

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

3.3 Installation space

Leave enough space around the equipment for heat dissipation. For convenience of maintenance, please keep a certain distance between the equipment and wall (see appendix 4). To choose air blower, please log on our website www.xichi.cn to download air blower's size.

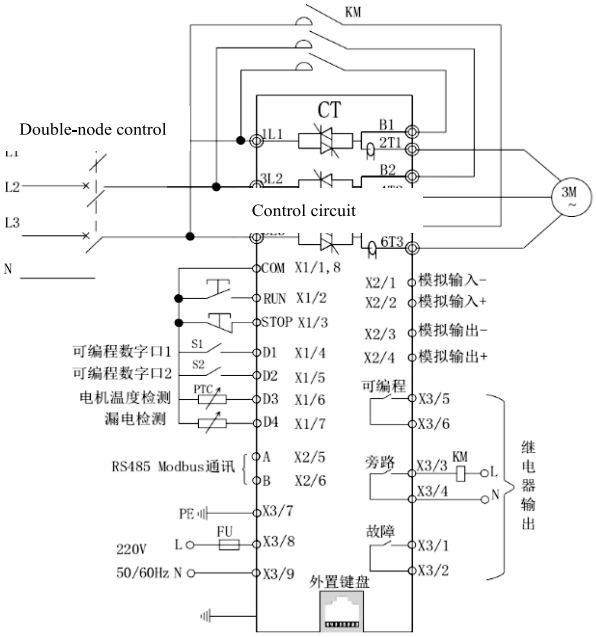
3.4 Circuit installation

Main circuit uses up-in and down-out wiring and cable should be guaranteed to have enough current-carrying capacity. For selection of supportive fittings, please refer to the appendix 2.

Chapter 4 Circuit Connection

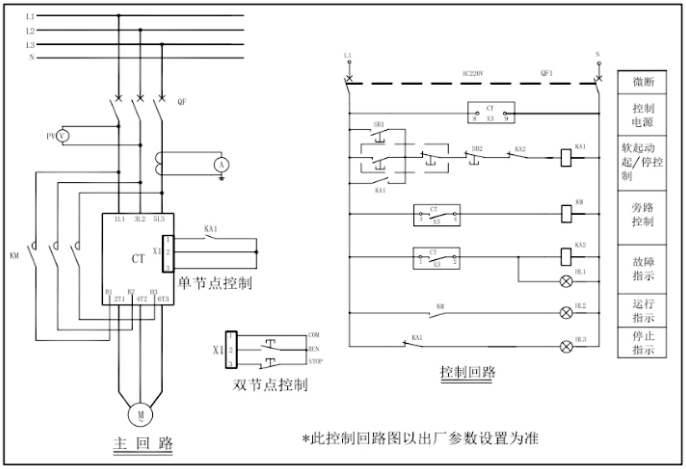
4.1 Basic wiring diagram

The terminals IL1, 3L2, and 5L3 of the soft starter are connected to the three-phase power supply, while 2T1, 4T2, and 6T3 are connected to the motor. Terminals B1, B2, and B3 are connected to the bypass contactor. The soft starter allows for the selection of phase sequence detection through parameter settings. When using a bypass contactor, it can be controlled by the built-in signal relay K2.



模拟输入 Analog input　　可编程数字口 1 Programmable digital port 1
模拟输出 Analog output　　电机温度检测 Motor temperature test
漏电检测 Current leakage detection　RS485 Modbus 通讯 RS485 Modbus communication
继电器输出 Relay output　　旁路 Bypass 故障 Fault　外置键盘 External keyboard

4.2 Wiring diagram for typical application



微断 Miniature breaker　　控制电源 Control power

软起动起/停控制　Soft starting start/stop control　旁路控制 Bypass control

故障指示 Fault indication　　运行指示 Operation indication　　停止指示　Stop indication

控制回路 Control circuit

双节点控制 Dual-node control

单节点控制 Single-node control

此控制回路图以出厂参数设置为准

This control loop diagram shall be subject to the factory-set parameters.

NOTES:

1. The above diagram shows the single-node control mode. When contact closes, soft starter starts, otherwise, it stops. But it needs to be noted that LED panel's start is ineffective with this type of wiring. Terminals X1/1, X1/2 and X1/3 start and stop signal is a passive node.

2. PE grounding wire should be as short as possible. It should be connected to an earth connection point close to soft starter. The proper earth connection point should be on installation board and close to soft starter. Installation board should be grounded too. This earth connection is for function rather than protection.

4.3 Description of terminal

The CT soft starter has 23 external control terminals which help user realize external signal control, remote control and system control.

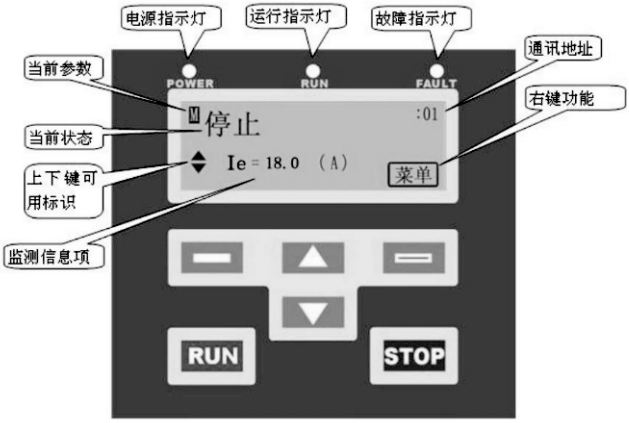
Terminal No.			Name of terminal	Description
Main circuit	lL1. 3L2. 5L3		AC power input terminal	Connected to three-phase AC power supply
	B1. B2. B3		External bypass output terminal	Connected to bypass contactor
	2T1. 4T2. 6T3		Soft start output terminal	Connected to asynchronous motor
Control circuit		X1/1	COM	COM
		X1/2	External control starting	Start when X1/1 and X1/2 are

	Digital input		terminal	short-circuited.
		X1/3	External control stopping terminal	Stop when X1/1 and X1/2 are disconnected
		X1/4	Programmable digital port D1	Different functions can be set through functional parameters Q04 and Q05.
		X1/5	Programmable digital port D2	
		X1/6	Digital port D3	Motor's temperature detection
		X1/7	Digital port D4	Current leakage detection
		X1/8	COM	COM
	Analog input	X2/1	Analog current input -	0 - 60mA analog input can be set through functional parameter Q06.
		X2/2	Analog current input +	
	Analog output	X2/3	Analog current output -	0 - 20mA analog output can be set through functional parameter Q07.
		X2/4	Analog current output +	
	485 COM	X2/5	485 COM A	R485 interface Modbus communication protocol
		X2/6	485 COM B	
	K1 relay output	X3/1	Failure relay output	When the output is effective, K11-K12 will be closed. The contact capacity is AC250V/5A and DC30V/5A.
		X3/2		
	K2 relay output	X3/3	Bypass relay output	When the output is effective, K21-K22 will be closed. The contact capacity is AC250V/5A and DC30V/5A.
		X3/4		
	K3 relay output	X3/5	Programmable relay output	When the output is effective, K31-K32 will be closed. The contact capacity is AC250V/5A and DC30V/5A.
		X3/6		
	Control power	X3/7	PE	To ground
		X3/8	Control power	AC110-220V±15% 50/60Hz
		X3/9		

Chapter 5 Instruction to Display and Operation

The human-machine interface is used for soft starter programming input and output settings, protection functions, warnings, bus communication, parameter setting, local control and display of soft starter status information.

The man-machine interface consists of three parts which are LED indicator lamp, LCD and keyboard. See Figure 5-1.



当前参数	Current parameters	电源指示灯	Power indicator light
运行指示灯	Running indicator light	故障指示灯	Fault indicator light
当前状态	Current status	通讯地址	Communication address
上下键可用标识	Up/down key available sign	右键功能	Right key’s function
监测信息项	Monitoring information		

Fig. 5-1 Introduction to Panel

5.1 Description of information displayed on panel

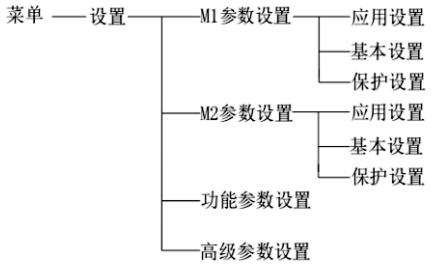
Key	Functions
Monitoring information	It displays the currently measured information. You can refer to the "Real-time Parameters" menu in the parameter table.
Up and down keys’ available mark	When there is this mark, you can use the "up and down scroll" keys to browse the items in the "Real-time Parameters".
Current status	It indicates the current status of the motor
Current parameters	Display the system is currently using the "M1" or "M2" parameters (the system has two sets of parameters available)
Power indicator light	It goes on when the system control power is energized
Running indicator light	It goes off in state of rest; it remains on in state of completing start; it flashes in other states
Fault indicator light	When the system is in a protected or faulty state, the indicator light is on; it goes off in the other states.

