Built in bypass type intelligent motor soft starter/cabinet

Operating Instructions

Chapter 1 Cautionary Statement

This symbol is used in this manual to remind readers to attach great importance to special precautions concerning equipment installation and operation.

The caution statement cannot cover every possible cause of equipment damage , but it can emphasize common causes of damage. The installer must read and understand all the instructions in this manual before installing, operating or maintaining the equipment , and must follow effective electrical installation practices (including wearing appropriate personal protective equipment), such as using a method different from that described in this manual To operate the equipment, advice must be sought in advance.

pay attention to

The user cannot repair the soft start. The soft start can only be serviced by authorized service personnel. Unauthorized modification of the soft starter will invalidate the product warranty.

1.1 Risk of electric shock

There is voltage at the following positions, which may cause serious electric shock accidents and can be fatal:

- AC power cord and connection
- Output wires and connections
- Many components of starters and external optional equipment

Before opening the starter cover or performing any maintenance work, the AC power supply must be isolated from the starter with an approved isolating device.

Warning-risk of electric shock

As long as the supply voltage is connected (including when the starter is tripped or waiting for a command), the bus and the heat sink must be considered live.

Short circuit

Cannot prevent short circuit. After a severe overload or short circuit occurs, an authorized service agent should fully test the soft start working conditions.

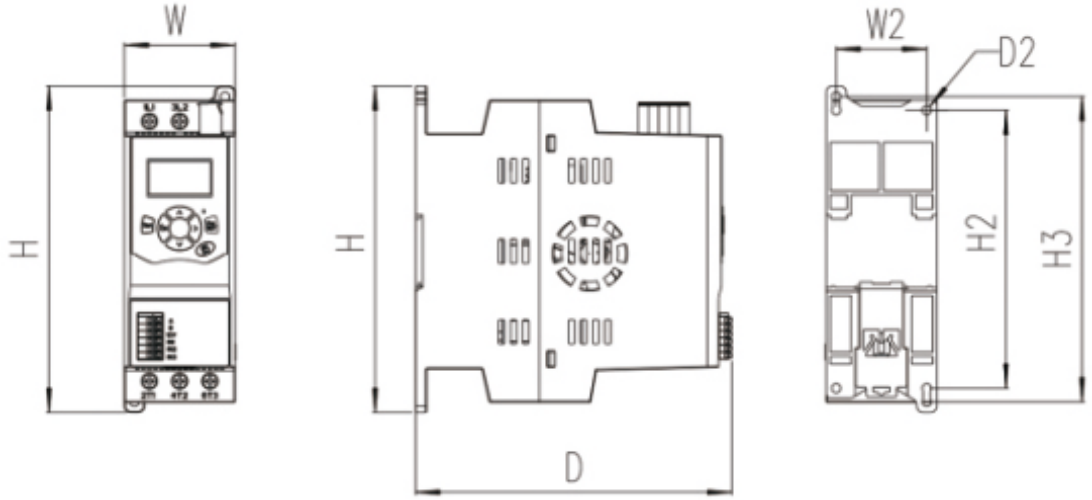
Grounding and branch circuit protection

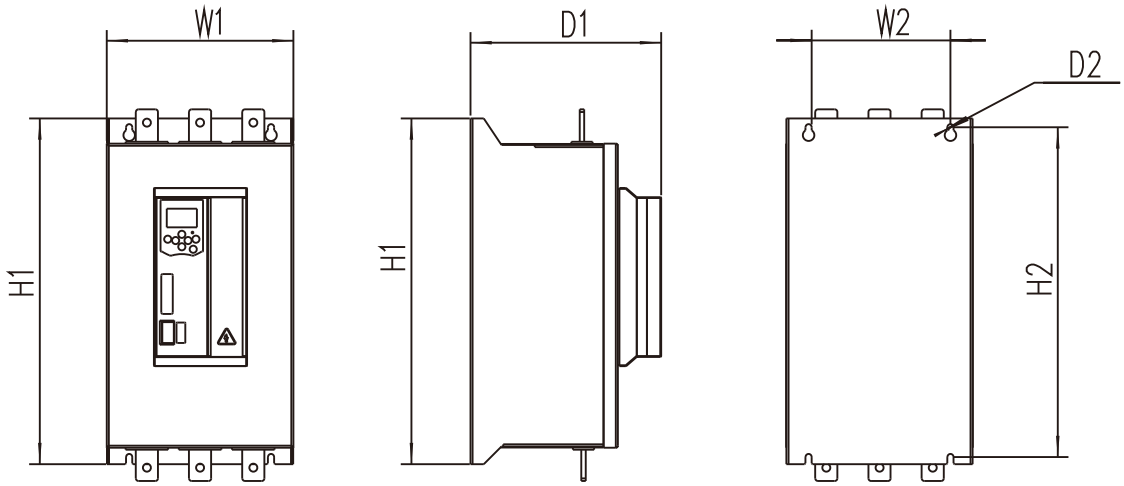
The user or installer must provide proper grounding and branch circuit protection in accordance with the requirements of local electrical safety regulations.

