ISO9001 CERTIFIED
CCC CERTIFIED

ZYDL SOFTSTARTER

FR1000 SERIES

4.0～315KW

INSTRUCTION MANUAL

PREFACE

Thank you for your choice of ZYDL SofsStarter.
As the return of your trust we will provide the perfect quality and wholehearted service to you .

Adopting modern control theory, modularization design, double CPU controlled, high quality material and parts/components, together with advanced SMT manufacturing engineering, FR1000 series softstarter is a high tech product combing digit, computer and modern automatic control theories. It is characteristic of high performance, high quality and skinny volume, and is widely applicable for starting and protection of three-phase motors in various industries.

Notes

This instruction manual provides information with respects to installation, parameter-setting, trouble-diagnosing and proper operation. This manual should therefore be kept properly and a careful reading shall be required before any operation attempt to avoid any accidental casualties or damage(s) to the facilities.

★ Special Notice:

▲ Installation, operation, maintenance or checking to this product shall be required before reading carefully this instruction manual and ensuring proper use.

▲ Power shall be disconnected before any wiring. Never touch power terminal with hand or conduct object.

Never put or drop foreign substance into soft starter.

▲ Connect input terminals R, S and T to urban power supply of 380V; connect output terminals U, V and W to motor.

▲ Grounding terminal PE  shall be properly earth connected (grounding impedance not exceeding 4Ω).

Standards for Product Design

FR1000 series soft starter is ISO9001 certified, with the following standards for product design:

GB14048.6-1998: Semiconductor Control-Unit & Starter for A/C Motors.

GB3797-89: Section 2 of Electric-Control Equipment——Electric-Control Equipment with Electronic Appliances.

IEC61000-4: Technology for EMC, Test and Measuring.

IEC65: Safety on Household & Similar General-Purpose Electronic Equipment and Related Facilities with Power Supply from Electric Network.

Quality Standards

With total quality activities and ISO9001 quality standards in practice, we are manufacturing hi-quality products and providing all-round service for establishing a top-class enterprise with renowned brand in out industry. We are promoting ISO9001 and "Zero-Defect Quality Management", which has strict specifications for every detail, requesting each person to be correct at his first attempt. For Zero-Defect, cooperative spirits of teamwork is required for mutual promotion and supervision as well.

CONTENTS

1. Product Model and Consignee Check

Please check the product carefully according to the following steps after unpacking, please contact the supplier immediately if any problem is found.

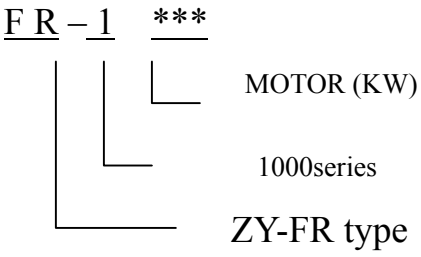
☞ FR1015————FR1055

☞ FR1075————FR1200

☞ FR1220————FR1315

1.1 Nameplate Check

Model Illustration:



1.2 Product Check-up

Product check- up is advised to be carried out to make sure whether damage(s) revived during transportation, such as depressed shell, distortion, loose connection with wiring or connected parts.

1.3 Unpacking Check-up

Each softstarter has certificate of quality, guarantee card, and user's manual. Please make sure whether the certificate and the card are intact and conform to each other.

2. Installation

For keeping a good product capability, the softstarter must be installed vertically. Installation space should strictly obey the following requirements. Good ventilation should be available to the installation environment, which should avoid direct sunlight for indoor installation.

Environment temperature: －10℃～＋50℃

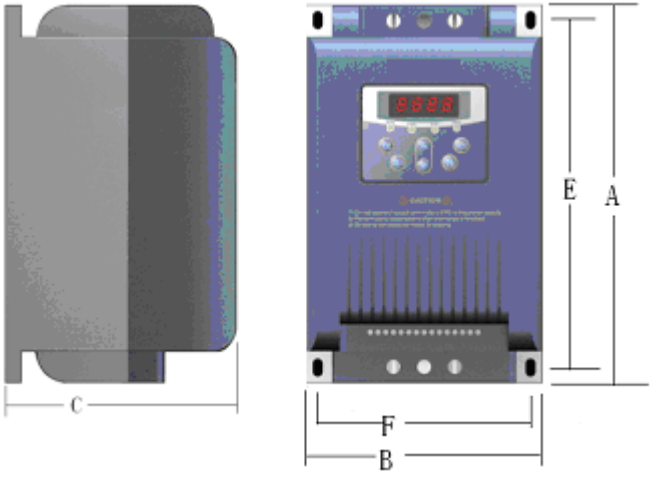
Relative humidity: ≤95% (20℃±5℃)

Environment conditions: Free from flammable gas, explosive gas and corrosive gas, free from electric dust, to be installed indoors with good ventilation.