Communication address	It displays the machine's communication address, which is the address on the external terminal (X2- 5/6). It flashes when this terminal is used for communication.
Right key	Display the current function of the "right key" of keyboard

5.2 Description of panel keys

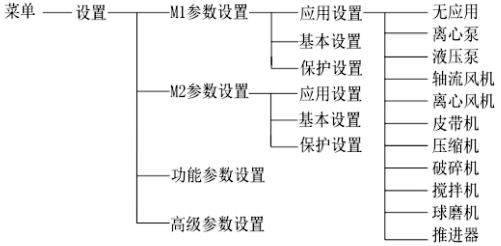
Symbol	Name	Functional description
	Left key	Set parameters and save data. The button shown in the lower left corner of the LCD screen corresponds to the key
	Right key	Enter menu, exit menu or cancel selection. The button shown in the lower right corner of the LCD screen corresponds to the key.
	Up key	Add parameter value or data
	Down key	Minus parameter value or data
RUN	Run key	Functions such as motor starting, inching, and macro activation can only work when the external terminals X1\1 and X1/3 or X1/3 and X1/8 are short - circuited and the key is enabled in the software.
STOP	Stop key	Complete the stop function of the motor and stop mode is subject to software's parameter

5.3 Menu and parameters setting



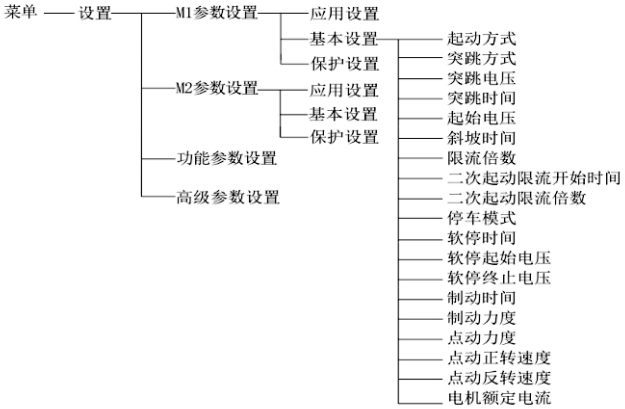
菜单	Menu	应用设置	Application setting
设置	Setting	基本设置	Basic setting
M1 参数设置	M1 parameter setting	保护设置	Protection setting
M2 参数设置	M2 parameter setting		
功能参数设置	Functional parameter setting		
高级参数设置	Senior parameter setting		

5.4 Application setting (parameter C)



菜单	Menu	应用设置	Application setting
设置	Setting	基本设置	Basic setting
M1 参数设置	M1 parameter setting	保护设置	Protection setting
M2 参数设置	M2 parameter setting	无应用	No application
功能参数设置	Functional parameter setting	离心泵	Centrifugal pump
高级参数设置	Senior parameter setting	液压泵	Hydraulic pump
轴流风机	Axial flow fan	压缩机	Compressor
离心风机	Centrifugal fan	破碎机	Crusher
皮带机	Belt conveyor	搅拌机	Mixer
球磨机	Ball mill	推进器	Propeller

5.5 Basic setting (parameter C)



菜单	Menu	应用设置	Application setting
设置	Setting	基本设置	Basic setting
M1 参数设置	M1 parameter setting	保护设置	Protection setting
M2 参数设置	M2 parameter setting	起动方式	Start mode
功能参数设置	Functional parameter setting	突跳方式	Step mode
高级参数设置	Senior parameter setting	突跳电压	Step voltage
突跳时间	Step time	二次起动限流开始时间	Starting time of secondary starting

			current limiting
起始电压	Initial voltage	二次起动限流倍数	Current limiting multiple of secondary starting
斜坡时间	Ramp time	停车模式	Stop mode
限流倍数	Current limiting multiple	软停时间	Soft stop time
软停起始电压	Initial voltage of soft start	制动力度	Brake force
软停终止电压	Final voltage of soft start	点动力度	Inching force
制动时间	Brake time	点动正转速度	Inching forward speed
点动反转速度	Inching reverse speed	电机额定电流	Motor's rated current

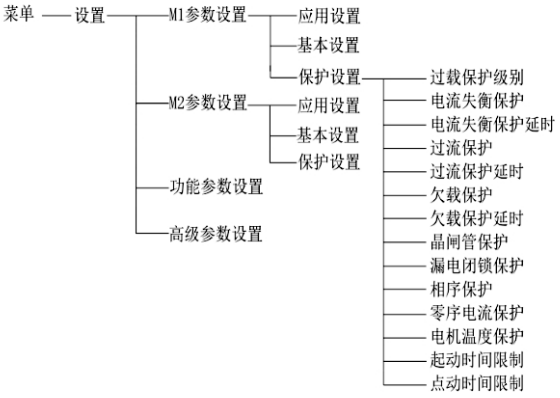
The basic settings are used to configure the basic start-stop control mode. Users can select the starting mode to ensure that the starting curve matches the actual load well, achieving the best starting effect. If the step voltage and step time are set, a transient and relatively large starting torque will be applied at the beginning of the start-up, followed by the start-up according to the set initial voltage/current and ramp-up time. If the second start-up time is set, and the start-up has not been completed by the time set for the second start-up, the start-up will be performed again according to the set initial voltage/initial current and ramp-up time. During the start-up process, the starting current is limited to below the set current limiting multiple value. When the current limiting multiple is set to 500%, the starting current during the starting process will not be limited. For details on various control modes, please refer to Chapter 6.

Note: During the starting process, if there is a stop command, the stop mode can only be free stop. After the starting is completed, if there is a stop command, the stop mode can be free stop, soft stop, pump stop or braking stop.

The parameter ramp time (C06) reflects the rising rate of the output voltage and does not represent the actual starting completion time. The actual starting time is often affected by current limiting, load size and characteristics, etc., and is an uncertain value. The relationship between the actual starting completion time and current limiting as well as the load is as follows: the lighter the load and the greater the current limiting multiple, the shorter the starting completion time; conversely, the longer the starting completion time.

When the ramp time is set to 0, the system will automatically assign a ramp time of 3 seconds. The functions of the parameters "starting voltage" and "ramp time" for other starting methods are the same as those described above. The difference lies in the curves of output voltage versus time, which will not be explained further later.

5.6 保护参数（B参数）Protection parameters (B parameters)



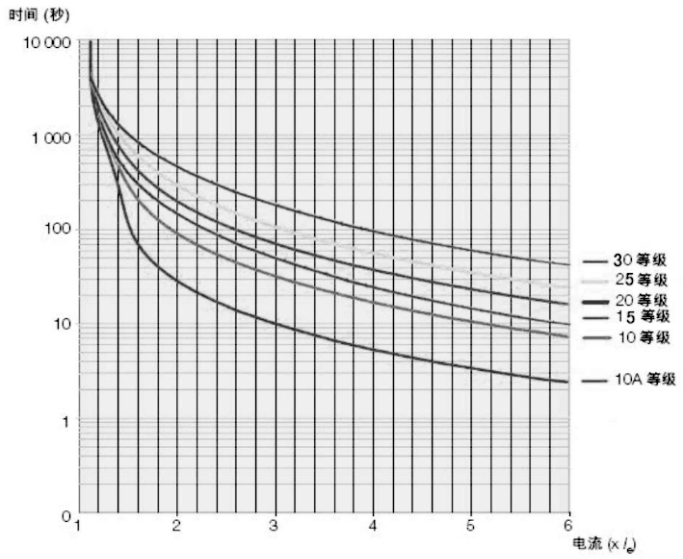
菜单	Menu	欠载保护	Underload protection
设置	Setting	欠载保护延时	Underload protection delay
M1 参数设置	M1 parameter setting	晶闸管保护	Thyristor protection
M2 参数设置	M2 parameter setting	漏电闭锁保护	Leakage lockout protection
功能参数设置	Functional parameter setting	相序保护	Phase sequence protection
高级参数设置	Senior parameter setting	零序电流保护	Zero sequence current protection
应用设置	Application setting	电机温度保护	Motor temperature protection
基本设置	Basic setting	起动时间限制	Starting time limit
保护设置	Protection setting	点动时间限制	Inching time limit
过载保护级别	Overload protection level		
电流失衡保护	Current imbalance protection		
电流失衡保护延时	Current imbalance protection delay		
过流保护	Overcurrent protection		
过流保护延时	Overcurrent protection delay		

Users can set the rated current of the motor according to the power of the motor being driven, so that the soft starter can be well matched with the motor and protect the motor perfectly.

◆ Overload protection

It is used to protect the motor during the operation of the starter and prevent the motor from being damaged by excessive running current. This protection can be turned on or off through parameter settings.

The setting range of the overload protection level: 10A, 10, 15, 20, 25, 30, OFF. The factory setting is at level 20.



电子过载的脱扣曲线

◆ Current imbalance protection

This protection function is set for the excessive deviation among the three-phase current values during the operation of the motor. During the use, the smaller this value is, the higher the sensitivity of the three-phase imbalance protection will be. Therefore, this value should not be set too small to avoid overly sensitive protection, which may affect the normal use of the equipment. The setting range of the current imbalance protection is: (0 - 100)%, and the factory setting is 40%. When set to 100%, this protection function is turned off. The setting range of the current imbalance protection delay is: 0-250S, and the factory setting is 2S.

◆ Overcurrent protection

If the current during operation exceeds the set over - current protection value and the duration exceeds the set over - current protection delay time, protection measures will be taken. The setting range of the over - current protection is (100 - 500)%Ie, and the factory default value is 300%. Setting it to 100% will turn off this protection function. The setting range of the over - current protection delay is 0 - 250S, and the factory default value is 2S.

◆ Underload protection

After start-up is completed, if the current during operation is lower than the set underload protection value and the duration exceeds the set underload protection delay time, protection will be activated. The underload protection setting range is: (0~99)%Ie, with the factory default setting at 0. When set to 0, this function is disabled. The underload protection delay setting range is: 0~250S, with the factory default setting at 2S.

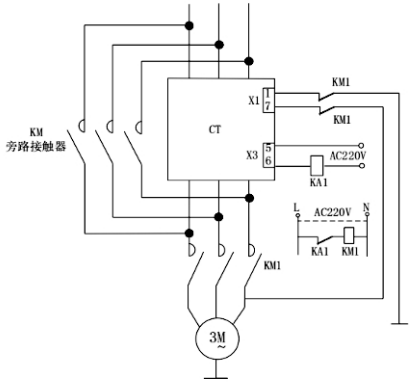
◆ Thyristor protection

Thyristor protection detects whether there is a direct conduction or non-conduction during triggering in thyristors, and provides protection if any. This function needs to be enabled before detection, and it is disabled by default in the factory settings.

◆ Leakage lockout protection

Before starting, detect the insulation level of the motor. The protection values differ at different voltage levels. The setting range for leakage lockout protection is: 0 for Disable and 1 for Enable. The use of this function requires coordination with relay output, which means that the K3 relay output (parameter Q17) needs to be set to 7 (output during leakage lockout detection process).

Voltage class	Single-phase-to-ground insulation resistance
AC380V/660V	≤20kQ+20%leakage protection works
AC1140V	≤40kQ+20% leakage protection works



漏电检测示意图

Leakage detection diagram

◆ Phase sequence protection

The soft starter can operate under any phase sequence, but if the phase sequence protection function is selected, the phase sequence must be a fixed phase sequence. The setting range for phase sequence protection is: 0 for Disable, and 1 for Enable. The factory default setting is Disable.

◆ Zero phase sequence protection

This function detects whether there is leakage on the three-phase windings. This function is flexible to use. During application, based on the received signal, select the "Analog Input" parameter range of "0～60mA", and then set the percentage of the range for protection. This parameter is set in the "Analog Input Upper Limit" parameter. After setting, the system will check during startup whether the input value reaches the set value. If it is greater than or equal to the "Analog Input Upper Limit", it will report "Zero-sequence Protection". The current connected to the analog input terminal should not exceed the maximum analog input value of 60mA. This protection is only detected after the system starts.

