



Soft Start Motor Controller (Soft Starter)

PTLK-SMC series Instruction Manual



220VAC Class	3 Φ	3~40Hp
380VAC Class	3 Φ	3~75Hp

Preface

Thanks for your purchase of PTLK-SMC soft starters.

This is a general instruction manual for the following PTLK-SMC models.

220VAC class: PTLK-SMC-20030 ~ PTLK-SMC-20400

380VAC class: PTLK-SMC-40030 ~ PTLK-SMC-40750

Please read this manual carefully before attempting to install, setup, operate, maintain or troubleshoot a PTLK-SMC soft starter. It's recommended to keep this manual in secure and convenient place for future reference.

DISCLAIMER

UNLESS SPECIFICALLY AGREED TO IN WRITING PTLK INTERNATIONAL LTD.:

(A) MAKES NO WARRANTY AS TO THE ACCURACY, SUFFICIENCY OR SUITABILITY OF ANY TECHNICAL, OR OTHER INFORMATION PROVIDED IN ITS MANUALS OR OTHER DOCUMENTATION.

(B) ASSUMES NO RESPONSIBILITY OR LIABILITY FOR LOSS OR DAMAGE, WHETHER DIRECT, INDIRECT, CONSEQUENTIAL OR INCIDENTAL, WHICH MIGHT ARISE OUT OF THE USE OF SUCH INFORMATION. THE USE OF ANY SUCH INFORMATION WILL BE ENTIRELY AT THE USER'S RISK.

■ RECEIVING

The PTLK-SMC soft starter has been put through severe tests at the factory before shipment. After receipt and unpacking, however, please check and make sure the following.

- (1) The nameplate data of soft starter meets your requirements.
- (2) The device has sustained with no damage while in transit.
- (3) Fastened bolts and screws are not loose.

■ STORAGE

If the device is temporarily stored or stops operating for an extended length of time, the following precautions should be taken.

LOCATION

Store the device under the following conditions.

- (1) Free from rainfall and drops of water
- (2) Clean and dry
- (3) Free from corrosive gases and liquids
- (4) Free from dirt and dust
- (5) Ambient temperature: $-10^{\circ}\text{C} \sim 50^{\circ}\text{C}$
- (6) Free from vibration

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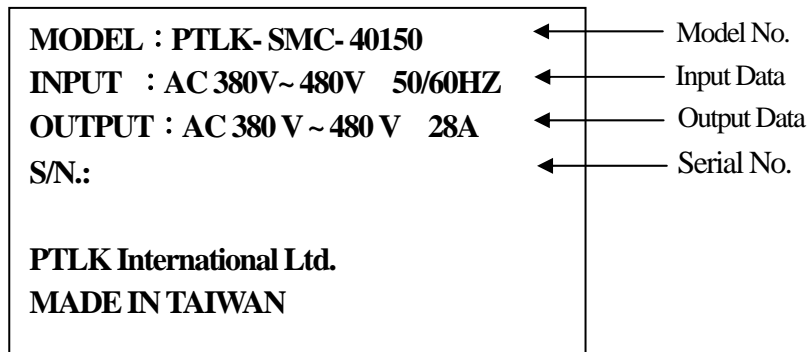
I. Feature Highlights

1. Adjustable torque and time: To make starting smoothly and stably.
2. No contact switch: To avoid the industrial danger caused by spark as well as tear and wear problem.
3. Easy wiring: Installation of 3-phase in, 3-phase out to motor, and the availability of connecting to PLC.
4. Built-in CT electronic protector: To provide motor safety protection for overload, phase failure, motor block, and overheat.
5. Support KICK START & CONSTANT CURRENT START
6. SCR control: Six SCRs with 3 phase/3 wires to transform control power.
7. Cooling fans with temperature control: the heat sink works at 55°C, and stops at 45°C, which can extend use-life of fans 2-3 times.
8. LED indicators: to monitor the status of running condition, self-diagnosis of breakdown, and power status.
9. " By PASS " Circuit terminal is available.
10. Meets CE, and IEC60947-4-2 standards.

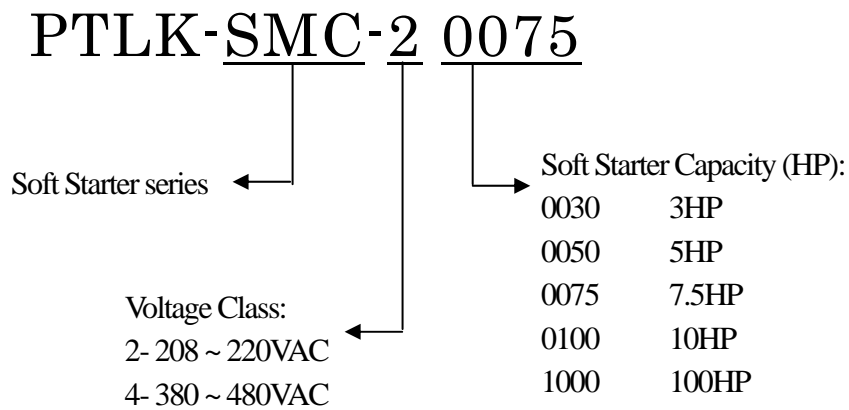
II. General Specification

2-1. Product Identification

(1). Nameplate



(2). Model Explanation



2-2. General Specification

Rated main power voltage:	220/380~480VAC \pm 10%
Control voltage:	220VAC \pm 15% (factory setting)
Start Mode:	Dry contact (contacts 11 and 12)
Operation Frequency:	50 / 60 Hz \pm 5%
Peak Voltage:	600VAC or 1200VAC ~ 1600VAC
Start time:	1 ~ 40 seconds
Torque adjustment:	100 ~ 500%
Operation temperature:	- 10°C ~ 50°C
Max. Relative humidity:	93 % RH without dew.

