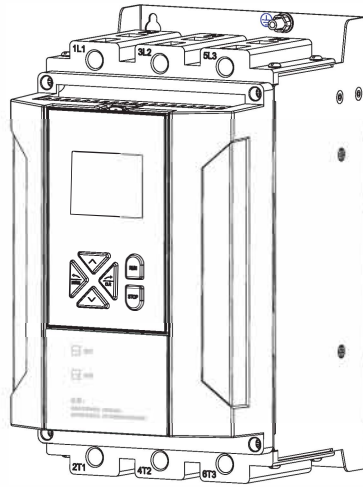


[Technical Manual]

For Safe Use Of This Product,
Please Read This Technical Manual

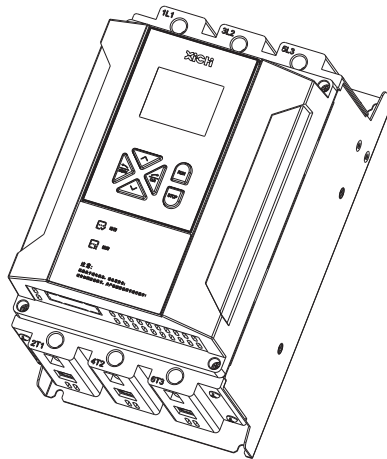


XiChi

Xst260 Soft Starter

Preface

Thank you for using the XST260 motor soft starter produced by Xi 'an Xichi Electric Co., LTD. In order to give full play to the function of the soft starter, please operate and use it correctly according to the regulations, and ensure the safety of the operator. Please read the Product Technical Manual in detail before use. When you find difficult problems in use and this product technical manual can not provide answers, please contact Xi 'an Xichi Electric Co., Ltd. or local agents, dealers, we will be dedicated to serve you.



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Safety precautions

- (1) there is dangerous voltage after the main circuit power supply is powered.
- (2) It is not allowed to connect the input terminal (1L1, 3L2, 5L3) to the output terminal (2T1, 4T2, 6T3).
- (3) The output end of the soft starter (2T1, 4T2, 6T3) is not allowed to be connected to the compensation capacitor or varistor.
- (4) When the soft starter and frequency converter are standby for each other, the output terminals of the two should be isolated from each other.
- (5) Do not try to repair damaged devices, please contact the supplier.
- (6) The temperature of the radiator may be too high.
- (7) It is strictly prohibited to reverse power supply at the output end of soft starting.
- (8) It is strictly prohibited to reverse power supply at the output end of soft starting.

Chapter 1 Functions and characteristics of XST260 soft starter

1.1 Action

XST260 motor Soft starter is a new motor starting and protection device that combines power electronics technology, microprocessor and automatic control. It can start and stop the motor stably without step, avoid the mechanical and electrical impact caused by the traditional starting mode of the motor such as direct starting, star/triangle starting, automatic decompression starting and other problems, and can effectively reduce the starting current and distribution capacity, to avoid increased capacity investment. At the same time, XST260 soft starter is integrated with internal current transformer and contactor, so users do not need external connection.

1.2 Features

- Unique SCR triggered closed-loop control algorithm

Unique SCR closed loop control function, specially designed for standard and heavy loads. Users can choose current limiting starting and voltage ramp starting according to the load situation, to achieve absolutely smooth torque-free oscillation starting effect.

- A variety of pre-starting functions

Users can choose motor heating, static braking, low speed forward rotation, low speed reverse, pulse starting, to maximize the requirements of the field, to achieve the best starting effect.

- Strong anti-interference

All external control signals are photoelectric isolation, and set up different levels of noise resistance, suitable for use in special industrial environment.

- Man-machine interface

There are two display panels available, LED and LCD.

- The panel can be exported

The panel can be led outside to the equipment operating surface through the fuselage RJ45 interface for remote operation, convenient for field use. Power frequency setting Power frequency 50/60Hz through the parameter setting, convenient for users to use.

- Dynamic fault memory

You can record up to 20 failures. Easy to find the cause of the failure.

- Optimized structure

The unique compact internal structure design makes it especially convenient for users to integrate into the existing system, saving the cost of current transformer and bypass contactor for users.

- Multifunctional analog output interface

Multifunctional analog output outlet can not only set the parameters that need to be output, but also the customer can intercept any parameter according to the demand according to the positive logic or negative logic for output.

- MODBUS-RTU communication

32 devices can be connected when conducting network communication. The user can achieve the purpose of automatic communication by setting the baud rate and correspondence address. The communication address setting range is 1-32, and the factory value is 1. The communication baud rate setting range is: 0. 2400; 1480; 2960; 3192 00; The factory value is 2(9600).

- Perfect protection function

A variety of motor protection functions (such as over current, input phase loss, thyristor short circuit, overheating protection, electronic thermal overload, internal contactor failure, phase current imbalance, etc.) ensure that the motor and soft starter will not be damaged in case of failure or misoperation.

- Communication expansion card accessories optional

Users can choose Profibus-DP, EtherCat, CANopen and other communication expansion cards according to their actual requirements.

- Function expansion card accessories optional

Users can choose the power monitoring module, local compensation function module and other expansion function optional cards according to their actual needs.

Chapter 2 Inspection of Receiving goods

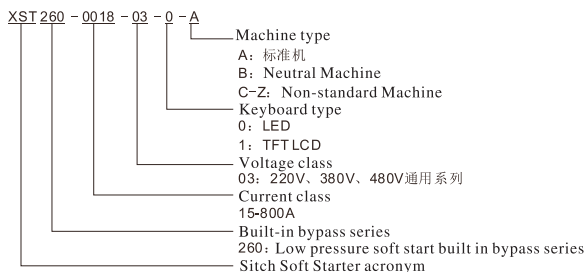
Every soft starter has been tested for all its functions and operation before leaving the factory. After receiving the device and unpacking it, users should check it according to the following steps. If you find any problems, contact your supplier immediately.

1. Check the nameplate to confirm that the product received is consistent with the product ordered

(1) Soft starter nameplate instructions



(2) Description of soft starter type



2. Check whether there is damage to the product during transportation, such as: the shell sag, deformation, internal wiring, connector loosening, etc.
3. Check whether it is equipped with product certificate, warranty card, packing list, Product Technical Manual, etc. After the product leaves the factory, the product shall be guaranteed according to the warranty card.
4. After you receive the goods, please fill in the warranty card carefully and send it back to Xi 'an Xichi Electric Co., LTD or the supplier.

Chapter 3 Conditions of use and installation

3.1 Conditions Of Use

Control Power	AC110V--AC220V±15% 50/60Hz
Supply Three-Phase	AC220V-480V ±10%
Power Supply	18A-780A,20 ratings in total
Suitable Formotors	General squirrel cage type asynchronous motor
Starting Mode	Voltage ramp,current ramp,pump starting control,direct starting
Parking Mode Logic	Voltage ramp,pump stop curve,brake,free stop
Input	Impedance 1.8KQ,power +24V
Starting Frequency	Frequent or infrequent starts can be made,and no more than 10 startsper hour arestarting frequency recommended
Protection Function	Over current, overload, underload, overheating,lack of phase, three-phase current Protection unbalance,phase sequence detection, motor overheating,frequency error,etc
Level of protection Cooling mode	IP00 IP20
Cooling Mode	55KW and below natural cooling 75KW and above forced air cooling
Installation Wall mount method	Wall mount
Environmental Conditions	Sea dials over 2000 m should be used with reduced capacity accordingly Ambient temperature between-10~+40°C Ambient conditions corresponding humidity 95%(20°C +5°C) No flammable,explosive,corrosive gas,no conductive dust,indoor installation,good ventilation,vibration less than 0.5G

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3.2 Mounting direction

To ensure that the soft starter has good ventilation and heat dissipation, the soft starter should be installed vertically.

3.3 Mounting space

Leave enough space around the equipment for heat dissipation, and keep the equipment at a certain distance from the wall for easy maintenance (see attached table II). If you need to use the fan, please download the relevant fan size from our website (www.xichi.cn).

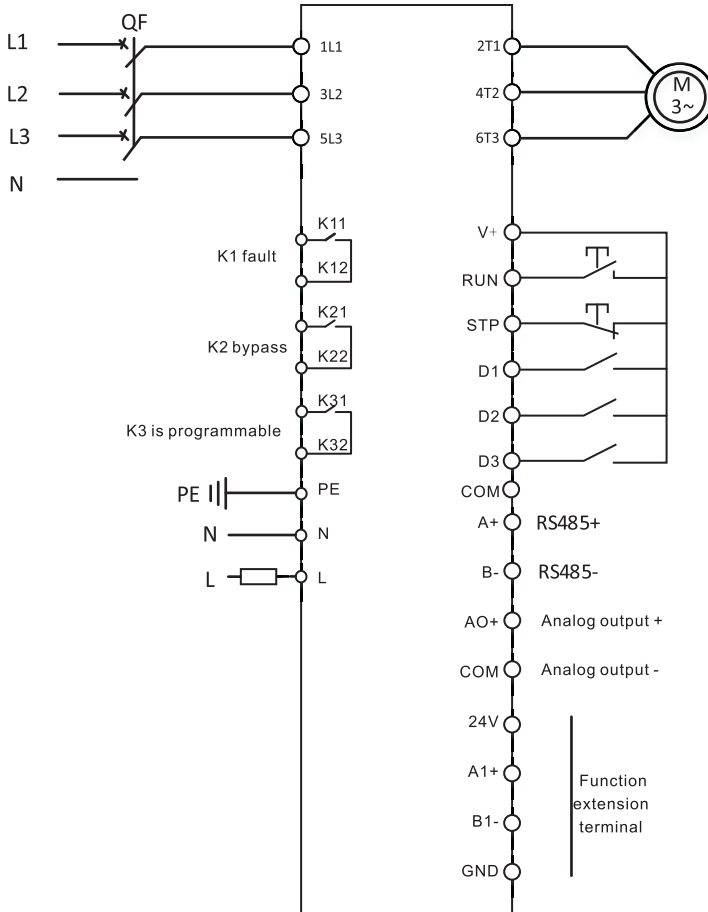
3.4 Circuit installation

The main loop adopts upper and lower out, and the wire should ensure sufficient carrying capacity. Please refer to the attached table for the selection of peripheral accessories.

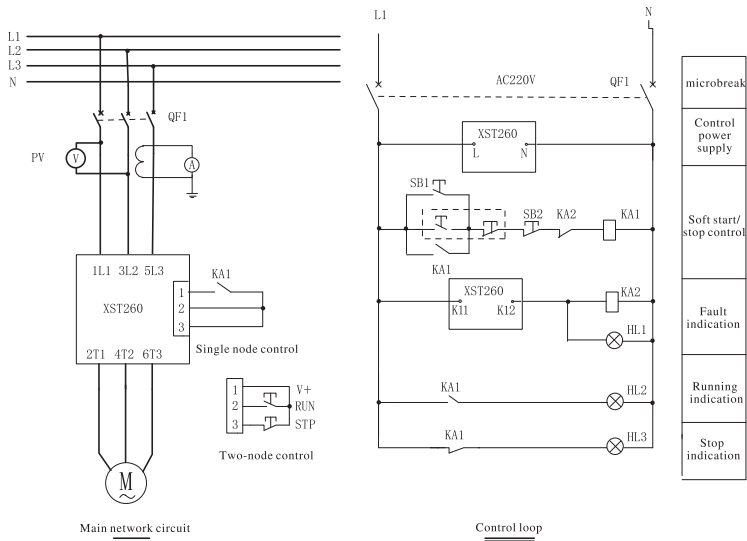
Chapter 4 Circuit connection

4.1 Basic Wiring Schematic Diagram

Soft starter terminals 1L1, 3L2, and 5L3 are connected to three-phase power supply, and soft starter terminals 2T1, 4T2, and 6T3 are connected to a motor. The soft starter can choose whether to detect phase sequence by parameter setting.