◆ Motor temperature protection

This function detects the size of the thermal resistor embedded inside the motor to determine if the motor is overheating. The activation resistance is 3.3K + 30% Ω, and it is of the PTC type. When the system detects that the thermal resistor's resistance is great than the activation resistance, the system will protect. This function must be enabled to be effective, and the factory default setting is off.

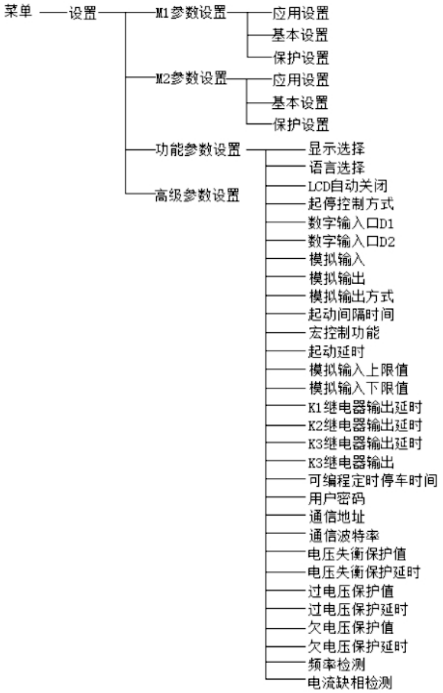
◆ Starting time limit

It is used to set the maximum allowable time for the starting process. The setting range for the starting time limit is: 10 to 120 seconds, with a factory default value of 60 seconds.

◆ Inching time limit

It is used to set the maximum allowable time for the inching process. The setting range for the inching time limit is: 10 to 60 seconds, with a factory default value of 60 seconds.

5.7 Functional parameters setting (O parameters)



菜单	Menu	起 动 延 时	Starting delay
设置	Setting	模拟输入上限值	Analog input upper limit value
M1 参数设置	M1 parameter setting	模拟输入下限值	Analog input down limit value
M2 参数设置	M2 parameter setting	R1 继电器输出延时	K1 relay output delay
功能参数设置	Functional parameter setting	K2 继电器输出延时	K2 relay output delay
高级参数设置	Senior parameter setting	K3 继电器输出延时	K3 relay output delay
应用设置	Application setting		
基本设置	Basic setting	K3 继电器输出	K3 relay output
保护设置	Protection setting	可编程定时停车时间	Programmable timed stopping time
显示选择	Display selection	用户密码	User's password
语言选择	Language selection	通信地址	Communication address
LCD 自动关闭	LCD auto off	通信波特率	Communication baud rate
起停控制方式	Start/stop control mode	电压失衡保护值	Voltage imbalance protection value
数字输入口 D1	Digital input port D1	电压失衡保护延时	Voltage imbalance

			protection delay
数字输入口 D2	Digital input port D2	过电压保护值	Over-voltage protection value
模拟输入	Analog input	过电压保护延时	Over-voltage protection delay
模拟输出	Analog output	欠电压保护值	Under-voltage protection value
模拟输出方式	Analog output mode	欠电压保护延时	Under-voltage protection delay
起动间隔时间	Starting interval	频率检测	Frequency detection
宏控制功能	Macro control function	电流缺相检测	Current phase loss detection

◆ **Display selection**

After setting the display selection parameter, the selected display item will be displayed as the default display item. The setting range for the display selection parameter is: 0. Motor Rated Current; 1. Average Current; 2. L1 Phase Current; 3. L2 Phase Current; 4. L3 Phase Current; 5. Analog Port Value %; 6. Output Voltage %; 7. L1-L2 Phase Voltage; 8. L2-L3 Phase Voltage; 9. L3-L1 Phase Voltage. The factory default value is 1.

◆ **Language selection**

Used to select the current display language. The parameter setting range is: 0. Chinese; 1. English. The factory default value is 0.

◆ **LCD auto off**

The LCD backlight can be automatically turned off within a set time. The parameter setting range is: 0～255Min, and the factory default value is 15. When set to 0, the backlight will not turn off.

◆ Start/stop control mode

Parameter Q03 is used to select the start/stop control mode of the soft starter. Under any start/stop control mode, the user can control the start/stop through the external control terminal.

◆ **Digital port D1/D2**

The soft starter has two programmable digital input ports (D1/D2), which can be used for different purposes and are independent of each other. The factory default value of the digital port D1 (parameter Q04) is 0 (M2 parameter selection), and the factory default value of the digital port D2 (parameter Q05) is 1 (fault reset).

1. M2 Parameter Selection: The soft starter has two sets of control parameter items. Users can select the second set of basic function items by closing D1/D2 and the COM terminal (D1/D2 is set as M2 parameter selection). When disconnected, it defaults to the M1 set of parameter items.

2. Fault Clearance: Clear the current fault by closing D1/D2 with the COM terminal. If a start command exists after the fault is cleared, the soft starter will start again.

3. Inching in forward direction: Inching control is achieved by closing the connection between D1/D2 and the COM terminal. The digital port closes to initiate soft start inching operation, and opens to stop the soft starter. The inching process is controlled according to the set inching force (C16), inching forward speed (C17), and inching time limit (B13).

4. Inching in reversal direction: Inching control is achieved by closing the connection between D1/D2 and the COM terminal. The digital port closes to initiate soft start inching operation, and opens to stop the soft starter. The inching process is controlled according to the set inching force (C16), inching forward speed (C18), and inching time limit (B13).

5. Emergency stop control input: When D1/D2 is set as the emergency stop control input, disconnecting D1/D2 from the COM terminal will achieve an emergency stop of the soft starter, and the LCD panel will display the emergency stop interface.

6. Time delay relay control input: When D1/D2 is set as the time delay relay control input, the corresponding programmable relay K3 output (parameter Q17) should be configured as a programmable time delay output. When D1/D2 is closed with the COM terminal, the corresponding relay will produce an output after the relay output delay parameter Q16 time has elapsed.

Note: For macro control of closed contacts and macro control of open contacts, please refer to the macro control function description.

◆ **Analog input and output**

The system has analog input and analog output functions. The analog output function mainly outputs the measured average current at a range of 0～20mA or 4～20mA. The output range is determined by the parameter "Analog Output Mode", and analog output is only performed according to the set parameters after a start command is given.

The analog input function must be used in conjunction with other functions. When applying, select the corresponding measurement range in the "Analog Input Mode (Q06)" parameter. The measurement range determines the percentage of analog input, which can be checked through the "Page Up/Down" keys in the monitoring status, i.e., the value of "Ai=%".

◆ **Starting interval**

The minimum interval between two startup operations. After the startup is completed, the starting interval timer counts down according to the set starting interval (parameter Q09). If the countdown has not reached zero, another starting cannot be performed. If the starting is attempted when the starting interval timer is not equal to zero, the soft starter will indicate a frequent starting fault. After resetting the fault, the time until the next allowed startup can be checked via the panel Ts (starting interval timer). The parameter setting range is 0 to 60 minutes, and the factory default value is 0 (startup interval restriction is off).

◆ **Macro control function**

Users can control the automatic start/stop of the soft starter by selecting macros (the macros need to be opened by pressing the RUN key on the panel).

7. No macro control: The start/stop of soft start is not controlled by macros.

8. Contact macro control of digital port 1: Control the starter's macro start/stop (by pressing the RUN key on the keyboard). Based on the setting of parameter Q04: (Set as closed contact macro control: When digital port D1 is closed, and the start delay time set by Q11 has elapsed, the soft starter will start. If digital port is opened during this process, the soft starter will stop, and "Macro Stop" will be displayed on the LCD interface. For open contact macro control: When digital port D1 is opened, and the start delay time set by Q11 has elapsed, the soft starter will start. If digital port is closed during this process, the soft starter will stop, and "Macro Stop" will be displayed on the interface. The soft starter can be restarted by opening digital port D1. The system can only be stopped by pressing the STOP key on the keyboard.)

9. Contact macro control of digital port 2: Control the starter's macro start/stop (by pressing the RUN key on the keyboard). Based on the setting of parameter Q05: (Set as closed contact macro control: When digital port D2 is closed, and the start delay time set by Q11 has elapsed, the soft starter will start. If digital port is opened during this process, the soft starter will stop, and "Macro Stop" will be displayed on the LCD interface. For open contact macro control: When digital port D2 is opened, and the start delay time set by Q11 has elapsed, the soft starter will start. If digital port is closed during this process, the soft starter will stop, and "Macro Stop" will be displayed on the interface. The soft starter can be restarted by opening digital port D2. The system can only be stopped by pressing the STOP key on the keyboard.)

10. Analog positive input macro control: Use the analog port macro control function to perform

control based on the upper and lower limits of the analog input set by parameters Q12 and Q13. When the analog input reaches the upper limit value, the controller starts; when it is lower than the lower limit value, the controller stops. Otherwise, it is in the "macro stop" state. (The RUN key on the keyboard must be pressed and the starting delay time set by Q11 must have elapsed. If the macro conditions are not met, "macro stop" will be displayed on the interface.)

11. Analog negative input macro control: Use the analog port macro control function to perform control based on the upper and lower limits of the analog input set by parameters Q12 and Q13. When the analog input reaches the down limit value, the controller starts; when it is higher than the upper limit value, the controller stops. Otherwise, it is in the "macro stop" state. (The RUN key on the keyboard must be pressed and the starting delay time set by Q11 must have elapsed. If the macro conditions are not met, "macro stop" will be displayed on the interface.)

◆ **K3 relay output**

There are three relays on the main control board of the CT soft starter. Two of them are used for fault output and bypass output respectively. The output of the other relay is programmable, and users can set the parameter Q17 according to actual needs. The factory setting is 7 (output during the leakage lockout detection process).

Parameters Q14, Q15, and Q16 are used to set the output delay of the relays. The parameter setting range is from 0 to 250 seconds, and the factory default value is 0.

0. Full-voltage output: The output is closed when the output voltage of the soft starter reaches the rated voltage (after the set delay time has elapsed).

1. Output during starting process: The output is closed when the soft starter is in the starting process (after the set delay time has elapsed). If the full voltage is reached before the delay time expires, there will be no output.

2. Output during soft-stop process: The output is activated when the soft starter is in the soft-stop process (after the set delay time has elapsed, and the set delay time must be less than the soft-stop time set by parameter C11).

3. Output in case of fault: The output is closed when the soft starter detects a fault (after the set delay time has elapsed).

4. Output during braking: The output is activated when the soft starter is in the external braking state (after the set delay time has elapsed, and the set delay time must be less than the braking time set by parameter C14).

