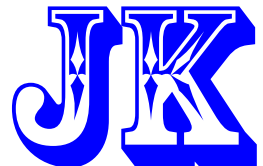




**Soft Starter Pump Motor Controller of SP series.**

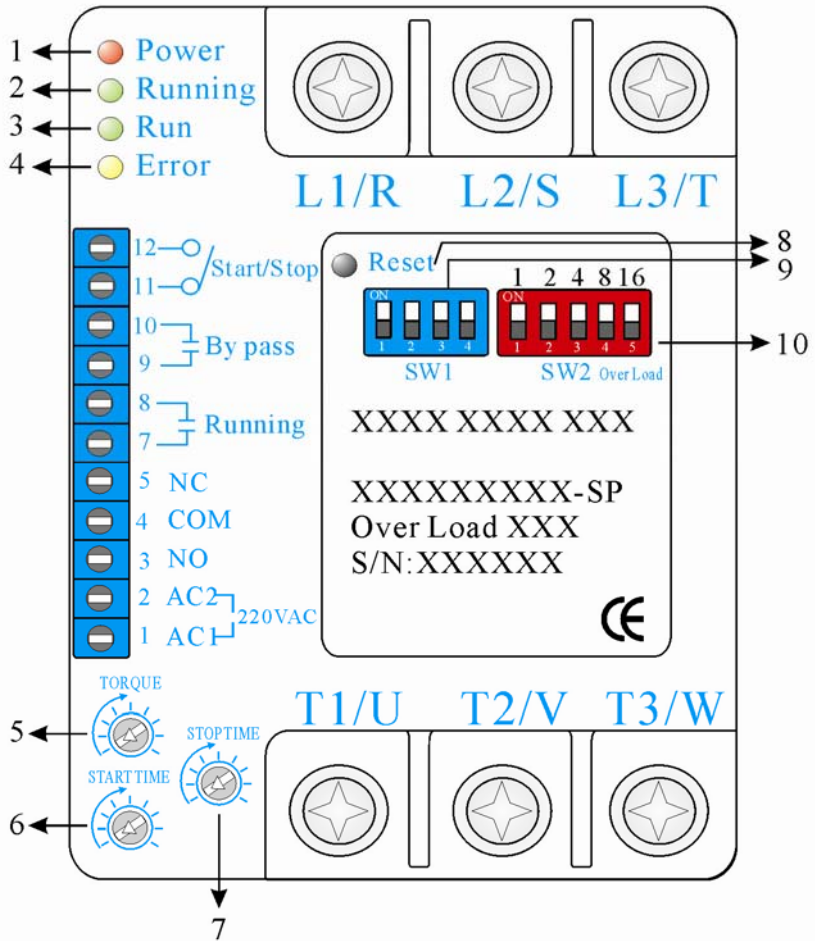
**Handbook**



# ***Content***

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# I. Instruction of faceplate and function:



- 1. Indication light of auxiliary power.
- 2. Indication light of in starting, in running, and in soft stopping.
- 3. Indication light of starting done.
- 4. Indication light of error.
- 5. Torque starting (100 ~ 500 %)
- 6. Start time (1S. ~ 40S.)
- 7. Stop time (1S. ~ 60S.)
- 8. Reset.
- 9. SW1: The function choosing.
- 10. SW2: overload current settings.

## Introduction:

1. Power: (Indication light ON when connecting with auxiliary power (AC1, AC2), 220 VAC 50/60Hz (auto-judging).
2. Running: Indication light ON in starting, running, and soft-stopping.
3. Run: Indication light ON when starting done.
4. Error: Including indication lights of
  - “Overload” : When the motor overstep the rated current, SMC-SP start protection.
  - “Loss Phase ” : Main power supply loss of one-phase or two-phase or three-phase power.
  - “Motor Block” : Motor of a foreign body clog, causing the current increase, can not function properly.
  - “Overheat of SMC-SP” : SMC-SP heat sink temperature reaches 80 to 90°C , exceed the security value.
  - “low-load” : Motor lack of water can be transported.
5. Start torque: Adjustment of torque when motor starting.
6. Start time: Adjustment of motor start time to decide the time of full-starting.
7. Stop time: Time adjustment of motor soft-stop to decide the time of motor stopping.



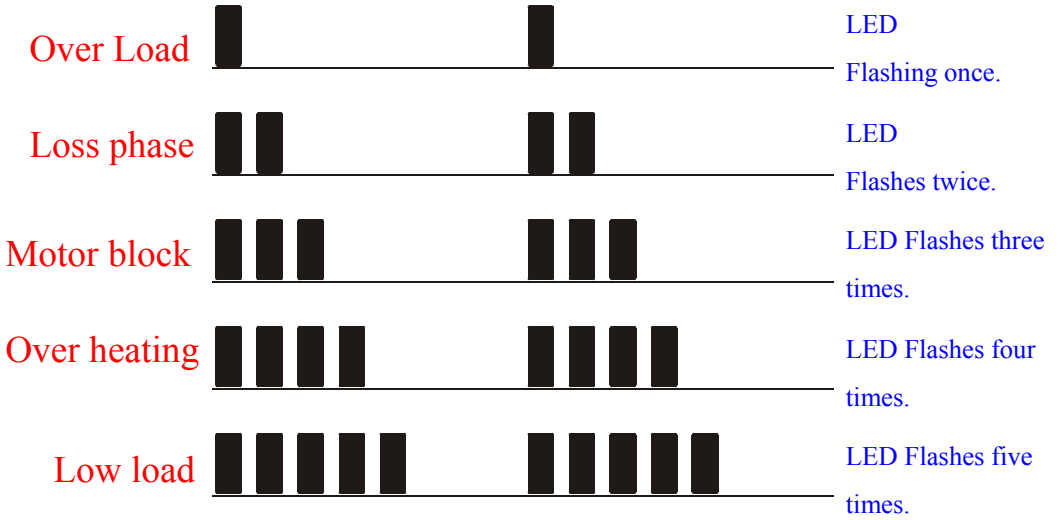
## Q & A

**Q:** How to reset if error light ON and the trouble had been removed?

**A:** Please check error light of condition of overload, loss phase, motor block, overheat of SMC-SP or low-load, then removed the error, and press reset key.

