INOMAX

Medium and Low-Voltage AC drives Servo drives
Soft Starters solution provider

AST8000 Series Soft Starters

Intelligent Online Soft Starter

7.5KW-320KW 220V-480V

User manual

220811028

REV: V212
Jun.2022

SHENZHEN INOMAX TECHNOLOGY CO.LTD

www.inomaxtechnology.com

Contents

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.

Notice

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 are voltages in the following locations, which may cause serious electric shock accidents and may be fatal:

- AC power cord and connection
- Output wires and connections
- Many parts of starter 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.

Chapter 2 Introduction

This soft starter is an advanced digital soft start solution, suitable for motors with power from 5.5kW to 320kW. Provides a complete set of motor and system protection functions to ensure reliable performance even in the harshest installation environment.

2.1 Function list

Optional soft start curve

- Voltage ramp start
- Current limit start
- Torque start

Optional soft stop curve

- Free parking
- Timed soft parking

Expanded input and output options

- Remote control input
- Relay output
  Analog output
- RS485 communication output

Customizable protection

- Input phase loss
- Output phase loss
- Soft start overheating
- Phase sequence
- Running overload
- Starting overcurrent
- Running overcurrent
- Overpressure
- Undervoltage
- Underload

Models that meet all connection requirements

- 11A-640A (rated)
- 220VAC-380VAC
- Star connection or inner delta connection

Easy-to-read display shows comprehensive feedback

- Removable operation panel
- Built-in Chinese + English display

Chapter 3 Conditions of Use and Installation Requirements

The on-line intelligent motor soft starter should meet the following conditions of use and installation method requirements; otherwise, the performance will not be guaranteed, and in severe cases, the on-line motor soft starter life may be shortened or even damaged.

3.1 The use conditions of online intelligent motor soft start:

○ Power supply: mains, self-supplied power station, diesel generator set, three-phase AC 220V, 380V, 30Hz to 70Hz, the power supply capacity must meet the starting requirements of the soft starter for the motor.

○Applicable motor: squirrel-cage three-phase asynchronous motor. The rated power of the motor should match the rated power of the on-line intelligent motor soft starter.

○ Starting frequency: No requirement, the specific number depends on the load.

○ Cooling method: forced air cooling.

○ Degree of protection: IP20.

○ Environmental conditions: below 2000 meters above sea level, ambient temperature between -10℃~+40℃, relative humidity below 95%RH, no condensation, no flammable, explosive, corrosive gas, no conductive dust, indoor ventilation Good places where the vibration is less than 0.5G. Above 2000 meters above sea level, derating is required.

● The company can provide users with products that are used under special conditions, such as explosion-proof, low-temperature, and high-voltage on-line intelligent motor soft start. The conditions of use will be explained separately.

3.2 The appearance and installation dimensions of the online intelligent motor soft starter:

Voltage Level	Rated Working Current	Rated Power	Display Method	Parameter Number	Protect Type	Input Output Number Of Terminals	Overload Capacity
220V	11A-640A	5.5kW-185kW	Chinese English LCD	49	10	11	Adjustable
380V	11A-640A	5.5kW-320kW					

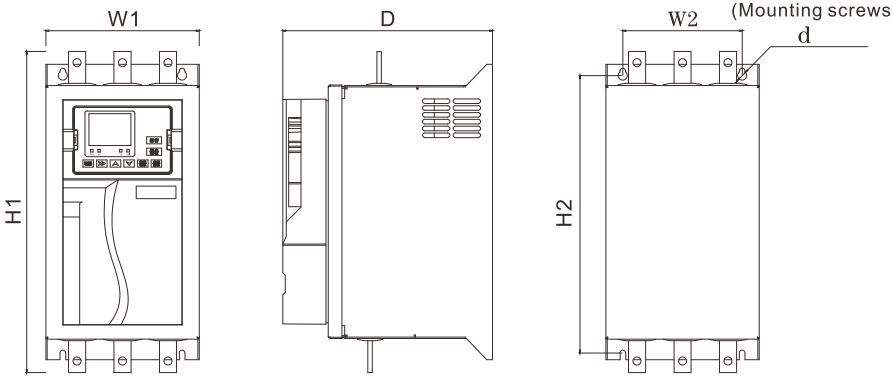
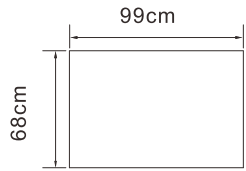