For safety

- The stop function of the soft start does not isolate the dangerous voltage at the output of the starter. Before touching the electrical connection, the soft starter must be disconnected with an approved electrical isolation device.
- The soft start protection function is only applicable to motor protection. The user must ensure the safety of machine operators.
- In some installation situations, accidental starting of the machine may endanger the safety of machine operators and may damage the machine. In such cases, it is recommended that you install an isolating switch and circuit breaker (such as a power contractor) that can be controlled by an external safety system (such as emergency stop and fault detection period) on the soft starter power supply.
- The soft starter has a built-in protection mechanism, and the starter trips when a fault occurs to stop the motor. Voltage fluctuations, power outages and motor jams can also cause the motor to trip.
- After eliminating the cause of the shutdown, the motor may restart, which may endanger the safety of some machines or equipment. In this case, proper configuration must be made to prevent the motor from restarting after an unexpected shutdown.
- The soft start is a well-designed component that can be integrated into the electrical system; the system designer/user must ensure that the electrical system is safe and meets the requirements of the corresponding local safety standards.
- If you do not comply with the above recommendations, our company will not bear any responsibility for any damage caused thereby.

1.2 Appearance and installation dimensions of the built-in bypass intelligent motor soft starter:





Specification model	Dimensions (mm)			Installation size (mm)			
	W1	H1	D	W2	H2	H3	D2
0.37-15KW	55	162	157	45	138	151.5	M4
18-37KW	105	250	160	80	236		M6
45-75KW	136	300	180	95	281		M6
90-115KW	210.5	390	215	156.5	372		M6

Chapter 2 Introduction

This soft starter is an advanced digital soft start solution suitable for motors with power ranging from 0.37kW to 115k. Provides a complete set of comprehensive motor and system protection functions, ensuring reliable performance even in the harshest installation environments.