III. PTLK-SMC Models

PTLK offers an extensive and comprehensive line of soft starter for various industrial applications.

Rated current	Rated voltage	HP	Rated voltage	HP
	208~220VAC		380~480VAC	
7A			PTLK-SMC-40030	3HP
10A	PTLK-SMC-20030	3HP	PTLK-SMC-40050	5HP
15A	PTLK-SMC-20050	5HP	PTLK-SMC-40075	7.5HP
22A	PTLK-SMC-20075	7.5HP	PTLK-SMC-40100	10HP
28A	PTLK-SMC-20100	10HP	PTLK-SMC-40150	15HP
35A			PTLK-SMC-40200	20HP
42A	PTLK-SMC-20150	15HP	PTLK-SMC-40250	25HP
55A	PTLK-SMC-20200	20HP	PTLK-SMC-40300	30HP
70A	PTLK-SMC-20250	25HP	PTLK-SMC-40400	40HP
82A	PTLK-SMC-20300	30HP	PTLK-SMC-40500	50HP
105A	PTLK-SMC-20400	40HP	PTLK-SMC-40600	60HP
135A	PTLK-SMC-20500	50HP	PTLK-SMC-40750	75HP
155A	PTLK-SMC-20600	60HP	PTLK-SMC-41000	100HP
185A	PTLK-SMC-20750	75HP	PTLK-SMC-41250	125HP
250A	PTLK-SMC-21000	100HP	PTLK-SMC-41500	150HP
280A			PTLK-SMC-41750	175HP
300A	PTLK-SMC-21250	125HP	PTLK-SMC-42000	200HP
360A	PTLK-SMC-21500	150HP	PTLK-SMC-42500	250HP
420A	PTLK-SMC-21750	175HP	PTLK-SMC-43000	300HP

IV. Installation

4-1. Environment Specification


Operation position:	Indoor without dust and corrosive air.
Work position:	Vertical.
Relative humidity:	under 93% RH without dew.
Operation temperature:	-10°C ~ under 50°C.
Frequency:	50Hz or 60Hz , auto-adjust.
Power, 3-phase voltage:	220VAC \pm 10% 380VAC~480VAC \pm 10%
Vibration:	Under 0.5G
Height:	Under 1,000m.
Rated voltage on motor nameplate	200V~240V, 380V~440V, 460V~480V.


4-2. Ventilation and Cooling.

- (1). PTLK-SMC soft starter must be installed at the place with good ventilation, and the temperature of the place can't be higher than 50°C, and lower than -10°C.
- (2). Do install one (or more) cooling fan if necessary for best operation performance of soft starter.
- (3). When mounting the soft starter in control box or enclosure, keep 10 cm away from the other device(s) for better cooling.

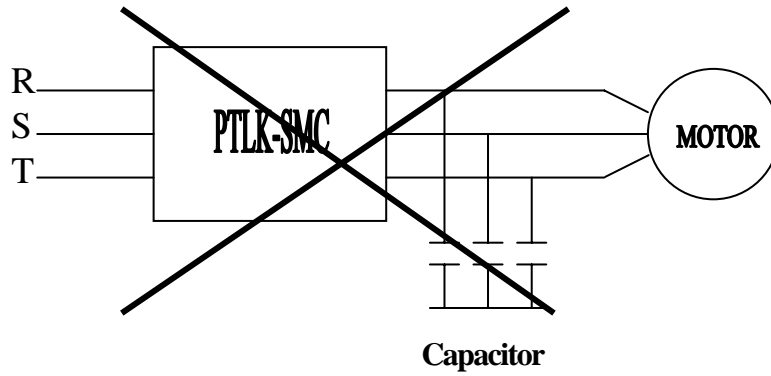
4-3. Installation Notice:

- (3). PTLK-SMC soft starter is designed to stand starting 20 times per hour equally. If startings of soft starter application are more than 20 times per hour, we suggest adopting 1 class higher model with larger capacity of PTLK-SMC soft starter.
- (4). When wiring, please note that the input terminals are R.S.T., and output terminals are U.V.W. Never connect AC power supply to the output terminals of U.V.W. by mistake.
- (5). Please make sure no voltage input is applied to start contacts 11, and 12 of PTLK-SMC soft starter. Dry contact start is required to the device.
- (6). When installing PTLK-SMC soft starter in the control box or enclosure, please make sure there are vents on top and bottom of control box or enclosure in order to let cool air in from bottom vent, and hot air out of top vent. Also please place the filter on the top vent to prevent dust or waste in, and do clean the filter regularly for better circulation.
- (7). When use PTLK-SMC soft starter, we suggest to install an electromagnetic contactor for isolation, which makes soft starter circuit and electric function can be switched off completely to ensure safety. Otherwise, a warning plate is required.