figure 1

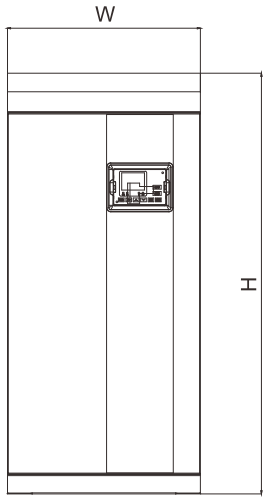


External keyboard installation size (mm)

Specification model	Dimensions (mm)			Installation size (mm)			Outline
	W1	H1	D	W2	H2	d	
11A-75A	105	240	168.5	75	211	M6	figure 1
90A-150A	135	282.5	184.5	105	244	M6	
180A-230A	190	370.5	224.5	150	322	M8	
264A-400A	225	393	243	170	333	M8	
440A-640A	390	677	294	260	601	M8	

3.2 The appearance and installation dimensions of the online intelligent motor soft starter cabinet:

Voltage Level	Rated Working Current	Rated Power	Display Method	Parameter Number	Protect Type	Input Output Number Of Terminals	Overload Capacity
220V	11A-640A	5.5kW-185kW	Chinese English LCD	49	10	11	Adjustable
380V	11A-640A	5.5kW-320kW					



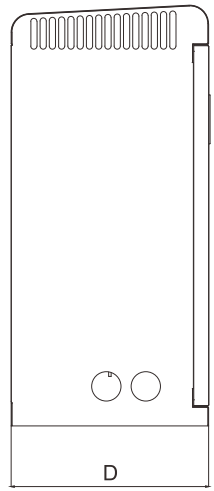
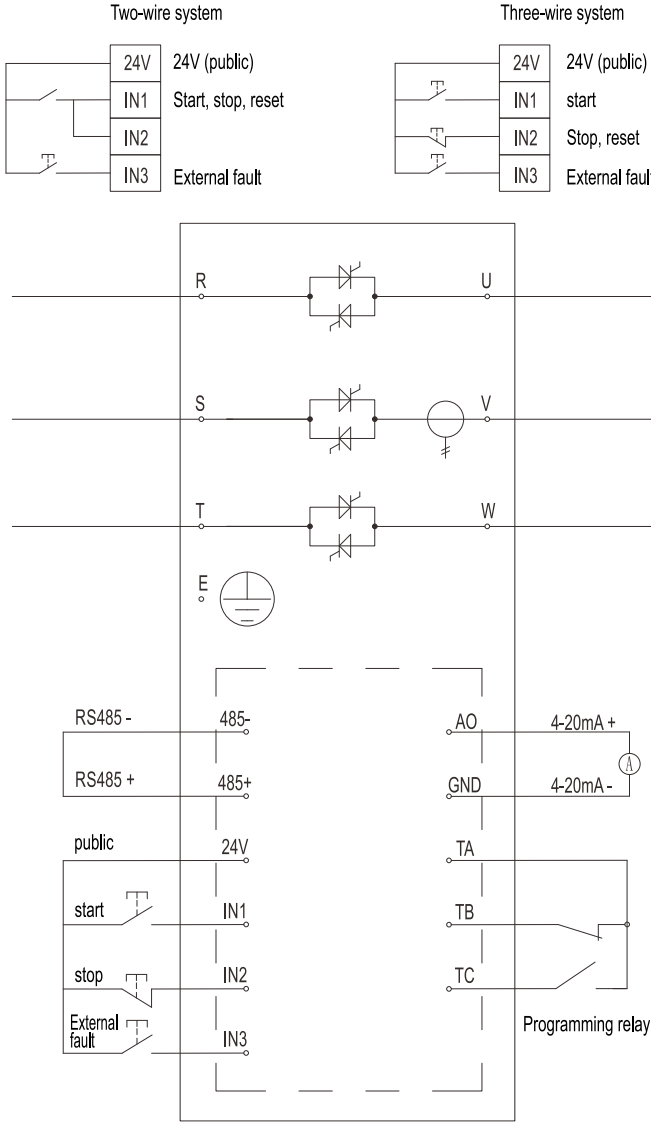