5. Output during operation: The output is closed when the soft starter is in the starting and operating processes (after the set delay time has elapsed).

6. Programmable delayed output: Parameters Q04/Q05 must be set to the control input of the time-delay relay. When the set delay time elapses, the relay outputs.

7. Leakage lockout detection output: Parameter B08 must be set to enable leakage lockout protection. When the leakage detection input terminal X1/7 detects a leakage, the relay outputs (in this mode, the relay delay time must be set to 0).

◆ **Programmable timed stopping time**

When this parameter needs to be set, the minimum setting amount is 0.1h. It means that after the soft starter is in operation, it will stop according to the set stopping mode after the specified time has elapsed. The parameter setting range is 0 - 999.9h, and the factory default value is 0.

◆ **User's password**

Users can protect the device by setting a user password to prevent external parties from modifying parameters and performing other operations. The parameter setting range is from 0 to 65535, and the factory default value is 0.

◆ **Communication**

When carrying out network communication, 32 devices can be connected, and the communication address of the current device can be viewed at the upper right corner of the LCD display screen. Users can set the baud rate and communication address to achieve the purpose of automatic communication. The setting range of the communication address is from 1 to 32, and the factory default value is 1. The setting range of the communication baud rate is as follows: 0, 600; 1, 1200; 2, 2400; 3, 4800; 4, 9600; 5, 19200, and the factory default value is 4 (9600).

◆ **Voltage imbalance protection**

This protection is a protection function set for the excessive deviation among the three-phase main power supply voltages. When in use, the smaller the value, the higher the sensitivity of the three-phase imbalance protection. Therefore, this value should not be set too small to avoid the protection being too sensitive and thus affecting the normal use of the equipment. The setting range of the voltage imbalance protection is (0 - 100)%, and the factory setting is 70%. When set to 100%, this protection function is turned off. The setting range of the voltage imbalance protection delay is 0 - 250S, and the factory default value is 2S.

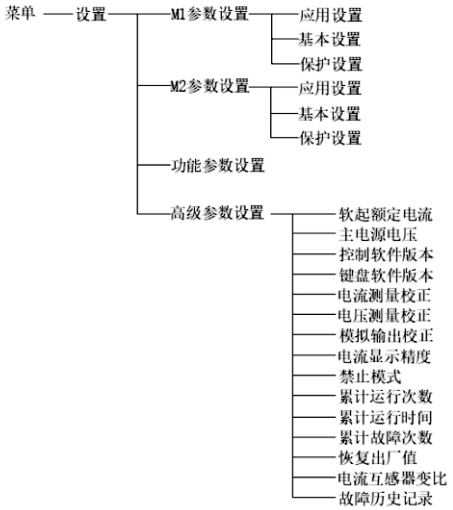
◆ **Over-voltage protection**

The protection is triggered when the main power supply voltage exceeds the set over-voltage protection value and the over-voltage protection delay time has elapsed. The range of the over-voltage protection value is (100 - 150)%. Setting it to 100% turns off this function, and the factory default value is 150%. The range of the over - voltage protection delay is 0 - 250S, and the factory default value is 2S.

◆ **Under-voltage protection**

The protection is triggered when the main power supply voltage is lower than the set under-voltage protection value and the under-voltage protection delay time has elapsed. The range of the under-voltage protection value is (100 - 150)%. Setting it to 100% turns off this function, and the factory default value is 70%. The range of the over-voltage protection delay is 0 - 250S, and the factory default value is 2S.

5.8Recording parameters setting (H parameter)

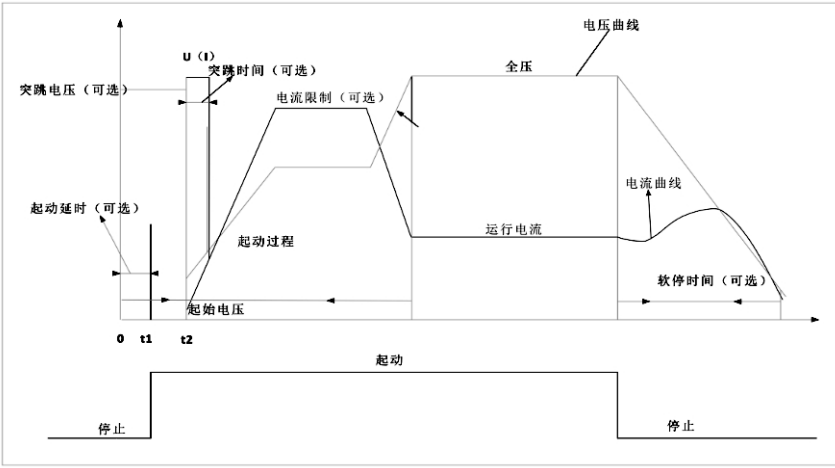


菜单	Menu	电压测量校正	Voltage measurement calibration

设置	Setting	模拟输出校正	Analog output calibration
M1 参数设置	M1 parameter setting	电流显示精度	Current display precision
M2 参数设置	M2 parameter setting	禁止模式	Forbidden mode
功能参数设置	Functional parameter setting	累计运行次数	Cumulative running times
高级参数设置	Senior parameter setting	累计运行时间	Cumulative running time
应用设置	Application setting	累计故障次数	Cumulative number of failures
基本设置	Basic setting	恢复出厂值	Factory reset
保护设置	Protection setting	电流互感器变比	Current transformer ratio
软起额定电流	Soft-start rated current	故障历史记录	Fault history
主电源电压	Main power voltage		
控制软件版本	Control software version		
键盘软件版本	Keyboard software version		
电流测量校正	Current measurement calibration		

The parameter items for display and recording record the working and status information of the soft starter. Users are not allowed to modify this function item.

Chapter 6 Control Modes of Soft Starter

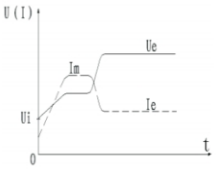


Characteristic curve of soft start/stop voltage (current)

突跳电压（可选）	Step voltage (optional)	电流曲线	Current curve
突跳时间（可选）	Step time (optional)	运行电流	Running current
全压	Full voltage	起动过程	Starting process
电压曲线	Voltage curve	起始电压	Initial voltage
起动延时（可选）	Starting delay (optional)	软停时间（可选）	Soft-stop time (optional)
起动	Start	停止	Stop

The CT soft starter has multiple starting modes: voltage ramp control, linear torque control, Square torque control, and stepped frequency control; it also features multiple stopping modes: free stopping, soft stopping, brake stopping, soft stopping + brake stopping, and it also has a jogging function. Users can select different starting and stopping modes according to different loads and specific operating conditions.

6.1 Voltage ramp control



When the voltage ramp starting method is used, the output voltage applied to both ends of the motor will increase linearly. Meanwhile, the output current will increase at a certain rate. When the starting current increases to the current limit value Im, the current remains constant. This is the current-limiting function of the system. Other starting methods also have the same function, and no further details will be provided later. If the current is lower than the current-limiting value, the system will continue phase-shifting until the starting process is completed.

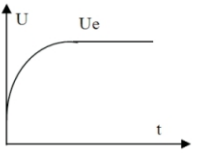
When applying, the main parameters are shown in the following table:

Parameter	Name	Range	Set value	Factory default
C01	Starting method	0～3	0	0

C05	Initial voltage	2～100%Ue		30%
C06	Ramp time	0～120S		10
C07	Current-limiting multiple	100~500%Ie	--	350%

6.2 Linear torque control

When the linear torque starting method is used, the output voltage applied to both ends of the motor will be controlled. The output voltage curve is as shown in the right figure. The output torque will gradually increase according to the preset optimal curve, enabling the motor to start. This starting mode is suitable for occasions where the load gradually becomes heavier.

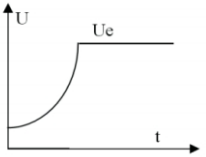


When applying, the main parameters are shown in the following table:

Parameter	Name	Range	Set value	Factory default
C01	Starting method	0～3	1	0
C05	Initial voltage	25～100%Ue	---	30%
C06	Ramp time	0～120S	---	10
C07	Current-limiting multiple	100～500%Ie	---	350%

6.3 Square torque control

When the square torque starting method is used, the output voltage applied to both ends of the motor will be controlled. The output voltage curve is as shown in the right figure. The output torque will gradually increase according to the preset optimal curve to start the motor. This starting method is suitable for occasions where the torque gradually becomes lighter.



When applying, the main parameters are shown in the following table:

Parameter	Name	Range	Set value	Factory default
C01	Starting method	0～3	2	0
C05	Initial voltage	20～100%Ue	---	30%
C06	Ramp time	0～120S	---	10
C07	Current-limiting multiple	100～500%Ie	---	350%

6.4 Stepped Frequency Conversion Control

The staged frequency conversion starting means that during the starting process, the soft starter first accelerates at a quarter of the rated frequency. When the speed reaches the rated speed corresponding to the quarter of the rated frequency, it then jumps to the power frequency for starting. The starting at a quarter of the rated frequency adopts the voltage ramp starting method, while the starting at the power frequency

adopts the torque ramp starting method. This starting mode is mainly applied to loads with large inertia.

When applying, the main parameters are shown in the following table:

Parameter	Name	Range	Set value	Factory default
C01	Starting method	0～3	3	0
C05	Initial voltage	20～100%Ue	---	30%
C06	Ramp time	0～120S	---	10
C07	Current-limiting multiple	100～500%Ie	---	350%

6.5 Stepping

The stepping function is mainly applied to load motors with high static resistance, which overcomes the large static friction torque by applying a momentarily large starting torque. In this mode, the output voltage quickly reaches the set step voltage. After reaching the preset step time, it drops to the starting voltage, and then starts smoothly according to the set starting voltage and ramp time until the starting is completed. There are two stepping methods, namely voltage drop step and low-frequency step. The low-frequency step has a greater output torque and a smaller current impact than the voltage step.

Parameter	Name	Range	Set value	Factory default
C01	Starting method	(20～100%)Ue	---	30%
C05	Initial voltage	0～1	---	0
C06	Ramp time	20～100%Ue	---	20%
C07	Current-limiting multiple	0～2000mS	---	0

When the step torque starting method is used, it must be used in combination with other soft starting methods, and the step voltage and step time need to be set.

6.6 The secondary start

In order to solve the problem of difficult starting of some loads on site, the system has the function of secondary starting. The main mechanism is as follows: when the starting time is greater than the parameter "secondary starting current-limiting start time (C08)" and the control system is still in the current limiting state, the system will limit the current according to the value of "secondary starting current-limiting multiple (C09)", that is, enlarge the current-limiting multiple. Therefore, this value should be set slightly larger than the value of the "current-limiting multiple (C07)" parameter.