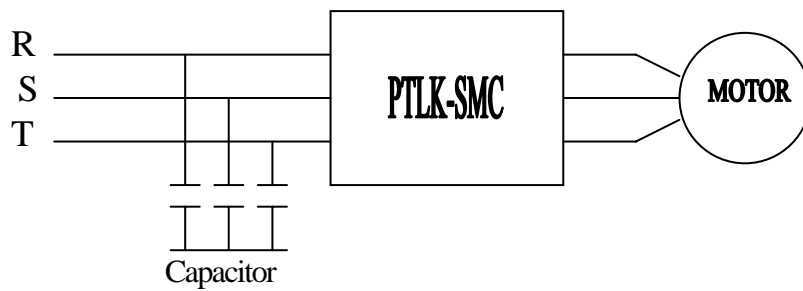
 Always confirm the power supply voltage is the same as the voltage listed on the soft starter (ex: 220V can't be applied by 380V). And also need to make sure the loading current does not exceed the rated current.

 When motor itself has capacitor for power factor improvement on PTLK-SMC soft starter, the capacitor must be installed on the soft starter input (R.S.T).

Wrong connection of the capacitor.

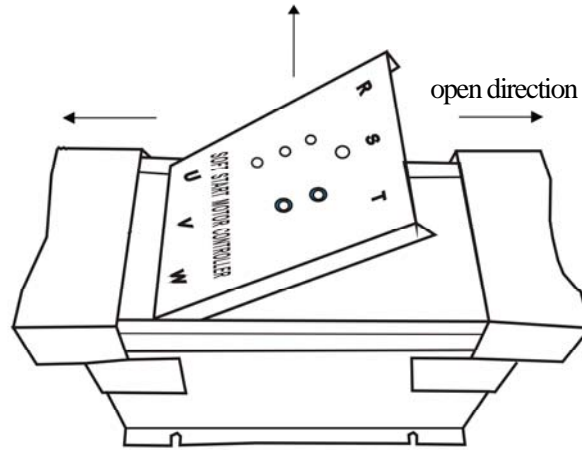


Correct connection of the capacitor.

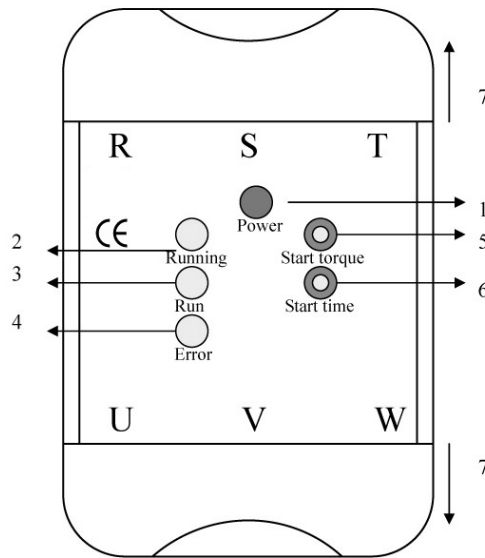


V. Operator Panel and Description

5-1. Operator Panel



Open Covers of PTLK-SMC Soft Starter



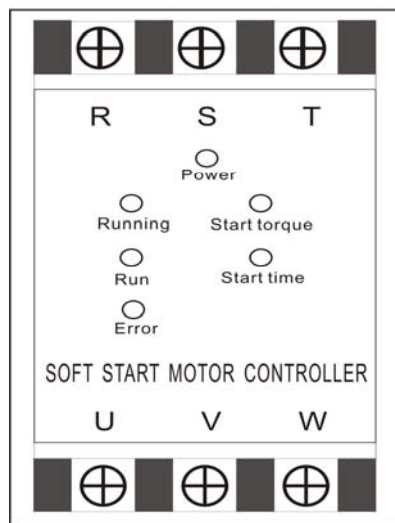
Functions of Operator Panel

5-2. The Description of Operator Functions

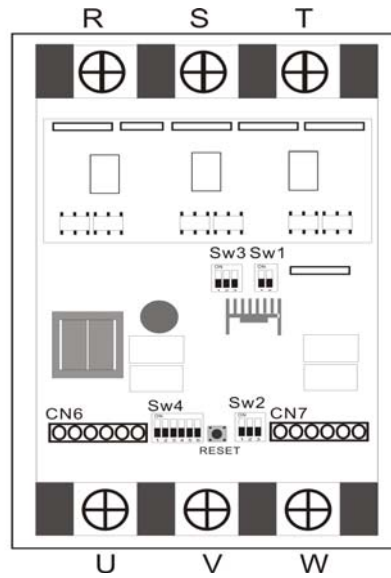
- (1). Power (Power Indicator):
when AC1 , AC2 is charged by AC 220V 50/60 Hz, the light will be on.
- (2). Running : light on when starting, operating, and stopping.
- (3). Run : light on when the starting is completed
- (4). Error : light on when
 - overload, phase loss, motor block, overheat happens
 - the inspection is abnormal
- (5). Start torque (100%~500%): Determine the initial value of voltage
- (6). Start Time (1S.~40S.): Determine how long the starting is completed
- (7). Slide covers: Can open to the directions as indicated.
- (8). Open operator panel: Slide covers need to open first, in order to lift up the panel following the open direction indicated in the picture on P.7.