figure 2

Specification model	Dimensions (mm)			Outline
	W1	H1	D	
11A-150A	312	681	320	figure 2
180A-230A	400	850	380	
264A-400A	500	1200	400	
440A-640A	680	1400	420	

Chapter 4 Description of External Terminals of Online Smart Motor Soft Starter

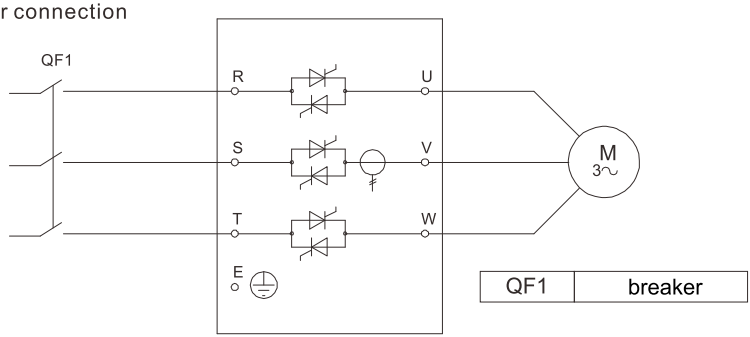


Terminal type		Terminal No.	Terminal name	Instruction
Main circuit		R,S,T	Power Input	Soft start three-phase AC power input
		U,V,W	Soft Start Output	Connect three-phase asynchronous motor
Control loop	Communication	485-	RS485-	For ModBusRTU communication
		485+	RS485+	
	Digital input	24V	Public	24V common
		IN1	Start	Short connection with common terminal (24V) Startable soft start
		IN2	Stop	Disconnect from the common terminal (24V) to stop the start soft start
		IN3	External Fault	Short-circuit with the common terminal (24V), soft start and shutdown
	Analog output	AO	4-20ma Output Positive	4-20mA output
		GND	4-20ma Output Negative	
	Programming Relay	TA	Programming relay common	Programmable output, available from Choose 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	

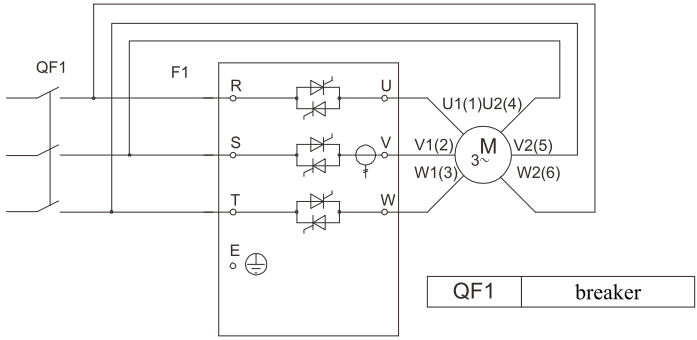
Chapter 5 Motor Connection

Soft start can use star connection method or inner delta connection method (also called three-wire connection method and six-wire connection method) to connect the motor. If the inner delta connection method is adopted, use parameter F00 to input the rated current of the motor.