# Instruction of error light :

This controller has 5 protection systems show as follows:



Light OFF when no error happened.



Light ON, and glimmered as 5 phases when error happened.



Glimmering once : **protection of overload.**

(Glimmering time is 3 sec. till next glimmering.)



Glimmering twice : **protection of loss phase.**

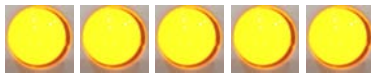


Glimmering 3 times :  
**Protection of motor block.**

(Glimmering every 0.25 sec. till error removed.)



Glimmering 4 times : **Protection of product overheat.**



Glimmering 5 times : **Protection of low-load**, no setting when ex-factory, please adjust various function settings of SW1 if protection of low-load necessary. Please read the instruction at P.11 and P.12 for reference.

## **II. General characteristic**

1. This controller offers 3 sets of output contact : output contact when starting, output contact when running done, and output contact of system error.
2. Diagnosis of LED : There' CT electronic detecting protector with the protection of overload, under phase, motor block, machine overheat, low-load ( water shortage).
3. the movement of cooling fan can stabilize the temperature, the heat sink will run at  $55^{\circ}\text{C}$  , and stop at  $45^{\circ}\text{C}$  , and this can extend 2 ~ 3 times use-life of heat sink.
4. This product offers loop design of BY PASS.
5. This product tally with the standard of CE, IEC60947-4-2, IEC60947-4-1, etc.

6. The SMC-SP softstarter is the first compact softstarter. It is developed in close cooperation with customers to ensure that the product solves all the important needs of the customers.

The SMC-SP softstarter is ideal for any applications where space is limited, but where advanced functionality still is required. It is suitable for most of the common applications such as pumps, fans, compressors, conveyor belts and more.

### 7. Easy

One of the most important features of any electrical device is that it is easy to set up and easy to use. The SMC-SP softstarter is equipped with an easy-to-use two sets DIP switch and faceplate have three knobs.

### 8. Reliable

The SMC-SP softstarter is not only designed to ensure an exceptional reliability. It has also been equipped with features to ensure that the whole operation is kept reliable. As an example, torque control eliminates water hammering and thereby greatly reduces the mechanical stress on pump systems and provides a more reliable operation with less downtime.

## 9. Efficient

Knowing what the customer want, it has been possible to design a softstarter that really fulfils the needs of the customers, without adding unwanted complexity. This gives excellent value for money and together with the by-pass for energy saving makes the SMC-SP softstarter a very efficient choice.

## 10. Protect

Overload protect.

Loss Phase protect.

Motor block protect.

Overheat protect of SMC-SP.

Low-load protect.

### III. Technical specification:

Main power: 208 ~ 220 VAC / 380 ~ 480 VAC  $\pm$  10%

Auxiliary voltage: 220 VAC  $\pm$ 10 % 【offer 110VAC for choice, please tell salesman if necessary.】

Starting model: dry contact 【11, 12 two contacts】

Working frequency: 50 ~ 60 Hz  $\pm$  5 %

Peak pressure: 600V or 1200V ~ 1600 VAC

Start Time: 1~40Sec.

Start Torque: 100%~500%

Stop Time: 1~60Sec.

Room temperature of working: -10°C ~50°C ◦

Max. Relative humidity : 93% without water drop concealed.



Please check motor HP and rated current; please choose the value higher if both are different.

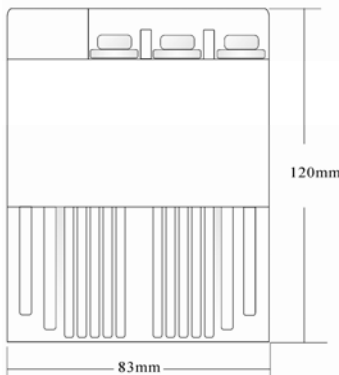
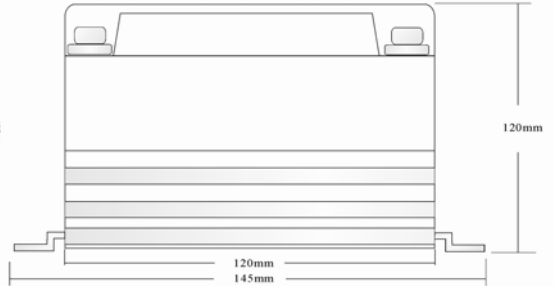
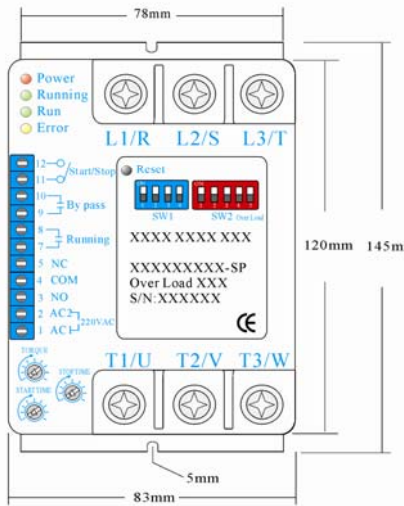
Example : Rated current of motor 220V/2HP is 9A, please use 220V/3HP SMC920030-SP soft starter.



# IV.Choice the model:

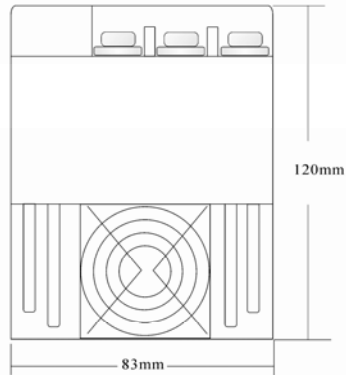
Rated current	Rated voltage			
	208~220VAC	HP	380~480VAC	HP
4A			SMC930020-SP	2HP
7A	SMC920020-SP	2HP	SMC930030-SP	3HP
10 A	SMC920030-SP	3HP	SMC930050-SP	5 HP
15 A	SMC920050-SP	5 HP	SMC930075-SP	7.5 HP
22 A	SMC920075-SP	7.5 HP	SMC930100-SP	10 HP
28 A	SMC920100-SP	10 HP	SMC930150-SP	15 HP

Size:



無風扇系統:  
208~220VAC/ 2HP  
380~440VAC/2HP, 3HP  
460~480VAC/2HP, 3HP

System without fans.