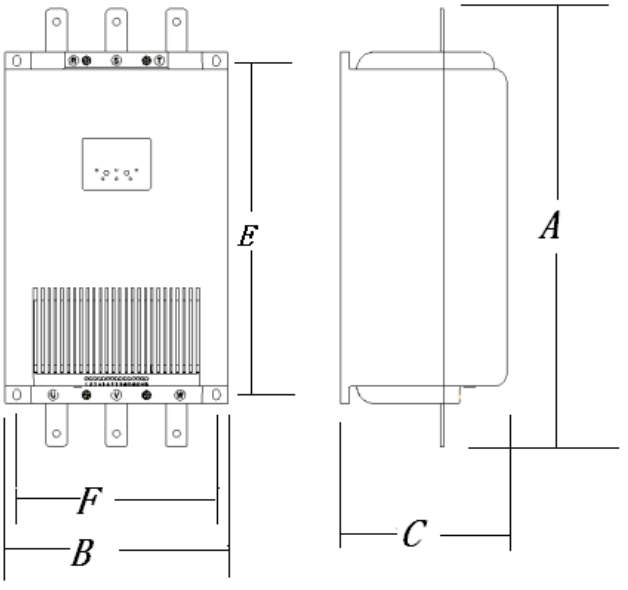
Vibration below 0.5G

If the altitude is above 2000m, the capacity should be decreased accordingly for application.

Structure Dimension: 15KW-55KW



Structure Dimension: 75KW-315KW



External Dimension（Unit:mm）

Model	A（High）	B(Wide)	C（Thick
FR1015（15KW）	250	153	162
FR1022（22KW）	250	153	162
FR1030（30KW）	250	153	162
FR1037（37KW）	250	153	162
FR1045（45KW）	250	153	162
FR1055（55KW）	250	153	162
FR1075（75KW）	510	260	194
FR1090（90KW）	510	260	194
FR1110（110KW）	510	260	194
FR1132（132KW）	510	260	194

FR1160（160KW）	510	260	194
FR1200（200KW）	510	260	194
FR1220（220KW）	590	360	255
FR1250（250KW）	590	360	255
FR1280（280KW）	590	360	255
FR1315（315KW）	590	360	255

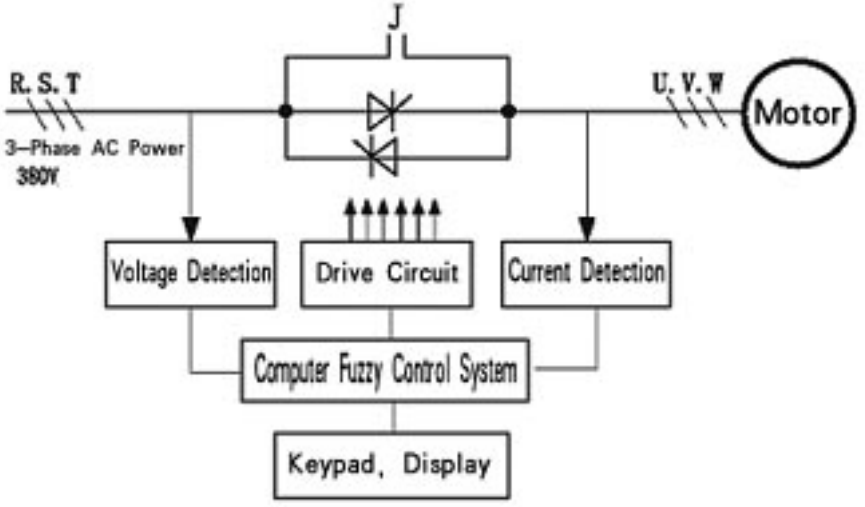
Installation Dimension（Unit: mm）

Model	E（High）	F(Wide)	Φ(Hole Dia）
FR1015	219	140	Φ6
FR1022	219	140	Φ6
FR1030	219	140	Φ6
FR1037	219	140	Φ6
FR1045	219	140	Φ6
FR1055	219	140	Φ6
FR1075	389	232.5	Φ8.5
FR1090	389	232.5	Φ8.5
FR1110	389	232.5	Φ8.5
FR1132	389	232.5	Φ8.5
FR1160	389	232.5	Φ8.5
FR1200	389	232.5	Φ8.5
FR1220	560	300	Φ8.5
FR1250	560	300	Φ8.5
FR1280	560	300	Φ8.5
FR1315	560	300	Φ8.5

Note: FR1015--FR1200 softstarter with plastic housing, available in stock.

FR1220--FR1315 softstarter with metal housing, available in stock.

3.Functional Block Diagram



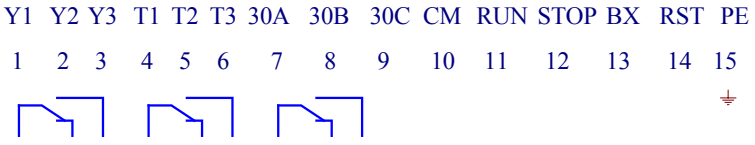
Three reverse-parallel connection SCR modules are adopted as power element. CPU1 works as a controlling SCM (Single Chip Micyoco) while CPU2 works as an instruction inputting and displaying SCM. By picking up synchronization signal from input voltage sampling circuit, it can pick up output current sampling for feedback fuzzy control, trace the phase automatically and control phase displacement angle. Voltage can thus be increased step by step, and startup current will be under control. After startup, the bypass contactor will make the SCR short circuit. The motor will finally be driven into the electricity network for operation.