4.2 Typical Application Wiring Diagram



Note:

1. Single node connection: in the shutdown state, V+ is disconnected from RUN, and RUN is short-connected with STP;

Single node control: contact closed soft start start, contact open soft start stop;

Two-node connection: in the shutdown state, V+ is disconnected from RUN, and V+ is short-connected with STP;

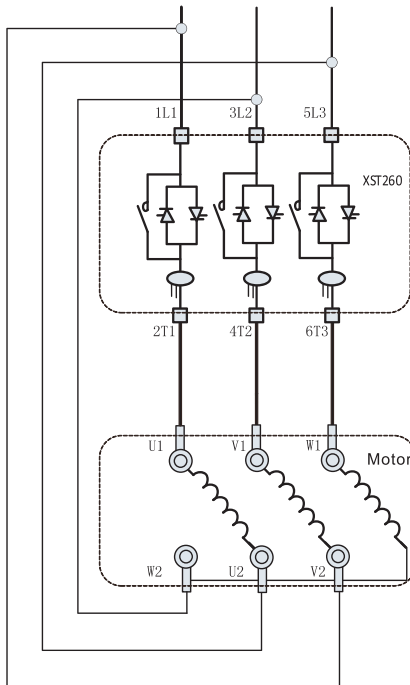
Two-node control: RUN end input pulse soft start start, STP end input pulse soft start stop.

2. The PE ground cable should be as short as possible and connected to the nearest ground point from the soft starter. The appropriate ground point should be located.

The mounting plate should be located next to the soft starter, and the mounting plate should also be grounded. The ground here is the functional ground rather than the protective ground.

4.3 Internal Triangle Cable Connection

If the user uses the internal triangle connection, the user must strictly follow the following figure to connect, otherwise it may cause damage to the motor or soft start-up. The machine will judge the motor connection before starting. If parameter 09.02 is set to 1, the soft starting will detect the connection after the start command is issued. If the inner triangle connection is not correct, the connection error will be reported.



The motor is triangle connected

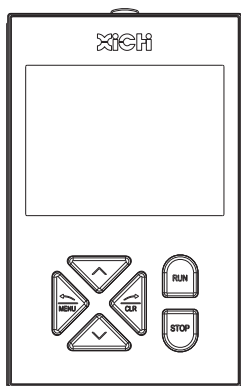
4.4 Terminal instructions

XST260 Soft starter has 24 external control terminals, including digital input I/O port, RS-485 communication and analog outlet, the three digital I/O ports are powered by 24V power supply, with a common reference ground.

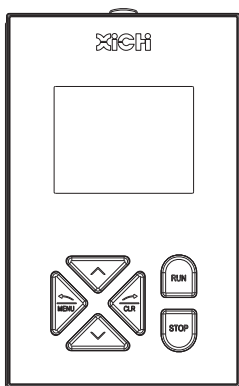
Terminal Symbol		Description	Instructions	
Main Loop	1L1、3L2、5L3	Ac Power Input Terminal	Connect To Three Phase Ac Power Supply	
	2T1, 4T2, 6T3	Soft Starting Output Terminal	Connect To A Three Phase Asynchronous Motor	
	Digital Input	V+	Public End Of A Digital Input Port	
		RUN	External Control Starting Terminal	V+ Starts When Short Circuited With Run
		STP	External Control Stop Terminal	Stop When V+ is Disconnected From STP
		D1	Programmable Digital Port	Set Via Parameter Item 03.01
		D2	Programmable Digital Port	Set Via Parameter Item 03.02
		D3	Programmable Digital Port	Set Via Parameter Item 03.03
	RS 485_COM	COM	Digital Input Port Reference	
		A+	Rs485 Is Communicating Correctly	
	Analog Output	B-	Rs 485 Communication Negative	
		AO+	Analog Output+	0-20MA(0-10V)analog Output,set Via Parameter 04.01
	COM	Analog Output-		
	K1 Relay Output	K11	Fault Output Relay	When The Output Is Valid,K11-K12 Is Closed And The Contact Capacity Is Ac250V/5A And Dc30V/5A
		K12		
	K2 Relay Output	K21	Bypass Output Relay	K21-K22 Closed When The Output Is Valid,Contact Capacity Ac250V/5A, Dc30V/5A
		K22		
	K3 Relay Output	K31	Programmable Output Relay	When The Output Is Valid,K31-K32 Is Closed And The Contact Capacity Is Ac250V/5A And Dc30V/5A
		K32		
Control Power Supply	PE	Grounding		
	N	Control Power Supply	AC110V--AC220V±15% 50/60Hz	
	L			
Optional Interface	24V	24V	24V	
	RS 485_GND	A1+	Rs485 Is Communicating Correctly	
		B1-	Rs 485 Communication Negative	
	GND	GND	24V Reference Ground	

Chapter 5 Display and Operation Instructions

5.1 A Schematic Of The Panel



LCD panel



LED Panel

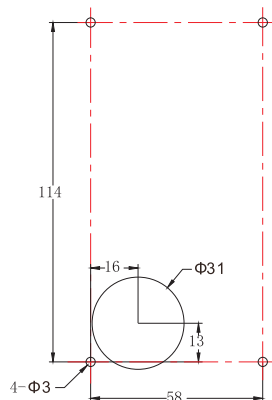












Diagram of the dimensions of the Opening of the external keyboard







5.2 Key Function Description

Identification	Name	Function Description	
		LED Panel	LCD Panel
	Confirm Key	Enter the menu, confirm the password, confirm the menu item and parameter item that need to modify the data, press this key when the low speed mode motor low speed reversal; Press this key when the pump cleaning mode pump cleaning reversal	Enter the menu, confirm password, confirm reenter password, confirm the menu items and parameter items that need to modify data, press this key in low speed mode motor low speed reversal, press this key in pump cleaning mode
	Increasing Key	Password value, menu item, parameter item, data increment (press this key and press the run key during operation to calibrate the increase of current), press this key during pump cleaning mode to enter automatic cleaning, scroll up to view real-time display parameters during shutdown or operation state	The increasing of password value and data (press this key and press the Run key during operation to calibrate the increase of current), the arrow of menu item, parameter item and parameter value option moves up, and press this key to enter automatic cleaning, stop or running state when the pump is in clean mode Scroll down and up to see real-time display parameters
	Decrement key	Password value, menu item, parameter item, data decrement (press this key and press the run key when running to calibrate current reduction), stop or run state scroll to view real-time display parameters	Decline of password value and data (press this key and press the run key when running to calibrate current reduction), arrow of menu item, parameter item, parameter value option moves down, stop or running state scroll down to view real-time display parameters

	Return Key	Confirm the modified parameter data, exit the parameter item, menu item, press this key in low speed mode motor low speed forward, press this key in pump clean mode pump clean forward	Confirm the modified parameter data, exit parameter item, menu item, password input shift, cancel re input password, press this key in low speed mode, motor low speed forward, press this in pump clean
	Run Key	Keyboard is used for "start" operations when active	When the keyboard is active, it is used for the "start" operation
	Stop key	The keyboard, when active, is used for "stop" operations and can also be used for "failure reset" operations	The keyboard, when effective, is used for a "stop" operation and can also be used for a "failure reset" operation

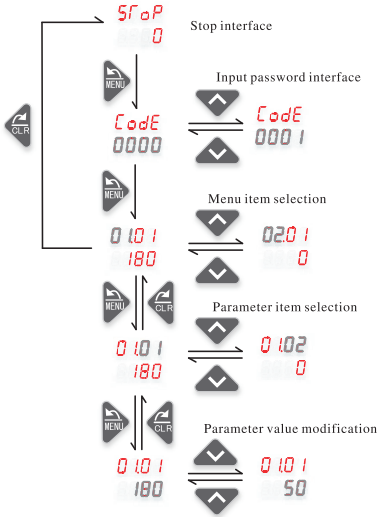
5.3 Displays Status Instructions

Identification	Name	Function description
	Stop	The device is in stop state. When the nixie tube blinks and the fault indicator is on, the device is in emergency stop state
	Starting Countdown	The device is in the starting countdown state
	Failure	The device is in a malfunctioning state
	Parameters	Parameters can be queried and set at this point
	A Phase Current	The first line shows the identification of the phase A current, and the second line shows the number A equivalent to the previous current value
	B Phase Current	The first line shows the identification of the phase B current, and the second line shows the number B equivalent to the previous current value
	C Phase Current	The first line shows the identification of the phase C current, and the second line shows the number C equivalent to the previous current value

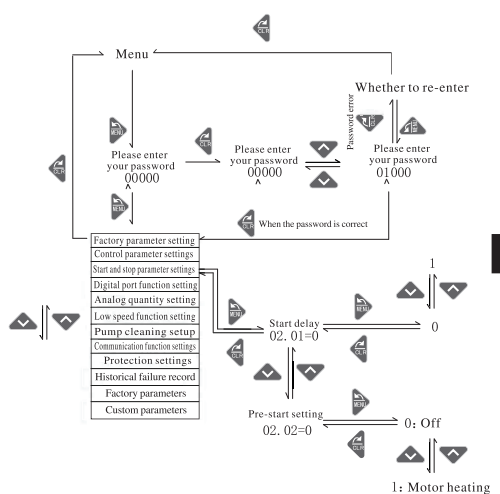
	Average current	The first row shows the identifier as the average current, and the second row of numbers is the current average current value
	A-phase voltage	The first line shows the identification of the A-phase voltage, and the second line shows the number A equivalent to the previous voltage value
	B-phase voltage	The first line shows the identification of the B-phase voltage, and the second line shows the number B equivalent to the previous voltage value
	C-phase voltage	The first line shows the identification of the C-phase voltage, and the second line shows the number C equivalent to the previous voltage value
	Average voltage	The first row shows the identifier as the average voltage, and the second row of numbers is the current average voltage value
	Communication failure	The first line shows the sign that the display board communication is abnormal

5.4 Process for modifying parameter items

LED panel operation process



LCD panel operation process



Chapter 6 Parameter items

The parameters of the XST260 soft starter can be divided into the following categories by function:00 is the factory parameter,01 is the main function setting parameter,02 is the conventional start-stop control setting parameter,03 is the digital input port and digital outlet setting parameter,04 is the analog output setting parameter,05 is the low speed function parameter,06 is the pump cleaning function parameter,08 is the communication parameter setting,09 is the fault protection function parameter setting,11 is the historical fault record parameter,12 is the historical running record parameter,and 13 is the field bus parameter.