VI. Introduction of Internal PTLK-SMC

6-1 Illustration of Operator and Internal Soft Starter



Operator Panel



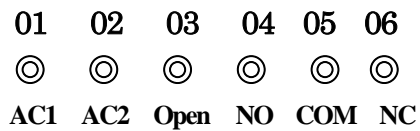
Internal PTLK-SMC Soft Starter

6-2. Main Circuit Terminal

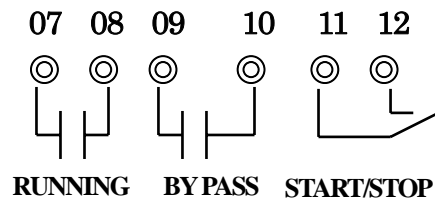
- R S T : Main power source input
- U V W : Motor load

6-3. Control Circuit Terminal

CN6:



CN7:



6-4. Contacts

Contact	Description
AC1, AC2 (01, 02)	system control power source input, Voltage AC 220V or 110V
Open (03) :	Empty.
NO, COM, NC (04, 05, 06)	abnormal output contacts (Max. 240 VAC/10A)
Running (07, 08)	When starting, output contact can change from 1A to 1B. (Max. 240VAC/5A) Can be used for remote monitor purpose.
By Pass (09,10)	When starting completes, output contact can change from 1A to 1B. (Max. 240VAC/5A) Can be used for By Pass purpose.
Start / Stop (11, 12)	Starting/stopping control

6-5. Switch Selection:

- SW1 (in blue): Torque control
- SW2 (in red): Various kinds of starting mode
- SW3 (in blue): Set multiplier of overload current
- SW4 (in red): Set the amperage of overload current

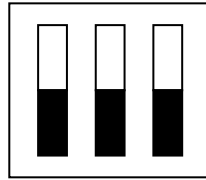


Note: In order to configure parameters of SW1~4, please open slide covers of soft starter first and then lift up LED panel as indicated on 5-1.

VII. Starting Methods

There are three kinds of Starting methods available to PTLK-SMC Soft starter. Please configure **SW2** as described below for your choice of starting method.

7-1. Slope Starting



1 2 3 down.

1 2 3

* general motor selection

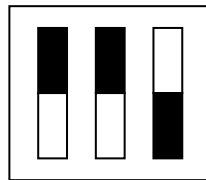
7-2. Constant Current Starting.



1 up, 2 3 down.

1 2 3

7-3. Constant Current Starting plus Kick Start.



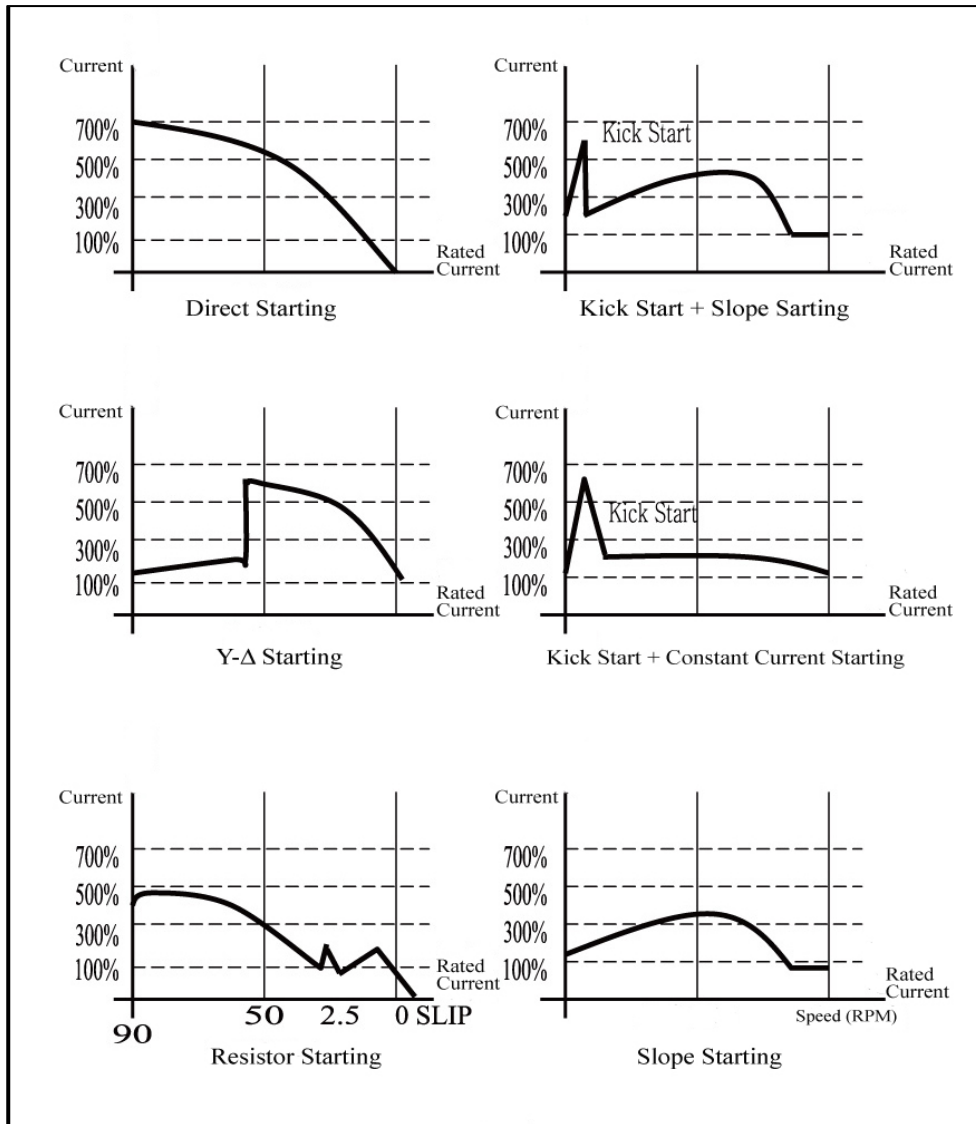
1 2 up, 3 down.

