




# SOFT STARTER

## INSTRUCTION MANUAL

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REL.	DATE	Verification and Approval R.T.

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# 1 - INTRODUCTION

SMS Sistemi e Microsistemi s.r.l. thanks for purchasing SOFT STARTER. This device is installed both in hydraulic lifts and in rope lifts and it reduces the value of the starting current. With SOFT STARTER, in hydraulic lifts (with acceleration time of 1.2 second) the starting current is 2 times the rated current as maximum, but tests carried out have confirmed that the starting current can decrease up to 1.2 times the rated current; with some type of motors; in the traction lifts (with acceleration time of 3 seconds) you can have a starting current about 3 times the rated current.

# 2 - OPTIONALS

For SOFT STARTER the following optionals are available:

- cooling fan (recommended for big sizes)
- E.M.C. filter kit (be installed externally, in series to the mains power, for the codes SST100S4ND, SST100S4NL, SST140S4ND, SST140S4NL, SST160S4ND, SST160S4NL, SST160S5FD, SST160S5FL)
- IP20 protection case
- current control kit
- Fuse kit to protect power components (SCR)

# 3 - CURRENT LIMIT OPERATION

SOFT STARTER without current control, regulates the supply voltage of the motor, starting from the value fixed with the regulation of the trimmer ST and bringing the voltage to the rated value in the time fixed from trimmer ACC (SMS fixes the time at 1.2 second).

SOFT STARTER with the current control, besides the voltage, also checks the current delivered to the motor. In this way, after fixing the value of the ACC and ST (usually the ST is at the minimum value), the device works as a current regulator, that is the voltage is slowly bringing to the rated value, without getting over the LIM trimmer setting. But using the device in this way the starting time became greater than the case without current limit, for example: to have the minimum current starting (LIM trimmer completely turns anticlockwise) the starting time can reach few seconds.

N.B. to have a good operation of SOFT STARTER with current control, it is **ESSENTIAL** to use the departure electrovalve in the pump unit. The drive of this electrovalve is provided from SOFT STARTER through the contact of the relay RL2 at the terminals 1-2-3 of M2.

# 4 – ELECTRIC INSTALLATION

## 4.1 – Preliminary instructions

Make the link of the SOFT STARTER following one of the shown possibility, and pay attention to the instructions:

- Check that the main voltage corresponds to the SOFT STARTER operating voltage. To adjust the SOFT STARTER to different voltage, you need to move the selection bridge on the terminal K1: 220V (for voltage between 200V and 240V) or 380V (for voltage between 340V and 420V) .
- SOFT STARTER hasn't got any protection inside against a short-circuit on the motor. To protect SCRs, you have to connect 3 super-fast fuses between the AC main circuit power supply and input terminals L1-L2-L3, one for each phase. The recommended fuse type is shown in the following table:

SOFT STARTER (kW)	FUSES (A)
40	140
55	190
75	250

The fuse kit, included protection box, can be supplied on request (see par.2).

- Connect SOFT STARTER to the earth terminal through the suitable terminal.

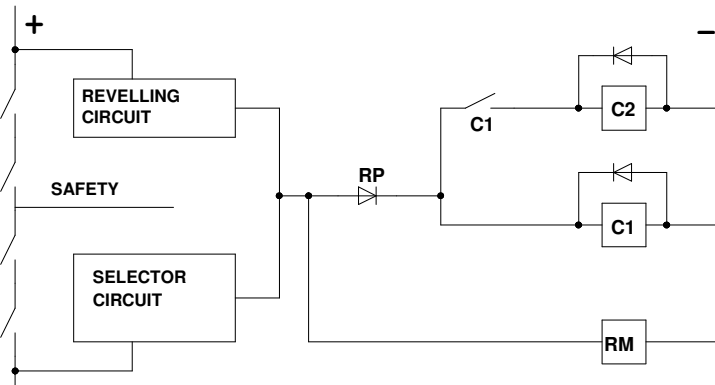
- SOFT STARTER doesn't need auxiliary commands, but if you want to reduce the wear and tear of the power contactor's contact it is necessary to take away the connection between the terminals 1-2 of M1 terminal board and connect the ON/OFF (RM) contact. This contact must be closed at the start , and open about 50 thousand seconds before the contactors open, so SOFT STARTER will stop working with <<no current>>.