4.Technical Parameters

Control power supply	AC 380V±20%, 50Hz
3-Phase power supply	AC 380V±20%, 50Hz
Nominal current	30A～630A, totaling 16 kinds rated currents
Motor power	15～315KW(rated voltage 380V)
Applicable motor	Common squirrel cage type asynchronism motor
Startup mode	Voltage kick soft startup; current limiting startup (1Ie ～ 4Ie); voltage ramp startup (1 ～ 600seconds, adjustable)
Stop mode	Free stop; soft stop (1～600seconds , adjustable)
Relay output	Delay running output; fault output; full voltage output (by pass) [contact dot: 5A, 250VAC]
Startup frequency	for frequent or unfrequent startup; Advise: not exceeding ten times per hour
Protection function	Phase loss of input, over-load, short circuit, over-heating, and etc.
Safety degree	IP40
Cooling mode	Cooling naturally
Installation mode	Hanging mode
Environment conditions	Environment temperature:-10℃~＋50℃ Relative humidity:≤95%(20℃±5℃) Free from flammable gas, explosive gas and corrosive gas, free from electric dust, to be installed indoors with good ventilation Vibration below 0.5G If the altitude is above 2000m, the capacity should be decreased accordingly for application.

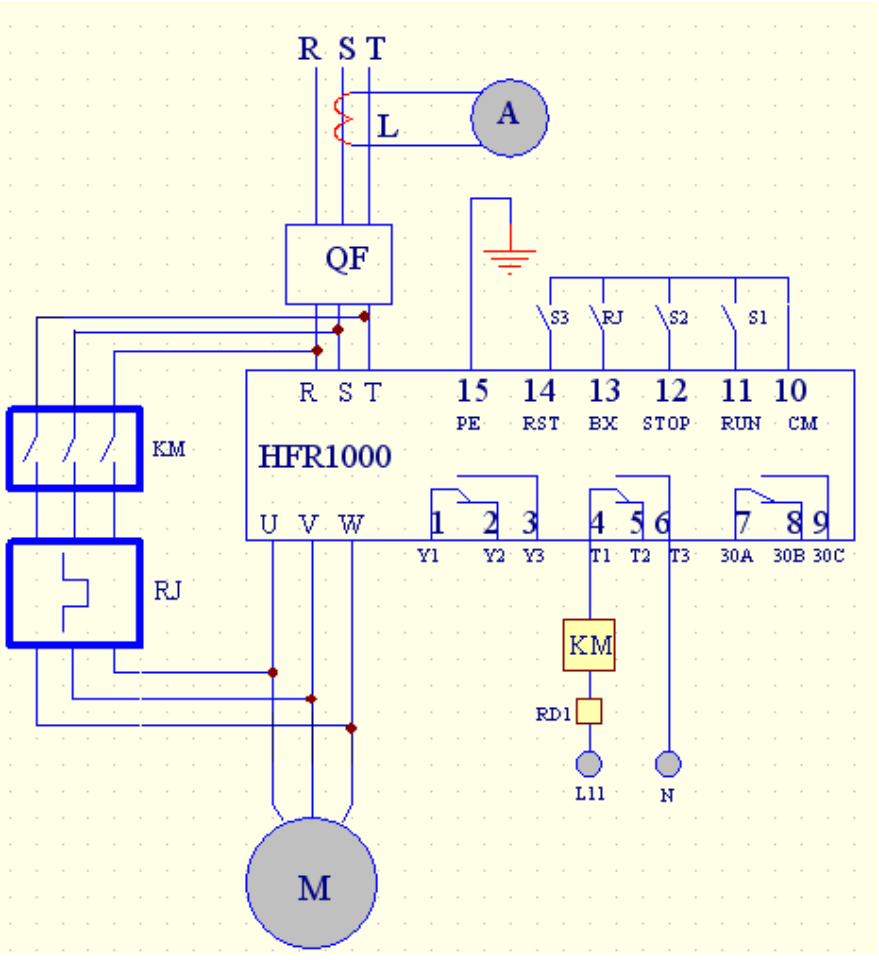
5. Wiring

5.1 Terminal Function



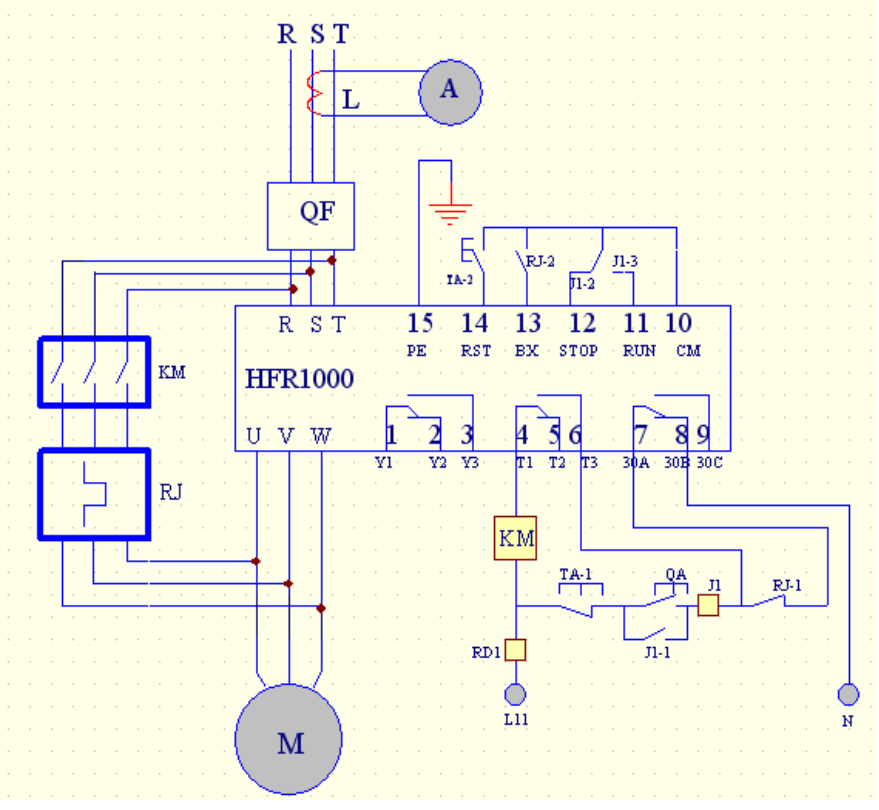
Terminal Number	Terminal Name	Description	Technical Parameters
1	Start-delay Signal	Y1: Middle terminal	AC250V5A
2	Start-delay Signal	Y2-Y1Normal close	AC250V5A
3	Start-delay Signal	Y3-Y1Normal open	AC250V5A
4	Bypass Signal	T1: Middle terminal	AC250V5A
5	Bypass Signal	T2-T1Normal close	AC250V5A
6	Bypass Signal	T3-T1Normal open	AC250V5A
7	Fault Signal	30A: Middle terminal	AC250V5A
8	Fault Signal	30B-30A Normal close	AC250V5A
9	Fault Signal	30C-30A Normal open	AC250V5A
10	Common Terminal	CM(External Common Terminal)	
11	Startup Signal	RUN-CM effective turn on	
12	Stop Signal	STOP-CM effective turn on	
13	Free stop Signal	BX-CM effective turn on	
14	Reset Signal	RST-CM effective turn on	
15	Function Ground -Terminal	PE—Ground	