1 2 3

VIII. Comparison of Soft Start and Other Starts

Other Start:

Soft Start:



IX. Application and Setup of PTLK-SMC

9-1. The adjustment of start time and torque of PTLK-SMC soft starter depends on both the load and the inertia measurement of motor.

9-2. Adjust torque and time of PTLK-SMC based on the actual requirement of motor load.

First adjust torque (clockwise, torque increase; counterclockwise, torque decrease). If the motor starts smoothly, then adjust TIME till motor is not buzzing to get correct start time.

9-3. PTLK-SMC soft starter supports soft KICT START, or Constant Current Starting, or use both start methods together for the machine that requires big inertia and needs linear start, e.g.: blower.

9-4 If motor load is not available, we suggest using Start Torque value 260% and Start Time value 20 S (20 seconds) as initial values, and then adjust both Start Torque and Start time based on actual operation situation.

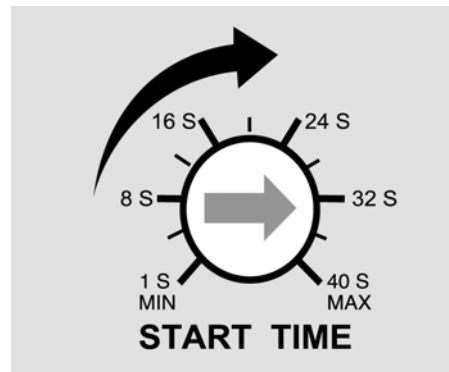
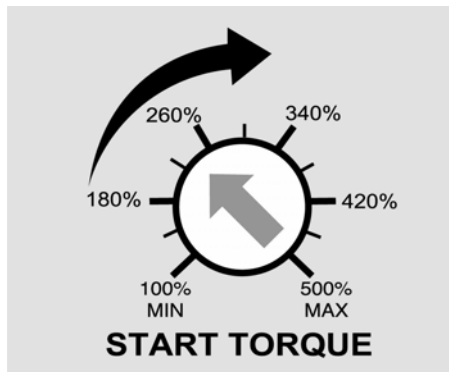
9-5. When motor reaches the full running speed based on the setting of Start Time of soft starter, soft starter will provide full voltage to motor.

(1). Start Torque adjustment: Can decide whether motor starts slowly or fast.

(2). Start Time adjustment: Can decide when motor will start at full voltage.

9-6. Start Torque and Start Time knobs

- (1). Start Torque knob: The setting of initial torque setting
- (2). Start Time knob: The setting of soft starting time



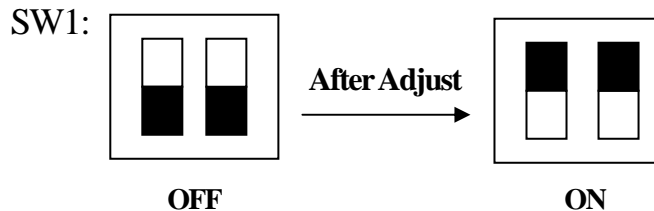
Note: All adjusted value must be configured prior to start. And the re-start is required after the adjustment is done. The adjustment is invalid during the starting procedure.

X. The Setting and and Adjustment of Overload Current

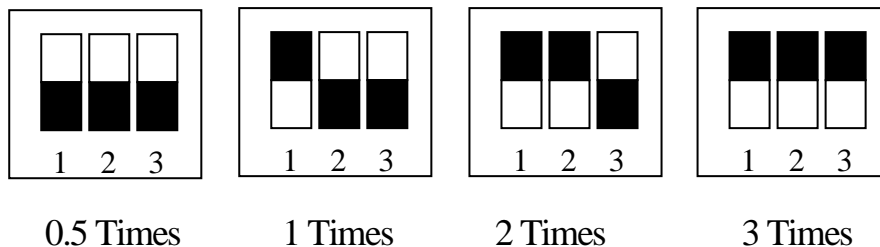
10-1. If "soft starter" starts /stops frequently while in use, please purchase the model with one level higher of capacity for better operation and protection.

10-2. The following are steps to adjust overload current settings of PTLK-SMC soft starter.