6.1 Parameter Table

Parameter number	Parameter name	Parameter range	Default values
00.01	Soft Start Rated Current	15-9999	180
00.02	Accuracy Of Current Display	0: No Decimal Point 1: 1 Decimal Point	1
00.03	Current Correction Factor K	50-255	120
00.05	4mA Calibration	0-9999	872
00.06	20mA Calibration	0-9999	1062
00.07	Calibration Selection	0: Indicates The Normal State 1:4mA Calibration 2:20mA Calibration	0
00.11	Manufacturer Parameters	-	0
00.12	Manufacturer Parameters	-	0
00.13	Voltage A correction factor K	500~1500	1000
00.14	Voltage B correction factor K	500~1500	1000
00.15	Voltage C correction factor K	500~1500	1000
00.16	Voltage A Zero	2000~2100	2050
00.17	Voltage B Zero	2000~2100	2050
00.18	Voltage C Zero	2000~2100	2050
00.19	Manufacturer Parameters	-	0
00.20	Manufacturer Parameters	-	0
01.01	Motor Current Rating	1-9999	180
01.02	Main Feature Selection	0: Regular Starting 1: Low Speed Function 2: Pump Cleaning Function	0
01.03	Start-stop Control Options	Bit 0: Keyboard Works Bit 1: Terminal Valid Bit 2: Communication Is Valid Bit 3: Fieldbus Is Valid	7
01.04	Frequency Setting	0: 50HZ 1: 60HZ	0
01.07	User Password Entry	0-9999	0
01.11	Set the Current Display Parameters	0: Average Current	0

Parameter Number	Parameter Name	Parameter Range	Default Values
		1: Average Voltage 2: Reactive Power 3: Active Power 4: Apparent Power 5: Power Factor	
02.01	Starting Delay	0-250s	0
02.02	Pre-start Setting	0. Close 1. Heat The Motor 2. Static Braking 3. Turn Forward At Low Speed 4. Reverse At Low Speed	0
02.03	Pre-start Time	0-250s	0
02.04	Pulse Start Setting	0. Off 1. Pulse Start	0
02.05	Pulse Time	(0 ~ 2000) ms	0
02.06	Pulse Strength	(30 ~ 100)%Ue	30
02.07	Soft Lift Mode	0. Voltage Ramp 1. Current Ramp 2. Pump Starting Control 3. Direct Start	0
02.08	Rise Time	5 ~ 120s	10
02.09	Starting Voltage	30 ~ 100%Ue	30
02.10	Current-limiting Multiples	100 ~ 500%le (no Limit Current When =500)	350
02.11	Soft Stop Mode	0. Voltage Ramp 1. Pump Stop Curve 2. Brake 3. Free Stop	3
02.12	Descent Time	5 ~ 120s	10
02.13	Termination Voltage	30 ~ 100%Ue	30
02.14	Secondary Starting Time	0-120s	0
02.15	Multiple Of Second Start Current Limit	150 ~ 500%le	350
02.16	Starting Time Limit	30 ~ 250s	60
02.17	Static Braking Effort	10-100%	10
02.18	Motor Heating Power	10-100%	10
02.19	Dynamic Braking Force	10-100%	30
03.01	D1 Feature Selection	0: Close	0
03.02	D2 Feature Selection	1: Heat The Motor	0
03.03	D3 Feature Selection	2: Static Braking 3: Turn Forward At Low Speed	0

Parameter Number	Parameter Name	Parameter Range	Default Values
		4: Delay K1 input 5: Delay K2 input 6: Delay K3 input 7: External fault input 8: Low Speed Control(D3 Does Not Have This Feature)	
03.04	K1 Feature Selection	0: Output When Bypassed	1
03.05	K2 Feature Selection	1: Output In Case Of Failure	0
03.06	K3 Feature Selection	2: Regular Starting-starting Process Output 3: Output Of Conventional Start Soft Stop Process 4: Undefined 5: Regular Start-run Process Output 6: Delay Relay Output	0
03.07	K1-TIM	0-250s	0
03.08	K2-TIM	0-250s	0
03.09	K3-TIM	0-250s	0
04.01	Analog Output Benchmark	0: 4-20mA 1: 0-20mA 2: 0-10V 3: 0-5V	0
04.02	Output Variable Selection	0: Motor Current ,A 1: Main Voltage ,V 2: Grid Frequency ,Hz 3: Motor Speed ,R/s	0
04.03	Output Logic Selection	0: Positive logic 1: Negative Logic	0
04.04	Variable Maximum	0-9999	200
04.05	Variable Minimum	0-9999	0
05.01	Forward Turn Speed	0:15% Speed 1:7% Speed	0
05.02	Positive Turn Strength	10-100%	30
05.03	Reversal Speed	0:20% Speed 1:10% Speed	0
05.04	Inversion Strength	10-100%	30
06.01	Pump Clean Forward Starting Mode	0. Voltage Ramp 1. Current Ramp 2. Pump Starting Control	2
06.02	Pump Clean Positive Turn Stop Mode	0. Voltage Ramp 1. Pump Stop Curve 2. Power Brake 3. Free Parking	1

Parameter Number	Parameter Name	Parameter Range	Default Values
06.03	Pump Clean Reversal Speed	0:20% Speed 1:10% Speed	0
06.04	Pump Clean Reversal Strength	10-100%	50
06.05	Pump Clean Braking Strength	10-100%	30
06.06	Automatic Cleaning Positive Turn Time	0-60s	10
06.07	Automatic Cleaning Reversal Time	0-60s	10
08.01	RS485Mailing Address	1-255	1
08.02	RS485Baud Rate	0: 2400 1: 4800 2: 9600 3: 19200	2
08.03	Expansion Card Selection	0: No Expansion Card 1: PROFIBUS Expansion Card	0
08.04	PROFIBUS Mailing Address	1-125	1
08.05	PROFIBUS Baud Rate	0: 9.6 kbps 1: 19.2kbps 2: 45.45kbps 3: 93.75kbps 4: 187.5kbps 5: 500kbps 6: 1.5Mbps 7: 3Mbps 8: 6Mbps 9: 12Mbps	0
09.01	Phase Sequence Detection	0: Off 1: On	1
09.02	Wiring Mode Choice	0:Outside 1:Internal Connection (detection Connection) 2:Inline (does Not Detect Wiring)	0
09.04	Scr And Contactor Detection	0: Off 1: On	1
09.05	Electronic Thermal Over Load Detection Protection	0:10A 1:10 2:15 3:20 4:25 5:30 6: off	4
09.06	Run The Over Current Protection Settings	100%-150% (Cancel Current Limit At =100)	120

Parameter Number	Parameter Name	Parameter Range	Default Values
09.07	Over Current Protection Delays The Output Time	0-60s	5
09.08	Running current under load setting	0-100%	50
09.09	Current Under Load Delay Output Time	0-60s	5
09.10	Current Imbalance Protection Settings	10-100%	20
09.11	Current Imbalance Failure Delays Output Time	0-60s	5
09.12	Main Power Over Voltage Protection Settings	100-2000V	418
09.13	Over Voltage Failure Delays The Output Time	0-60s	5
09.14	Main Under Voltage Protection Settings	100-2000V	342
09.15	Under Voltage Failure Delay Output Time	0-60s	5
09.16	Motor Jam Fail-safe Settings	100%-600%	200
09.17	Gridlock Failure Delay Output Time	0-60s	5
11.01	Number Of Failures		0
11.02	Historical Trouble 1		0
11.03	Historical Trouble 2		0
11.04	Historical Trouble 3		0
11.05	Historical Trouble 4		0
11.06	Historical Trouble 5		0
11.07	Historical Trouble 6		0
11.08	Historical Trouble 7		0
11.09	Historical Trouble 8		0
11.10	Historical Trouble 9		0
11.11	Historical Trouble 10		0
11.12	Historical Trouble 11		0
11.13	Historical Trouble 12		0
11.14	Historical Trouble 13		0
11.15	Historical Trouble 14		0
11.16	Historical Trouble 15		0
11.17	Historical Trouble 16		0
11.18	Historical Trouble 17		0
11.19	Historical Trouble 18		0
11.20	Historical Trouble 19		0
11.21	Historical Trouble 20		0
12.01	Software Version Number		0
12.02	Manufacturer Parameters		0
12.03	Manufacturer Parameters		0
12.04	Manufacturer Parameters		0
12.05	Manufacturer Parameters		0
13.01	Customize Parameters 1	121~306	280

Parameter Number	Parameter Name	Parameter Range	Default Values
13.02	Customize Parameters 2	121~306	280
13.03	Customize Parameters 3	121~306	280
13.04	Customize Parameters 4	121~306	280
13.05	Customize Parameters 5	121~306	280
13.06	Customize Parameters 6	121~306	280
13.07	Customize Parameters 7	121~306	280
13.08	Customize Parameters 8	121~306	280
13.09	Customize Parameters 9	121~306	280
13.10	Customize Parameters 10	121~306	280
13.11	Customize Parameters 11	120~399	120
13.12	Customize Parameters 12	120~399	120
13.13	Customize Parameters 13	120~399	120
13.14	Customize Parameters 14	120~399	120
13.15	Customize Parameters 15	120~399	120
13.16	Customize Parameters 16	120~399	120
13.17	Customize Parameters 17	120~399	120
13.18	Customize Parameters 18	120~399	120
13.19	Customize Parameters 19	120~399	120
13.20	Customize Parameters 20	120~399	120

Chapter 7 Functions

7.1 Introduction

Soft starters come in a variety of operating states, and different functions can be used in different operating states.

Soft starters have the following states:

- 1) Stand-alone features
- 2) Pre-starting
- 3) Pulse starting
- 4) Soft starting process
- 5) Full pressure
- 6) Soft stop procedure

■ Stand-alone features

In the "independent function" state, the soft starter performs independent functions. Independent functions include low speed functions, pump cleaning functions.

■ Pre-start

When the pre-start function is in effect, the soft starter will perform the pre-start function first after receiving the start command. The pre-start function runs within the preset pre-start time. The soft starter will then continue to be in the "pulse start" or "soft start process".

- a) Motor heating
- b) Static braking
- c) Low speed forward
- d) Low speed reversal

7.2 Voltage Ramp

When a "voltage ramp" is used, the voltage rises in a linear manner from the starting voltage to the full voltage during starting and falls in a linear manner from the initial step-down voltage to the terminating voltage during stopping.

7.2.1 Voltage Starting ramp

When the soft starter receives the start signal, the soft starter quickly raises the voltage to the starting voltage. The soft starter then controls the output voltage of the starting ramp process.

This starting mode is suitable for large inertia load, and the starting stability requirements are relatively high occasions, can greatly reduce the starting impact and mechanical stress.

When the output voltage reaches 100% of the nominal voltage (full voltage), the soft starter will close the bypass.

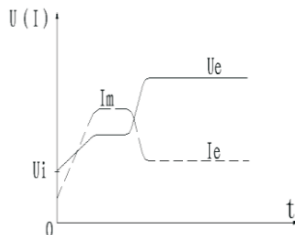
To reach full voltage, these conditions need to be met:

The output voltage reaches 100% of the nominal voltage.

The load current is less than 1.2 times the rated current of the motor.

Rise time refers to the output voltage from the starting voltage to 100% of the nominal voltage of the period of time, indicating the speed of motor acceleration, not the actual starting time.

Configure the voltage Starting Ramp using these parameters:



Parameter number	Name	Range	Set value	Factory value
02.07	Soft Lift Mode	0. Voltage Ramp 1. Current Ramp 2. Pump Starting Control 3. Direct Start	0	0
02.08	Rise Time	5-120s	---	10
02.09	Starting Voltage	30-100%Ue	---	30
02.10	Current-limitingMultiples	100-500%Ie (no limit current when =500)	---	350

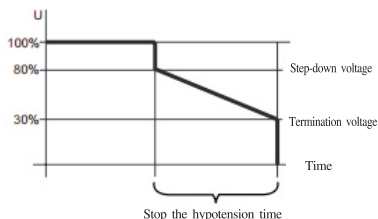
7.2.2 Voltage Stop Ramp

When the soft starter receives a stop signal, the soft starter will quickly drop the output voltage from full voltage to 80%, then follow the drop time to drop the output voltage to the stop voltage.

When stopping in this way, the soft starter firstly disconnects the bypass contactor and then performs phase shift triggering. After the voltage ramp stopping process is completed, the soft starter turns to white stop.

Down time refers to the period from 80% output voltage to the termination voltage, indicating the speed of motor deceleration, but not the actual shutdown time.

