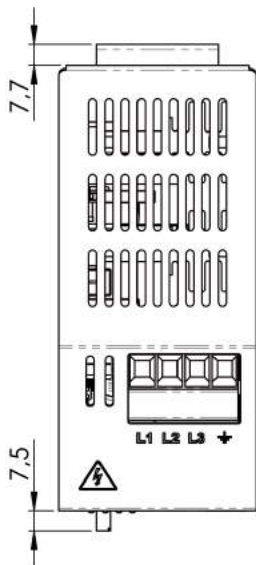
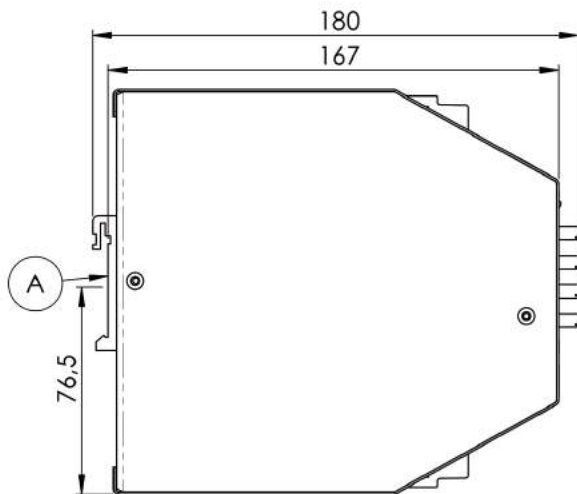
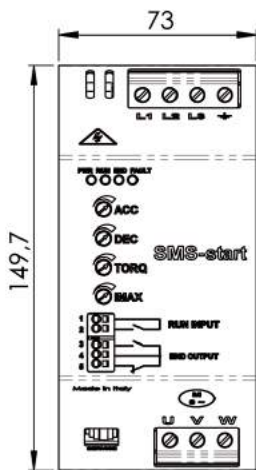


SMS

SOFT STARTER





- A= Attacco per montaggio su DIN (DIN46277)
- A= Clamp for DIN rail mounting (DIN46277)
- A= Junta para montaje en DIN (DIN46277)
- A = Anschluss zur Montage auf DIN (DIN 46277)

PESO: 2 Kg circa

WEIGHT: 2 Kg approx

PESO: aproximadamente 2 Kg

GEWICHT: circa 2 Kg

NOTICE

Please read the manual before using and installing the device.

Read carefully the following paragraphs and pay attention to the instructions. Our warranty does not cover any damage resulting from failure to follow instructions contained therein.

INTRODUCTION

SMS-start is a three-phase asynchronous motor starter, designed to reduce starting current. In hydraulic lift systems (1-second starting time), the starting current is reduced to less than half of the direct starting current. In traditional rope lift systems (3-second acceleration time), a starting current of approximately 0.7 times the direct starting current can be obtained.

SMS-start has two sizes with the same mechanical outfit but different electrical properties (see [pag. 10](#)). Both include an internal Bypass function for the soft starter SCRs during runtime.

IMPORTANT SAFETY WARNINGS

Please read this manual carefully before proceeding with installation or maintenance. The safety warnings do not cover all causes of device failure, but do identify the most common causes. The following symbols appear in this document or on the equipment to warn of potential hazards, and they require special attention.



RISK OF ELECTRIC SHOCK



YOU MUST PAY PARTICULAR ATTENTION



If the device is visibly damaged or missing components, or if the size of the device is not suitable for the motor, DO NOT proceed with installation.



When the device is connected to the mains it is subject to hazardous voltages. Installation, inspection and maintenance of the device must be performed by authorised and appropriately trained personnel, and should be performed only when it is disconnected from the electric network. Incorrect installation can cause equipment malfunction, injury or even death. Carefully follow the safety regulations in force..



The device must be connected to GROUND and the circuits adequately protected, in accordance with current standards.



To ensure correct device operation and in order to avoid the risk of fire, use cables with a suitable cross section, depending on the current and the length of the connection.



Ensure that no type of external object enters the device, as it can lead to failure of the product or hazardous conditions, when connecting to the electric network. Make sure that there is no voltage on the device control terminals which could link to the electric network. The control and power conductors must be correctly isolated from each other.