風扇系統:  
208~220VAC/ 3HP, 5HP, 7.5 HP, 10HP  
380~440VAC/5HP, 7.5HP, 10HP, 15HP  
460~480VAC/5HP, 7.5HP, 10HP, 15HP

System with fans.

## **V. Warning of installation:**

1. Ventilation and cooling : SMC-SP must be operated at the place well ventilated and cool, and pay attention to the room temperature not rise over  $50^{\circ}\text{C}$  and less than  $-10^{\circ}\text{C}$ .
2. This product is designed to start 12 times/hr., if the starter times over the 12 times/hr., please improve the level of soft starter to use, because the heat sink's temperature will over to  $85^{\circ}\text{C}$ . This will result in temperatures in excess of silicon-controlled rectifier to reduce the life or cause failure.
3. Please check and make sure the right wiring sequence when give the power to machine test : input end is R.S.T., output end is U.V.W. The trouble caused by error wiring of input and output should not include in our guarantee.
4. SMC-SP soft start must be installed at the place well ventilated and cool, so please pay attention to the air flow direction when install, and keep at least 10 cm with other tools or instrument to cool.
5. The top and bottom of the control box should open the mouth for cool air enter through bottom mouth and hot air out from top mouth; and please add filter net on the mouth to avoid dust and impurities stuck the mouth; and clean the filter net regularly.  
( figure 1 at page 17)
6. Please add fan if the temperature in the box over  $45^{\circ}\text{C}$  to improve air circulation and keep the temperature in the box under  $45^{\circ}\text{C}$ , and this will give the best running.
7. The setting of full load current is designed as 380V of ex-factory for our product of 380-480V, please let's know and change the settings in advance if install in the place with 440 ~ 480V. Otherwise it'll lose the meaning to overload without overload protection, therefore please pay attention to the settings.
8. The rated current of our soft start is in accordance with TECO four-pole motor's current. To the motor used; please check the rated current listed in the catalogue if full-load current is different from TECO motor's load current (over 10%). 1 level must be rose to work when actual current is over 10%.
9. The soft start can't work if it has input auxiliary power (220VAC or 110VAC) only without main power input.
10. Load (motor) starter can't be controlled by soft start time knob (Start fast) when the big difference generated between soft start overload current settings and actual running current.

Examples: Motor 380VAC/ 10HP current is 20A.

Overload set value is 40A; this situation has no protection to the motor, lead to an instant when it starters up at full load condition, no soft-starter function. This time need to adjust the overload protection setting values to the normal state. [Details on page 16.](#)

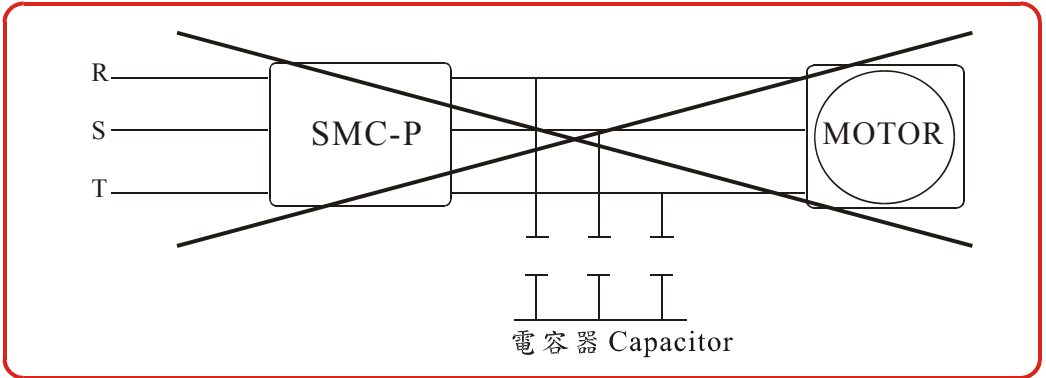


Please confirm again the voltage used is same as the auxiliary power marked on soft start when installation (eg : 220V can't be used for 380V.....and so on.), and all load current can't be over soft start's rated current.

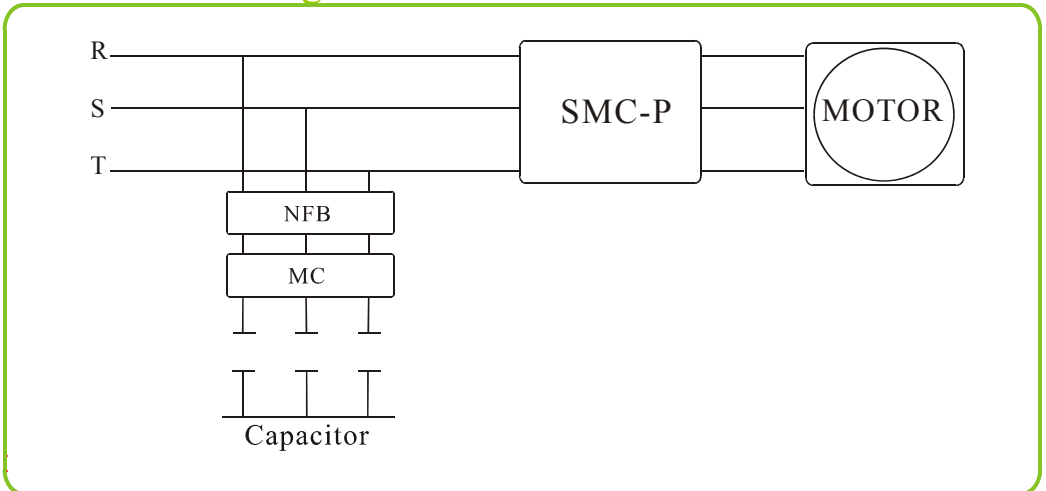
Please install the condenser next to soft start's R.S.T. when install soft start if the motor itself has the condenser to improve power factor, because the soft start trouble will be caused by installing condenser next to U.V.W.

(The trouble caused by error installing soft start next to U.V.W. is not included in our guarantee.)