Parameter	Name	Range	Set value	Factory default
C08	Secondary start current-limiting time	0～60S, disable at zero	0	0
C09	Secondary start current-limiting multiple	100～500%Ie	400%	400%

6.7 Free stop

After receiving the shutdown command, the soft starter first blocks the control relay of the bypass contactor and immediately blocks the output of the thyristor in the main circuit, allowing the motor to stop

freely due to the inertia of the load.

Parameter	Name	Range	Set value	Factory default
C10	Stop mode	0～4	0	0

6.8 Soft stop

When stopping in this mode, the soft starter first disconnects the bypass contactor, and the output voltage of the soft starter gradually decreases to the set soft stop termination voltage value within the set soft stop time, so that the voltage applied to the motor terminal gradually decreases, thereby reducing the impact on the motor caused by some loads during sudden stoppage.

Parameter	Name	Range	Set value	Factory default
C10	Stop mode	0～4	1	0
C11	Soft-stop time	0～120S	—-	10
C12	Soft-stop initial voltage	60~100%Ue		80%
C13	Soft-stop final voltage	0～60%Ue		20%

6.9 Pump stop

When stopping in this mode, the soft starter first disconnects the bypass contactor. The output voltage of the soft starter gradually decreases to the set soft-stop final voltage value within the set soft-stop time. Pump shutdown is a special type of soft stop, specifically designed for soft stopping of pump loads.

Parameter	Name	Range	Set value	Factory default
C10	Stop mode	0～4	2	0
C11	Soft-stop time	0~120S	-	10
C12	Soft-stop initial voltage	60～100%Ue	–	80%
C13	Soft-stop final voltage	0～60%Ue	–	20%

6.10Internal braking

When the soft starter is set with a braking time and internal braking is selected, the soft starter will apply braking during stoppage, thereby shortening the stopping time. This braking function has good effects on small motors, but the braking effect is not ideal for large motors, and it is also greatly affected by the load. Therefore, when applying it, setting the parameters is very important. If the motor is larger and the

inertia of the load is greater, then the braking time should be set longer.

Parameter	Name	Range	Set value	Factory default
C10	Stop mode	0～4	3	0
C14	Braking time	0 ～ 120S, disable at zero	-	0
C15	Braking force	10～100%	-	30%

6.11 External braking

The external braking function must be connected to an external braking unit, and then a control signal is provided by the control system. The signal is outputted by relay K3, so when using this function, the parameters outputted by relay K3 must be set to "Output during braking". The signal hold time is determined by the "Braking Time" parameter, and it is essential to pay attention to the impact of the output delay of relay K3 on the system.

When applying, the main parameters are shown in the following table:

Parameter	Name	Range	Set value	Factory default
C10	Stop mode	0～4	4	0
C14	Braking time	0 ～ 120S, disable at zero		10
Q17	K3 relay output	0~7	4	7
Q16	K3 relay output delay	0～250S		0

6.12 Inching

Inching has two types: inching forward and inching reverse, each with two speed options as shown in the parameters. The inching force determines the torque output during inching. The larger the numerical value, the greater the output torque.

When applying, the main parameters are shown in the following table:

Parameter	Name	Range	Set value	Factory default
C16	Inching force	10～100%		30%
C17	Inching forward speed	0. 15% rated speed 1. 7% rated speed		0
C18	Inching reverse speed	0. 20% rated speed 1. 10% rated speed		0
B13	Inching time limit	0～60S		60

Chapter 7 Fault Detection and Troubleshooting

7.1 Fault code table

The soft starter uses a yellow LED indicator light to indicate that a fault has occurred, and displays the corresponding fault information on the LCD screen. There are 19 protection functions. When the soft starter's protection function is activated, the soft starter immediately shuts down, and the LCD screen displays the current fault. Users can analyze the fault based on the fault content.

List of fault code and troubleshooting

Fault code	Fault	Cause	Clearing method
01	Phase loss of main power	Phase loss during start or running	Check three phase power supply to ensure it is reliable
02	Phase sequence error	Reverse phase sequence	1. Adjust the phase sequence of the three-phase main power supply. 2. Set the B09 parameter to not detect the phase sequence.
03	Loss of parameter	Lost of parameter setting?	1. Check functions and reset
04	Overload protection	After a certain period of time, the current remains too high, causing the motor to overload.	1. Check and correct the causes of overload, and check if the current limiting multiple is set too low. 2. Check if the starting time is set too long. 3.Check if the motor overload protection level is set reasonably. 4. Check if the motor rated current is set correctly.
05	Operation overcurrent	Is the load suddenly increased? Is the load fluctuation too large?	1. Adjust the load operating conditions 2. Check if the B03 parameter settings are too low.
06	Underload protection	The operating current of the motor is lower than the rated current.	1. Check the cause of underload and make corrections. 2. Check whether the settings are based on operating conditions.
07	Phase current imbalance	Three-phase current imbalance	1. Check whether the three-phase current imbalance exceeds the imbalance protection level set in parameter B01.
08	Over-voltage protection	The main circuit voltage is too high	2. Adjust the load running status. 1. Check whether the voltage of the main circuit is too high. 2. Check whether over-voltage protection value Q24 is correctly set.
09	Under-voltage protection	The main circuit voltage is too low	1. Check whether the voltage of the main circuit is too low. 2. Check whether over-voltage protection value Q26 is correctly set.

10	Phase voltage imbalanced	The three-phase power voltage is imbalanced	1. Check whether the three-phase voltage of the main circuit is imbalanced. 2. Check whether voltage imbalance protection value Q23 is correctly set.
11	SCR abnormal		1. Whether the thyristor is short-circuited.
12	Leakage lockout		1. Check the grounding insulation of the three-phase winding.
13	Start timeout	Starting time is too long	1. Check whether the current-limiting multiple is too small. 2. Check whether the starting time limit B12 parameter is set too low.
14	Thyristor overheating	Internal diffuser overheating? The machine is poorly ventilated	1. Check if the fan is working reliably. 2. Reduce the starting frequency. 3. Check if the control power supply voltage is too low.
15	Motor temperature	The PTC thermistor inside the motor detects a high motor temperature.	1. Check whether the PTC loop is closed and the input is connected. 2. Check and correct the cause of excessive temperature. 3. Wait until the motor is cool enough to restart.
16	Frequent start	Start frequently	1. The starting frequency exceeds the set starting interval parameter Q09.
17	Frequency fault	Frequency is beyond the range	1. Check and change the power frequency.
18	Zero sequence protection		1. Check whether the three-phase leakage exceeds the design value.
19	Inching timeout	Inching time is too long	1. The inching time exceeds the set inching time limit B13 parameter.

List of fault detection time

Note: Mark with √ in the corresponding state where the detection is conducted.

No.	Fault	Initializing	Stop state	Ready to start	Start process	Running process	Condition
01	Phase loss of main power			√	√	√	-
02	Phase sequence error			√			-
03	Loss of parameter	√					-
04	Overload protection					√	-
05	Overcurrent protection					√	-
06	Undercurrent protection					√	-

07	Phase current imbalance					√	-
08	Over-voltage protection					√	-
09	Under-voltage protection					√	
10	Phase voltage unbalance protection				√	√	-
11	SCR abnormal			√			-
12	Leakage lockout protection			√			-
13	Start timeout protection				√		-
14	SCR overheated			√	√	√	-
15	Motor temperature protection				√	√	-
16	Frequent start			√			-
17	Frequency fault			√			-
18	Zero sequence protection				√	√	-
19	Inching timeout				√		-
20	System abnormal		√	√	√	√	-

7.2 Fault records

The starter can record at most the latest 15 faults, which can be used by users for subsequent analysis.

7.3 Fault displaying

User may read fault records by pressing key ∧ when soft starter is in failure state. Code E0 represents the latest fault. User can read the latest three faults (E0, E1, E2) on LCD panel and read record history through displaying and recording parameter.

7.4 Troubleshooting

The fault is memorable. After troubleshooting, reset it by pressing the reset button or using the external fault clear input (D1. D2 multifunction input) terminals to restore the soft starter to the startup readiness state.

Chapter 8 Routine Maintenance

1. Dust: Too much dust is likely to reduce insulation level of soft starter and make soft starter unable to properly operate.

(1) Adopt clean and dry brush to brush over the dust.

(2) Adopt compressed air to blow dust away.

2. Dewing: Dewing is likely to reduce insulation level of soft starter and make soft starter unable to properly operate.

(1) Adopt electric drier or electric heater to blow dry.

(2) Dehumidification of distribution room

3. Check the elements so as to confirm whether they are in good condition and whether they are able to properly operate.

4. Check the cooling channel of soft starter to prevent it from being blocked by dirt and dust.

Maintenance inspection shall be carried out after all powers on the side of the incoming line of soft starter are cut off!

Chapter 9 Communication

The CT motor soft starter is equipped with RS485 communication port, adopting international standard Modbus communication protocol for master-slave communication. User may implement centralized control by PC/PLC and upper computer control to satisfy requirement of application in special condition.

9.1 Protocol

The Modbus serial communication protocol defines the frame content for asynchronous transmission in serial communication and the format for using slave response frames. The frame content organized by the master includes: slave address, execution command, data, and error check, etc. The slave's response also adopts the same structure, with content including: operation acknowledgment, returned data, and error check, etc. If the slave encounters an error when receiving a frame or cannot complete the action requested by the master, it will organize a fault frame as a response to feed back to the master.

9.2 Bus structure

(1) Interface mode

RS485 hardware interface

(2) Transmission mode

Asynchronous serial, half-duplex transmission mode: at the same time, one sends data while the other receives data for master and slave machines. Data in serial asynchronous communication shall be transmitted in the form of message frame by frames.

(3) Topological structure

Single-master multi-slave system: Setting range of slave address is from 1 to 32, every slave in network has unique address, which shall be the base for ModBus serial communication.

9.3 Explanation of protocol

Communication protocol for the CT soft starter is asynchronous serial master-slave ModBus communication protocol. There is only one device able to set up protocol in network. The other devices shall only respond to “Inquiry/order” of master by data or function by “Inquiry/order” of master. Master means personal computer (PC), industrial control equipment or programmable logical control (PLC). Slave means CT soft starter or other control equipment having the same communication protocol.