Star connection



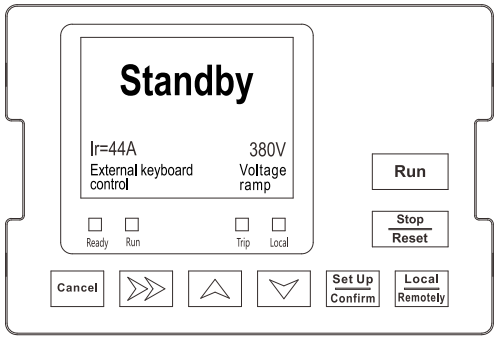
Inner triangle connection method



Notice

If the inner delta connection method is adopted, use parameter F00 to input the rated current of the motor. Whether the soft starter adopts the star connection method or the inner delta connection method is modified by the parameter "F16 motor connection method".

Chapter 6 Operation Panel



Button	Name	Function
Cancel	Cancel key	1. Exit the parameters. 2. Cancel modification parameters
⋙	Shift key	1. Shift key when modifying parameters. 2. View the fault record in the main interface.
△	Increment key	Increment of data and parameter codes.
▽	Decrement key	Decrement of data and parameter codes.
Run	Run key	In keyboard operation mode, it is used for running operation.
Stop/reset	Stop/reset button	In the running state, press this key to stop the operation; It can be used to reset operation when it is in a fault state.
Set/confirm	Set/Confirm key	1. Enter the parameter menu. 2. Set the parameters to confirm.
Local/remote	Panel control keys	Turn keyboard control on or off.

Starter status LED

Name	Chang Liang	Flashing
Ready	The motor stops and the starter is ready to start.	
Run	The motor is in the state of starting, running, soft stop, and DC braking.	
Trip	The starter has tripped.	The starter is in a warning state.
Local	The starter is in local control mode.	-

- The local LED light only works for the keyboard control mode. The light on means that the panel can be started and stopped, and the light off means that the panel cannot be started or stopped.

Chapter 7 Basic Parameters

No.	No.	Function Name	Setting Range	Defaults
0	F00	Soft start rated current		
1	F01	Soft start rated voltage		
2	F02	Motor rated current		
3	F03	Way to control	0: Prohibit start and stop 1: The keyboard is individually controlled 2: External control alone control 3: Keyboard + external control 4: Communication is controlled separately 5: keyboard + communication 6: External control+communication 7: keyboard + external control + communication	3: Keyboard + external control
4	F04	Starting method	0: Voltage ramp start 1: Current limit start 2: Torque start	0: Voltage ramp start
5	F05	Starting current limit percentage	50%~600%	300%
6	F06	Percentage of starting voltage	30%~80%	35%
7	F07	Starting time	1s~120s	15s
8	F08	Sustain voltage	60%~85%	65%
9	F09	Early acceleration time	1s~10s	5s
10	F10	Hold time	1s~120s	10s
11	F11	After acceleration time	1s~10s	3s
12	F12	Soft stop time	0s~60s	0s
13	F13	Programmable relay	0: No action 1: Power-on action 2: Soft start action 3: Bypass action 4: Soft stop action 5: Run action 6: Standby action 7: Failure action	7: Failure action
14	F14	Programmable output delay	0~600s	0s
15	F15	4-20mA upper limit current	50%~500%	200%
16	F16	Motor wiring method	0: Line type 1: Inner triangle	0: Line type