5.2 Basic Wiring Diagram



R, S, T terminals of softstarter are input terminals while U, V, W are output terminals. QF-auto air breaker, KM-contactor, RJ-over heating protection relay, RD1-fuse, L11—N is connected to 220V.

5.3 Recommended Wiring Diagram



!PE Grounding wire should be as short as possible, and should be connected to the nearest grounding point, better on the installation board against the softstarter. Installation board should also be grounded. It is function grounded, not protection grounded.

Controlling Loop:

User can select to use bypass contactor. It can be switched to bypass circuit running automatically. To select this operation mode, an AC contactor should be fixed (to be ordered separately)

5.4 Optional Parts

Adaptable Motor(KW)	Model	Rated Current（A）	Contactor Model （optional）	Wiring （MM^2）
15	FR1015	30	CJX4-50	10
22	FR1022	45	CJX4-50	10
30	FR1030	60	CJX4-80	16
37	FR1037	76	CJX4-80	16
45	FR1045	90	CJX4-95	25
55	FR1055	110	CJX4-115F	25
75	FR1075	150	CJX4-150F	35
90	FR1090	180	CJX4-185F	35
110	FR1110	218	CJX4-225F	50
132	FR1132	260	CJX4-265F	60
160	FR1160	320	CJX4-330F	75
200	FR1200	400	CJX4-500F	90
220	FR1220	440	CJX4-500F	90
250	FR1250	500	CJX4-630F	150
280	FR1280	560	CJX4-630F	150
315	FR1315	630	CJX4-630F	150

6. Setting

Keypad Panel

Keys	Name of Keys	Note The following is the operation instruction of keypad panel.  Fig 1-1 keypad panel
Mode	"mode" key	To be used with "set" key. Control box displays function code "HF××".
set	"set" key	To be used with "mode" key. Control box displays function code "HF××";Under the "HF××" display state, press "set" key, the control box will display the corresponding value of function code. Press "up" and "down" key to change its value, and then press "set" to save the changed value.
▲	"up" key	Under "HF××" display state, press "up", "down" key to select other function code. After enter the function code, they are used to change the value of the function code.
▼	"down" key	
run	"run" key	Under "HF××" display state, press"run" key for startup.
Stop/Reset	"stop/reset" key	Under any state, press "stop/reset" key, it will have priority to be valid. Press twice for free stop of the softstarter. And it also can reset the softstarter when malfunction happens.

Special Display Content and Interpretation

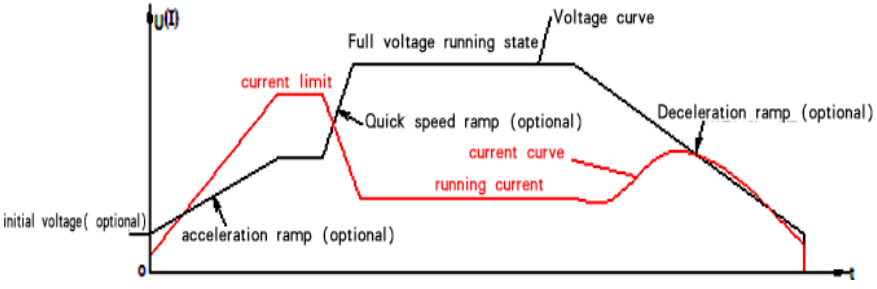
Display Items	Interpretation
—HF—	Show reset process; under single control mode, it displays such content after reset normally;
RUN	startup state
STOP	Stop state
OUT	Run state
RT	Soft-stop state
Count Down	Delay state

Set the Starter through Keypad

Main adjustable parameters：initial voltage
startup time
stop time
startup current

Startup mode： voltage ramp soft startup
current limiting soft startup
kick soft startup

Stop mode: voltage ramp soft stop mode
Free stop mode



Soft Startup/Soft Stop Voltage (Current) Feature Curve

6.1 Initial Voltage Setting (U0)

Initial voltage for startup (0--50%)Ue, stepless adjustable.
Initial voltage for kick startup, voltage (20%-100%) Ue, stepless adjustable。
Select 100% as full voltage startup, at present the softstarter works as a switch without contact.