Configure the "voltage stop ramp" using these parameters:

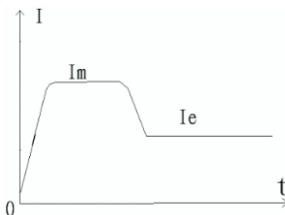


Parameter Number	Name	Range	Set value	Factory value
02.11	Soft Stop Mode	0. Voltage Ramp 1. Pump Stop Curve 2. Brake 3. Free Stop	0	3
02.12	Descent Time	5-120s	---	10
02.13	Termination Voltage	30-100% U_e	---	30

7.3 Current Ramp

When the current ramp starting mode is used, the output current of the soft starter will increase according to the set curve after receiving the starting instruction, until the output current reaches the set current limiting value I_m , and the output current will no longer increase. After the motor accelerates for a period of time, the current begins to decline, and the output voltage increases rapidly until the full voltage output, and the starting process is completed.

Configure the "current ramp" using these parameters:



Parameter Number	Name	Range	Set value	Factory value
02.07	Soft Lift Mode	0. Voltage Ramp 1. Current Ramp 2. Pump Starting Control 3. Direct Starting	1	0
02.08	Rise Time	5-120s	---	10
02.10	Current Limiting Multiples	100-500% I_e (no Limit Current When =500)	---	350

7.4 Pump Control

Mainly for the starting control of pump load, not only can reduce the current in the process of starting the pump, but also can reduce or eliminate the phenomenon of water hammer in the process of stopping the pump.

7.4.1 Pump Starting Control

When the pump starting mode is used, the output voltage of the soft starter will increase according to the characteristic curve of the pump load after receiving the starting command until the output voltage reaches the full voltage.

Configure the "pump Starting control" using these parameters:

Parameter Number	Name	Range	Set value	Factory value
02.07	Soft Lift Mode	0. Voltage Ramp 1. Current Ramp 2. Pump Starting Control 3. Direct Start	2	0
02.08	Rise Time	5-120s	---	10
02.09	Starting Voltage	30-100%Ue	---	30
02.10	Current-limiting Multiples	100-500%Ie	---	350

7.4.2 Pump Stop Control

When the soft stop mode is set to the pump stop curve, stopping under the full pressure state is pump stop. In this way, the soft starter firstly disconnects the bypass contactor, the output voltage of the soft starter gradually drops to the set termination voltage value within the set descent time, and the soft starter turns to free stop at the end of the stopping process. The pump stop curve is mainly applicable to the pump load, which can effectively slow down the water hammer phenomenon caused by the pump load when it is stopped.

Configure the "pump stop control" using these parameters:

Parameter Number	Name	Range	Set value	Factory value
02.11	Soft Stop Mode	0. Voltage Ramp 1. Pump Stop Curve 2. Brake 3. Free Stop	1	3
02.12	Descent Time	5-120s	---	10
02.13	Termination Voltage	30-100%Ue	---	30

7.5 Direct Start

When using direct starting, the soft starter will quickly bring the motor up to full running speed and the motor voltage will be boosted to full voltage in 2 seconds. Direct starting is not limited by current.

Configure "Direct starting" using these parameters:

Parameter Number	Name	Range	Set value	Factory value
02.07	Soft Lift Mode	0. Voltage Ramp 1. Current Ramp 2. Pump Starting Control 3. Direct Start	3	0

7.6 Braking

When the soft stop mode is set to braking, when the soft starter is in the soft stop state, the soft starter will provide the motor with braking torque to stop the motor quickly.

Using the soft starter's braking function to stop the motor will cause noise and vibration. If you need to stop the motor quickly, the braking strength must be set to a higher value, which will cause noise and vibration levels to rise.

It is recommended to use an external temperature sensor to detect the motor temperature.

Configure the "brake" using these parameters:

Parameter Number	Name	Range	Set value	Factory value
02.11	Soft Stop Mode	0. Voltage Ramp 1. Pump Stop Curve 2. Brake 3. Free Stop	2	3
02.12	Descent Time	5-120s	---	10
02.13	Termination Voltage	30-100%Ue	---	30
02.19	Dynamic Braking Force	10-100%	---	30

7.7 Free Stop

When the soft stop mode is set to free stop, after receiving the stop instruction, the soft starter first blocks the control relay of the bypass contactor and then blocks the output of the main circuit thyristor, and the motor stops freely according to the load inertia.

Use these parameters to configure "free stop ":

Parameter Number	Name	Range	Set value	Factory value
02.11	Soft Stop Mode	0. Voltage Ramp 1. Pump Stop Curve 2. Brake 3. Free Stop	3	3

7.8 Pulse Start

The impulse starting is mainly applied to the load motor with relatively large static resistance. It can overcome the large static friction moment by applying a large instantaneous starting moment. In this mode, the output voltage quickly reaches the set pulsation intensity, and when it reaches the preset pulse time, it drops to the starting voltage, and then starts smoothly according to the set starting voltage and rising time until the starting is completed.

Use these parameters to configure "pulse starting ":

Parameter Number	Name	Range	Set value	Factory value
02.04	Pulse Startp Setting	0. Off 1. Pulse Start	1	0
02.05	Pulse Time	(0-2000) ms	---	0
02.06	Pulse Force	(30-100)%Ue	---	30

7.9 Motor Heating

If the motor heating function is set, the motor will be preheated before running. The soft starter will supply current to the motor, but not to a level of torque that will make the motor turn.

If the motor heating function is used while the motor is plugged in, damage to the equipment may result.

Since motor heating can cause motor temperature to rise, temperature detection components need to be used to monitor the temperature and prevent irreversible damage to the motor caused by excessive temperature.

Configure "Motor heating" using these parameters:

Parameter Number	Name	Range	Set value	Factory value
02.02	Pre-start setting	0. Close 1. Heat the motor 2. Static braking 3. Turn forward at low speed 4. Reverse at low speed	1	0
02.03	Pre-start time	0-250s	---	0
02.18	Motor heating power	10-100%	---	10

7.10 Static Braking

The static braking function will brake the motor. Using this feature during pre-starting ensures that the motor will not turn before starting.

If the static braking function is used while the motor is wired, damage to the equipment may result.

Since static braking can cause the motor temperature to rise, temperature detection components need to be used to monitor the temperature and prevent irreversible damage to the motor from excessive temperature.

Configure "static braking" using these parameters:

Parameter Number	Name	Range	Set value	Factory value
02.02	Pre-start setting	0. Close 1. Heat the motor 2. Static braking 3. Turn forward at low speed 4. Reverse at low speed	2	0
02.03	Pre-start time	0-250s	---	0
02.17	Motor heating power	10-100%	----	10

7.11 Low Speed

Low speed can be used as a standalone feature or as a pre-start feature.

When the pre-start setting is set to 3 or 4, it is the low speed feature. After the end of the starting delay time, the motor will first enter the low speed modeType.

When using, you need to set the speed and strength of low speed operation according to the actual situation.

The low speed function is to drive the motor at a lower output voltage. The positive speed percentage is 15% or of the motor's rated speed7%, and the reverse speed is 20% or 10% of the motor's rated speed.

If the motor strength is too high, it may cause vibration; if it is too low, the motor may fail to start.

The use time of low speed should not exceed 2 minutes, otherwise it will cause the motor to heat.

The low speed function can only be used when the soft starter is connected externally.

Configure "Low speed" using these parameters:

Parameter Number	Name	Range	Set Value	Factory Value
01.02	Main Feature Selection	0: Regular Starting 1: Low Speed Function 2: Pump Cleaning Function	0 Or 1	0
02.02	Pre-start Setting	0. Turn Off 1. Heat The Motor 2. Static Braking 3. Turn Forward At Low Speed 4. Reverse At Low Speed	3 Or 4	0
02.03	Pre-start Time	0-250s	---	0
05.01	Forward Turn Speed	0: 15% Speed 1: 7% Speed	--	0
05.02	Forward Turn Speed	10-100%	---	30
05.03	Reversal Speed	0: 20% Speed 1: 10% Speed	---	0
05.04	Reversal Speed	10-100%	---	30

7.12 Pump Cleaning

The pump cleaning function is used in industrial applications to solve two problems: Pump blade stuck problem, you can use forward or reverse to cut or disengage processing. The sludge treatment of the pump, through repeated positive turn and reverse to clean up the pump blade.

Control method:

Manual cleaning

Manual cleaning is when the user decides at any point in time which direction the motor should be rotated for cleaning by starting the front and rear pump cleaning commands.

Automatic cleaning

Automatic cleaning refers to a complete forward and reverse cleaning operation of the soft starter after the automatic cleaning command has been issued.

The pump cleaning function has the following parameters:

Parameter Number	Name	Range	Set Value	Factory Value
06.01	Pump Clean Forward Starting Mode	0. Voltage Ramp 1. Current Ramp 2. Pump Starting Control	---	2
06.02	Pump Clean Positive Turn Stop Mode	0. Voltage Ramp 1. Pump Stop Curve 2. Power Brake 3. Free Stop	---	1
06.03	Pump Clean Reversal Speed	0:20% Speed 1:10% Speed	--	0
06.04	Pump Clean Reversal Strength	10-100%	---	50
06.05	Pump Clean Braking Strength	10-100%	---	30
06.06	Automatic clean positive turn time	0-60s	---	10
06.07	Automatic Cleaning Reversal Time	0-60s	---	10
01.02	Main Feature Selection	0: Regular Starting 1: Low Speed Function 2: Pump Cleaning Function	2	0
02.08	Rise Time	5 ~ 120s	---	10
02.09	Starting Voltage	30 ~ 100%Ue	---	30
02.12	Descent Time	5 ~ 120s	---	10
02.13	Termination Voltage	30 ~ 100%Ue	---	30

7.13 I/O

7.13.1 Digital Input (DI)

The soft starter has five digital inputs for the basic control of the device. These five digital inputs are RUN,STP, D1,D2, and D3.

The RUN and STP inputs are fixed start and stop functions and cannot be modified. D1.D2.D3 are programmable inputs. You can associate functions with physical signals through the menu on the panel.

The internal digital input has the following parameters:

Parameter number	Parameter name	Parameter range	Default values
03.01	D1 Feature selection	0: Clear the current fault	0
03.02	D2 Feature Selection	1: Emergency Stop control input	0
03.03	D3 Feature Selection	2: motor overheat protection input 3: motor speed detection 4: delay K1 input 5: Delay K2 input 6: Delay K3 input 7: External fault input 8: Low speed control (D3 does not have this feature)	0

Instructions:

0, clear the current fault, when the fault occurs, clear the fault cause, and then short connect the digital port and V+ to clear the current fault.

1. Emergency stop control input. When the digital port is set as emergency stop control input, disconnect the digital port and V+ soft starter to stop and report emergency stop under the running state. In the emergency stop state, short connect the digital port and V+, press the reset button to clear the emergency stop.

2, motor overheating protection input, use normally open type temperature switch, the two wires of the switch are connected to the digital port and V+ respectively. When the motor temperature is too high, the temperature switch closes, and the soft starter stops to report the motor overheating fault.

3, delay K1\K2\K3 input, when the digital port for delay K1 input, K1 function selection for delay relay output, in D1 and V+ short connection, K1 relay start delay, when the delay time to the hind K1 relay closed. D1, D2, D3 can also be set at the same time as the delay K1 input, any one of the digital port and V+ short-circuited can control K1 output.

4. External fault input. When the external fault signal imposes a long closed signal between the digital port and V+, the soft starter stops and reports an external fault.