9.4 Communication frame structure

Data format of ModBus protocol for the CT soft starter is RTU (Remote terminal unit) mode. Each byte in RTU mode is as follows:

Coding system: 8-digit binary system, hexadecimal system 0—9 and A—F

Each 8-digit frame domain contains two hexadecimal characters.

In this mode, new one is always silent in transmission time of no less than 3.5 bytes as start. In network to calculate transmission rate based on baud rate, it is easy to control in transmission time of 3.5 bytes. The next data domain in transmission: slave address, operating command code, data and CRC check word, byte in transmission in every domain is hexadecimal 0…9, A…F. Network device is always monitoring the operation of communication bus even in silent interval time. When receiving first domain (Address information) , each network device shall affirm the byte, with the completion of the transmission of the last byte, there is a similar transmission time interval of 3.5 bytes to indicate the end of the frame.

After this, the transmission of a new frame will begin.

A frame information shall be transmitted in a continuous data stream, if interval time before completion of entire frame transmission exceeds 1.5 bytes, receiving device shall remove this incomplete information.

9.5 Explanation to status control word

Status control word reflects the state of soft starter and it is expressed by a word.

Definition of status word's low 8 bits

Bit function	Major state			Sub-state					Description
	7	6	5	4	3	2	1	0	
Stop	**0**			**0**					Normal stop
				1					Emergent stop
Edit	**1**			**0**					Enter edit(0x20)
				1					User's parameter modification allowed
				2					Management parameter modification allowed
Running	**2 (0x40)**			**0**					Enter start state (0x40)
				1					Starting delay
				2					Leakage detection
				3					Step
				4					Ramp process
				5					Current limiting process
				6					Start finished
				7					Soft start
				8					Internal braking
				9					External braking
				10					Brake countdown
				11					Macro stop
				12					Free stop
				13					Frequency division start
				14					Pump stop
Inching	**3 (0x60)**			**0**					Enter inching state (0x60)
				1					Inching delaying
				2					Inching forward, fast
				3					Inching forward, slow
				4					Inching reverse, fast
				5					Inching reverse, slow
Fault	**4(0x80)**			**0**					(0x80)
				1					Phase loss of main power
				2					Phase sequence error
				3					Parameter missing
				4					Overload protection
				5					Overcurrent protection
				6					Under-current protection

		7	Phase current imbalance
		8	Over-voltage protection
		9	Under-voltage protection
		10	Phase voltage imbalance protection
		11	SCR abnormal
		12	Leakage lockout protection
		13	Starting timeout protection
		14	SCR overheating
		15	Motor temperature protection
		16	Frequent start
		17	Frequency fault
		18	Zero sequence protection
		19	Inching timeout
		20	System abnormal

Definition of high eight bits of status word

Bit / Function	Main state								Description
	7	6	5	4	3	2	1	0	
Display accuracy								0	Do not display decimal
								1	Display decimal
M1\M2 parameters							0		M1 parameter
							1		M2 parameter
Communication state						0			Communication normal
						1			Communication failure
Bus					0				Bus allowed
					1				Bus forbidden
Key control				0					Key control permitted
				1					Key control forbidden (0x10)
Internal forbidden			0						Unforbidden
			1						Forbidden (deciphering)
Password locked		0							Locked
		1							Unlocked

9.6 Address explanation

Real-time measured data

Name	Type of variables	Register number	Type of data	R/W feature
Working status of soft starter	I/O integer	0000	Uint	R
Current fault 1	I/O integer	0001	Uint	R
Current fault 2	I/O integer	0002	Uint	R
Current fault 3	I/O integer	0003	Uint	R
Motor rated current	I/O integer	0004	Uint	R
Motor average current	I/O integer	0005	Uint	R
L1 phase current	I/O integer	0006	Uint	R
L2 phase current	I/O integer	0007	Uint	R

L3 phase current	I/O integer	0008	Uint	R
Analog input port value %	I/O integer	0009	Uint	R
Output voltage %	I/O integer	0010	Uint	R
L1-L2 line voltage	I/O integer	0011	Uint	R
L2-L3 line voltage	I/O integer	0012	Uint	R
L3-L1 line voltage	I/O integer	0013	Uint	R
Status of IO port	I/O integer	0014	Uint	R
Starting interval countdown	I/O integer	0015	Uint	R
Starting countdown time	I/O integer	0016	Uint	R

M1 Basic parameters

Name	Type of variables	Register number	Type of data	R/W feature
Selection of application parameters	I/O integer	0020	Uint	R/W
Start method	I/O integer	0021	Uint	R/W
Step method	I/O integer	0022	Uint	R/W
Step voltage	I/O integer	0023	Uint	R/W
Step time	I/O integer	0024	Uint	R/W
Initial voltage	I/O integer	0025	Uint	R/W
Ramp time	I/O integer	0026	Uint	R/W
Current-limiting multiple	I/O integer	0027	Uint	R/W
Secondary start current-limiting start time	I/O integer	0028	Uint	R/W
Secondary start current-limiting multiple	I/O integer	0029	Uint	R/W
Stop mode	I/O integer	0030	Uint	R/W
Soft-stop time	I/O integer	0031	Uint	R/W
Soft-stop initial voltage	I/O integer	0032	Uint	R/W
Soft-stop final voltage	I/O integer	0033	Uint	R/W
Braking time	I/O integer	0034	Uint	R/W
Braking force	I/O integer	0035	Uint	R/W
Inching force	I/O integer	0036	Uint	R/W
Inching forward speed	I/O integer	0037	Uint	R/W
Inching reverse speed	I/O integer	0038	Uint	R/W
Motor's rated current	I/O integer	0039	Uint	R/W
Over-load protection level	I/O integer	0050	Uint	R/W
Current imbalance protection	I/O integer	0051	Uint	R/W
Current imbalance protection delay	I/O integer	0052	Uint	R/W
Over-current protection	I/O integer	0053	Uint	R/W
Over-current protection delay	I/O integer	0054	Uint	R/W
Under-load protection	I/O integer	0055	Uint	R/W
Under-load protection delay	I/O integer	0056	Uint	R/W
Thyristor protection	I/O integer	0057	Uint	R/W
Leakage lockout protection	I/O integer	0058	Uint	R/W
Phase sequence protection	I/O integer	0059	Uint	R/W
Zero sequence protection	I/O integer	0060	Uint	R/W
Motor temperature protection	I/O integer	0061	Uint	R/W
Starting time limit	I/O integer	0062	Uint	R/W

Inching time limit	I/O integer	0063	Uint	R/W

M 2 basic parameters

Name	Type of variables	Register number	Type of data	R/W feature
Selection of application parameters	I/O integer	0070	Uint	R/W
Start method	I/O integer	0071	Uint	R/W
Step method	I/O integer	0072	Uint	R/W
Step voltage	I/O integer	0073	Uint	R/W
Step time	I/O integer	0074	Uint	R/W
Initial voltage	I/O integer	0075	Uint	R/W
Ramp time	I/O integer	0076	Uint	R/W
Current-limiting multiple	I/O integer	0077	Uint	R/W
Secondary start current-limiting start time	I/O integer	0078	Uint	R/W
Secondary start current-limiting multiple	I/O integer	0079	Uint	R/W
Stop mode	I/O integer	0080	Uint	R/W
Soft-stop time	I/O integer	0081	Uint	R/W
Soft-stop initial voltage	I/O integer	0082	Uint	R/W
Soft-stop final voltage	I/O integer	0083	Uint	R/W
Braking time	I/O integer	0084	Uint	R/W
Braking force	I/O integer	0085	Uint	R/W
Inching force	I/O integer	0086	Uint	R/W
Inching forward speed	I/O integer	0087	Uint	R/W
Inching reverse speed	I/O integer	0088	Uint	R/W
Motor’s rated current	I/O integer	0090	Uint	R/W
Over-load protection level	I/O integer	0100	Uint	R/W
Current imbalance protection	I/O integer	0101	Uint	R/W
Current imbalance protection delay	I/O integer	0102	Uint	R/W
Over-current protection	I/O integer	0103	Uint	R/W
Over-current protection delay	I/O integer	0104	Uint	R/W
Under-load protection	I/O integer	0105	Uint	R/W
Under-load protection delay	I/O integer	0106	Uint	R/W
Thyristor protection	I/O integer	0107	Uint	R/W
Leakage lockout protection	I/O integer	0108	Uint	R/W
Phase sequence protection	I/O integer	0109	Uint	R/W
Zero sequence protection	I/O integer	0110	Uint	R/W
Motor temperature protection	I/O integer	0111	Uint	R/W
Starting time limit	I/O integer	0112	Uint	R/W
Inching time limit	I/O integer	0113	Uint	R/W

Senior parameter items

Name	Type of variables	Register number	Type of data	R/W feature
Display selection	I/O integer	0120	Uint	R/W
Language selection	I/O integer	0121	Uint	R/W
Auto off time displayed on LCD	I/O integer	0122	Uint	R/W
Start/stop control method	I/O integer	0123	Uint	R/W
Function of digital input port D1	I/O integer	0124	Uint	R/W

Function of digital input port D2	I/O integer	0125	Uint	R/W
Analog input	I/O integer	0126	Uint	R/W
Analog output	I/O integer	0127	Uint	R/W
Analog output method	I/O integer	0128	Uint	R/W
Starting intervals	I/O integer	0129	Uint	R/W
Selection function of Macro control	I/O integer	0130	Uint	R/W
Starting delay	I/O integer	0131	Uint	R/W
Analog input upper limit value	I/O integer	0132	Uint	R/W
Analog input down limit value	I/O integer	0133	Uint	R/W
K1 relay output delay	I/O integer	0134	Uint	R/W
K2 relay output delay	I/O integer	0135	Uint	R/W
K3 relay output delay	I/O integer	0136	Uint	R/W
K3 relay output	I/O integer	0137	Uint	R/W
Programmable timed stopping time	I/O integer	0138	Uint	R/W
User's password	I/O integer	0139	Uint	R/W
Communication address	I/O integer	0140	Uint	R/W
Communication baud rate	I/O integer	0141	Uint	R/W
Voltage imbalance protection value	I/O integer	0142	Uint	R/W
Voltage imbalance protection delay	I/O integer	0143	Uint	R/W
Over-voltage protection value	I/O integer	0144	Uint	R/W
Over-voltage protection delay	I/O integer	0145	Uint	R/W
Under-voltage protection value	I/O integer	0146	Uint	R/W
Under-voltage protection delay	I/O integer	0147	Uint	R/W
Frequency detection	I/O integer	0148	Uint	R/W
Current phase loss detection	I/O integer	0154	Uint	R/W