6.2 Startup Ramp Time Setting

Ramp ascending time: 1-600S, adjustable。

6.3 Stop Ramp Time Setting

Ramp descending time:1-600S, adjustable。

6.4 Startup Current Limit

Startup current (1～4) Ie : stepless adjustable. (with the data set, the biggest startup current will be limited in this range)

☞ The above parameters should be set when the starter is not working! Under the startup, soft-stop and full-voltage working state, all the parameter-settings will not be effective.

All the technical parameters of softstarter are effective when the environment temperature is below 45℃. If the environment temperature is from 45℃ to 60℃, the rated power should be decreased by a power-level.

7. Softstarter Function Chart

Function No.	Function Explanation	Data Explanation	Mfr Value
HF00	Control mode	0 keypad control 1 External terminal control	1
HF01	Startup mode	0 Voltage ramp startup 1 Current limit startup 2 Kick startup	0
HF02	Startup delay time	0-600S	0S
HF03	Stop mode	0 Free stop 1 Soft stop	0
HF04	Torque compensation	0-50% Rated voltage	5%
HF05	Kick voltage	20-100%Rated voltage	50%
HF06	Kick time	1-60S	2S
HF07	Ramp ascending time	1-120S	20S
HF08	Ramp descending time	1-120S	20S
HF09	Startup current limit	150-400% Rated current	400%
HF10	Startup time interval	1-3600S	240S
HF11	Data initialization	0 No action 1Action (manufacturer value restored)	0
HF12	Fault memory 1	Present fault	
HF13	Fault memory 2	The last fault	
HF14	Fault memory 3	Previous two faults	
HF15	Fault memory elimination	0 No Action 1 action	0
HF16	Overload protection time	1-600S	60S
HF17	Motor power	1-315KW	22KW
HF18	Quick-startup select	0 Not quick startup 1 Quick startup	1
HF19	softstarter address	1—16 255 Broadcast address	1
HF20	Baud rate select	0 2400 bit 1 4800 bit 2 9600 bit	0
HF21	Parity check	0 Odd 1 Even 2 No check	0

8. Function in Details

HF00	Control mode	0 Keypad control 1 external terminal control	1

Control mode selection can be operated directly through the panel keypad, and can also be done by external terminal control. The manufacturer value is 1.

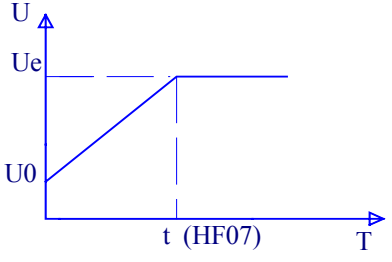
HF01	Startup mode	0 Voltage ramp startup 1 Current limit startup 2 Kick startup	0

You can start by selecting one of the following three modes：

0 Voltage ramp startup, 1 current limit startup, 2 kick startup, manufacturer value is 0

Δ Voltage ramp startup

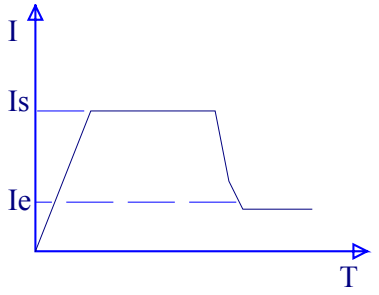
Set HF01 to 0, and set ramp startup time t (HF07) and torque compensation voltage (HF04) U0, the motor will start along with the increasing input voltage, and the speed will accelerate accordingly till its top speed, as shown in Figure (1).



Voltage Ramp Startup Feature Curve, Figure(1)

Δ Current limit startup

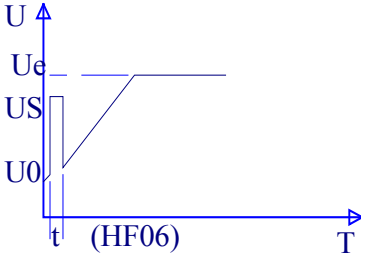
Set HF01 to 1 and set startup current limit percent Is（HF09）and Torque compensation voltage (HF04). The current of the motor will increase until the voltage ramp reaches Is, then it will stop, and the speed will accelerate to its full speed. After that, the current will decrease to below the rated current Ie, as shown in Figure (2):



Current Limit Startup Feature Curve (2)

Δ Kick startup

Set HF01 to 2, and set ramp start time t(HF07) and torque compensation (HF04), kick time t（HF06）. The motor will start rapidly along with the increasing voltage, then the voltage will increase in an ramp way, and the speed will accelerate to its full speed. HF01. It is better for startup motor with big inertia, as shown in Figure (3):



Kick Startup Feature Curve (3)

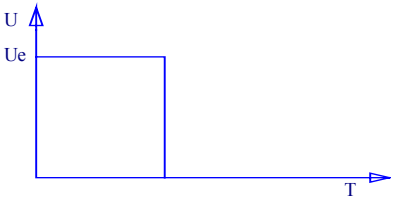
HF02	Startup delay time	0-600S	0S

Startup delay time is set for startup preparation, and the motor will not start in this interval. Count down mode is used for display, and the time can be set from 0 to 600 seconds. And it will output a normal open –normal close contact dot signal. By applying the signal, a warning signal may be effected for safety attention! The manufacturer value is set to 0S

HF03	Free stop	0 Free stop 1 Soft stop	0

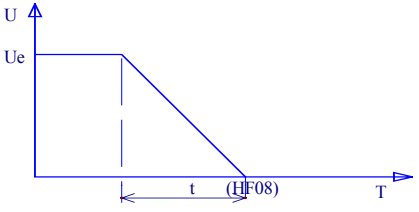
You can stop by selecting two modes: 0 free stop 1 soft stop. The manufacturer value is set to 0.