Any static power factor correction unit must be connected upstream of the device (Terminals L1-L2-L3) and never downstream (Terminals U, V, W). Incorrect connection may cause hazardous conditions and/or device breakage.

The examples and diagrams in this manual are included solely for demonstration purposes.

The content of this manual is subject to change without notice.

In no event shall liability be accepted for damage, indirect or consequential, resulting from the use or application of the device.

TECNICAL FEATURES

Rated current for light load Application for LIFTS - INTERMITTENT duty (*)	40A	70A
Rated current for heavy load INDUSTRIAL application - CONTINUOUS duty	25A	40A
Maximum starting current	120A	210A
Maximum instantaneous current	180A	270A
Ramp maximum time: for acceleration (ACC) and Deceleration (DEC)	7 sec	3 sec
Ambient temperature 0 ÷ 50°C . Degree of protection IP20		

(*)Duty is considered intermittent where the motor drive starts for a duration below or equal to 60" each 120".

NUMBER OF STARTS/HOUR

SMS-start is designed to be able to carry out an increased number of starts per hour, even in critical conditions. The maximum number of starts per hour depends on the acceleration duration, as shown in the Table below:

Acceleration time	MAX No. Starts/Hour	
1 sec	75 starts/h	
2 sec	40 starts/h	
3 sec	25 starts/h	
4 sec	18 starts/h	n.a for 70A
5 sec	15 starts/h	n.a for 70A

The Table shows the maximum number of starts per hour which can be obtained at an ambient temperature of 50°C and at starting currents equal to the maximum current supported by the device.

PROTECTION FUSES

In order to protect the power component (SCR) and to avoid dangerous conditions in the event of a short circuit, you are advised to install, upstream of the power line (L1-L2-L3), 3 fuses with an I_{pt} the the one is supported by the SCR.

The fuses shown in the Table ensure Type 2 protection.

Type of SMS-start	I _{pt} SCR @ 45°C	Type ITALWEBER	Code ITALWEBER	I _{pt} Fuse
SSV040	2120	CH14 50A aR	1461050	1800
SSV070	6810	CH22 80A aR	1462080	6600

CONNECTIONS



The electrical connections to the SMS-start device must be carried out in accordance with the isolations and maximum temperatures allowed by the cables.

The Table shows the minimum cross sections, where H07V-K type cables are used.

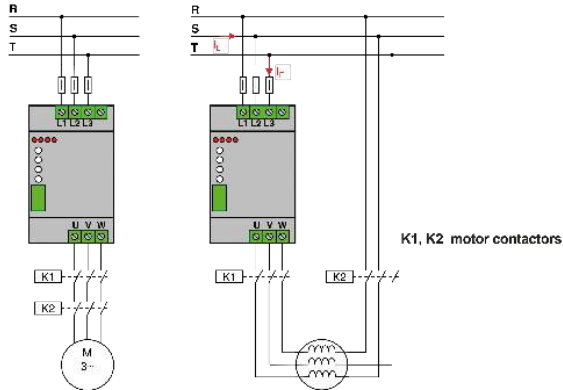
	SSV040	SSV070
Power terminals L1-L2-L3-U-V-W	10mm ²	16mm ²
Command terminals 1-2-3-4-5	1mm ²	1mm ²

CONNECTIONS MOTOR

ENGLISH

SMS-start can be connected either on the line that powers the motor (Fig. 1), or inside the delta of the motor (Fig. 2), if you are using a motor with the windings connected in delta when powered by mains voltage (i.e. 400/690 motor with 400V mains power or 230/400 motor with 230V mains power).

When SMS-start is connected to the delta, the current passing through it (IF) is 1.6 times lower than the line current (IL). It can therefore be used for motors with a rated current 1.6 times greater rated current.



PICTURE. 1-CONNECTION ON LINE

PICTURE. 2-INSIDE CONNECTION IN DELTA

TYPE SMS-start	MAX Motor Current	
	Connection on line (Picture 1)	Connection on delta (Picture 2)
SSV040	40	65
SSV070	70	115

We suggest the connection of SMS-start upstream of the contactors; (this is) because once that power supply is removed the thermal memory, that allows different operating time according to the absorbed current, is reset (see operating paragraph).

Without thermal memory the device is not able to be protected by any overload.