**N.B. Usually this little delay is simply obtained putting a diode 25A – 1200V in parallel to the contactors coil (see exemple Fig.1).**

**LEGEND :**

- C1 = Upward contactor
- C2 = Main contactor
- RP = Diode 25A 1200V
- RM = Running relay

**Fig.1:** Example of modification for the opening of the contactors with <<no current>> .



**4.2 - SOFT STARTER connected below contactors**

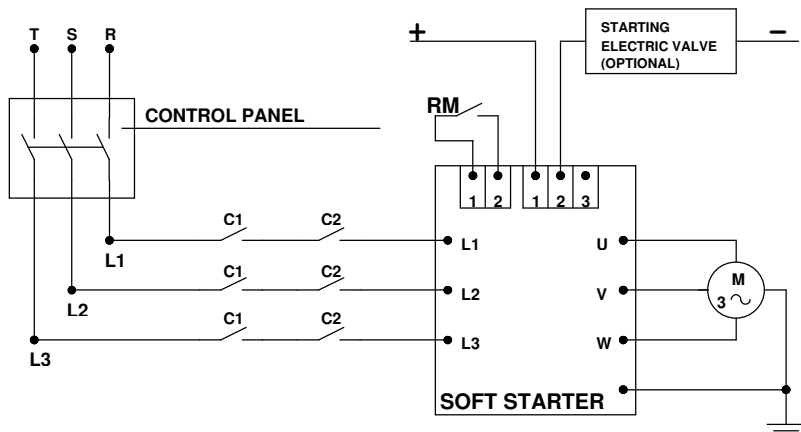
**4.2.1** Make the link of power connection as shown in the scheme of the picture number 2, that is installed SOFT STARTER between the contactors and the motor.

**LEGEND :**

- C1 = Upward contactor
- C2 = Main contactor
- RP = Diode 25A 1200V
- RM = Running relay

**Fig.2:** Example of the link of SOFT STARTER below the contactors.

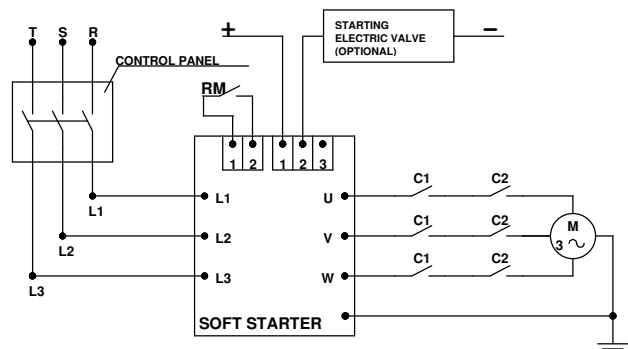
In this case SOFT STARTER works only when the contactors switch on



**4.3 - SOFT STARTER connected before contactors**

**4.3.1** Link the device as shown in the picture number 3 that is between the voltage supply and the contactors.

**4.3.2** In this case SOFT STARTER is always supplied and starts only when you give the RM command. This must be energized a little bit later of the contactors.



**Fig.3:** Example of connection before the contactors

## 4.4 - SOFT STARTER connected on the motor phases

4.4.1 When you use a motor with winding in triangle configuration to the net voltage (ex. Motor 380/660 with 380V supply or motor 220/380 with 220V supply), SOFT STARTER can be connected on the motor phases, as shown in picture 4. In this case the phase current is 1.6 times inferior to the line current and the size of SOFT STARTER will be obviously 1.6 times inferior.

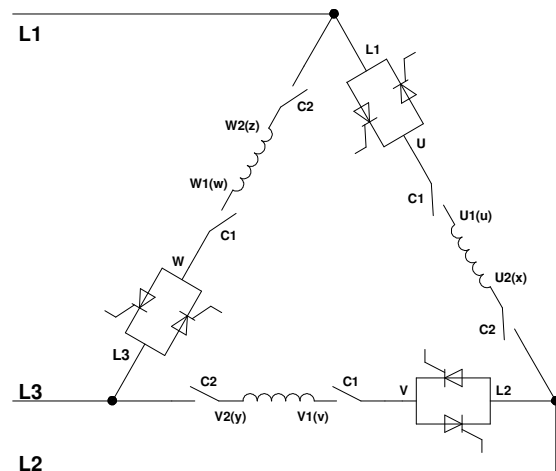
### LEGEND :

C1 = Upward contactor

C2 = Main contactor

Fig.4: Example of connection between the phases

4.4.2 We produce SOFT STARTER for the connection on the line. If you like to use it between the motor phase it is necessary to take away the tinning on the solder point SP2,SP3,SP4.