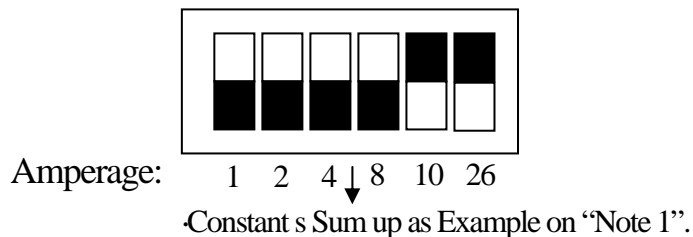
- (1). Auto-Torque detection: Default setting is OFF. If the motor is shaking while starting, please set SW1 to ON as below:



- (2). Set up the multiplier of overload current (**SW3**) as follows:



- (3). Set up the Amperage of overload current (**SW4**) as follows:





Note 1: If measured full current of U phase of soft starter is 30A, then multiply this value by 1.2 to get 36A as overload Amperage value. Set the overload Amperage to 36A (10 and 26 of SW4 set ON).



Note 2: This setting method is only suitable for 220V/40HP and 380V/75HP below. If the capacity exceeds, please consult distributor or our technical.

XI. Standard Factory Setting of Overload Current

HP	220V	Multiplier	380V	Multiplier	440V	Multiplier	480V	Multiplier
10HP	28A	1						
15HP	42A	1	26A	1	46A	0.5	40A	0.5
20HP	28A	2	32A	1	28A	1	26A	1
25HP	36A	2	42A	1	38A	1	34A	1
30HP	40A	2	26A	2	46A	2	42A	1
40HP	36A	3	34A	2	30A	2	28A	2
50HP			42A	2	38A	2	34A	2
60HP			46A	2	42A	2	36A	2
75HP			40A	3	36A	3	48A	3

Recommended setup for motor overload current :

1. Multiply the fully load current of the motor nameplate by 1.1
2. If the fully load current of motor is unavailable, please measure the S phase of the motor with electric meters and multiply the value by 1.2



Note: The recommended setup method 2. is valid only when the motor is neither overloaded nor fully loaded.

XII. Fault Message and Troubleshooting:


12-1. There are four types of protections in the machine.

1.  a
Overload LED flash once.

Troubleshooting: Please refer to The Setting of Overload Current on page 15-17.

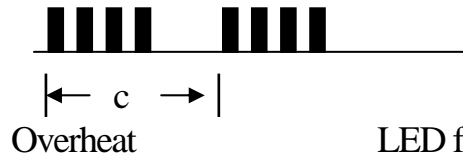
2.  b
Loss phase LED flash twice.

Troubleshooting: Please check power supply, and check whether to install the mistake in proper order in motor load or not.

3. 
Motor seize LED flash three times.

Troubleshooting: Check whether the motor is seized, or is vibrating while starting, Please refer to 10-3 Auto-Torque Detection on page 15.

4.



Troubleshooting: Please check the Ventilation and Cooling of installation location. Please refer to the details of 4-2 Ventilation and Cooling on P.5.



a: Flash cycle time is 0.25 Sec.

b: Flash cycle time is 0.25 Sec.

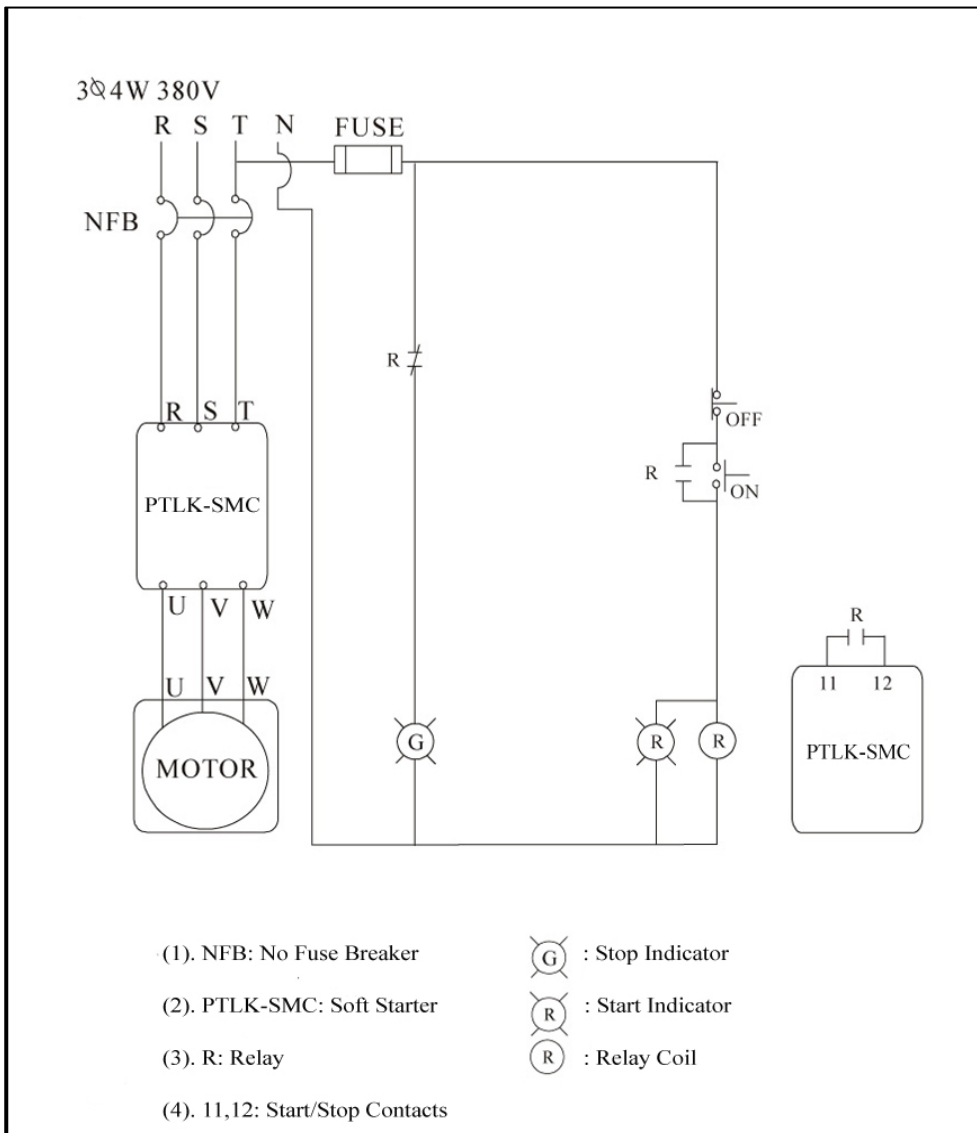
c: One abnormal cycle time is 3 Sec.