## Error connection of capacitor.



## Right connection of condenser



### Warning :

For the security of maintainers, please OFF the power before check or disassembly the protection module mentioned above; please change a new one if he module failure, and maintain regularly.

## VI. Application and Setting:

1. Application of SMC-SP for pump : This product is designed specially for water pump with water hammer caused, suitable to water system of building pumping, sewage, waste water, farmland, factory, .....etc., the effect will be more excellent when lift is higher.
2. The torque and time will be adjusted depend on motor load type. It can be classified as big load inertia and small load inertia. We recommend setting the initial settings as start torque value – 260% and starting time - 20 sec. when we don't know the load value, and add or reduce torque with actual running.
3. In any condition, the soft start will running with full pressure when motor arrives full-speed running.

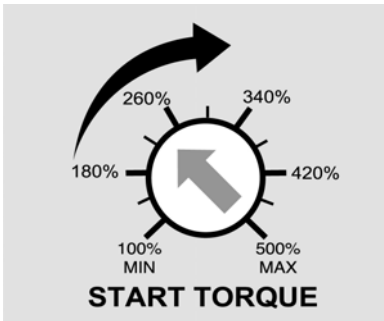


Motor start slow or fast depends on the adjustment of start torque.  
The time of motor's full-pressure start depends on the adjustment of start time.

The stop time of motor soft start depends on the adjustment of stop time.

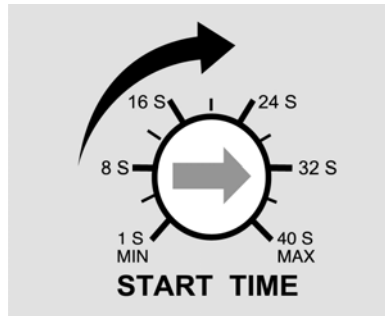
Soft start pump motor controller in the operation, all the features of the settings are nullity, please complete before starting to set or set to restart.

### Start Torque



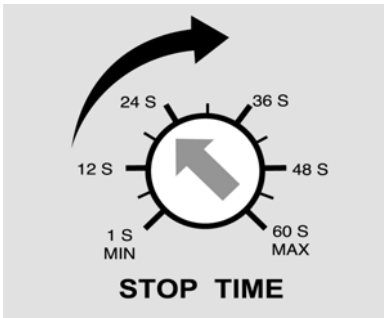
(P.1)

### Start Time



(P.2)

### Stop Time

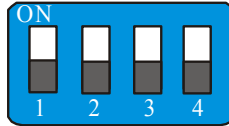


(P.3)

## VII. Function settings (SW1)

1. Slope start:

Push down 1, (1 OFF).

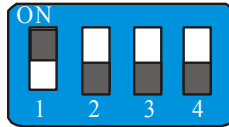


SW1

You can refer to page 20 of the curve description.

2. Limit current start:

Push up 1, (1 ON).

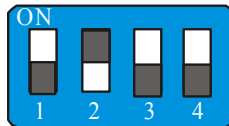


SW1

You can refer to page 20 of the curve description.

3. Torque start:

Push up 2, (2 ON),  
push down (2 OFF)  
cancel function.

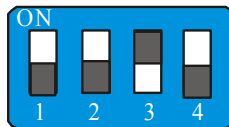


SW1

You can refer to page 20 of the curve description.

4. Low load check:

Push up 3, (3 ON),  
push down (3 OFF)  
cancel function.

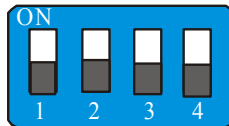


SW1

Motor lack of water check.

5. Overload current  
multiple 0.5 time:

Push down 4, (4 OFF).

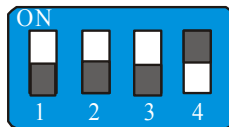


SW1

0.5time. With the use of the page 13 and page 14.

6.Overload current  
multiple 1 time:

Push up 4, (4 ON).



SW1

1 time. With the use of the page 13 and page 14

## Details of the location:

### Torque function open.

Torque starter mode: when the motor starts to vibrate, resulting in SMC-SP to differentiate the overload protection, turn on this function can be normal starter the motor, SMC-SP no erroneous differentiate, resulting in protection mode.

### Limit current function open.

This function will not usually be used to, because the slope starter to meet varied of environments.

This function depends on the starter torque settings, example:

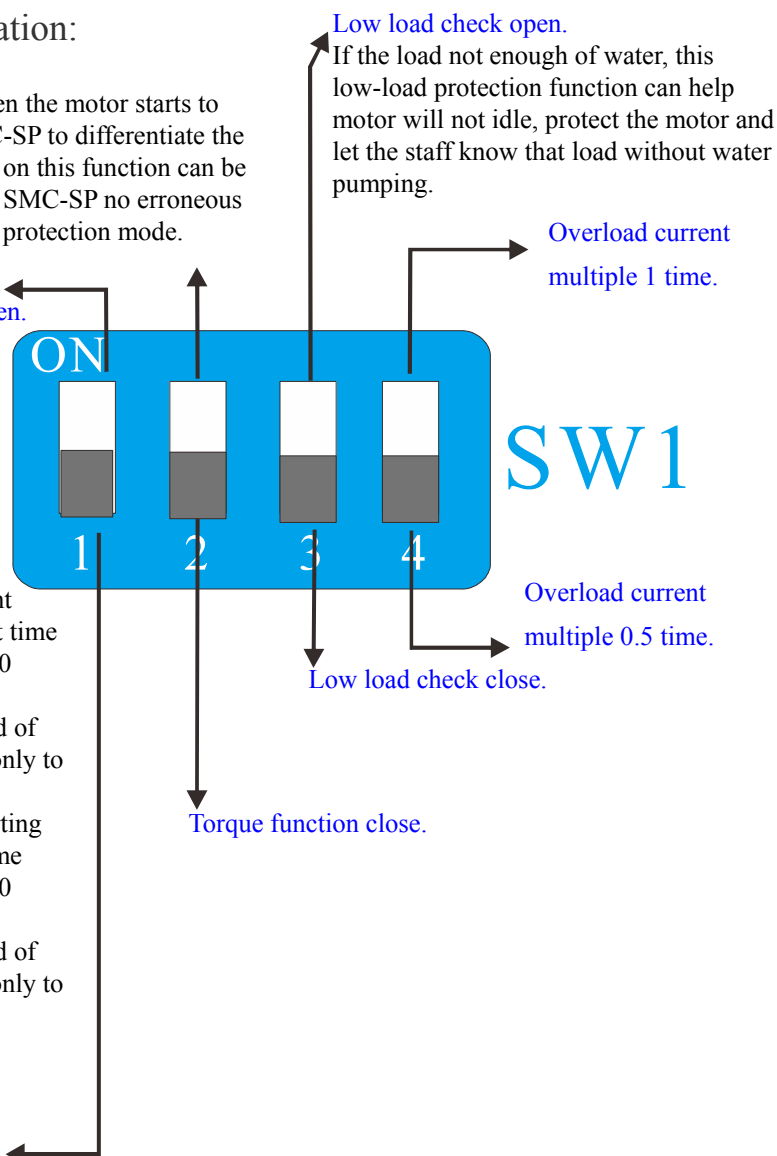
(1) Start torque adjustment to 300% (12 o'clock), but time must be a maximum of 40 seconds, the motor (380VAC/20HP) full load of 30A, maximum current only to 90A.