## 4.5 - OPERATION VERIFY

4.5.1 Try the functioning of the system making a maintenance call, check that the rotating sense of the motor is the right one and that the start of the motor isn't abrupt. If the motor rotates in the opposite sense to the one that is wished, invert two of the three output phases if SOFT STARTER is connected on the line (ex. U with V) or invert all the three phases if the connection is on the motor phases (U1 with U2 and V1 with V2 and W1 with W2) If the motor stands still check that:

- 1 - the supplying fuse F1 isn't cut off;
- 2 - the contact RM (terminals 1 and 2 of the terminal board M1) is close and that LED DL1 (SOFT STARTER running) is lit.

4.5.2 After these examinations make a call from the control panel. The system must run, with no considerable delay if compared with the direct starting, when the motor reaches its full speed must commute the end acceleration ramp relay RL2. The two contacts (NO+NC) of this relay are present in the terminals 1-2-3 of M2 at the your disposal for:

- 1 - drive the possible departure electrovalve (see Fig. 1);
- 2 - drive the possible BY - PASS contactor of SOFT STARTER.

## 5 - ELECTRIC ADJUSTMENTS

We provide to adjust the operation of SOFT STARTER working on the trimmers.

ACC - Acceleration time : rotating it clockwise, the acceleration time increases (min.: 0.2 sec., max.: 6 sec). Setted from SMS at 1.2 second for hydraulic lifts and at 3 seconds for rope lifts.

ST - Starting torque : rotating it clockwise increases the value of the voltage of the first phase of starting (from 25% of the rated voltage to the 70% of the rated voltage). Setted by SMS at 0.

LIM - Current limit (when using the current limit kit):rotating it clockwise, the value of current supplied from SOFT STARTER increases. Setted by SMS at the maximum value of current .

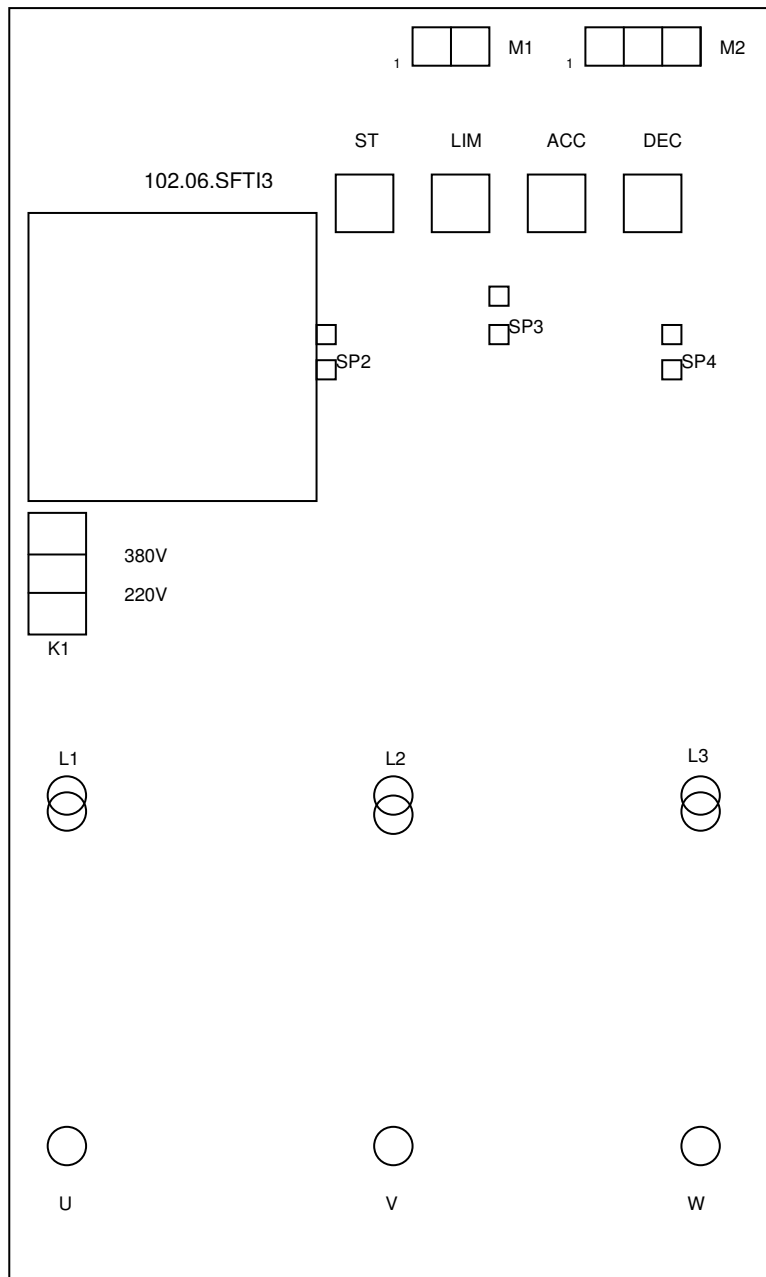
The max starting current for the various types of SOFT STARTER is:

T40 = 200A

T55 = 280A

T75 = 360A

## 6 – LAYOUT SOFT STARTER BOARD



**Fig. 5:** Position of the regulation trimmers and of the solder point on the board

## APPENDIX A

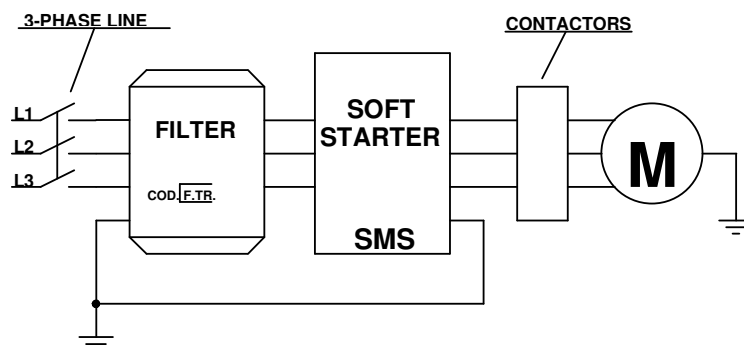
### COMPARATIVE SCHEME OF STARTING CURRENT:

DIRECT SOFT START STARTING AND SOFT STARTER STARTING IN 380 Vac HYDRAULIC LIFT.

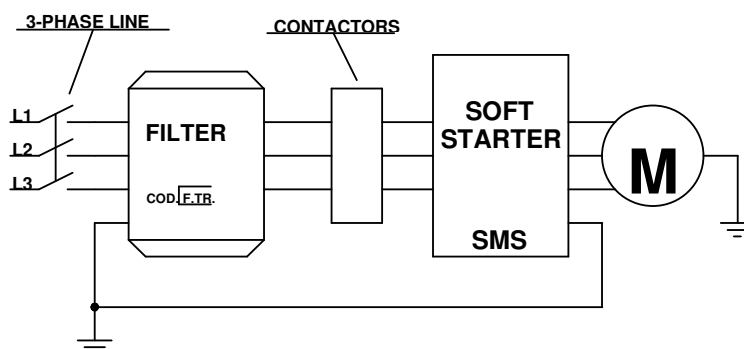
Motor power	Rated current	DIRECT STARTING		SOFT STARTER	
		Starting current	Power used	Starting current	Power used
4.5kW	12A	48A	15KW	21.6A	10KW
6kW	16A	64A	20KW	28.8A	10KW
7.5kW	20A	80A	25KW	36A	15KW
9.5kW	26A	104A	35KW	46.8A	15KW
11kW	30A	120A	40KW	54A	20KW
15kW	40A	160A	50KW	72A	25KW
18.5kW	50A	200A	60KW	90A	30KW
22kW	60A	240A	75KW	108A	35KW
25kW	80A	320A	95KW	144A	45KW

## APPENDIX B

CONNECTION OF THE FILTER (EMC) WHEN NOT INCLUDED IN THE CASE:  
SOFT STARTER CONNECTED BELOW CONTACTORS



SOFT STARTER CONNECTED BEFORE CONTACTORS



For any further information contact:

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