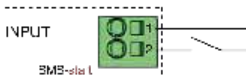
SMS-start adapts automatically to the connection implemented and to the network phase sequence. In the event that it is necessary to reverse the motor rotation, it is sufficient to reverse two supply phases between them (e.g. R with S), and consequently modify the connection of the eventual PHASE CONTROL device, so that it keeps working fine.



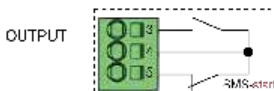
IMPORTANT!

In the case of internal delta connection, it is necessary to reverse R with S and not 1 with L2!

CONTROL CIRCUITS CONNECTION



RUN — START
External "voltage free" contact command:
Working voltage: 20 : 50Vdc – Min main current: 1mA



END — END START and END DECELERATION
Internal "voltage free" contact:
Switching capacity: 250Vac / 3A – 30Vdc / 3A

OPERATION

ENGLISH

SMS-start is able of limiting both the inrush current absorbed from the network, and the mechanical torque transferred to the load.

During start-up, there is a gradual increase in voltage and torque supplied to the motor, with constant monitoring of current consumption.

At the end of start-up, there is a power components bypass. This reduces power dissipation and ensure a high number of starts per hour.

Once powered up and turned on the power components by-pass, a thermal protection of the device is activate.

SSV040		SSV070	
By pass current	Operation time	By pass	operation time
40A	continuos	45A	continuos
40A<50A	2 minute 30 sec	50A<60A	8 minute
		60A<70A	4 minute
		70A<80A	2 minute

It allows different operating time according to the absorbed current, as shown in the chart below. Exceeding the given data will shut down the device.

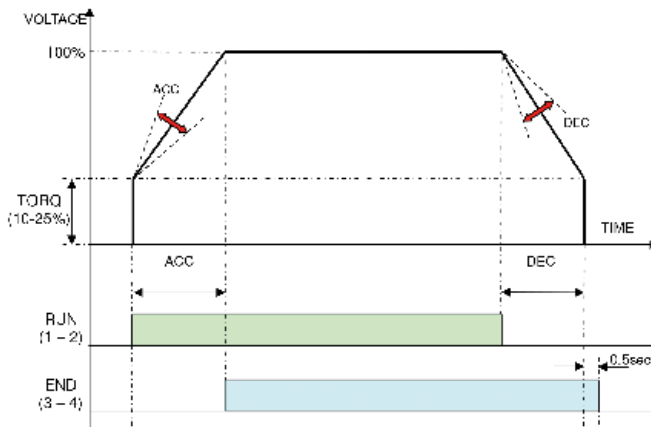
The deceleration function ensures a gradual reduction in torque, for a “soft” stop.

Starting of the motor takes place following closure of the external run contact (terminals 1-2).

SMS-start starts the motor by initially providing the starting torque set by the TORQ trimmer, and increasing it up to the maximum torque, in the time set by the ACC trimmer.

Motor deceleration begins on opening of the run command, moving the voltage from the maximum value to the minimum value, within the time set by the DEC trimmer.

During the starting phase the output current is monitored. On reaching the current limit set by the IMAX trimmer, the “slowdown” of the acceleration ramp takes place, allowing the motor to rev without using additional power.



ADJUSTMENT

ACC Acceleration time:

Adjustment from 1 to 7 seconds (SMS-start 40A).
1 to 3 seconds (SMS-start 70A).

This is the time during which the output voltage reaches 100%, following a run command.

DEC Deceleration time:

Adjustment from 0 to 7 seconds (SMS-start 40A)
0 to 3 seconds (SMS-start 70A)

This is the time during which the output voltage passes from 100% to 0, on opening of the run command.

If the trimmer is turned fully clockwise (time = 0), deceleration is disabled.

TORQ Starting torque: Adjustment from 10% to 25% of maximum torque. This is the torque with which the motor will begin acceleration.

IMAX Current limit: Adjustment from 50% to 300% of rated current. This is the maximum current value admit during acceleration. When the set value is reached, the acceleration ramp locks, thereby increasing its duration.

If the time exceeds 7 seconds, operation locks and FAULT is indicated.