(2) adjusted to 400% starting torque (2 o'clock), but time must be a maximum of 40 seconds, the motor (380VAC/20HP) full load of 30A, maximum current only to 120A.

### Slope function open.

Slope starter model and Limit current starter model just only can be choose one model.

This function applies to varied of environmental load, soft starter and soft stop.



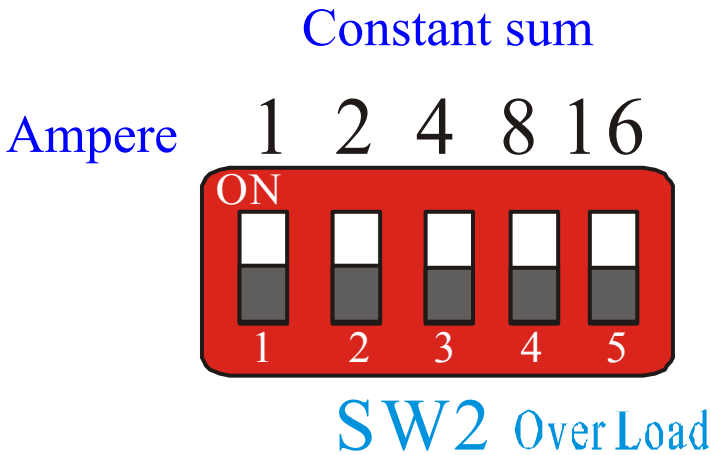
## VIII. Explanation of overload current settings:

The reasons of speed start and speed stop caused when use pump motor professional soft start are a follows:

1. Motor running current is less than pump soft start current set over 30%.
2. Motor load is less much than soft start.  
Eg. : motor load is 1 HP, and soft start is 10 HP.
3. Actual motor load is same soft start, but the difference between motor running current set and soft start is over 30%.

Must adjust overload current of soft start same as 1.2 times of full load current of motor S phases running.

Setting of overload current ampere (SW2):



Annotate 1: If you measure V phase full load electric current it is 30A, must be multiplied by safety coefficient of 1.2 times, equal 36A, go to setting overload amperage.

Annotate 2: The aforesaid setting and is only suitable for using under 220V/40HP and 380V/75HP, if exceed horsepower of this range, please get in touch with the distributor or our company technical staff as quickly as possible.



1. Ampere setting of soft start overload current is as follows:

ON (up)  $2A+4A+8A=14A$

2. Please check ex-factory standard overload current setting list at [page.16](#) of manual for reference.

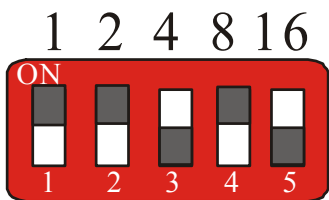
# IX. Ex-factory standard overload current setting:

HP	220V	Times	380V~480V	Times
2HP	9A/18	0.5 time	5.5A/11	0.5 time
3HP	11A/22	0.5 time	9A/18	0.5 time
5 HP	18A	1	12A/24	0.5 time
7.5 HP	26A	1	17A	1 time
10 HP	33A/30	1.1 time✘	24A	1 time
15 HP			28A	1 time



✘ Immobile multiple, can not adjust.

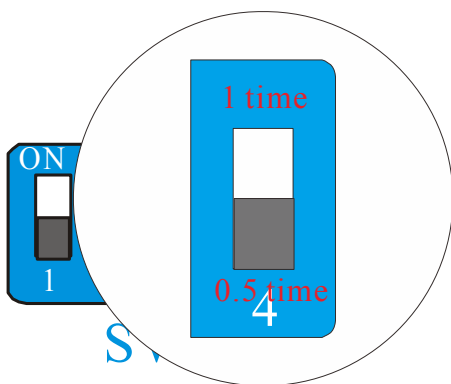
Example: motor is 380V~480V/2HP, setting ampere is 11A, and multiple is 0.5 time equal 5.5A:



SW2 Over Load

$$1A + 2A + 8A = 11A$$

1(1A), 2(2A) and 4(8A) First, second and fourth pin push up, equal 11 ampere.



Fourth pin need push down, and then multiple 0.5 time function is open.

$$11A \times 0.5 \text{ time} = 5.5A$$

## Recommendation of motor overload current setting:

1. Full load current showed on motor's nameplate  $\times 1.1$ .
2. Please check current of motor's S phase with hook table, then the current  $\times 1.2$  to set.

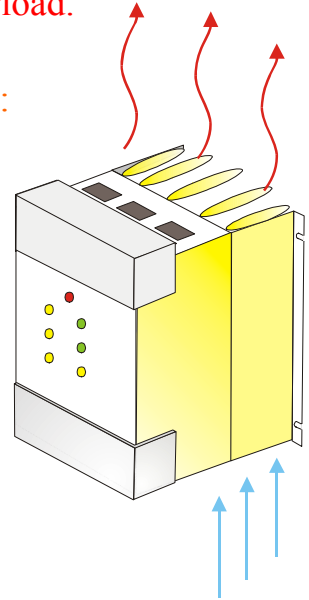
**【Please confirm motor isn't overload or full load first according to this setting.】**

**Warning :** Please pay attention to motor's running current never be over than rated current limited of soft start itself when use pump soft start. It doesn't include in our guarantee if overload.