12-2. **Reset** the Error Indication light?

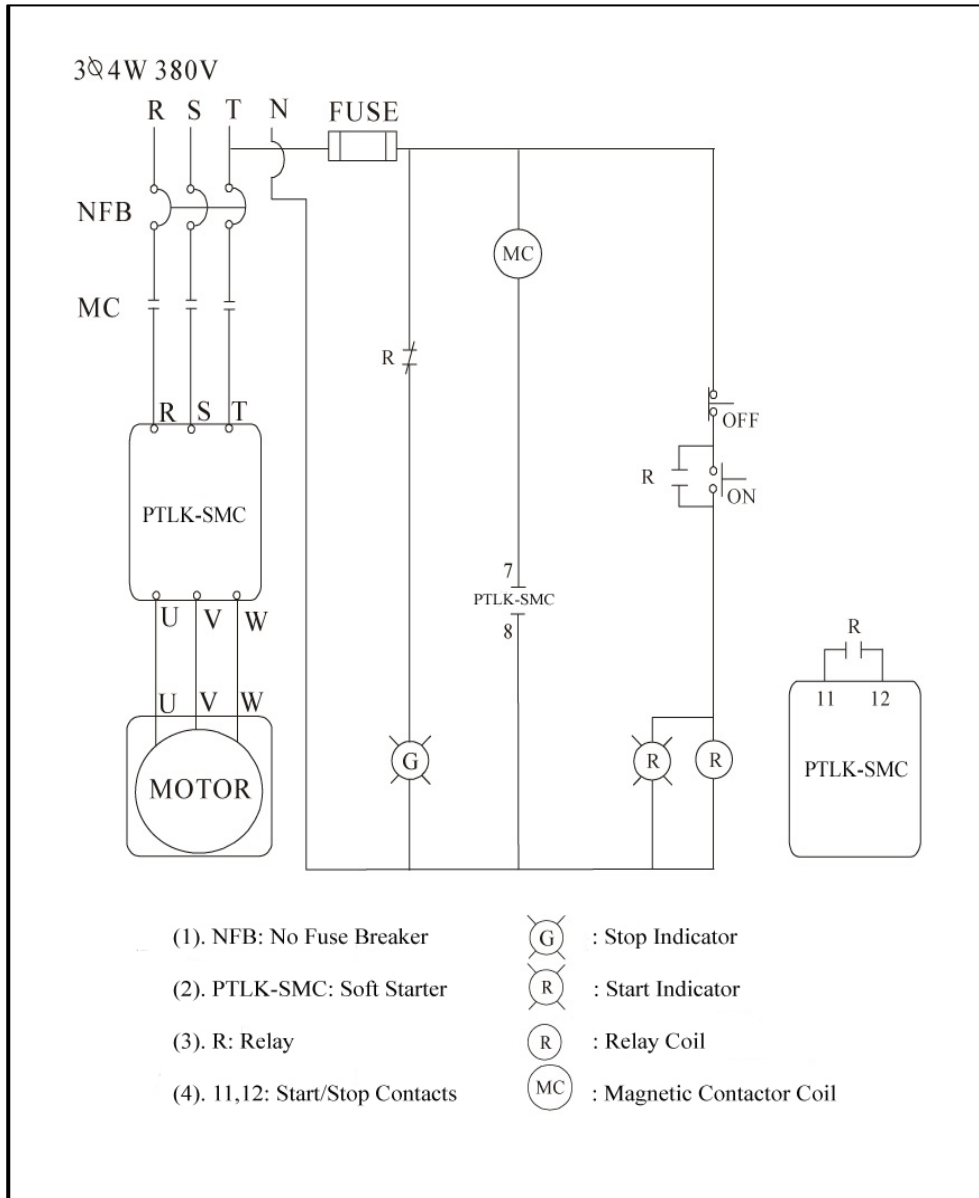
First make sure the error light on is due to overload, phase loss, motor seize, or overheating. Find the cause and eliminate the fault. And then press the **Reset** button between switches SW2 and SW4 once to reset the error indicator.