ADJUST TRIMMER



ENGLISH

THE TRIMMERS ARE EQUIPPED WITH PINS IN ORDER TO FACILITATE ADJUSTMENT, WITHOUT THE USE OF TOOLS. AT THE END OF THE START-UP OF THE DEVICE, YOU CAN REMOVE THEM TO AVOID LATER INAPPROPRIATE CHANGES.

INDICATORS

LED INDICATORS



PWR FLASHING = Logic board power supply present.

RUN ON = RUN command active.

END ON = Start complete, remains active during the run and goes off 0.5 seconds after deceleration is complete: contact 3-4 closed and contact 4-5 open.

FLASHING FAULT = FAULT flashing, see troubleshooting [page 14](#).

SAFEGUARDS

- Checking for the presence of input phases before carrying out start-up.
- Checking for the presence of the motor before carrying out start-up.
- Heat checking of the power components.
- Checking of correct operation of the bypass relays.
- Checking of correct operation of the SCRs.
- Checking the maximum current during start-up.

TROUBLESHOOTING

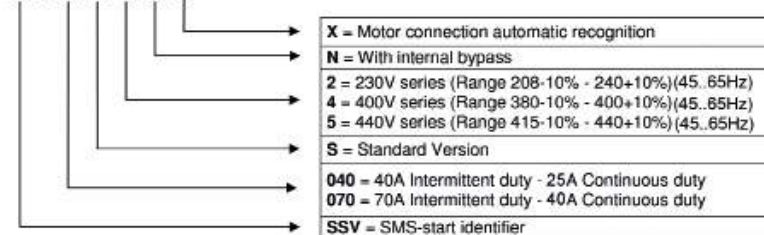
ENGLISH

	Diagnostics	Cause	Checks	Conclusions / Actions to be performed if the suggested checks are negative
1	The POWER led doesn't flash	The control board is not powered	Check that the correct supply is present on terminals L1/L2/L3	Probable damage on the internal supplier. Contact SMS
2	The RUN doesn't lit		Check that between terminals 1-2 (RUN) the contact is closed	Probable failure of the run command. Contact SMS
3	The FAULT* LED flashes once	The starting current exceeds the maximum limits of the device	Check the insulation of the motor. Make sure that the size of the device is compatible with the power of the motor	Probable failure of the by-pass relays. Contact SMS
4	The FAULT* LED flashes twice	The heatsink temperature exceeds 80°C	Check that the ventilation slots are not obstructed. Wait for several minutes to allow the heatsink to reduce the temperature	Probable failure of the temperature probe. Contact SMS
5	The FAULT* LED flashes three times	SMS start is not synchronizing with the mains	Check that the mains frequency is between 45Hz and 65Hz	Probable electrical network failures or faulty components
6	The FAULT* LED flashes four times	SMS start doesn't detect the 3 phases of the power supply	Check that the motor is properly connected. Check that the correct supply is present on terminals L1/L2/L3	Probable damage on the power components. One of the phases missing
7	The FAULT* LED flashes five times	SMS Start recognises an incorrectly connected motor	Check that the motor is properly connected	Probable damage on the power components
8	The FAULT* LED flashes six times	SMS Start detects the failure of a power component	Make sure that the power supply voltage is correct	Probable damage on the power components
9	The FAULT* LED flashes seven times	SMS Start detects that the by-pass relays have not been activated	Make sure that the power supply voltage is correct	Probable damage on the power components
10	The FAULT* LED flashes eight times	SMS Start detects an overload on the power components	Make sure that the size of the device is compatible with the power of the motor. Wait a few minutes and try to start it again	Replace the device with a greater size one
11	The FAULT* LED flashes nine times	SMS Start is not able to finish the start-up process	Try to increase again the IMAX trimmer	Replace the device with a greater size one
12	The FAULT* LED flashes ten times	SMS Start detects an undesired ignition	Try to increase again the TORQ trimmer	Probable damage on the power components

* The FAULT LED flashes "xN" indicates that the FAULT LED flashes synchronously with the PWR LED "N" times.

SMS-start CODE FORMAT

SSV 040 S 4 N X



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3	CURRENT LIMIT OPERATION.....	Page	3
4	ELECTRIC INSTALLATION	Page	3
5	ELECTRIC ADJUSTMENTS	Page	5
6	LAYOUT SOFT STARTER BOARD	Page	6
7	APPENDIX	Page	7

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.