No.	No.	Function Name	Setting Range	Defaults
17	F17	Mailing Address	1~127	1
18	F18	Communication baud rate	0:2400 1:4800 2:9600 3:19200	2:9600
19	F19	Operation overload level	1~30	10
20	F20	Starting overcurrent multiple	50%-600%	500%
21	F21	Start over current protection time	0s-120s	5s
22	F22	Operating overcurrent multiple	50%-600%	200%
23	F23	Running overcurrent protection time	0s-6000s	5s
24	F24	Overvoltage protection multiple	100%~140%	120%
25	F25	Overvoltage protection time	0s~120s	5s
26	F26	Undervoltage protection multiple	50%-100%	80%
27	F27	Undervoltage protection time	0s~120s	5s
28	F28	Three-phase unbalance	20%~100%	40%
29	F29	Three-phase unbalance protection time	0s~120s	10s
30	F30	Underload protection multiple	10%~100%	50%
31	F31	Underload protection time	1s~120s	10s
32	F32	Soft phase sequence	0: Any phase sequence 1: Forward sequence 2: Reverse order	0：Any phase sequence
33	F33	A phase current calibration value	10%~1000%	100%
34	F34	B Phase current calibration value	10%~1000%	100%
35	F35	C phase current calibration value	10%~1000%	100%
36	F36	Voltage calibration value	10%~1000%	100%
37	F37	4-20mA lower limit calibration	0%~150.0%	20.0%
38	F38	4-20mA upper limit calibration	0%~150.0%	100.0%
39	F39	Running overload protection	0：Trip and shutdown 1：neglect	0：Trip and shutdown
40	F40	Start overcurrent protection	0：Trip and shutdown 1：neglect	0：Trip and shutdown
41	F41	Running overcurrent protection	0：Trip and shutdown 1：neglect	0：Trip and shutdown
42	F42	Overvoltage protection	0：Trip and shutdown 1：neglect	0：Trip and shutdown
43	F43	Undervoltage protection	0：Trip and shutdown 1：neglect	0：Trip and shutdown

No.	No.	Function Name	Setting Range	Defaults
44	F44	Three-phase unbalance protection	0：Trip and shutdown 1：neglect	0：Trip and shutdown
45	F45	Underload protection	0：Trip and shutdown 1：neglect	0：Trip and shutdown
46	F46	Overheating protection	0：Trip and shutdown 1：neglect	0：Trip and shutdown
47	F47	Soft start language	0：English 1：Chinese	1：Chinese
48	F48	Main control software version		
49	F49	Water pump matching selection	0: None 1: Float 2: Electric contact pressure gauge 3: Water supply level relay 4: Drain level relay	0：without
50	F50	Show software version		

Water pump matching function selection

Water Pump Matching Function Selection			
①	0: None	None: Standard soft start function.	Figure 1
②	1: Float	Float: IN1, start when closed, stop when open. IN2 has no function.	As shown in Figure 2
③	2: Electric contact pressure gauge	Electric contact pressure gauge: When IN1 is closed, it starts, and when IN2 is closed, it stops.	As shown in Figure 3
④	3: Water supply level relay	Water supply level relay: IN1 and IN2 are both disconnected and started, IN1 and IN2 are both closed and stopped.	As shown in Figure 4
⑤	4: Drain level relay	Drainage level relay: IN1 and IN2 are disconnected and stopped, IN1 and IN2 are both closed and started.	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

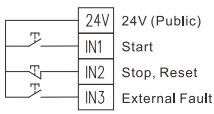


figure 1

1: Float

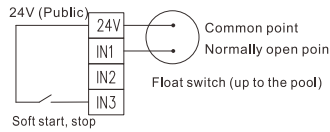


figure 2

2: Electric contact pressure gauge

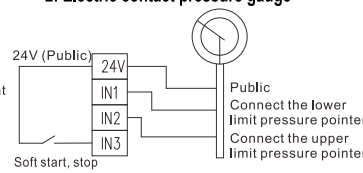


figure 3

3: Water supply level relay

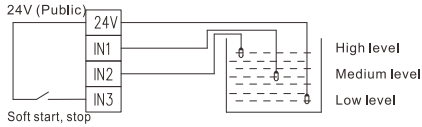


figure 4

4: Drain level relay

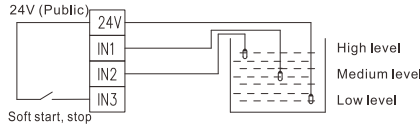


figure 5

Chapter 8 Troubleshooting

8.1 Protection response

When the protection condition is detected, the soft starter writes the protection condition into the program, and it may trip or issue a warning. The soft start response depends on the protection level.