Recording function items

Name	Type of variables	Register number	Type of data	R/W feature
Soft-start rated current	I/O integer	0161	Uint	R
Main power voltage	I/O integer	0162	Uint	R
Control software version	I/O integer	0163	Uint	R
Keyboard software version	I/O integer	0164	Uint	R
Current measurement calibration	I/O integer	0165	Uint	R
Voltage measurement calibration	I/O integer	0166	Uint	R
Analog output calibration	I/O integer	0167	Uint	R
Current display precision	I/O integer	0168	Uint	R
Forbidden mode	I/O integer	0169	Uint	R
Unlock encryption	I/O integer	0170	Uint	R
Allowed starting and running times	I/O integer	0171	Uint	R
Allowed starting and running time	I/O integer	0172	Uint	R
Cumulative running times record	I/O integer	0173	Uint	R
Cumulative running time record	I/O integer	0174	Uint	R
Cumulative number of failures	I/O integer	0175	Uint	R
Factory reset	I/O integer	0176	Uint	R
Current transformer ratio	I/O integer	0177	Uint	R

Undefined parameter	I/O integer	0178	Uint	R
Undefined parameter	I/O integer	0179	Uint	R
Undefined parameter	I/O integer	0180	Uint	R
Fault history 1	I/O integer	0181	Uint	R
Fault history 2	I/O integer	0182	Uint	R
Fault history 3	I/O integer	0183	Uint	R
Fault history 4	I/O integer	0184	Uint	R
Fault history 5	I/O integer	0185	Uint	R
Fault history 6	I/O integer	0186	Uint	R
Fault history 7	I/O integer	0187	Uint	R
Fault history 8	I/O integer	0188	Uint	R
Fault history 9	I/O integer	0189	Uint	R
Fault history 10	I/O integer	0190	Uint	R
Fault history 11	I/O integer	0191	Uint	R
Fault history 12	I/O integer	0192	Uint	R
Fault history 13	I/O integer	0193	Uint	R
Fault history 14	I/O integer	0194	Uint	R
Fault history 15	I/O integer	0195	Uint	R

Control command data

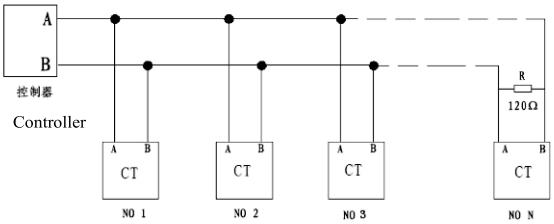
Name	Type of variables	Register number	Type of data	R/W feature
Stop	I/O integer	0200	0x0081	W
Run	I/O integer	0202	0x0083	W
Reset	I/O integer	0203	0x0084	W
Enter edit	I/O integer	0204	0x0085	W
Exit edit	I/O integer	0205	0x0086	W
Password setting	I/O integer	0206	Password value	W
Current calibration	I/O integer	0207	0x0001 means incremented by 1	W

Notices:

(1) During multi-machine communication, the address of the CT soft starter is unique, meaning that the addresses of any two soft starters cannot be the same (set via parameter Q20).

(2) The communication baud rate of the CT soft starter must be the same as that of the controller (set via parameter Q21).

(3) When communicating with multiple CT soft starters, a 120-ohm resistor should be connected across terminals A and B on the last one.



Chapter 10 Appendix

Appendix 1: CT parameter form

Code	Secondary menu	Range of parameters	Factory value	Remark
M1 Application parameters				
C00	Selection of application parameters	0. No application 1. Centrifugal pump 2. Hydraulic pump 3. Axial flow fan 4. Centrifugal fan 5. Belt conveyor 6. Compressor 7. Crusher 8. Mixer 9. Ball mill 10. Propeller	0	
M1 Basic parameters				
CO1	Starting method	0. Voltage ramp control 1. Linear torque control 2. Square torque control 3. Stepped frequency conversion start control (Applicable to heavy loads and constant torque loads)	0	
C02	Step method	0. Voltage drop step 1. Low-frequency step	0	
C03	Step voltage	20~100%Ue	20%	
C04	Step time	0~2000mS	0	
C05	Initial voltage	20~100%Ue	30%	
C06	Ramp time	0～120S	10	
C07	Current-limiting multiple	100～500%Ie	350%	
C08	Secondary start current-limiting start time	0～60S, disable at zero	0	
C09	Secondary start current-limiting multiple	100～500%Ie	400%	
C10	Stop modes	0. Free stop 1. Soft stop 2. Pump stop 3. Internal braking 4. External braking	0	
C11	Soft-stop time	0~120S	10	
C12	Soft-stop initial voltage	60～100%Ue	80%	
C13	Soft-stop final voltage	0～60%Ue	20%	
C14	Braking time	0~120S, disable at zero	10	
C15	Braking force	10~100%	30%	

C16	Inching force	10～100%	30%	
C17	Inching forward speed	0. 15% rated speed 1. 7% rated speed (low)	0	
C18	Inching reverse speed	0. 20% rated speed 1. 10% rated speed (low)	0	
C19	Motor rated current	15～9999A		
C20 ～C29	Undefined			
M1 Protection parameters				
B00	Over-load protection level	10A、10. 15. 20. 25. 30. OFF	20	Set to OFF =6
B01	Current imbalance protection	0～100%	40%	Set to 100% Turn off the function
B02	Current imbalance protection delay	0～250S	2	
B03	Over-current protection	100～500%Ie	300%	Set to 100% Turn off the function
B04	Over-current protection delay	0~250S	2	
B05	Under-load protection	0～99%Ie	0	Set to 0 Turn off the function
B06	Under-load protection delay	0～250S	2	
B07	Thyristor protection	0. Disable 1. Enable	0	
B08	Leakage lockout protection	0. Disable 1. Enable	0	
B09	Phase sequence protection	0. Disable 1. Enable	0	
B10	Zero sequence protection	0. Disable 1. Enable	0	
B11	Motor temperature protection	0. Disable 1. Enable	0	
B12	Starting time limit	0～250S	60	
B13	Inching time limit	0～60S	60	
B14～B19	Undefined parameters	--		
M2 application parameters				
C00	Selection of application parameters	0. No application 1. Centrifugal pump 2. Hydraulic pump 3. Axial flow fan 4. Centrifugal fan	0	

		5. Belt conveyor 6. Compressor 7. Crusher 8. Mixer 9. Ball mill 10. Propeller		
M2 basic parameters				
C01	Start method	0. Voltage Ramp Control 1. Linear Torque Control 2. Squared Torque Control 3. Staged frequency converstion starting control (Applicable to heavy loads and constant torque loads)	0	
C02	Step methods	0. Voltage drop step 1. Low-frequency step	0	
C03	Step voltage	20～100%Ue	20%	
C04	Step time	0~2000mS	0	
C05	Initial voltage	20~100%Ue	30%	
C06	Ramp time	0～120S	10	
C07	Current-limiting multiple	100～500%Ie	350%	
C08	Secondary start current-limiting start time	0~60S, disable at zero	0	
C09	Secondary start current-limiting multiple	100～500%Ie	400%	
C10	Stop modes	0. Free stop 1. Soft stop (Linear torque control) 2. Pump stop (Square torque control) 3. Internal braking 4. External braking	0	
C11	Soft-stop time	0～120S	10	
C12	Soft-stop initial voltage	60～100%Ue	80%	
C13	Soft-stop final voltage	0～60%Ue	20%	
C14	Braking time	0~120S, disable at zero	10	
		10～100%	30%	
C16	Inching force	10～100%	30%	
C17	Inching forward speed	0. 15% rated speed 1. 7% rated speed	0	
C18	Inching reverse speed	0. 20% rated speed 1. 10% rated speed	0	
C19	Motor's rated current	15～9999A		
C2～C29	Undefined parameters			

M2 protection parameters				
B00	Over-load protection level	10A、10. 15. 20. 25. 30. OFF	20	Set to OFF =6
B01	Current imbalance protection	0～100%	40%	Set to 100% Turn off the function
B02	Current imbalance protection delay	0～250S	2	
B03	Over-current protection	100~500%Ie	300%	Set to 100% Turn off the function
B04	Over-current protection delay	0～250S	2	
B05	Under-load protection	0～99%Ie	0	Set to 100% Turn off the function
B06	Under-load protection delay	0～250S	2	
B07	Thyristor protection	0. Disable 1. Enable	0	
B08	Leakage lockout protection	0. Disable 1. Enable	0	
B09	Phase sequence protection	0. Disable 1. Enable	0	
B10	Zero sequence protection	0. Disable 1. Enable	0	
B11	Motor temperature protection	0. Disable 1. Enable	0	
B12	Starting time limit	0～250S	60	
B13	Inching time limit	0～60S	60	
B14～B19	Undefined parameters			
Functional parameters setting				
Q00	Display selection	0. Rated current of motor 1. Average current 2. L1 phase current 3. L2 phase current 4. L3 phase current 5. Analog port value % 6. Output voltage % 7. L1-L2 line voltage 8. L2-L3 line voltage 9. L3-L1 line voltage	1	
Q01	Language selection	0. Chinese 1. English	0	
Q02	Auto off time displayed on LCD	0～255Min	1	0 is for always on

Q03	Start/stop control method	0. Keyboard control prohibited/ Communication control prohibited 1. Keyboard control allowed/ Communication control prohibited 2. Keyboard control prohibited/ Communication control allowed 3. Keyboard control allowed/ Communication control allowed 4. Keyboard inching forward 5. Keyboard inching reverse	3	
Q04	Function of digital input port D1	0. M2 Parameter selection 1. Reset the fault 2. Inching forward 3. Inching reverse 4. Close the contact macro control 5. Disconnect the contact macro control 6. Emergent control input 7. Delay (time) relay control input	0	
Q05	Function of digital input port D2	0. M2 Parameter selection 1. Reset the fault 2. Inching forward 3. Inching reverse 4. Close the contact macro control 5. Disconnect the contact macro control 6. Emergent control input 7. Delay (time) relay control input	1	
Q06	Analog input	0. 0～20mA 1. 4~20mA 2. 0~60mA	1	
Q07	Analog output	0. 0～20mA 1. 4～20mA	1	
Q08	Analog output method	0. Average current output 1(0~200%Ie) 1. Average current output 2(0~400%Ie)	0	
Q09	Starting intervals	0～60 minutes	0	
Q10	Selection function of Macro control	0. No macro control 1. Macro control of digital port 1 2. Macro control of digital port 2 3. Analog positive input macro control	0	