2.1 Function list

Optional soft start curve
- Voltage ramp start
- Torque start

Optional soft stop curve
- Free parking
- Timed soft parking

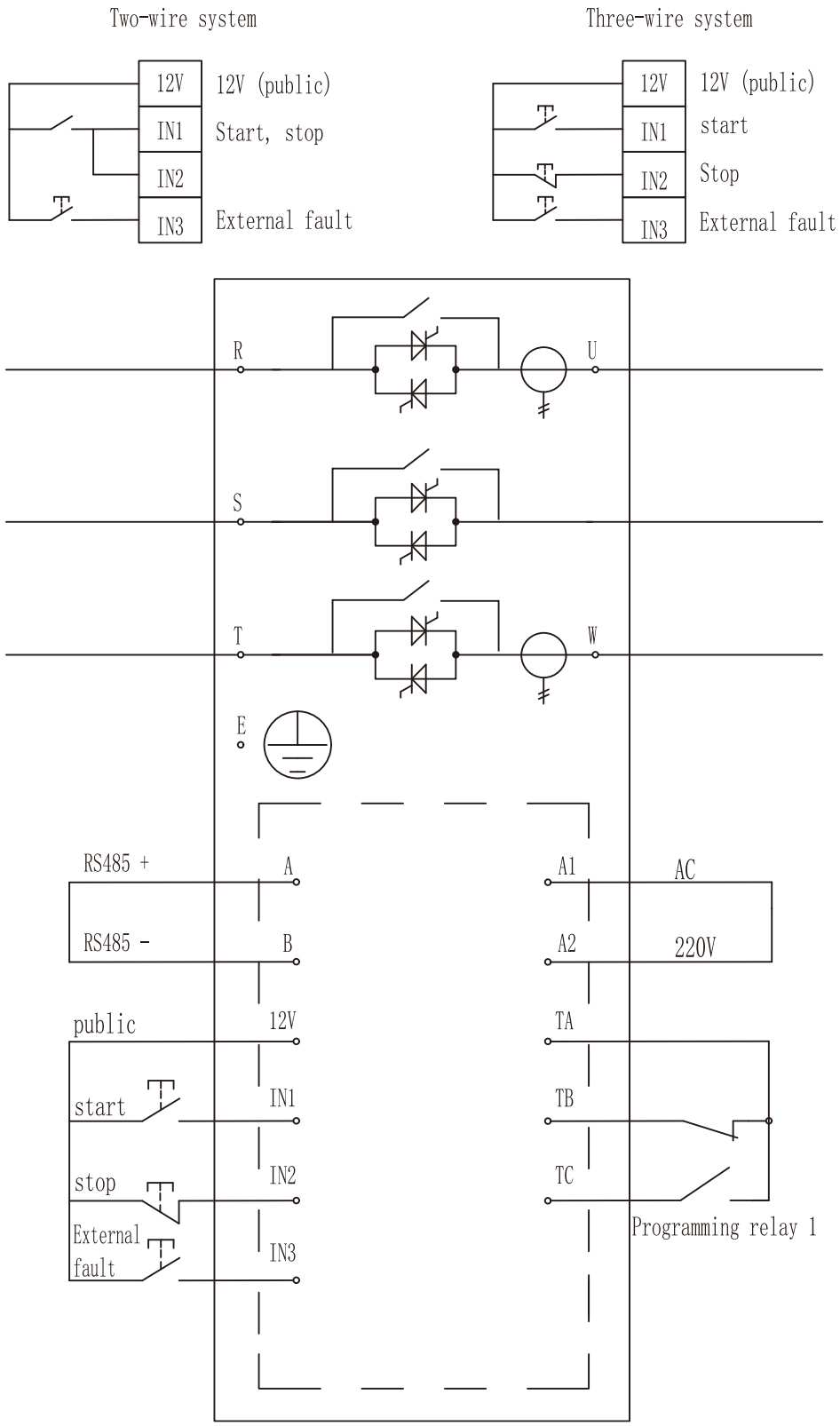
Expanded input and output options
- Remote control input
- Relay output
- RS485 communication output

Customizable protection
- Input phase loss
- Output phase loss
- Running overload
- Starting overcurrent
- Running overcurrent
- Underload

Models that meet all connectivity requirements
- 0.37-115KW (rated)
- 220VAC-380VAC
- Star shaped connection or inner triangle connection

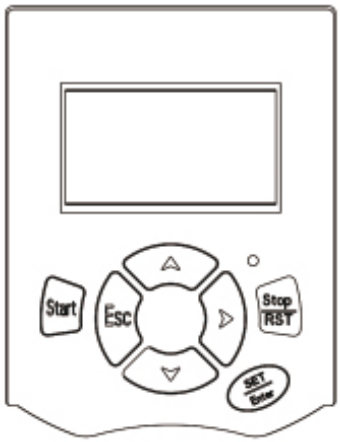
Easy to read display with comprehensive feedback
- Removable operation panel
- Built-in Chinese + English display

Chapter 2 Instructions for External Terminals of Built in Bypass Intelligent Motor Soft Start



Terminal type		Terminal No.	Terminal name	Instruction
Main circuit		R,S,T	Power Input	Soft start three-phase AC power input
		U,V,W	Soft Start Output	Connect three-phase asynchronous motor
Control loop	Communication	A	RS485+	For ModBusRTU communication
		B	RS485-	
	Digital input	12V	Public	12V common
		IN1	start	Short connection with common terminal (12V) Startable soft start
		IN2	Stop	Disconnect from the common terminal (12V) to stop the start soft start
		IN3	External Fault	Short-circuit with the common terminal (12V) , soft start and shutdown
	Soft start power supply	A1	AC200V	AC200V output
		A2		
	Programming Relay 1	TA	Programming relay common	Programmable output, available fromChoose from the following functions: 0. No action 1. Power-on action 2. Soft start action 3. Bypass action 4. Soft stop action 5. Runtime actions 6. Standby action 7. Failure action
		TB	Programming relay normally closed	
		TC	Programming relay normally open	