The user cannot adjust some of these protection responses. These trips are usually caused by external events (such as phase loss), and may also be caused by internal faults in the soft start. These trips have no relevant parameters and cannot be set as warning or ignored.

If the soft start trips, you need to identify and clear the conditions that triggered the trip, reset the soft start, and then restart. To reset the starter, press the (stop/reset) button on the operation panel, or activate"Stop/reset remote input".

8.2 Trip message

The following table lists the protection mechanism of soft start and possible trip reasons. Some settings can be adjusted with the protection level, while other settings are built-in system protection and cannot be set or adjusted.

No.	Fault name	Possible Causes	Suggested solution	Remark
01	Input phase loss	1. The start command is issued, and one or more phases of the soft start are not energized. 2. The main board of the circuit board is faulty.	1. Check whether the main circuit has electricity 2. Check whether the SCR of the input circuit is open, and whether the pulse signal line is in poor contact. 3. Seek help from the manufacturer.	This trip is not adjustable
02	Output phase loss	1. Whether the SCR is short-circuited. 2. One or more phases of the motor wire are open. 3. The main board of the circuit board is faulty.	1. Check whether the SCR is short-circuited. 2. Check whether the motor wire is open. 3. Seek help from the manufacturer.	This trip Not adjustable
03	Running overload	1. The load is too heavy. 2. Improper parameter settings.	1. Replace the soft starter with more power. 2. Adjust the parameters.	Related parameters: F19, F39

No.	Fault name	Possible Causes	Suggested solution	Remark
04	Underload	1. The load is too small. 2. Improper parameter settings.	1. Adjust the parameters.	Related parameters: F30, F31, F45
05	Soft overheating	1. The temperature switch is faulty. 2. The fan does not rotate. 3. The working time of soft start is too long.	1. Check whether the temperature switch is faulty. 2. Check whether the fan is working normally. 3. Stop the machine and let the soft start cool down.	Related parameters: F46
06	Over -pressure	1. The input power supply voltage is too high. 2. Improper parameter settings.	1. Check the power supply voltage. 2. Adjust the parameters.	Related parameters: F24, F25, F42
07	Under -voltage	1. The input power supply voltage is too low. 2. Improper parameter settings.	1. Check the power supply voltage. 2. Adjust the parameters.	Related parameters: F26, F27, F43
08	Running overcurrent	1. The load is too heavy. 2. Improper parameter settings.	1. Replace the soft starter with more power. 2. Adjust the parameters.	Related parameters: F22, F23, F41
09	Starting overcurrent	1. The load is too heavy. 2. Improper parameter settings.	1. Replace the soft starter with more power. 2. Adjust the parameters.	Related parameters: F20, F21, F40
10	External fault	1. The external fault terminal has input.	1. Check whether there is input at the external terminal.	Related parameters: without
11	Phase sequence failure	1. The input power phase sequence is inconsistent with the setting.	1. Adjust the power phase sequence. 2. Adjust the parameters.	Related parameters: F32