5, low speed control, this function can only be used when the main function is selected as low speed function. When D1 is set to low speed, you can control the forward rotation at low speed, and when D2 is set to low speed, you can control the reverse at low speed. When the low-speed function is enabled, it is necessary to enter the low-speed standby state first, and then short-connect D1 and V+ to start the low-speed positive rotation function. If it is disconnected, the motor will enter the low-speed standby state and stop rotating. To modify the main function selection, first press the STOP key to exit the low-speed standby state, and then modify the parameters.

7.13.2 Relay Output

30VDC/250VACIth=5A.The soft starter has 3 relay outputs. These relay outputs are K1, K2, and K3. The relay output is: 30VDC/250VACIth=5A.

You can set the function of these relay output signals. You can associate functions with physical signals through the menu on the panel. Relay outputs have the following parameters:

Parameter number	Parameter name	Parameter range	Default values
03.04	K1 Feature selection	1:Output in case of failure	1
03.05	K2 Feature selection	2:Regular starting - Starting process output	0
03.06	K3 feature selection	3:Output of conventional start-soft stop process 4:Undefined 5:RegularStart-Run process output 6:Delay relay output	0
03.07	K1-TIM	0-250S	0
03.08	K2-TIM	0-250s	0

Parameter Number	Parameter Name	Parameter Range	Default values
03.09	K3-TIM	0-250s	0

Instructions:

0. Output in bypass. When the output voltage of the soft starter reaches 100% of the nominal voltage and the time set in 03.07 is up, the relay output closes.

1. Output in case of failure. When the soft starter detects a fault and the time set in 03.07 is up, the relay output closes.

2. Output in the conventional start-starting process. When the soft starter is in the starting process and the time set in 03.07 is up, the relay output will close. If the delay time has not reached the full voltage, it will not be output.

3. Output in the process of conventional start-soft stop. When the soft starter is in the process of soft stop and the time set in 03.07 is up, the relay output closes. If it has stopped before the delay time, it will not be output.

4. Output in the conventional start-running process. When the soft starter is in the running process and the time set in 03.07 is up, the relay output closes.

5. Delay relay output, when D1 function is set as delay K1 input, D1 and V+ short connect, the relay starts timing, when the time reaches the time set in 03.07 K1 output closed.

7.13.3 Analog Output

The soft starter is equipped with a one way analog output for sending a configurable analog output signal to an analog meter or PLC. The following parameters displayed by the analog output can be selected:

Amotor current, A

Vmain voltage, V

HzGrid frequency, Hz

Motor speed, R/s You can use the configuration parameter "Analog Output Benchmark" in the soft starter to set the voltage or current output. The selected voltage or current must match the analog meter or PLC.

These Settings include:

0-10V (need external 500 ohms resistance)

0-5V (need external 500 ohms resistance)

Parameter number	Parameter name	Parameter range	Default values
04.01	Analog output benchmark	0: 4-20mA 1: 0-20mA 2: 0-10V 3: 0-5V	0
04.02	Output variable selection	0: motor current, A 1: Main voltage, V 2: Grid frequency, Hz 3: Motor speed, R/s	0
04.03	Output Logic Selection	0: Positive logic 1: negative logic	0
04.04	Variable maximum	0-9999	200

Parameter number	Parameter name	Parameter range	Default values
04.05	Variable minimum	0-9999	0

Example:

- Set Output Variable Selection to Motor Current
- Set "Analog Output Baseline" to "4-20mA"
- Set Output Logic Selection to Positive Logic
- Set "Variable Max" to 400 and "Variable Min" to 0.

This means that when the motor current is:

- 400A, the output current is 20mA.
- For OA, the output current is 4mA.

If Output Logic Selection is set to Negative Logic, the motor current is:

- At 400A, the output current is 4mA.
- For OA, the output current is 20mA.

7.14 Fieldbus

The XST260 has a modbus RTU port, and an optional PROFIBUS port
Fieldbus communication uses the following parameters:

Parameter number	Parameter name	Parameter range	Default values
01.03	Start-stop control options	Bit 0: The keyboard is valid Bit 1: Terminal valid Bit 2: Communication is valid Bit 3: Fieldbus is valid	7
08.01	Rs485 mailing address	1-255	1
08.02	Rs485 baud rate	0: 2400 1: 4800 2: 9600 3: 19200	2
08.03	Expansion card selection	0: No expansion card 1: PROFIBUS expansion card	0
08.04	PROFIBUS mailing address	1-125	1
08.05	PROFIBUS baud rate	0: 9.6 kbps 1: 19.2kbps 2: 45.45kbps 3: 93.75kbps 4: 187.5kbps 5: 500kbps 6: 1.5Mbps 7: 3Mbps 8: 6Mbps 9: 12Mbps	0

7.14.1 Communication Control

If you need a communication mode to control the start-stop reset operation of the soft starter, you need to set the 01.03 (register address 122) parameter to make the communication control effective. How to just view the value of the relevant register does not need to set the 01.03 parameter.

The following describes the Settings of binary and decimal data for the 01.03 parameter under different start-stop control modes:

Start and stop control mode	Value				Decimal
	Binary				
	The fieldbus is available	Communication is effective	The terminal is valid	The keyboard works	
	Bit3	Bit2	Bit1	Bit0	
Invalid	0	0	0	0	0
keyboard works	0	0	0	1	1
terminal is valid	0	0	1	0	2
Terminal, keyboard available	0	0	1	1	3
Communication is effective	0	1	0	0	4
Communication, keyboard available	0	1	0	1	5
Communication, terminal available	0	1	1	0	6
Communication, keyboard, terminal available	0	1	1	1	7
The fieldbus is available	1	0	0	0	8
Field bus and keyboard are available	1	0	0	1	9
Field bus and terminal are available	1	0	1	0	10
Field bus, terminal and keyboard are available	1	0	1	1	11
Fieldbus, effective communication	1	1	0	0	12
Fieldbus, communication, keyboard is effective	1	1	0	1	13
Field bus, communication and terminal are available	1	1	1	0	14
Fieldbus, communication, terminal, keyboard is effective	1	1	1	1	15

Note: The Bus, communication and keyboard control from the start to stop the RUN and STP terminals in a dual-node mode wiring

7.14.2 Correspondence Address

If the upper computer needs to communicate with the soft starter, set the communication address for the soft starter. Choose an appropriate number that is not occupied! Value as the address.

7.14.3 Baud Rate

If the upper computer needs to communicate with the soft starter, set the baud rate for the soft starter. Select the same baud rate as the upper computer it is communicating with.

7.15 Protection

Soft starters have a variety of protection features to protect soft starters, motors, and other equipment.

Users can enable or disable the protection feature.

When protection occurs, the soft starter stops, the display board fault indicator lights up, and the fault information is displayed

7.15.1 Reverse Protection

This protection can tell if the soft starter phase is connected in the correct order.

The phase connection order of the input power terminal does not have any effect on the soft starter, but it may affect the motor connected to the soft starter. For example, if the phase is not connected correctly, the motor may reverse. When the phase sequence detection is turned on, if a phase sequence error is detected, the motor will not start and a phase sequence error will be reported.

The following parameters are used for reverse protection:

Parameter number	Parameter name	Parameter range	Default values
09.01	Phase sequence detection	0: Off 1: On	1

7.15.2 Cable Error Protection

This protection can determine whether the main loop of the soft starter is wired correctly.

The soft starter has two connection modes, namely internal connection and external connection. Because the trigger modes of internal connection and external connection are not consistent, improper trigger may cause damage to the motor, so it is necessary to protect the motor wiring error. When the 09.02 parameter is set to in-connect (detect wiring) and the motor wiring is external, the soft starter will report a wiring error after giving the starting command. If the parameter of 09.02 is set to internal connection (no detection connection), no fault will be reported, and the soft starter will trigger in accordance with the internal connection mode.

Before the starter motor, it is necessary to determine the wiring mode of the motor and set the 09.02 parameter, and finally connect the motor according to the wiring diagram in Chapter 4.

The following parameters are used for wiring error protection:

Parameter number	Parameter Name	Parameter Range	Default values
09.02	Wiring mode choice	0: External 1: Internal connection (detection connection) 2: Inline (does not detect wiring)	0

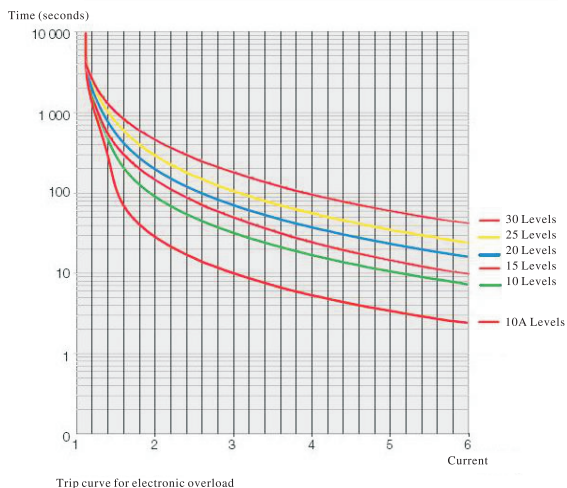
7.15.3 Silicon Control and contactor detection protection

This protection can detect whether the thyristor is short-circuited or whether the contactor is closed before starting. The following parameters are used to detect the thyristor and contactor:

Parameter Number	Parameter Name	Parameter Range	Default values
09.04	SCR and contactor detection	0: Off 1: On	1

7.15.4 Electronic Thermal overload protection

When the current of the motor in operation exceeds the electronic thermal overload class and trip time set in parameter 09.05, the soft starter will carry out electronic thermal overload protection. The electronic thermal overload protection is effective in the running process of the soft starter.



Electronic thermal overload protection uses the following parameters:

Parameter Number	Parameter Name	Parameter Range	Default Values
09.05	Electronic thermal overload detection protection	0:10A 1:10 2:15 3:20 4:25 5:30 6:off	4

7.15.5 Running Overcurrent Protection

If the current in operation exceeds the overcurrent protection value set in parameter 09.06 and the duration exceeds the overcurrent operation time set in parameter 09.07, the soft starter will be provided with overcurrent protection. No overcurrent protection will be applied when 09.06 is set to 100%.

Run overcurrent protection is only effective during full voltage processes.

Run overcurrent protection uses the following parameters:

Parameter Number	Parameter Name	Parameter Range	Default Values
09.06	Run the overcurrent protection Settings	100%-150% (cancel current limit at =100)	120
09.07	Overcurrent protection delays the output time	0-60s	5

7.15.6 Running Undercurrent Protection

When the current is lower than the set value during operation, the soft starter will apply undercurrent protection. No undercurrent protection will be applied when 09.08 is set to 100%.

Running undercurrent protection is only effective during full voltage processes.

Run undercurrent protection using the following parameters:

Parameter Number	Parameter Name	Parameter Range	Default Values
09.08	Running current underload setting	0-100%	50
09.09	Current underload delay output time	0-60s	5

7.15.7 Current Imbalance Protection

This protection can detect if the current is unbalanced. Normally the three-phase current should be the same. The principle of current imbalance detection is to calculate the current difference of any two phases relative to the current unbalance of the larger phase, a total of 3 degrees of unbalance will be calculated, of course, the condition of opening the calculation of current unbalance is that the value of one phase of the three-phase current should exceed the rated current of the motor 0.1 times. For example:

A phase current is 20A, B phase current is 25A, and C phase current is 30A. The motor is rated for 35A. Follow the following algorithm to calculate the unbalance.