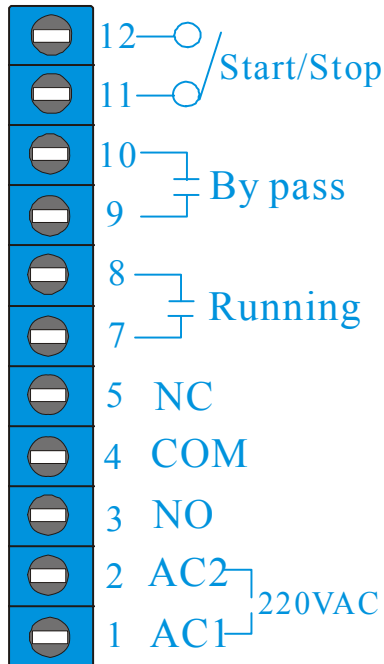
## Explanation of Installation :

Please install the product with this direction, in order to let cool air enter from bottom, and hot air comes out from top. Please add filter net to avoid dust or impurities blocked if the control box has holes, and clean the net regularly to avoid the net blocking.

Fig.1:



## X. Annotation of control contact function:



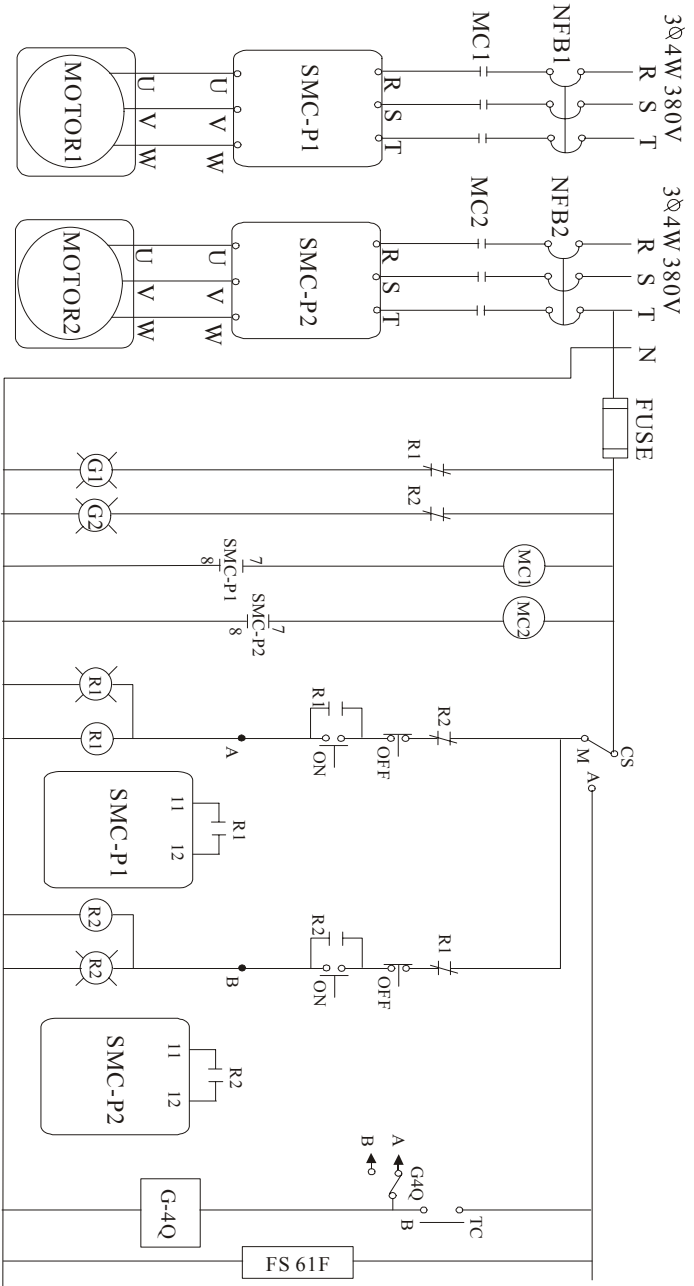
1. AC1 、 AC2(1, 2): Connect with 220VAC auxiliary power.
2. NO 、 COM 、 NC(3, 4, 5,): Error output contact (capacity of output contact 240VAC/5A)
3. RUNNING(7, 8): Output contact will be close often from open often when soft start starts running, it also can be output contact of remote monitoring.
4. BY PASS(Run , 9, 10): The output contact will be close often from open often when soft start done, it also can be used of by pass.
5. START/STOP(11 、 12): Contacts of start and stop, input contact of soft start starting, open close is stop running, and close often I start running.



The capacity of item 3, 4, 5 output contact is 240VAC/5A.

# XI. General control diagram suggested:

Water tray only of alternating running control diagram (1 to 1) recommended of SMC pump.