		4. Analog negative input macro control		
Q11	Starting delay	0～250S	0	
Q12	Analog input upper limit value	0~100%	80	
Q13	Analog input down limit value	0～100%	20	
Q14	K1 relay output delay	0～250S	0	
Q15	K2 relay output delay	0～250S	0	
Q16	K3 relay output delay	0～250S	0	
Q17	K3 relay output	0. Full pressure output 1. Start process output 2. Soft stop process output 3. Output when a fault occurs 4. Output when braking 5. Running process output 6. Programmable delay (time relay) output 7. Output of leakage lock detection process	7	
Q18	Programmable timed stopping time	0～999.9h (valid when run is disconnected)	0	
Q19	User's password	0～65535	0	
Q20	Communication address	1～32	1	
Q21	Communication baud rate	0. 600 1. 1200 2. 2400 3. 4800 4. 9600 5. 19200(Pbs)	4	
Q22	Voltage imbalance protection value	0～100%	70%	Set to 100% Turn off the function
Q23	Voltage imbalance protection delay	0～250S	2	
Q24	Over-voltage protection value	100~150%	150%	Set to 100% Turn off the function
Q25	Over-voltage protection delay	0～250S	2	

Q26	Under-voltage protection value	20～100%	70%	Turn off the function
Q27	Under-voltage protection delay	0～250S	2	
Q28	Frequency detection	Self-adaptive 1. 50HZ 2. 60HZ	0	
Q2～Q33	Undefined parameters	--		
Q34	Current phase loss detection	0. Enable 1. Off	0	
Q3～Q39	Undefined parameters	--		
Senior parameter setting				
H01	Soft-start rated current	15～9999A	180	
H02	Main power voltage	0. 380V 1. 660V 2. 1140V	0	
H03	Control software version	0～9999	—-	
H04	Keyboard software version	0～9999	—-	
H05	Current measurement calibration	0～2000	1000	
H06	Voltage measurement calibration	0~9999		
H07	Analog output calibration	0～2000	1020	
H08	Current display precision	0. Do not add decimal points 1. Add decimal points	1	
H09	Forbidden mode	0. No prohibition 1. Prohibition after reaching the maximum number of runs 2. Prohibition after reaching the maximum runtime 3. Both times and time are prohibited at the same time	0	
H10	Unlock encryption	0～9999	****	
H11	Allowed starting and running times	0～9999	0	
H12	Allowed starting and running time	0～9999	0	
H13	Cumulative running times record	Unmodifiable	0	Each time the startup is completed, this parameter is incremented by

				1.
H14	Cumulative running time record	Unmodifiable	0	
H15	Cumulative number of failures	Unmodifiable	0	
H16	Factory reset	Command parameter		
H17	Current transformer ratio	50, 100, 200, 300, 400, 500, 600, 800, 1000, 1500		
H1～H20	Undefined parameters	Unmodifiable		
H21~H35	Fault history	Unmodifiable		History fault 1-15

Appendix 2: Specifications, models and accessories selection (380V as an example)

Applicable motor (KW)	Soft starter model	Rated current (A)	Bypass contactor model	Primary wire specification (Copper wire)
7.5	CT-0018/3	18	CJX4-25	4 mm2
11	CT-0024/3	24	CJX4-32	6 mm2
15	CT-0030/3	30	CJX4-32	10 mm2
18.5	CT-0039/3	39	CJX4-40	10 mm2
22	CT-0045/3	45	CJX4-50	16 mm2
30	CT-0060/3	60	CJX4-63	25 mm2
37	CT-0076/3	76	CJX4-80	35 mm2
45	CT-0090/3	90	CJX4-95	35 mm2
55	CT-0110/3	110	CJX4-115F	35 mm2
75	CT-0150/3	150	CJX4-150F	50 mm2
90	CT-0180/3	180	CJX4-185F	Copper busbar
110	CT-0218/3	218	CJX4-225F	Copper busbar
132	CT-0260/3	260	CJX4-265F	Copper busbar
160	CT-0320/3	320	CJX4-330F	Copper busbar
185	CT-0370/3	370	CJX4-400F	Copper busbar
220	CT-0440/3	440	CJX4-500F	Copper busbar
250	CT-0500/3	500	CJX4-500F	Copper busbar
280	CT-0560/3	560	CJX4-630F	Copper busbar
315	CT-0630/3	630	CJX4-630F	Copper busbar
400	CT-0780/3	780	JWCJ20-800	Copper busbar
470	CT-0920/3	920	JWCJ20-1000	Copper busbar
530	CT-1000/3	1000	JWCJ20-1000	Copper busbar

Order instructions

◆ When placing an order, please inform the supplier of the product model, specifications, load conditions, and operating conditions to facilitate the correct selection of the product.

◆ The standard configuration of the soft starter includes a current transformer, and users should reasonably select the bypass contactor according to the specifications and models listed in the table above.

◆ When the main power supply is AC660V or AC1140V, the selection of accessories is also based on the controller's current.

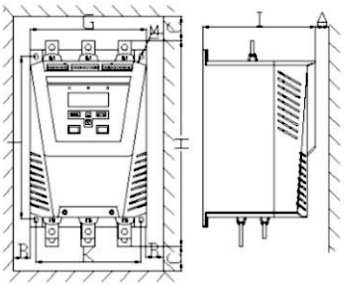
◆ The attachments in the above table are for reference only.

Appendix 3: Basic settings for different applications. (The following settings are for reference only)

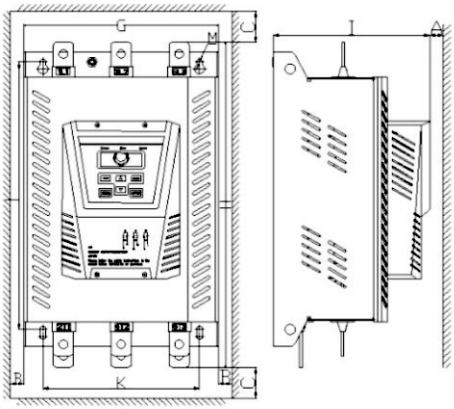
Types of load	Initial voltage (%)	Start ramp time sec	Stop ramp time sec	Current limit ILIM
Ship's propeller	20	10	0	2.5
Centrifugal fan	20	20	0	3.5
Centrifugal pump	20	6	6	3
Reciprocating compressor	20	15	0	3
Lifting machinery	30	15	6	3.5
Mixer	40	15	0	3.5
Crusher	30	15	6	3.5
Screw compressor	20	15	0	3.5
Screw conveyor	20	10	6	3.5
No-load motor	20	10	0	2.5
Belt conveyor	20	15	10	3.5
Heat pump	20	15	6	3
Escalator	20	10	0	3
Air pump	20	10	0	2.5

Appendix 4: Dimensions of soft starter and opening (Unit: mm, with 380V as an example)

Model	G	H	I	K	L	M	A	B	C	Gross weight
CT-0018～0045	172	320	167	156	240	6	20	10	100	4.5
CT-0060～0090	172	320	167	156	240	6	20	10	100	4.7
CT-0110～0150	172	320	167	156	240	6	20	10	100	5.1
CT-0180～0370	285	474	230	230	390	9	20	10	100	20.6
CT-0440～0630	320	512	230	270	415	9	20	10	100	25.6
CT-0780～1000	400	647	230	330	495	9	20	10	100	37.6



150A and below products



180A and above products

Appendix 5: Type selection of soft starter

No.	Rated current (A)	380V		660V		1140V	
		Power (KW)	Dimension (mm)	Power (KW)	Dimension (mm)	Power (KW)	Dimension (mm)
1	18	7.5	F005	15	F005	22	F005
2	24	11		22		33	
3	30	15		30		45	
4	39	18.5		37		55	
5	45	22		45		65	
6	60	30		55		90	
7	76	37		75		110	
8	90	45		90		135	
9	110	55		110		165	
10	150	75		132	F006	225	
11	180	90	F006	160		280	F006
12	218	110		200		344	
13	260	132		250		400	
14	320	160		300		505	F007
15	370	185		350		584	
16	440	220	F007	400	F007	695	
17	500	250		456		789	
18	560	280		500		884	F008
19	630	315		560	F008	995	
20	780	400	F008	700			
21	920	470					
22	1000	530					

Note：Dimension F005:172×320×167. F006:285×474×230.
F007:320×512×230. F008:400×647×230 (W×H×T)

装箱单 Packing List

序号 NO.	名称 Item	规格型号 Specification	数量 Qty	单位 Unit	备注 Remark
1	电机软起动器 Motor soft starter	CT□ CMC-MX□ CMC-LX□ CMC-HX□	1	台 copy	
2	用户手册 User's manual	CT□ CMC-MX□ CMC-LX□ CMC-HX□	1	本 copy	
3	产品合格证 Product certification		1	份 copy	
4	标准件 Standard Parts	M12X35(18套set)□ M8X20(9套set)□ M12×30(6套set)□ M12X30(9套set)□			

公司名称：西安西驰电气股份有限公司
XI'AN XICHI ELECTRIC CO.,LTD.
地址：西安市高新区草堂科技产业基地秦岭四路西2号
Add: NO.2 West,Qinling four road,Cottage technology industries Base,Xi'an Hi -Tech Zone,Shaanxi,China
电　　话：029-89020808/89020707　　客服热线：4000-114-666
Tel: 029-89020808/89020707　　Customer service hotline:4000-114-666
Http:www.xichi.cn

产品合格证

XiCHi

Qualification Certificate

产 品 名 称: 软起动器
Name of product: Motor soft starter

检 验 员: 检 1
Checked by:

检 验 日 期:
Test date:

国家标准：GB/T 14048.6-2016

本产品经检验合格准予出厂

This product has been strictly quality checked and granted for delivery.

西安西驰电气股份有限公司 质量部

西 安 西 驰 电 气 股 份 有 限 公 司
XI'AN XICHI ELECTRIC CO.,LTD.

保 修 卡
Warranty Card

用户名称 Customer			
地址 Address			
部门 Department		联系人 Contact Person	
电话 Telephone		传真 Fax	
产品型号 Type Of Product		出厂编号 Serial No.	
负载类型 Load Type		设备参数 Machine Parameter	
代理商/经销商 Agent / Dealer		购买日期 Date Of Purchase	
代理商/经销商联系方式 Agent/Dealer Contact Information			

保修卡作为机器保修凭证，请用户认真填写并妥善保存。
Please fill in this warranty card carefully and keep it properly for maintenance.

公司名称：西安西驰电气股份有限公司
XI'AN XICHI ELECTRIC CO.,LTD.
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