Chapter 9 Function Description

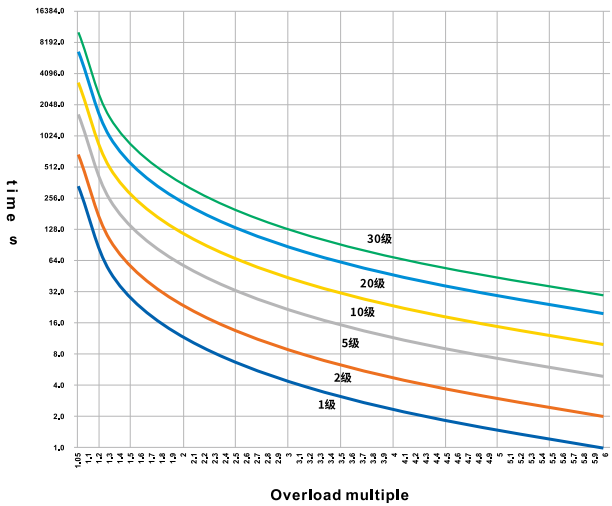
Overload protection

Overload protection adopts inverse time limit control

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

Among them: t represents the operating time, Tp represents the protection level, I represents the operating current, Ip represents the motor rated current

Motor overload protection characteristic curve: Figure 11-1



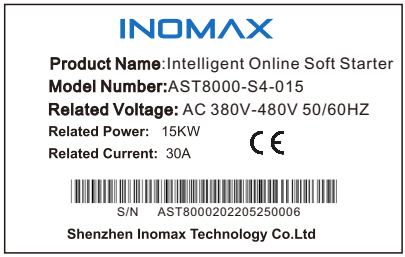
Motor overload protection characteristics

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

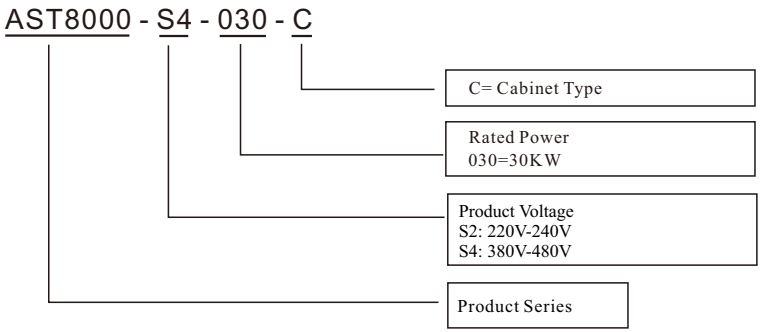
∞：Indicates no action

General technical data

Name Plate



Model code



Model List

Model No.	Voltage	Power	Current (A)	Product Size (mm)			Weight
	(V)	(KW)	(A)	W	D	H	Kg
220V-240V 3phase input 3 phase output 50/60HZ							
AST8000-S2-7.5	220V-240V	7.5KW	32A	105	168.5	240	3.5 kg
AST8000-S2-011	220V-240V	11KW	45A	105	168.5	240	3.5kg
AST8000-S2-015	220V-240V	15KW	60A	105	168.5	240	3.5kg
AST8000-S2-18.5	220V-240V	18.5KW	75A	105	168.5	240	3.5kg
AST8000-S2-022	220V-240V	22KW	90A	135	184.5	282.5	6.2kg
AST8000-S2-030	220V-240V	30KW	110A	135	184.5	282.5	6.3kg
AST8000-S2-037	220V-240V	37KW	150A	135	184.5	282.5	6.4kg
AST8000-S2-045	220V-240V	45KW	180A	190	224.5	370.5	10kg
AST8000-S2-055	220V-240V	55KW	220A	190	224.5	370.5	10kg
AST8000-S2-075	220V-240V	75KW	320A	225	243	393	13kg