If the A phase current is greater than the B phase current, the A phase and B phase unbalance is $(I_a - I_b) / I_a$; If the A phase current is less than the B phase current, the A phase and B phase unbalance degree is $(I_b - I_a) / I_b$. Phase B and phase C and phase A and phase C algorithms are the same as above. The calculated result is:

AB phase unbalance degree 20%; BC phase unbalance degree 16.67%; AC phase unbalance 33.33%. The maximum degree of unbalance is 33.33%. If parameter 09.10 is set to 35%, no phase current imbalance fault will be reported; If parameter 09.10 is set to 30%, phase current unbalance fault will be reported.

Phase current unbalance fault is effective in the whole running process, that is, the fault detection is effective when the machine is powered. When 09.10 is set to 100%, the parameter is invalid.

The current unbalance protection uses the following parameters:

Parameter Number	Parameter Name	Parameter Range	Default values
09.10	Current imbalance protection Settings	10-100%	20
09.11	Current imbalance failure delays output time	0-60s	5

7.15.8 Overvoltage Protection

This protection can detect if the main loop voltage is too high.

Overvoltage protection is effective during operation, but not during shutdown.

The overvoltage protection uses the following parameters:

Parameter Number	Parameter Name	Parameter range	Default values
09.12	Main power overvoltage protection Settings	100-2000V	418
09.13	Overvoltage failure delays the output time	0-60s	5

7.15.9 Under Voltage Protection

This protection can detect if the main loop voltage is too low.
Under voltage protection is effective during operation, but not during shutdown.
Under voltage protection uses the following parameters:

Parameter Number	Parameter Name	Parameter Range	Default values
09.14	Main under voltage protection sets the under voltage fault delay	100-2000V	342
09.15	output time	0-60s	5

7.15.10 Blocked Turn Protection

The motor does not run smoothly.
Stoppage protection is effective in both running and shutdown conditions.

Parameter Number	Parameter Name	Parameter range	Default values
09.16	Motor jam fail-safe Settings	100%-600%	200
09.17	Gridlock failure delay output time	0-60s	5

7.15.11 Motor Over Temperature Protection

The motor temperature is too high.
Configure the digital port D1 as the motor overheat protection input, connect the normally open type temperature switch to the V+ and D1 ports at both ends. The operating temperature of the temperature switch is the over temperature protection temperature of the motor.

The following parameters are used for motor over temperature protection:

Parameter Number	Parameter Name	Parameter Range	Default values
03.01	D1 Feature selection	0: Clear The Current Fault 1:emergency Stop Control Input 2:motor Overheat Protection Input 3: Motor Speed Detection 4: Delay K1 Input 5: Delay K2 Input 6: Delay K3 Input 7: External Fault Input 8: Low Speed Control (d3 DoesNot Have Thisfeature)	0
03.02	D2 Feature selection		0
03.03	D3 Feature selection		0

7.15.12 Starting Timeout Protection

Sets the maximum time for the motor to start.

This fault may be reported if the load is too heavy or the current limiting multiple is set too low. The starting time limit should be greater than the ramp time, otherwise this fault will also be reported.

Parameter number	Parameter name	Parameter range	Default values
02.16	Start Time Limit	30 ~ 250s	60

7.15.13 External Fault Protection

The digital port has an external fault signal input.

Select the digital port function as external fault input. When the digital port is short-circuited with V+, a fault is reported.

External fault protection uses the following parameters:

Parameter Number	Parameter Name	Parameter Range	Default values
03.01	D1 Feature selection	0: Clear the current fault 1: Emergency Stop control input 2: Motor overheat protection input 3: Motor speed detection 4: Delay K1 input 5: Delay K2 input 6: Delay K3 input 7: External fault input 8: Low speed control (D3 does not have this function)	0
03.02	D2 Feature Selection		0
03.03	D3 Feature Selection		0

Chapter 8 Fault detection and troubleshooting

8.1 Fault Code Table

The soft starter has 19 protection functions. When the protection function of the soft starter acts, the soft starter stops immediately, the fault indicator lights up, the LED display displays the current fault code, and the LCD display displays the current fault name. The user can analyze the fault according to the fault content.

Fault code	Fault name	Cause of the fault	What to do
E01	The msin power supply is out of pgage	Out of phase in starting or running?	Check that the three-phase power supply is reliable
E02	Machine overheating	Check that the three-phase power supply is reliable	<ul style="list-style-type: none"> a) Check that the installation environment of the soft starter is well ventilated and vertically installed. b) Check whether the radiator is overheated or overheated Whether the switch is disconnected. c) High starting frequency leads to continuous heating of the machine, reducing the starting frequency. d) The control power supply is too low, and the power drop is too large during the starting process.
E03	Starting time out fault	Excessive starting time	<ul style="list-style-type: none"> a) Check the set values of each working parameter one by one to verify whether the set values match the actual parameters of the motor. b) Starting fails. Check whether the current limiting multiple is set too low.
E04	Short-circuited inputs and outputs of soft starting	<ul style="list-style-type: none"> Is the thyristor not working properly? Soft starter output out of phase? Incorrect internal connection? Contact not working properly? 	<ul style="list-style-type: none"> a) Is the thyristor damaged? b) Check whether the input and output of the soft starter are missing Phase? c) Is the contactor abnormal?
	The motor connection wire is open	No load is connected, or the output line is disconnected	<ul style="list-style-type: none"> a) Check that the output end of the soft starter is correctly and reliably connected to the motor. b) Determine whether the motor is open inside. c) Check whether the thyristor is broken or damaged. d) Check whether the incoming line is out of phase.
E05	Motor running overcurrent	Overload	<ul style="list-style-type: none"> a) Check if the three-phase voltage is too low, resulting in insufficient motor output. b) Check whether there is overload operation of the load motor.
E06	Electron thermal overload phase	Persistent load overload	Check for overload operation (running current greater than 1 times the rated current of the motor)
E07	sequence error	The incoming line is reversed in phase sequence	Check if the incoming line phase sequence is A-B-C phase sequence.
E08	Phase current imbalance	The current difference between the two phases exceeds the set value	Use a current clamp meter to measure if the three phase currents are balanced.

Fault code	Fault name	Cause of the fault	what to do
E10	Parameter loss	EEPROM damage	If this occurs after re-powering, please contact the freelancer
E11	Wiring error	Incorrect wiring in the innertriangle mode	Look at the wiring and parameters
E12	Memory failure	Abnormal internal storage	a) Control power back on b) Please contact the manufacturer
E13	Current underload	The current current is below the over limit of underload	Check to see if the load is out of the power system
E14	Blocked rotation	The current current exceeds the stoppage current setting Check	Please check whether the motor is blocked
E15	Overvoltage fault	Voltage higher than set upper limit	a) Please check that the voltage upper limit is set properly b) Test whether the actual voltage exceeds the voltage upper limit
E16	Under voltage fault	Voltage below the set lower limit	a) Please check that the lower voltage limit is set properly b) Test whether the actual voltage is lower than the lower voltage limit
E19	Motor overtemperature fault	Motor temperature exceeds set value	Please check whether the motor temperature is too high
E20	External input failure	Digital input port settings	To see if there is an external failure

Fault detection time schedule (" note: state detection in a state with the corresponding √)

Fault code	Parameter name	Tart St Beone	Art Pre Delay	Start delay	Pre-start	JUMP phase	Slope starting stage	Full pressure or bypass stage	Ramp soft stop stage
1	Missing phase fault		√	√	√	√	√	√	√
2	Machine overheating failure		√	√	√	√	√	√	√
3	Starting timeout failure						√		
4	Thyristor/contactorfailure		√						
5	Run overcurrentfault							√	
6	Electronic thermal overload failure		√	√	√	√	√	√	√
7	Phase sequence error		√						
8	Phase currentimbalance failure	√	√	√	√	√	√	√	√
10	Parameterloss failure		√						
11	Wiring errors		√						
12	Memory failure	√							
13	Current underload fault							√	
14	Gridlock failure	√	√	√	√	√	√	√	√
15	Overvoltage failure		√	√	√	√	√	√	√
16	Undervoltage failure		√	√	√	√	√	√	√
19	Motor overtemperature failure	√	√	√	√	√	√	√	√
20	Externalinputfailure	√	√	√	√	√	√	√	√

8.2 failure record

The soft starter can record up to 20 recent failures for the user to analyze later, with 11.02 being the most recent failure.

8.3 Fault clearance

The fault has memory, so after troubleshooting, reset the soft starter by pressing STOP (long press for more than 4s), so that the soft starter can be restored to the starting ready state.

Chapter 9 Routine Maintenance

1. Dust: If there is too much dust, it will reduce the insulation level of the soft starter and may make the soft starter not work normally.

- (1) Gently brush with a clean, dry bristle brush to remove the dust.
- (2) Use compressed air to blow away the dust.

2. condensation: If condensation, will reduce the insulation level of the soft starter, may make the soft starter can not work properly.

- (1) Dry it with a hair dryer or electric oven.
- (2) Dehumidify the distribution room.

3. Regularly check whether the components are in good condition and can work normally.

4. Check the cooling channel of the soft starter to ensure that it is not blocked by stolen goods and dust.

Maintenance checks must be done after cutting off all power to the inlet side of the soft starter!



Chapter 10 Description of correspondence

XST260 motor soft starter, provides RS485 communication interface, using the international standard Modbus RTU communication protocol for master/slave communication.

Users can realize centralized control through PC/PLC, control host computer, etc., in order to adapt to specific application requirements.

10.1 Protocol Content

The Modbus serial communication protocol defines the frame content of asynchronous transmission in serial communication and the format of the slave answering frame. The frame content organized by the host includes: slave address, execution command, data and error check, etc. The response of slave machine also uses the same structure, the content includes: operation confirmation, return data and error check. If the slave machine makes an error when receiving the frame, or fails to perform the action required by the host, it will organize a fault frame as a response to the host.

10.2 Bus Structure

a) Interface mode

Rs485 hardware interface

b) Transmission mode

Asynchronous serial, half duplex transmission mode. Only one host and slave can send data and the other can receive data at the same time. In the process of serial asynchronous communication, data is sent frame by frame in the form of packets.

c) Topological structure

Single master multiple slave system. Slave addresses range from 1 to 32. Each slave address in the network is unique. This is the basis to ensure serial communication of ModBus.

10.3 Protocol Description

The XST260 Soft Starter communication protocol is an asynchronous serial master-slave ModBus communication protocol in which only one device in the network is capable of establishing the protocol. Other devices can only respond to the host's "query/command" by providing data, or make corresponding actions according to the host's "query/command". Host here refers to personal computer (PC), industrial control equipment or programmable logic controller (PLC), etc. Slave refers to the XST260 soft starter or other control device with the same communication protocol.

10.4 Communication Frame Structure

The ModBus protocol communication data format of the XST260 soft starter is RTU (Remote Terminal Unit) mode. In RTU mode, the format of each byte is as follows:

Encoding system: 8-bit binary

Hexadecimal 0 -- 9, A -- F,

Each 8-bit frame field, including two hexadecimal characters.

In this mode, new ones are always silenced with at least 3.5 bytes of transmission time, as a starting point. On networks where the transmission rate is calculated at baud, 3.5 bytes is easy to grasp. The following data fields are: slave address, operation command code, data, and CRC check word. Each field transmits bytes in hexadecimal 0... 9, A... F. Network devices always monitor the activity of the communication bus, even during silent intervals. When the first field (address information) is received, each network device acknowledges the byte. As the last byte is transmitted, a similar 3.5-byte transmission interval is used to indicate the end of the frame, after which the transmission of a new frame begins.

A frame's information must be transmitted in a continuous stream of data, and the receiving device will clear the incomplete information if there is more than an interval of 1.5 bytes before the end of the entire frame transmission.