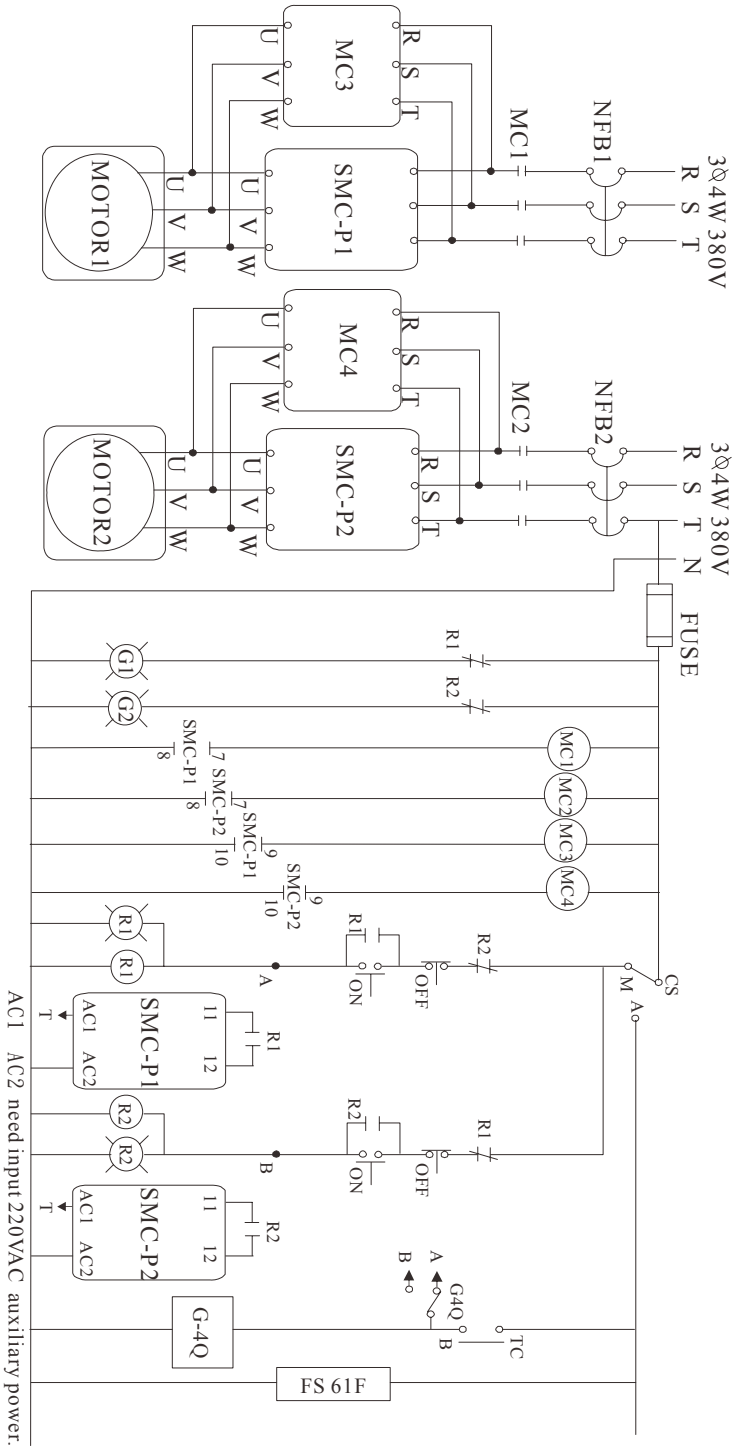
SMC-P Soft Start Pump Motor Controller

AC1, AC2: Input 220VAC auxiliary voltage. FS 61F: liquid surface controller.

G4Q: Ratchet Relay. CS: auto/manual switch.

All contacts are dry contact.

MC isolation switch and By Pass, a motor versus to a soft starter, running alternately proposed control charts.



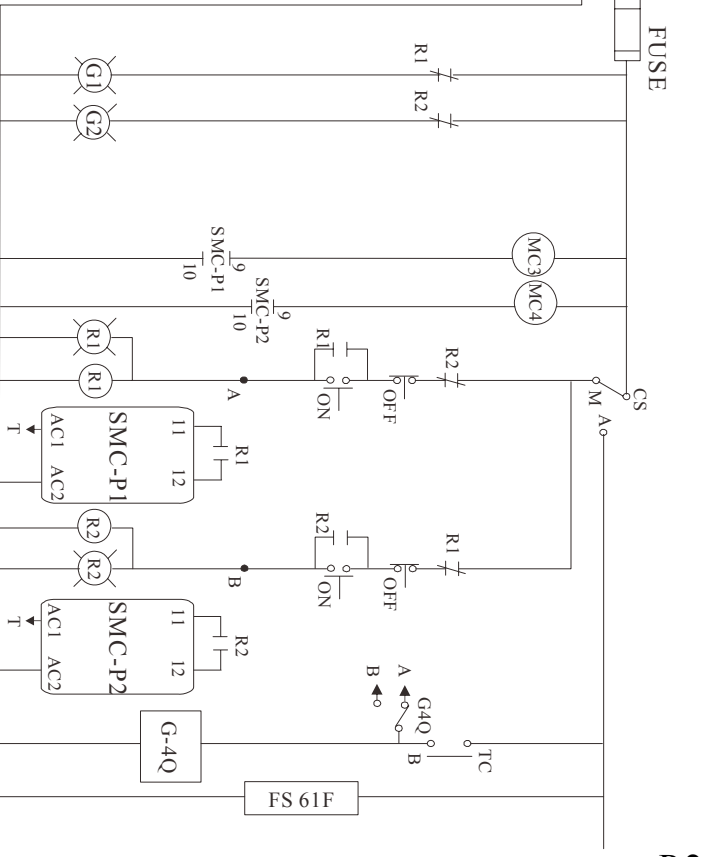
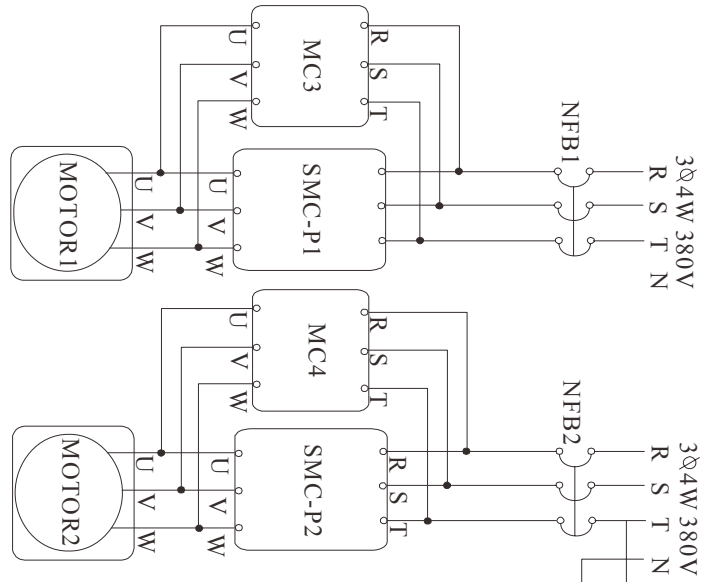
**SMC-P Soft Start Pump Motor Controller**

AC1, AC2: Input 220VAC auxiliary voltage. FS 61F: liquid surface controller.

G4Q: Ratchet Relay. CS: auto/manual switch.