Chapter 3 Operation Panel



key	function
Start	starter
STOP/RST	1. In case of fault tripping, reset 2. Stop the motor while starting it
ESC	Exit menu/submenu
△	1. In the starting state, the up key will call out the display interface for the current values of each phase 2. Move option up in menu state
▽	1. Display interface for each phase current value, move down key to turn off each phase current display 2. Move option up in menu state
≫	1. In menu mode, the displacement key moves the menudown by 10 items 2. In the submenu state, the displacement key moves themenu selection bit to the right in sequence 3. Long press and hold the displacement in standby mode to call out the factory reset and clear the fault record interface
SET/Enter	1. Call out menu during standby 2. Enter the next level menu within the main menu 3. Confirm adjustments
Fault light	1. Lights up when starting/running the motor 2. Flashing during malfunction

Starter status LED

name	Light	flicker
run	The motor is in a starting, running, soft stop, and DC braking state.	
tripping operation		The starter is in a warning/ tripping state

●The local LED light only works for keyboard control mode. When the light is on, it indicates that the panel can start and stop. When the light is off, the meterThe display panel cannot be started or stopped.

Chapter 4 Basic Parameters

function			
number	function name	set range	Modbus address
F00	Soft start rated current	Motor rated current	0
	Description: The rated working current of the soft starter should not exceed the working current of the matching motor [F00]		
F01	Motor rated current	Motor rated current	2
	Description: The rated working current of the motor in use should be consistent with the current displayed in the bottom right corner of the screen		
F02	control mode	0: Prohibit start stop 1: Individual keyboard control 2: External control is individually controlled 3: Keyboard+external control 4: Separate communication control 5: Keyboard+Communication 6: External control+ communication 7: Keyboard+external control +communication	3
	Description: This determines which methods or combinations of methods can control soft start. A. Keyboard: refers to soft key control for soft start B. External control: refers to the 12V external control terminal controlled through soft start C. Communication: refers to the control of 485 communication terminals through soft start		
F03	Starting method 000000	0: Voltage ramp start 1: Limited current starting	4
	Description: When this option is selected, the soft starter will quickly increase voltage from [35%] to [rated voltage] * [F05], and then gradually increase voltage. Within [F06] time, it will increase to [rated voltage]. If the startup time exceeds [F06]+5 seconds and the startup is still not completed, a startup timeout will be reported		
F04	Starting current limiting percentage	50%~600% 50%~600%	5
	Description: The soft starter will gradually increase voltage starting from [rated voltage] * [F05], as long as the current does not exceed [F01] * [F04], will be continuously boosted to [rated voltage]		
F05	Starting voltage percentage	30%~80%	6
	Description: The [F03-1] and [F03-2] soft starters will gradually increase voltage starting from [rated voltage] * [F05]		
F06	START time	1s~120s	7
	Description: The soft starter completes the step up from [rated voltage] * [F05] to [rated voltage] within [F06] time		
F07	Soft stop time	0s~60s	8
	Soft start voltage drops from [rated voltage] to [0] within [F07] time		

number	function name	set range	Modbus address
F08	Programmable relay 1	0: No action 1: Power on action 2: Soft start middle action 3: Bypass action 4: Soft stop action 5: Running actions 6: Standby action 7: Fault action	9
	Description: Under what circumstances can programmable relays switch		
F09	Relay 1 delay	0~600s	10
	Description: Programmable relays complete switching after triggering the switching condition and passing through【F09】time		
F10	mail address	1~127	11
	Description: When using 485 communication control, the local address.		
F11	Baud rate	0:2400 1:4800 2:9600 3:19200	12
	Description: The frequency of communication when using communication control		
F12	Operating overload level	1~30	13
	Description: The curve number of the relationship between the magnitude of overload current and the time to trigger overload tripping and shutdown, as shown in Figure 1		
F13	Starting overcurrent multiple	50%-600%	14
	Description: During the soft start process, if the actual current exceeds [F01] * [F13], the timer will start. If the continuous duration exceeds [F14], the soft starter will trip and report [starting overcurrent]		
F14	Start overcurrent protection time	0s-120s	15
	Description: During the soft start process, if the actual current exceeds [F01] * [F13], the timer will start. If the continuous duration exceeds [F14], the soft starter will trip and report [starting overcurrent]		
F15	Operating overcurrent multiple	50%-600%	16
	Description: During operation, if the actual current exceeds [F01] * [F15], timing will begin. If it continues to exceed [F16], the soft starter will trip and report [running overcurrent]		
F16	Running overcurrent protection time	0s-6000s	17
	Description: During operation, if the actual current exceeds [F01] * [F15], timing will begin. If it continues to exceed [F16], the soft starter will trip and report [running overcurrent]		
F17	Three-phase unbalance	20%~100%	18
	Description: Timing starts when [three-phase maximum value]/[three-phase mean value] -1>[F17], lasting for more than [F18], soft starter tripped and reported [three-phase imbalance]		
F18	Three phase imbalance protection time	0s~120s	19
	Description: When the ratio between any two phases in the three-phase current is lower than [F17], timing begins, lasting for more than [F18], soft starter tripped and reported [three-phase imbalance]		