Free stop means that the voltage of softstarter will reduce directly from Ue to 0V， and the motor will run with inertia till its stop, as shown in Figure (4):



Free Stop Feature Curve Figure (4)

Soft stop means that the voltage of starter will reduce gradually from Ue to 0V when the voltage drops. The soft stop can help resist "water hammer domino effect ", as shown in Figure (5):



Soft Stop Feature Curve Figure (5)

HF04	Torque compensation	0-50% rated voltage	20%

Torque compensation means to adjust the torque produced by initial voltage U0. The manufacturer value is set to 20%.

HF05	Kick voltage	20-100% rated voltage	50%

As for a load with big static torque, an instant high voltage must be inflicted, so that it can start smoothly with the torque big enough, the "kick voltage" range is from 20% to 100% percent of the rated voltage. The manufacturer value is set to 50% rated voltage.

HF06	Kick time	1-60S	2S

Kick time means the interval to exert high voltage, adjustable between 1-60S. The manufacturer value is set to 2S.

HF07	Ramp ascending time	1-600S	20S

Ramp ascending time means the interval to bring the voltage from 0V up to rated voltage Ue. The manufacturer value is set to 20S.

HF08	Ramp descending time	1-600S	20S

Ramp descending time means the interval to bring the voltage from rated voltage Ue to 0V. The manufacturer value is set to 20S.

HF09	Startup current limit	100-400% rated current	400%

It works when HF01 is set to 1, startup current limit = HF09*Ie, please adjust HF09 for a successful start, less current is preferred.

HF10	Startup interval	1-3600S	240S

This equipment is small-sized, and you can only restart it when the radiator cools down from the previous startup, otherwise the machine will stop due to over-heating protection. The startup interval is adjustable, and no more than 10 startups per hour are preferred for full load startups. The manufacturer value is set to 240S.

HF11	Data initialization	0 no action 1 action (manufacturer value is restored)	0

When the data is in disorder, please restore the manufacturer value by setting data initialization 1.

HF12	Fault memory 1	Present fault	

Store and display the code for present fault, for example 0: no fault, 1: means OH overheating fault, 2: means OC over current fault, 3: means PF phase loss, 4: means OL over load or jam fault.

HF13	Fault memory 2	Last fault	

Store and display code of last fault, for example 0: no fault, 1: means OH overheating fault，2: means OC over current fault, 3: means PF phase loss, 4: means OL over load or jam fault.

HF14	Fault memory 3	Previous two faults	

Store and display the code of fault before last，for example 0: no fault, 1: means OH overheating fault, 2: means OC over current fault，3: means PF phase loss, 4: means OL over load or jam fault.

HF15	Fault memory elimination	0 no action 1 action	0

Available, when the HF15 setting is 1, all present fault codes, code of last fault and the code of previous two faults will be eliminated, and the display will be 0. When HF15 setting is 0, the program will be renewed automatically after each fault occurs. The manufacturer value is 0.

HF16	Overload protection time	1-600S	60S

When the continuous overload time has exceeded the setting time, protection program will work. At the same time it displays 0L. This will protect the motor from long time jam and overload running. The manufacturer value is set to 60S.

HF17	Motor power	1-315KW	22KW

Motor power setting is applied for current display warp revising. The manufacturer value is set to 22KW.

HF18	Quick startup selection	0 not quick startup 1 quick startup	1

HF18 setting is 1, when the motor rotate speed reaches its full speed, the voltage will rapidly reach its highest level to avoid any vibration to the motor. HF setting is 0, when the motor rotate speed reaches its full speed, the voltage will work according to the ramp ascending time setting.

HF19	softstarter address	1--16	1

When the softstarter computer works to control, it can control at most 16 softstarters, the address can be set from 1-16. 255 is a broadcast address, and it is available for all machines.

HF20-HF21 function is applied for computer communication.

9.State Indication

9.1 Fault Indication

Over current protection ： OC
Phase loss protection: P.F.
Overheating protection：OH
Over load protection：OL

9.2 Process State Display

Stop state ： STOP
Delay state ： Time count down
Startup state：RUN
Running state：OUT
Soft stop state：RT

9.3 Current Display

During the debugging process, press the mode key. The LED display value of current can be amended by adjusting HF17 function. Observe whether the max amount of current conforms to the setting amount, so that we can see whether the data setting is correct or not. When the startup is finished, and it works with full voltage, it can be examined by external current mutual inductor, with ammeter display.

9.4 Indicator Display

Indicator state	Softstarter state	Explanation
RUN○ FWD● DGT● FRQ●	Running state	Light is on in-running state after startup finished, and light is off in standby state.
RUN● FWD○ DGT● FRQ●	Delay state	Light is on when delay begins ，and light is off when delay ended.
RUN● FWD● DGT○ FRQ●	External control state	Light is on when external control works, and light is off in keypad state.
RUN● FWD● DGT● FRQ○	Current display	Light is on, and current is displayed when press MODE key during the startup process; light goes off when press it again, and state is displayed.