All contacts are dry contact.

By Pass, a motor versus to a soft starter, running alternately proposed control charts.



AC1 AC2 need input 220VAC auxiliary power.

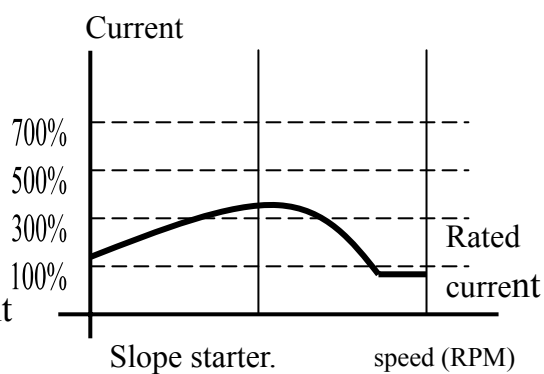
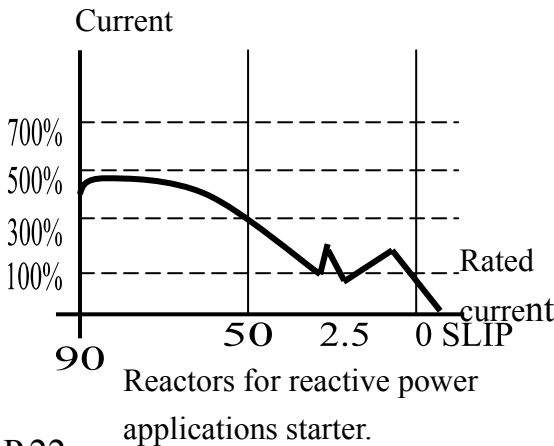
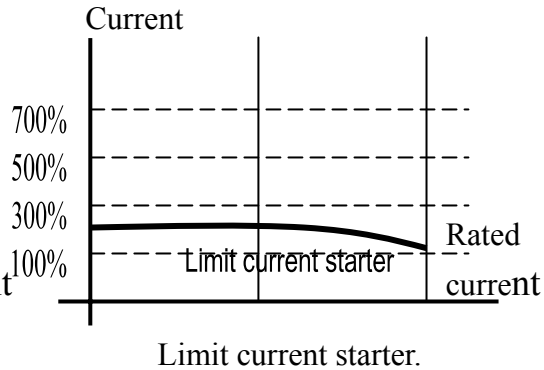
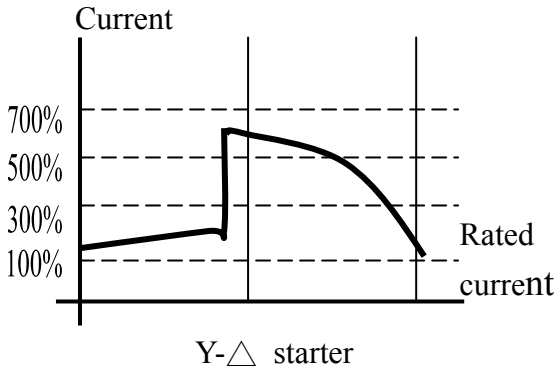
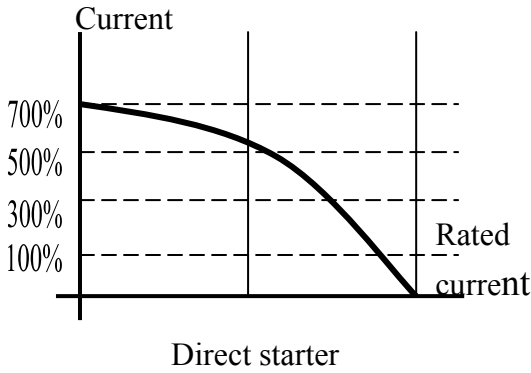
### SMC-P Soft Start Pump Motor Controller

AC1, AC2: Input 220VAC auxiliary voltage. FS 61F: liquid surface controller.

G4Q: Ratchet Relay. CS: auto/manual switch.

All contacts are dry contact.

Comparison between SMC, direct starting an Y- $\Delta$  start current:





## XII. Environmental characteristics.

Operation position	No corrosive gas and dust
Working position	Vertical
Relative humidity	45%↑, 93 RH without water drop
Room temperature of working	-10 ~ 45°C
Frequency	50 Hz or 60 Hz auto adjusting
3Ø power, voltage	208~220VAC <sup>+10%</sup> 380~480VAC <sup>+10%</sup>
vibration	↓ 0.5G
Height	↓ 1000 M
Voltage indicated on motor nameplate	200~240V , 380~440V , 460~480V

### **XIII. Attention.**

1. This product has the function of overload protection. Please check voltage of motor, (ex: 220V, 380V, 440V...etc.) and full voltage of motor listed similar as the voltage listed in our catalogue (in principle, error can be -20%~+5%), and write on the order if plan to raise the class in order to setting before leaving the plant, or also can as overload protector by yourself.

E.G.: Please let's know what you use SMC100HP in motor 75HP or add overload protector.

2. Concerning our product of 380v~440V, the 380v is full current standard setting when leaving the plant, please let's know what you use 440v. In order to, change setting before leaving the plant. Otherwise, the overload function will lose efficacy. It become without overload protection. When you use it, you should pay attention reference of manual.

3. Our company SMC-P electric current setting value, environment temperature is less than 45°C in Centigrade, can operate for a long time. But need to pay attention if motor starting times are high frequently, the SMC-P must raise one level.



Annotate 1: An hour is started 20 or more times or heat sink temperature exceeds 85°C Centigrade, need upgrading.

## XIV. Product guarantee



We guarantee that our products are conformed to each specification list on the manual; the product can be operating normally with suitable and proper installation.

Warranty : one year from the date of production. We shall offer free maintenance if our product has any flaw certainly within warranty period. The warranty doesn't include error installation, man-made damage, and the damage caused by irresistible natural disasters.

**This guarantee offer repair guarantee of the product only, not includes other damage caused by any direct or indirect accidents.**

Model No. :	<input type="checkbox"/> SMC92 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -SP		
	<input type="checkbox"/> SMC93 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -SP		
Serial No. :	S/N:		
Date of Installation:	Month:	Date:	Year:
Agent:			



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