number	function name	set range	Modbus address
F19	Underload protection multiple	10%~100%	20
	Description: When the ratio between any two phases in the three-phase current is lower than [F17], timing begins, lasting for more than [F18], soft starter tripped and reported [three-phase imbalance]		
F20	Underload protection time	1s~300s	21
	Description: When the actual current is lower than [F01] * [F19] after starting , timing starts. If the duration exceeds [F20], the soft starter trips and reports [motor under load]		
F21	A-phase current calibration value	10%~1000%	22
	Description: [Display Current] will be calibrated to [Original Display Current] * [F21]		
F22	B-phase current calibration value	10%~1000%	23
	Description: [Display Current] will be calibrated to [Original Display Current] * [F21]		
F23	C-phase current calibration value	10%~1000%	24
	Description: [Display Current] will be calibrated to [Original Display Current] * [F21]		
F24	Operation overload protection	0: Trip stop 1: Ignored	25
	Description: Is the trip triggered when the operating overload condition is met		
F25	Starting overcurrent protection	0: Trip stop 1: Ignored	26
	Description: Is the trip triggered when the [start overcurrent] condition is met		
F26	Operation overcurrent protection	0: Trip stop 1: Ignored	27
	Description: Is the trip triggered when the operating overcurrent condition is met		
F27	Three-phase imbalance protection	0: Trip stop 1: Ignored	28
	Description: Is the trip triggered when the three-phase imbalance condition is met		
F28	Underload protection	0: Trip stop 1: Ignored	29
	Description: Is the trip triggered when the motor under load condition is met		
F29	Output phase loss protection	0: Trip stop 1: Ignored	30
	Description: Is the trip triggered when the [output phase loss] condition is met		
F30	Thyristor breakdown protection	0: Trip stop 1: Ignored	31
	Description: Is the trip triggered when the conditions for the thyristor are met		
F31	Soft start operation language	0: English 1: Chinese	32
	Description: Which language is selected as the operating language		
F32	Selection of water pump matching equipment	0: None 1: Floating ball 2: Electric contact pressure gauge 3: Water supply level relay 4: Drainage liquid level relay	33
	Description: See Figure 2		
F33	Running a Simulation		–
	Description: When starting the simulation program, be sure to disconnect the main circuit		
F34	Dual display mode	0: Local control valid 1: Local control invalid	
	Description: Is the operation of soft lifting the display screen on the body effective when inserting an additional display screen		

number	function name	set range	Modbus address
F35	Parameter lock password	0~65535	35
F36	Accumulated running time	0-65535h	36
	Description: How long has the software started running cumulatively		
F37	Accumulated number of starts	0-65535	37
	Description: How many times has the soft start been run cumulatively		
F38	Password	0-65535	–
F39	Main control software version		99
	Description: Display the version of the main control software		

state			
number	function name	set range	Modbus address
1	Soft start state	0: standby 1: Soft rise 2: Running 3: Soft stop 5: Fault	100
2	Current Fault	0: No malfunction 1: Input phase loss 2: Output phase loss 3: Running overload 4: Running overcurrent 5: Starting overcurrent 6: Soft start under load 7: Current imbalance 8: External faults 9: Thyristor breakdown 10: Start timeout 11: Internal fault 12: Unknown fault	101
3	Output current		102
4	spare		103
5	A-phase current		104
6	B-phase current		105
7	C-phase current		106
8	Start completion percentage		107
9	Three-phase imbalance		108
10	Power frequency		109
11	Power phase sequence		110