"○" indicates the light is on, "●" indicates the light is off.

10. Maintenance

☞ **Be sure the power of softstarter is turned off, before you start any maintenance and checkup!**

10.1 Please check the cooling channel of softstarter regularly, make sure it isn't blocked by trash and dust.

10.2 Keep and install softstarter in a place far from strong eroding, high powder, high temperature or high humidity. Softstarter should avoid strong vibration.

10.3 Clean it regularly and check whether it works properly.

10.4 Check input wire and output wire of softstarter regularly. Check whether the grounded wire is reliable, and whether terminals become flexible.

10.5 Renew startup contact implement (relay) regularly.

10.6 Check whether there is imprint or parts damage caused by overheating.

10.7Check whether the wire is aging.

Note: When softstarter breaks down or doesn't work properly, please handle it according to this manual; Contact the manufacturer when you fail to solve the problems. Users are not allowed for any repair by themselves.

11. Fault Diagnosis

Problems	State explanation	Troubleshooting
Motor sounds buzz, when power is on	Softstarter is in standby state	1.check whether the bypass contactor is blocked at the closed place; 2.check whether the silicon controlled rectifier (SCR) is spark-through or damaged.
Motor can not work normally with the startup signal input.		1.In external control state, check whether the terminal RUN-CM is turned on; 2.Check whether the control circuit connection is right, control switch works normally.
	No control power supply state	1.Check whether work voltage is normal.
	Wrong parameter set	1.Check every parameter set value one by one, make sure that the set values match the practical parameters of motor; 2.Check the current limit value
	Phase loss occurs during startup	Check three phases' voltage, judge whether there is phase loss and eliminate fault
	Wire connection of motor is open	1.Check whether the connection of output terminals of softstarter and what of motor is right and reliable; 2.Check the input terminals' voltage, judge whether internal circuit of motor is open; 3.Check whether there is phase loss in input terminal
Startup current exceeds the set value	Current limit function fails	1.check whether the startup current set is right; 2.check whether the connection of current mutual inductor is right; 3.check whether the current mutual inductor works properly, and matches the motor.
	Environment temperature is too high	1.Check whether softstarter installation environment has good ventilation and is installed vertically; 2.check whether softstarter avoids direct sunlight successfully;
	Over run current of	1.Check whether the softstarter has short circuit in output connection ;

	motor	2.check whether overload of motor or damage happens; 3.check whether phase loss fault happens in the motor.
	Softstarter is short circuit between input and output terminal connection	1.check whether the bypass contactor is blocked at the closed place; 2.check whether the silicon controlled rectifier (SCR) is sparked through or damaged

☞ The above problems must be handled by professionals. Users are not allowed for any repair by themselves.

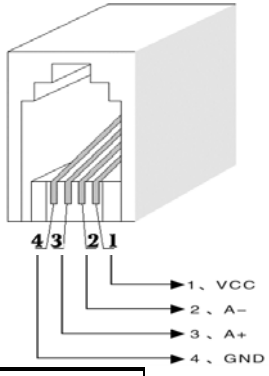
12. Computer Communication Control

Soft startup RS485 Communication Agreement

（一）Overview

1、 MAX485 hardware is adopted for communication, the pins array of 485 interface on the softstarter is as below:

VCC, GND act as positive and negative terminals of 5V power supply for external usage in soft startup.



2、Communication Format:

Baud rate setting range 2400,4800,9600

Character format as below :

Bit Number	Function
1	Startup bit
8	Data bit
1	Parity check bit
1	Stop bit

3．Man-machine conversation screen

Explanation ：

1. Select manual refreshing，softstarter state is readable.
2. Select auto refreshing，the state of softstarter is readable every second
3. Double- click the corresponding function code, user can check and revise the corresponding value of function code.

（二）Order type and format

1、Five order types ：

Order type	Description
3	order to write function code parameter
4	order to read motor parameter
5	order to read function code parameter
6	order to Run order
7	order to Stop/reset

2、Data package format：data bundle received by PC or PLC and softstarter has 18 bytes

3、Detailed definition of order data bundle format is as below

3. Function Definition of Every Byte When PC or PLC Sends Out Data

Package for writing function code parameter order：

Pointer	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Function	Original Byte		Empty	softstarter	order	Empty	Empty	Function code	numerical value higher 8 byte	numerical value lower 8 byte	Empty	Empty	Empty	Empty	Empty	Empty	Checkout sum	Empty
data	E7	E7	0		3	0					0	0	0	0	0	0		0

4. Function Definition of Every Byte When PC or PLC Sends out Data

Package for reading motor parameter order:

point	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Function	Original Byte		Empty	softstarter address	Order	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Checkout sum	Empty
data	E7	E7	0		4	0	0	0	0	0	0	0	0	0	0	0		0

Function Definition of Every Byte that softstarter sends out to PC or PLC after softstarter receives the reading motor parameter order from PC or PLC

Pointer	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Function	Original Byte		Fault code	softstarter address	order	Empty	Empty	Empty	Empty	Present state	Voltage		Time count down		empty	BB Accept right	Checkout sum	Blank
data	E7	E7								Remark 1	Remark 2							0

Remark 1：The ninth byte9 is defined as below:

a) 0 means stop

b) 3 means startup finished

c) 4 means startup state

d) 5 means soft stop (RT)