XIII. Examples of Soft Starter Application

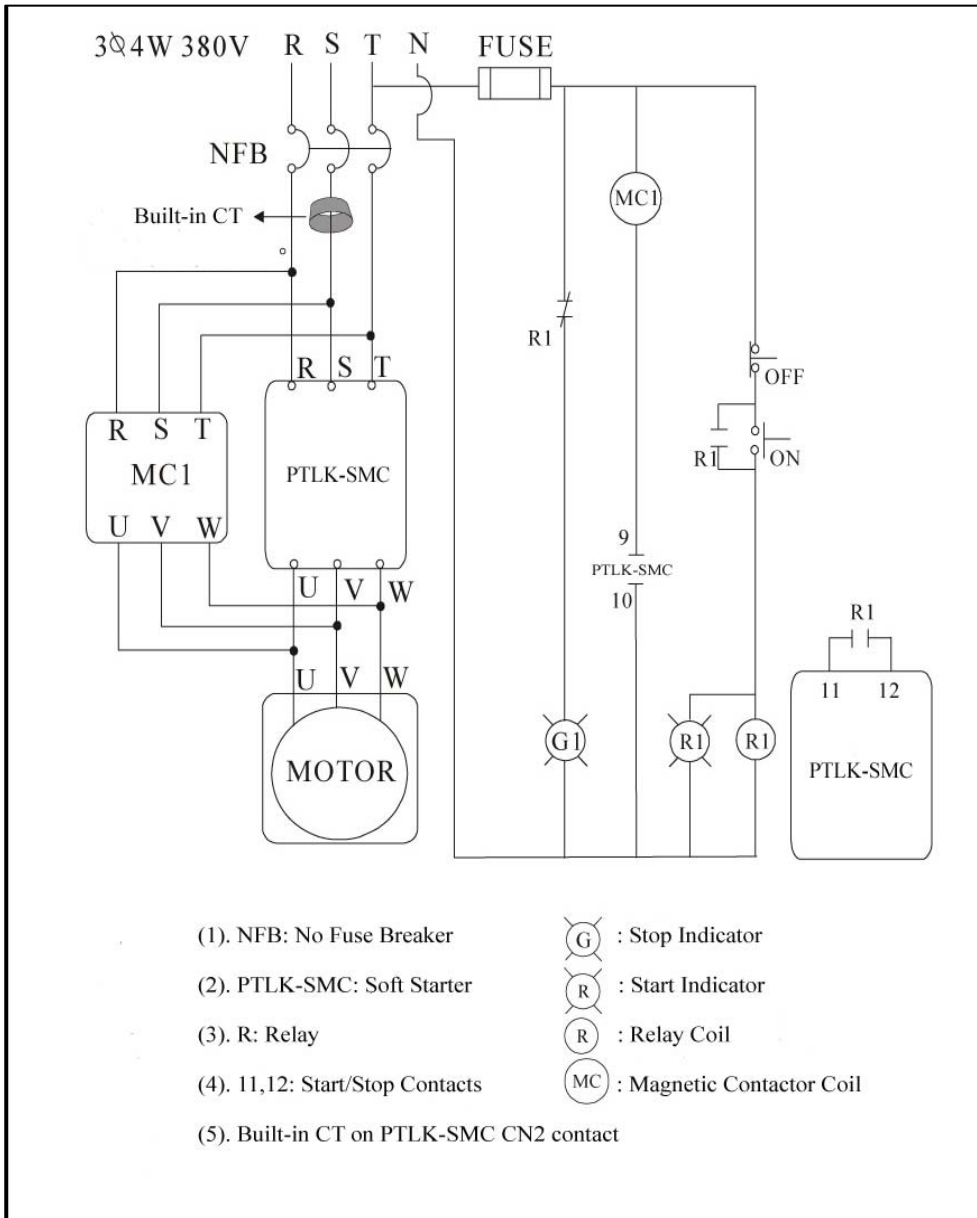
13-1. Standard connection diagram



13-2. Connection diagram with MC



13-3. Connection Diagram with By Pass



XIV. Warranty

PTLK provides one-year (1) limited warranty (“Warranty”) against defects in materials and workmanship for its soft starter products (“Products”) if installed in fixed location applications.

Warranty term: This product guarantee for one year starting from when the product leaves the factory.

The warranty does not apply to any Product or Product part that has been modified or damaged by wrong installation, artificial destroy, or damage caused by irresistible natural disaster.

PTLK’s liability for any defective Product, or any Product part, shall be limited to the repair or replacement of the Product, at PTLK’s discretion. PTLK is not responsible for the assurance of the damaged responsibility for any direct or indirect accident result.

This Warranty does not cover the costs of installation, removal, both-way shipping, tax, duties or reinstallation of Products

◇ AC Motor Drive ◆ Soft Starter

PTLK International Ltd.
www.ptlk.com.tw