Operate			
number	Operation Name	types of	Modbus address
1	Start stop command	0x0001 Start 0x0002 reserved 0x0003 Stop 0x0004 Fault reset	406

Selection of supporting functions for water pumps			
①	0: None	No: Standard soft start function.	As shown in Figure 1
②	1: Floating ball	Float: IN1, close to start, open to stop. IN2 has no function.	As shown in Figure 2
③	2: Electric contact pressure gauge	Electric contact pressure gauge: IN1 starts when closed , IN2 stops when closed.	As shown in Figure 3
④	3: Water supply level relay	Water supply level relay: IN1 and IN2 both open and start, IN1 and IN2 both close and stop.	As shown in Figure 4
⑤	4: Drainage liquid level relay	Drain liquid level relay: IN1 and IN2 both open and stop , IN1 and IN2 both close and start.	As shown in Figure 5

Note: The water supply function starts and stops controlled by IN3, the standard soft start IN3 is an external fault, and the water supply type is used to control the start and stop. IN3 is the starting end, and the above operation can be performed only when it is closed, and it stops when it is open.

0: None

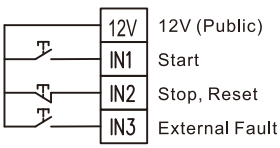
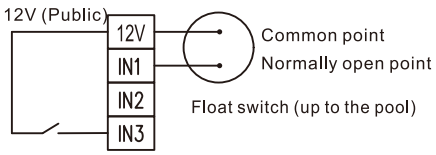


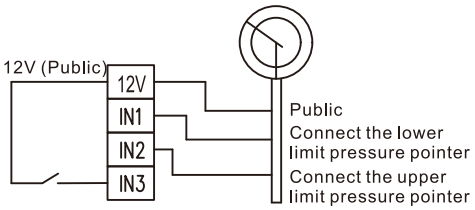
figure 1

1: Float



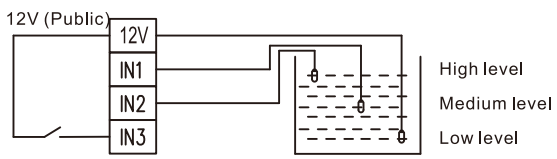
Soft start, stop **figure 2**

2: Electric contact pressure gauge



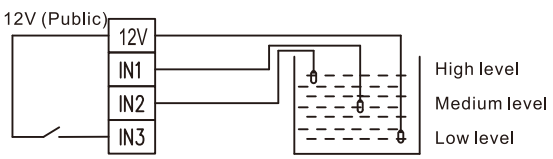
Soft start, stop **figure 3**

3: Water supply level relay



Soft start, stop

4: Drain level relay



Soft start, stop

Chapter 5 Troubleshooting

5.1 Protection response

When a protection condition is detected, the soft start writes the protection condition into the program, which may trip or cause Issue a warning. The soft start response depends on the protection level.

Users cannot adjust some of the protection responses. These trips are usually caused by external events (such as phase loss) It may also be caused by internal faults in the soft start. These trips have no relevant parameters and cannot be set as warnings orIgnored.

If The Soft Start Trips, You Need To Identify And Clear The Conditions That Triggered The Trip, Reset The Soft Start, And Then Proceed Restart. To Reset The Starter, Press The (stop/reset) Button On The Control Panel.

5.2 Trip messages

The following table lists the protection mechanisms and possible tripping reasons for soft start. Some settings can be adjusted with protection level , while others are built-in system protection and cannot be set or adjusted.