Remark 2：Voltage＝380 × [8333-（byte(10)*256+byte(11)）] \6250

5. Function Definition of Every Byte When PC or PLC sends out Data

Package for reading function code parameter order

Pointer	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
function	Original Byte		Empty	softstarter address	Order	Empty	Empty	Function code	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Checkout sum	Empty
Data	E7	E7	0		5	0	0		0	0	0	0	0	0	0	0		0

After softstarter computer received the reading function code order from PC or PLC, softstarter sends data bundle to PC or PLC, the function definition of every byte:

Pointer	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Function	Original Byte		Fault code	Softstarter address	Order	Empty	Parameter high byte	Parameter low byte	Empty	Empty	Empty	Empty	Empty	Empty	Empty	BB accept right	Checkout sum	Empty
Data	E7	E7	remark			0	0	0	0	0	0	0	0	0	0			0

6. Function Definition of Every Byte When PC or PLC sends out Data Package for 6, and 7 type order：

Pointer	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
function	Original Byte		Empty	softstarter address	Order	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Checkout sum	Empty
Data	E7	E7	0		remark	0	0		0	0	0	0	0	0	0	0		0

Remark ： The fourth byte definition is as below ：

byte4 = 6　run order

byte4 = 7　stop / reset order

7、For 3,6,7 type order, namely write parameter order, run order, stop order, the softstarter will send the Data Package to PC or PLC in the following format

If the softstarter receives correctly, it will deliver data BB;

If the softstarter does not receive correctly, it will deliver AA,

If it has no right to revise nor exceeds the revision range, it will deliver CC.

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
function	Original Byte		Fault code	softstarter address	Order	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	symbol	Checkout sum	Empty

Data	E7	E7				0	0		0	0	0	0	0	0	0	AA/BB/CC		0

（三） **Related attached explanation**

[1]：The value of all computer byte16（checkout sum）is the low byte of this data bundle's sum

（byte2+byte3+byte4+byte5+byte6+byte7+byte8+byte9+byte10+byte11+byte12+byte13+byte14+byte15）.

The value of all softstarter byte16（checkout sum）is the low byte of this data bundle's sum

（byte2+byte3+byte4+byte5+byte6+byte7+byte8+byte9+byte10+byte11+byte12+byte13+byte14+byte15）.

[2]：softstarter sends byte to PC or PLC byte2（fault code ）,the definition is as below

0 Without fault ；

1 /* OH */ Overheating protection

2 /* OC */ Over current protection

3 /* PF */ Phase loss protection

4 /* OL */ Over load protection

[3]：Available address range of softstarter is 1－16

Address 255 （FFH）represents broadcast address，it is available to all softstarters. Softstarter will not return data when it receives broadcast address.

[4]：The value of "empty" in the above form is 0

Attached Table

Applied Machinery	Load type	Starting torque / rate load torque	nduplicate inertial torque / motor's inertial torque	Starting current %	Starting time (S)
Centrifugal Pump	Pump Mαn^2	40%	1	300	5～15
Centrifugal Fan	Fan Mαn^2	40%	15	350	10～40
Centrifugal Compressor	Fan or Heavy Load ＞30S Mαn^2	50%	15	350	10～40
centrifugal Filter	Fan Mαn^2	20%	30	300	10～40
Piston-type compressor	presser Mαn	50%	1	350	5～10
Spiral-type compressor	presser Mαn	10%	1	300	3～20
Piston Pump	Pump M= constant		0.2～0.8	350	5～10
Fan	Fan or Heavy Load ＞30S Mαn Mαn2	40%	10	300	10～40

Cooling Compressor	Fan M=n			300	5～10
Belt Convey	M= constant	100%	10	300	3～10
Elevator	Grinding machine M=constant	100%	10	350	5～10
T-type Cable Car	Belt conveyor M= constant	100%	10	400	2～10
Spiral-type Conveyor	Belt Conveyor Mαn	100%	5	300	3～10
Circular saw Band saw	Belt conveyor or heavy load ＞30S M=constant			300	10～60
Mixer	Grinding Machine Mα1/n	120%	10	350	5～20
Drawbench	press Mαn	20%	10	350	5～40
Muller	Grinding machine or heavy load Mα1/n	100%	10	400	10～40
Hot Pump	pump Mαn	40%	0.5	350	5～10
Cutter	Grinding machine or heavy load M=constant	100%	10	400	3～10
Rolling Machine	Presser or heavy load Mαn	120%	15	450	5～60
refiner	Standard Load	100%	10	300	5～30
Pressure Machine	Presser or heavy load	120%	15	400	20～60
Lathe	Mα1/n	100%	3	350	5～10

Note: cubage type of fan is Mαn，the others are $M\alpha n^2$

Application environment (for reference)

Type of machinery	Type of load	Starting mode				Starting time (S)	
		voltage	current	voltage(%)	current(%)		
Centrifugal Pump	Standard load		●		250		
fan	A little heavy load	●		55		10	15
Compressor (Piston-type)	Standard load		●		300		
Compressor (centrifugal-type)	Standard load	●		45		10	12
Conveyor	Standard load		●		250		
Mixer	A little heavy load		●		350		
Ball mill	Heavy load	●		55		15	20
Roll machine	Heavy load		●	50			

User can set the parameter according to actual load.

To a little heavy load and heavy load, the manufacturer recommend user to choose higher power of softstarter. Furthermore, the startup mode of "Kick startup" is recommended for heavy load and heavy inertia.

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