Model No.	Voltage	Power	Current (A)	Product Size (mm)			Weight
	(V)	(KW)	(A)	W	D	H	Kg
380V-480V 3phase input 3 phase output 50/60HZ							
AST8000-S4-7.5	380V-480V	7.5KW	15A	105	168.5	240	3.5kg
AST8000-S4-011	380V-480V	11KW	23A	105	168.5	240	3.5kg
AST8000-S4-015	380V-480V	15KW	30A	105	168.5	240	3.5kg
AST8000-S4-18.5	380V-480V	18.5KW	37A	105	168.5	240	3.5kg
AST8000-S4-022	380V-480V	22KW	45A	105	168.5	240	3.5kg
AST8000-S4-030	380V-480V	30KW	60A	105	168.5	240	3.5kg
AST8000-S4-037	380V-480V	37KW	75A	105	168.5	240	3.5kg
AST8000-S4-045	380V-480V	45KW	90A	135	184.5	282.5	6.2kg
AST8000-S4-055	380V-480V	55KW	110A	135	184.5	282.5	6.3kg
AST8000-S4-075	380V-480V	75KW	150A	135	184.5	282.5	6.4kg
AST8000-S4-090	380V-480V	90KW	180A	190	224.5	370.5	10kg
AST8000-S4-115	380V-480V	115KW	230A	190	224.5	370.5	10kg
AST8000-S4-132	380V-480V	132KW	264A	225	243	393	10kg
AST8000-S4-160	380V-480V	160KW	320A	225	243	393	13kg
AST8000-S4-185	380V-480V	185KW	370A	225	243	393	13kg
AST8000-S4-200	380V-480V	200KW	400A	225	243	393	13kg
AST8000-S4-220	380V-480V	220KW	425A	390	294	677	39kg
AST8000-S4-250	380V-480V	250KW	500A	390	294	677	39kg
AST8000-S4-280	380V-480V	280KW	560A	390	294	677	39kg
AST8000-S4-320	380V-480V	320KW	630A	390	294	677	45kg

Model List for cabinet type soft starters

Model No.	Voltage	Power	Current (A)	Product Size (mm)			Weight
	(V)	(KW)	(A)	W	D	H	Kg
380V-480V cabinet soft starters 3phase input 3 phase output 50/60HZ							
AST8000-S4-7.5-C	380V-480V	7.5KW	15A	312	320	681	14.5kg
AST8000-S4-011-C	380V-480V	11KW	23A	312	320	681	14.5kg
AST8000-S4-015-C	380V-480V	15KW	30A	312	320	681	14.5kg
AST8000-S4-18.5-C	380V-480V	18.5KW	37A	312	320	681	14.5kg
AST8000-S4-022-C	380V-480V	22KW	45A	312	320	681	14.5kg
AST8000-S4-030-C	380V-480V	30KW	60A	312	320	681	14.5kg
AST8000-S4-037-C	380V-480V	37KW	75A	312	320	681	16.6kg
AST8000-S4-045-C	380V-480V	45KW	90A	312	320	681	16.6kg
AST8000-S4-055-C	380V-480V	55KW	110A	312	320	681	16.6kg
AST8000-S4-075-C	380V-480V	75KW	150A	312	320	681	16.6kg
AST8000-S4-090-C	380V-480V	90KW	180A	400	380	850	28kg
AST8000-S4-115-C	380V-480V	115KW	230A	400	380	850	28kg
AST8000-S4-132-C	380V-480V	132KW	264A	500	400	1200	28kg
AST8000-S4-160-C	380V-480V	160KW	320A	500	400	1200	41.5kg
AST8000-S4-185-C	380V-480V	185KW	370A	500	400	1200	41.5kg
AST8000-S4-200-C	380V-480V	200KW	400A	500	400	1200	41.5kg
AST8000-S4-220-C	380V-480V	220KW	425A	680	420	1400	87kg
AST8000-S4-250-C	380V-480V	250KW	500A	680	420	1400	87kg
AST8000-S4-280-C	380V-480V	280KW	560A	680	420	1400	87kg
AST8000-S4-320-C	380V-480V	320KW	630A	680	420	1400	87kg

INOMAX

Build your trust of technology from China

SHENZHEN INOMAX TECHNOLOGY CO.LTD

Address: Ideal Science and Technology Park,
Guanlan Avenue, Longhua District, Shenzhen,
Guangdong, China

Tel: 0086-75521002258
Fax: 0086-75521002258
E-mail:info@inomaxtechnology.com
Websit:www.inomaxtechnology.com