Serial Number	Fault name	Possible reasons	Suggested handling method	notes
01	Input phase loss	1. Send a start command , and one or more phases of the soft start are not powered on. 2. The motherboard of the circuit board is faulty.	1. Check if there is power in the main circuit 2. Check the input circuit thyristor for open circuits, pulse signal lines, and poor contact. 3. Seek help from the manufacturer.	This trip is not adjustable
02	Output phase loss	1. Check if the thyristor is short circuited. 2. There is one or more phases of open circuit in the motor wire. 3. The motherboard of the circuit board is faulty.	1. Check if the thyristor is short circuited. 2. Check if the motor wires are open. 3. Seek help from the manufacturer.	Related parameters : F29
03	Running overload	1. The load is too heavy. 2. Improper parameter settings.	1. Replace with a higher power soft start. 2. Adjust parameters.	Related parameters : F12, F24

Serial Number	Fault name	Possible reasons	Suggested handling method	notes
04	Underload	1. The load is too small. 2. Improper parameter settings.	1. Adjust parameters.	Related parameters: F19,F20,F28
05	Running overcurrent	1. The load is too heavy. 2. Improper parameter settings.	1. Replace with a higherpower soft start. 2. Adjust parameters.	Related parameters: F15,F16,F26
06	Starting overcurrent	1. The load is too heavy. 2. Improper parameter settings.	1. Replace with a higherpower soft start. 2. Adjust parameters.	Related parameters: F13,F14,F25
07	External faults	1. External fault terminalhas input.	1. Check if there is input from the externalterminals.	Related parameters : None
08	Thyristor breakdown	1. The thyristor has broken down. 2. Circuit board malfunction.	1. Check if the thyristor is broken down. 2. Seek help from the manufacturer.	Related parameters : None

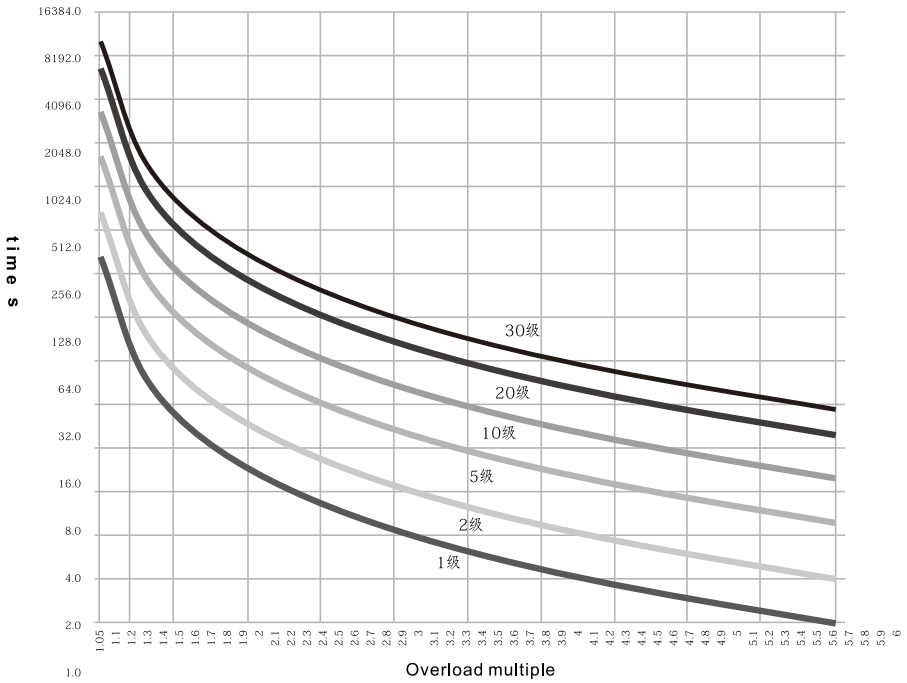
Chapter 7 Function Description

Overload protection

Overload protection adopts inverse time limit control

$$\text{Protection time: } t=\frac{35*Tp}{(I/Ip)^2-1}$$

Among them: t represents the action time, Tp represents the protection level, I represents the operating current, and Ip represents the rated current of the motor
Characteristic curve of motor overload protection: Figure 11-1



Motor overload protection characteristics

overload multiple / overload level	1.05Ie	1.2Ie	1.5Ie	2Ie	3Ie	4Ie	5Ie	6Ie
1	∞	79.5s	28s	11.7s	4.4s	2.3s	1.5s	1s
2	∞	159s	56s	23.3s	8.8s	4.7s	2.9s	2s
5	∞	398s	140s	58.3s	22s	11.7s	7.3s	5s
10	∞	795.5s	280s	117s	43.8s	23.3s	14.6s	10s
20	∞	1591s	560s	233s	87.5s	46.7s	29.2s	20s
30	∞	2386s	840s	350s	131s	70s	43.8s	30s

∞：Indicates no action