10.5 Soft Starter status control word Description

The status control word reflects the status of the soft starter and is represented by one word.

The status word definition:

Function bit	Status	Instructions
Stop	0x0000	Normal stop
	0x0001	Emergency stop
	0x0002	Internal stop state (over-starting)
Run	0x0400	Enter the starting state (0x40)
	0x0411	Starting delay
	0x0420	Pre-starting stage
	0x0430	Pulse start phase-Jump
	0x0440	Slope process
	0x0441	Current limiting process
	0x0442	Full pressure (judge start complete)
	0x0450	Start completion
	0x0460	Soft stop
	0x0462	Free stop
Low speed	0x1000	The standby state is running at low speed
	0x1010	Low speed forward
	0x1020	Low speed reversal
Pump cleaning	0x2000	Pump clean standby
	0x2010	Pump clean control state together moving ready
	0x2012	Pump cleaning control state-ramp start
	0x2013	Pump cleaning control state-current limiting phase
	0x2014	Pump cleaning control state-full pressure stage
	0x2015	Pump cleaning control state moves together to complete
	0x2016	Pump clean control state-slope soft stop
	0x2017	Pump clean control state a ramp soft stop-brake
	0x2020	Pump cleaning control state-Low speed reversal
Malfunction	0x0800	(0x80)
	0x0801	Phase-out fault
	0x0802	Machine overheating fault
	0x0803	Starting timeout fault
	0x0804	The thyristor or contactor fails
	0x0805	Running overcurrent fault
	0x0806	Electronic thermal overload fault
	0x0807	Phase sequence error
	0x0808	Phase current imbalance fault
	0x080A	Parameter loss fault
	0x080B	Wiring error

	0x080D	Current underload fault
	0x080E	Gridlock fault
	0x080F	Overvoltage fault
	0x0810	Undervoltage fault
	0x0813	Motor overtemperature fault
	0x0814	External input fault

10.6 Address description

Register addresses start at 0, so if the starting address of the upper computer starts at 1, take care to uniformly add 1 to the register addresses. If the start address of the upper computer is 0, there is no need to add 1.

Parameter number	Parameter name	Parameter range	default value	Read and write letters	Parameter address
Parameter group 00: Factory parameters					
00.01	Soft start rated current	15-9999	180	R	100
00.02	Accuracy of current display	0: No decimal point 1: 1 Decimal places	1	R	101
00.03	Current correction factor K	50-255	120	R	102
00.05	4mA calibration	0-9999	872	R	104
00.06	20mA calibration	0-9999	1062	R	105
00.07	Calibration selection	0: Normal state 1: 4mA calibration 2: 20mA Demarcation	0	R	106
00.11	Manufacturer parameters	-	0	R	110
00.12	Manufacturer parameters	-	0	R	111
00.13	Voltage A correction factor K	500~1500	1000	R	112
00.14	Voltage B correction factor K	500~1500	1000	R	113
00.15	Voltage C correction factor K	500~1500	1000	R	114
00.16	Zero correction for voltage A	2000~2100	2050	R	115
00.17	Voltage B zero correction	2000~2100	2050	R	116
00.18	Voltage C zero correction	2000~2100	2050	R	117
00.19	Manufacturer parameters	-	0	R	118
00.20	Manufacturer parameters	-	0	R	119
Parameter Group 01: Control parameter parameter					
01.01	Motor current rating	1-9999	180	R/W	120
01.02	Main Feature selection	0: Regular starting 1: Low speed function 2: Pump cleaning function	0	R/W	121

Parameter number	Parameter name	Parameter range	default value	Read and write letters	Parameter address
01.03	Start-stop control options	Bit 0: Keyboard valid Bit 1: Terminal valid Bit 2: Communication is valid Bit 3: Fieldbus valid	7	R/W	122
01.04	Frequency setting	0: 50HZ 1: 60HZ	0	R/W	123
01.07	User Password entry	0-9999	0	W	126
01.11	Set the current display parameters	0: Average current 1: Average voltage 2: Reactive power 3: active power 4: apparent power 5: power factor	0	R/W	130
Parameter Group 02 Start stop parameter Settings					
02.01	Starting delay	0-250s	0	R/W	140
02.02	Prestart setting	0 Close Steps 1 Heat the motor 2 Static braking 3 Turn forward at low speed 4 Reverse at low speed	0	R/W	141
02.03	Pre-start time	0-250s	0	R/W	142
02.04	Pulse start setting	0. Off 1. Pulse start	0	R/W	143
02.05	Pulse time	(0 ~ 2000) ms	0	R/W	144
02.06	Pulse Force	(30 ~ 100)%Ue	30	R/W	145
02.07	Soft Rise mode	0. Voltage ramp 1 Current ramp 2. Pump starting control 3 Direct start	0	R/W	146
02.08	Rise time	5 ~ 120s	10	R/W	147
02.09	Starting voltage	30 ~ 100%Ue	30	R/W	148
02.10	current-limiting multiples	100 ~ 500%Ie (no limit current when=500)	350	R/W	149
02.11	Soft Stop Mode	0. Voltage ramp 1. Pump stop curve 2. Brake 3. Free stop	3	R/W	150

Parameter number	Parameter name	Parameter range	default value	Read and write letters	Parameter address
02.12	Descent time	5 ~ 120s	10	R/W	151
02.13	Termination	30 ~ 100%Ue	30	R/W	152
02.14	voltage secondary starting time	0-120s	0	R/W	153
02.15	Multiple of second start current	150 ~ 500%Ie	350	R/W	154
02.16	Start time limit	30 ~ 250s	60	R/W	155
02.17	Static braking effort	10-100%	10	R/W	156
02.18	Motor heating power	10-100%	10	R/W	157
02.19	Dynamic braking force	10-100%	30	R/W	158
Parameter Group 03 Digital portfunction					
03.01	D1 Feature selection	0: Clear the current fault 1: Emergency Stop control input 2: Motoroverheat protection input 3: motor speed detection 4: delay K1 input 5: Delay K2 input 6: Delay K3 input 7: External fault input 8: Low speed control (D3 does not have this feature)	0	R/W	160
03.02	D2 Feature Selection		0	R/W	161
03.03	D3 Feature Selection		0	R/W	162
03.04	K1 Feature selection	0: Output when bypassed 1: Output in case of failure	1	R/W	163
03.05	K2 Feature selection		0	R/W	164
03.06	K3 feature selection	2: Regular starting-Starting process output 3: Regular start-soft stop process output 4: Undefined 5: Regular Start-Run process output 6: delay relay output	0	R/W	165
03.07	K1-TIM	0-250S	0	R/W	166
03.08	K2-TIM	0-250s	0	R/W	167
03.09	K3-TIM	0-250s	0	R/W	168
Parameter Group 04: Analog quantity Settings					
04.01	Analog output benchmark	0: 4-20mA 1: 0-20mA 2: 0-10V 3: 0-5V	0	R/W	190
04.02	Outputvariable selection ea	0: Motor Current, A	0	R/W	191

Parameter number	Parameter name	Parameter range	default value	Read and write letters	Parameter address
		1:Main voltage,V 2:Grid frequency,Hz 3:Motor speed,R/s			
04.03	Output Logic Selection	0: Positive logic 1:negative logic	0	R/W	192
04.04	Variable maximum	0-9999	200	R/W	193
04.05	Variable minimum	0-9999	0	R/W	194
Parameter Group 05:Low speed function sett					
05.01	Positive rotation speed	0:15% speed 1:7% speed	0	R/W	210
05.02	Positive rotation strength	10-100%	30	R/W	211
05.03	Forward tum speed	0:20% speed 1:10% speed	0	R/W	212
05.04	Reversal strength	10-100%	30	R/W	213
Parameter Group 06: Pump cleaning function setting					
06.01	Pump clean positive starting mode	0.Voltage ramp 1.Current ramp 2.Pump starting control	2	R/W	230
06.02	Pump cleaning is turned to stop mode	0.Voltage ramp ₁ 1.Pump stop curve 2.Power brake 3 Free stop	1	R/W	231
06.03	Pump clean reversal speed	0:20% speed 1:10% speed	0	R/W	232
06.04	Pump cleaning reversal strength	10-100%	50	R/W	233
06.05	Pump clean brake strength	10-100%	30	R/W	234
06.06	Self-cleaning positive turn time	0-60s	10	R/W	235
06.07	Automatic cleaning reversal time	0-60s	10	R/W	236
Parameter Group 08: Communication function Settings					
08.01	Rs485 mailing address	1-255	1	R/W	270
08.02	Rs485 baud rate	0: 2400 1: 4800 2: 9600 3: 19200	2	R/W	271
08.03	Expansion card selectio	0: No expansion card 1: PROFIBUS expansion ca	0	R/W	272
08.04	PROFIBUS Address	1-125	1	R/W	273
08.05	PROFIBUS Baud rate	0: 9.6 kbps 1: 19.2kbps	0	R/W	274

Parameter number	Parameter name	Parameter range	default value	Read and write letters	Parameter address
		2: 45.45kbps 3: 93.75kbps 4: 187.5kbps 5: 500kbps 6: 1.5Mbps 7: 3Mbps 8: 6Mbps 9: 12Mbps			
Parameter group 09; Protection Set					
09.01	Phase sequence detection	0:Off 1:0n	1	R/W	290
09.02	Wiring mode choice	0: Outside 1: Internal connection (detection connection) 2. internal connection jdoes not detect wiring)	0	R/W	291
09.04	Thyristor and contactor check	0:Off 1:0n	1	R/W	293
09.05	Electronic thermal overload detection protection	0:10A 1:10 2:15 3:20 4:25 5:30 6: off	4	R/W	294
09.06	Run the overcurrent protection Settings	100%-150%(cancel current limit at =100)	120	R/W	295
09.07	Overcurrent protection delays the output time	0-60s	5	R/W	296
09.08	Running current underload setting	0-100%	50	R/W	297
09.09	Current underload delay output time current imbalance	0-60s	5	R/W	298
09.10	Current imbalance protection settings	10-100%	20	R/W	299
09.11	Imbalancefault delay output time	0-60s	5	R/W	300
09.12	Main power overvoltage protection Settings	100-2000V	418	R/W	301
09.13	Overvoltage failure delays the output time	0-60s	5	R/W	302
09.14	Main undervoltage protection Settings	100-2000V	342	R/W	303
09.15	Undervoltage fault delay output	0-60s	5	R/W	304

Parameter number	Parameter name	Parameter range	Default values	Read and write properties	Parameter address
	Time				
09.16	Motor jam fail-safe Settings	100%-600%	200	R/W	305
09.17	Gridlock failure delay output time	0-60s	5	R/W	306
Parameter Group11: Historical fault records					
11.01	Number of failures		0	R	340
11.02	Historical Breakdown1		0	R	341
11.03	Historical Breakdown2		0	R	342
11.04	Historical Breakdown3		0	R	343
11.05	Historical Breakdown4		0	R	344
11.06	Historical Breakdown5		0	R	345
11.07	Historical Breakdown6		0	R	346
11.08	Historical Breakdown7		0	R	347
11.09	Historical Breakdown8		0	R	348
11.10	Historical Breakdown9		0	R	349
11.11	Historical Breakdown10		0	R	350
11.12	Historical Breakdown11		0	R	351
11.13	Historical Breakdown12		0	R	352
11.14	Historical Breakdown13		0	R	353
11.15	Historical Breakdown14		0	R	354
11.16	Historical Breakdown15		0	R	355
11.17	Historical Breakdown16		0	R	356
11.18	Historical Breakdown17		0	R	357
11.19	Historical Breakdown18		0	R	358
11.20	Historical Breakdown19		0	R	359
11.21	Historical Breakdown20		0	R	360
Parameter Group12: Historical fault records					
12.01	Software version number		0	R	380
12.02	Manufacturer parameters		0	R	381
12.03	Manufacturer parameters		0	R	382
12.04	Manufacturer parameters		0	R	383
12.05	Manufacturer parameters		0	R	384
Parameter Group13: Historical fault records					
13.01	Customize Parameters 1	121~306	280	w	400
13.02	Customize Parameters 2	121~306	280	w	401
13.03	Customize Parameters 3	121~306	280	w	402
13.04	Customize Parameters 4	121~306	280	w	403
13.05	Customize Parameters 5	121~306	280	w	404

Parameter number	Parameter name	Parameter range	default value	Read and write properties	Parameter address
13.06	Custom parameters 6	121~306	280	w	405
13.07	Custom parameters 7	121~306	280	w	406
13.08	Custom parameters 8	121~306	280	w	407
13.09	Custom parameters 9	121~306	280	w	408
13.10	Custom parameters 10	121~306	280	w	409
13.11	Custom parameters 11	120~399	120	R	410
13.12	Custom parameters 12	120~399	120	R	411
13.13	Custom parameters 13	120~399	120	R	412
13.14	Custom parameters 14	120~399	120	R	413
13.15	Custom parameters 15	120~399	120	R	414
13.16	Custom parameters 16	120~399	120	R	415
13.17	Custom parameters 17	120~399	120	R	416
13.18	Custom parameters 18	120~399	120	R	417
13.19	Custom parameters 19	120~399	120	R	418
13.20	Custom parameters 20	120~399	120	R	419

Status data

Parameter Names	Parameter Description	Read And Write Properties	Parameter Address
A-phase current		R	0
B-phase current		R	1
C-phase current		R	2
Average current		R	3
A-phase voltage		R	4
B-phase voltage		R	5
C-phase voltage		R	6
Average voltage		R	7
Current grid frequency		R	8
Motor speed		R	9
System status word	Refer to Section 10.5	R	18
Digit input I/O port status	Bit 0: RUN status Bit 1: STOP status Bit 2: D1 status Bit 3: D2 status Bit 4: D3 status	R	23
Digital output I/O port status	Bit 0: K1 status Bit 1: K2 status Bit 2: K3 status	R	24
Analog output value	The actual value of the simulated output	R	25
Regular starting delay time		R	26

Control command data

Name	Variable type	Register number	Data	R/w Characteristics
Stop	06	67	2	W
Run	06	67	1	W
Reset	06	67	4	W

Note: If the control command is invalid, check the 01.03 parameter to see whether the communication control function is enabled. Check whether terminal V+ and STP are short-circuited.

10.7 Function Code Overview

(1) Function code "03" (read multiple hold registers)

Host send data	Number of bytes	Routines	Return data from the machine	Number of bytes	Routines
Slave address	1	01	Slave address	1	01
Function code	1	03	Function code	1	03
Starting address	2	006D	Return bytes	1	02
Data length	2	0001	Data 1	2	4100
CRC	2	15D7	CRC	2	8814

Note: A maximum of 50 registers can be read each time.

(2) Function code "04" (read multiple input registers)

Send Data	Number of bytes	Routines	Return data from the machine	Number of bytes	Routines
Slave address	1	01	Slave address	1	01
Function code	1	04	Function code	1	04
Starting address	2	006D	Return bytes	1	02
Data length	2	0001	Data 1	2	4100
CRC	2	A017	CRC	2	78DD

Note: A maximum of 50 registers can be read each time.

(3) Function code "04" (read multiple input registers)

Send Data	Number of bytes	Routines	Return data from the machine	Number of bytes	Routines
Slave address	1	01	Slave address	1	01
Function code	1	06	Function code	1	06
Starting address	2	0001	Return bytes	2	0001
Data length	2	001E	Data 1	2	001E
CRC	2	5802	CRC	2	5802

Note: When using command 06 to modify parameters of soft starter, the soft starter must be in the stop or edit state. Other states can not be modified successfully. When modifying a parameter, the modified parameter must be within the range specified in the technical manual. If it is beyond the range, the modification can not be successful.

10.8 Communication interval

(1) "03", "04" command use time interval:

Time interval = $(17 + \text{number of registers} * 2) * 8 / \text{baud rate} * 1000 * 1.2\text{ms}$;

For example: 9600 baud rate, read 1 register value,

Time interval = $(17 + 1 * 2) * 8 / 9600 * 1000 * 1.2 = 19\text{ms}$.

(2) Time interval for using command "06" :

Time interval = $20 * 8 / \text{baud rate} * 1000 * 1.2\text{ms}$;

Example: 9600 baud rate, time interval = $20 * 8 / 9600 * 1000 * 1.2 = 20\text{ms}$.

10.9 Precautions

For multi-machine communication, the address of the XST260 soft starter is unique, that is, the address of any two soft starters cannot be the same (set by parameter 08.01).

The baud rate of the XST260 soft starter must be the same as the baud rate of the controller (set via parameter 08.02). When multiple XST260 soft starters communicate, a resistance of 120 ohms should be connected to both ends of AB on the last platform.

10.10 Analysis Of Communication Fault Codes

- (1) Write address error: device address +0x86+0x02+CRC
 - ① The address exceeds 339
 - ② It is not a specified writable register
 - ③ It is not in the stopped state
 - ④ Communication control start/stop is not enabled when writing control command
- (2) Write data error: device address +0x86+0x03+CRC
 - ① Write data beyond the specified range in the specified writable register
 - ② The command data is incorrect when the start command is sent
- (3) Read address error: device address +0x83+0x02+CRC
 - ① The read address exceeds 386
- (4) Function code error: device address +(0x80+ error function code)+0x01+CRC
 - ① The function code is not specified by the soft starter

Attached Table I: Soft hoisting standard wiring specifications, models and accessories selection (380V as an example)

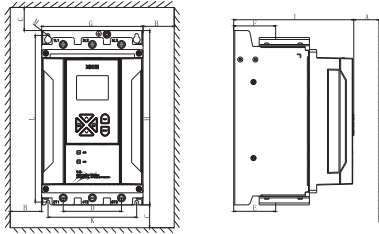
Adaptive Motor (Kw)	Soft Starter Type Number	Rated Current (A)	Rated Current Of Motor (external)	Motor Current Rating (built-in)	Primary Wire Specification (copper Wire)
7.5	XST260-0018-03	18	18	32	4mm ²
11	XST260-0024-03	24	24	42	6mm ²
15	XST260-0030-03	30	30	52	10mm ²
18.5	XST260-0039-03	39	39	68	10mm ²
22	XST260-0045-03	45	45	78	16mm ²
30	XST260-0060-03	60	60	104	25mm ²
37	XST260-0076-03	76	76	132	35mm ²
45	XST260-0090-03	90	90	156	35mm ²
55	XST260-0110-03	110	110	190	35mm ²
75	XST260-0150-03	150	150	260	30×4copper bars
90	XST260-0180-03	180	180	312	30×4copper bars
110	XST260-0218-03	218	218	378	30×4copper bars
132	XST260-0260-03	260	260	450	30×4copper bars
160	XST260-0320-03	320	320	554	30×4copper bars
185	XST260-0370-03	370	370	640	40×5copper bars
220	XST260-0440-03	440	440	762	40×5copper bars
250	XST260-0500-03	500	500	866	40×5copper bars
280	XST260-0560-03	560	560	969	40×5copper bars
315	XST260-0630-03	630	630	1090	50×8copper bars
400	XST260-0780-03	780	780	1350	50×8copper bars

The standard connection refers to the triangular or star connection of the motor windings, and the thyristor is connected between the power supply and the motor. Internal triangle connection refers to the motor winding triangle a thyristor connected with the winding in series. The main advantage of the inner triangle control is that the soft starter can be derated. The current flowing through the soft starter and the motor in the inner triangle connection is $1/\sqrt{3}$ of the line current. The above table adopts the soft starter with the allowance, which is selected according to the line current $/1.5I_e$. In the selection process, users can further derate the soft starter according to the actual situation.

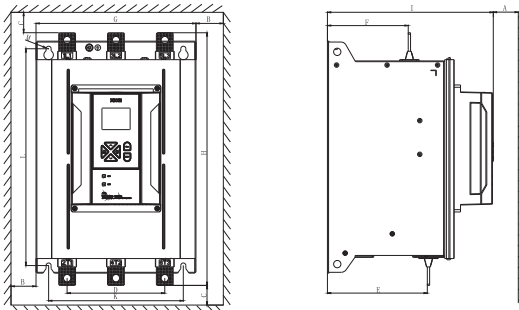
Annex II: Outline and opening Size of soft starter
(380V as an example, unit: mm)

Adaptive Motor (KW)	Model Number	G	H	I	K	L	M	D	E	F	A/B/C	Gross Weight (Kg)
7.5~30	XST260-0018~0060-03	160	275	189	140	263	5.5	92	66	66	50	5.8
37~55	XST260-0076~0110-03	160	275	189	140	263	5.5	92	66	66	50	6.3
75~160	XST260-0150~0320-03	285	450	295	240	386	9	174	178	144	50	25
185~280	XST260-0370~0560-03	320	520	320	250	446	9	197	189	146	50	35.6
315~400	XST260-0630~0780-03	490	744	344	400	620	11	306	220	162	50	84

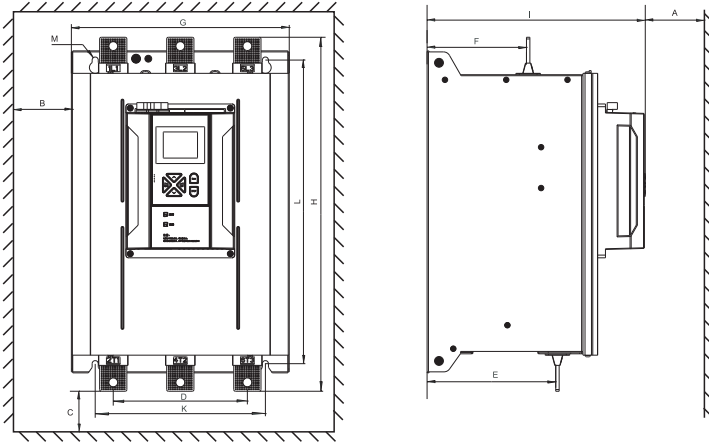
Size Remarks: Width (G) x height (H) x thickness (I)



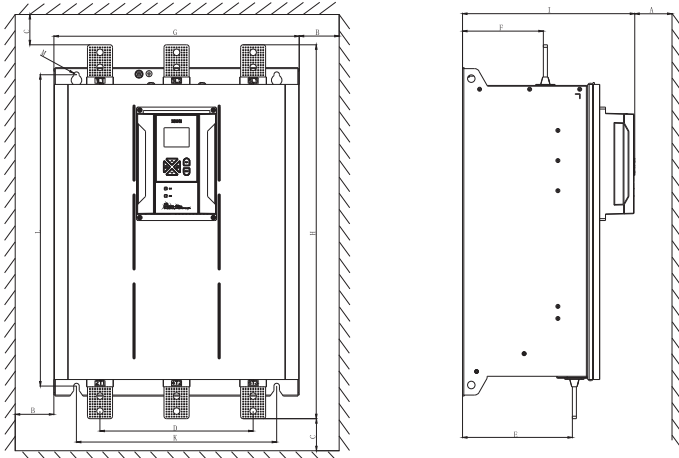
Dimensions up to 55KW



75KW-160KW Overall dimension



185KW-280KW Overall dimension



315KW-400KW Overall dimension



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