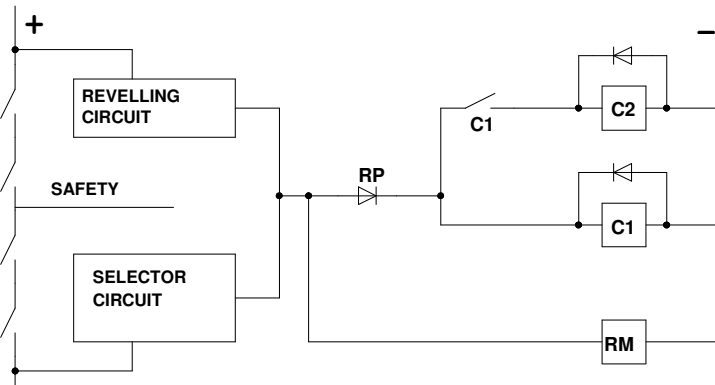
- SOFT STARTER doesn't need auxiliary commands, but if you want to reduce the wear and tear of the power contactor's contact it is necessary to take away the connection between the terminals 1-2 of M1 terminal board and connect the ON/OFF (RM) contact. This contact must be closed at the start, and open 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

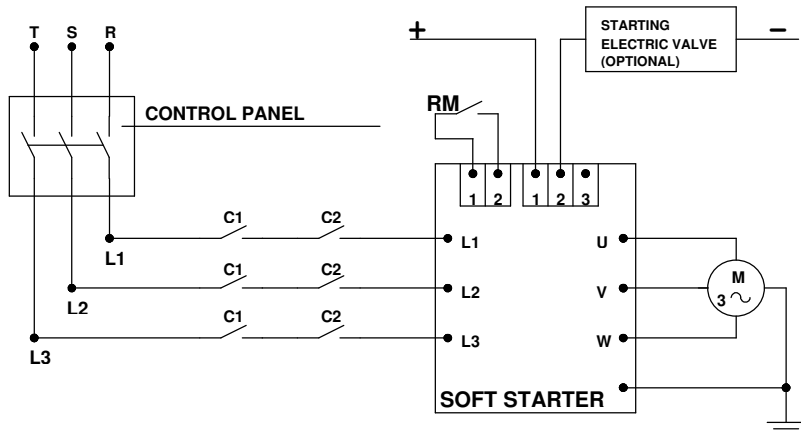
4.2.1 Make the link of power connection as shown in the scheme of the picture number 2, that is installed SOFT STARTER between the contactors and the motor.

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.

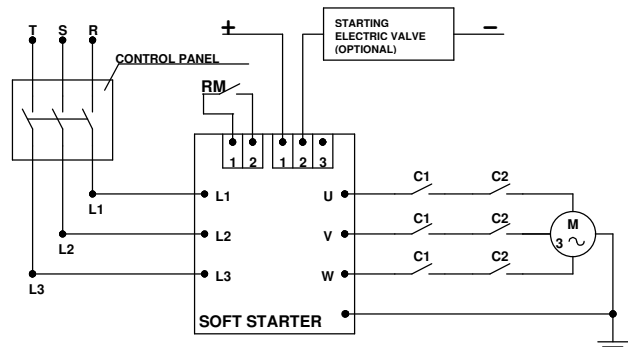


Fig.3: Example of connection before the contactors

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.

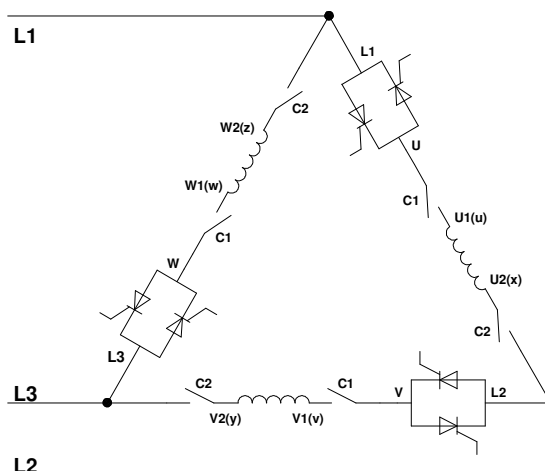
LEGEND :

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

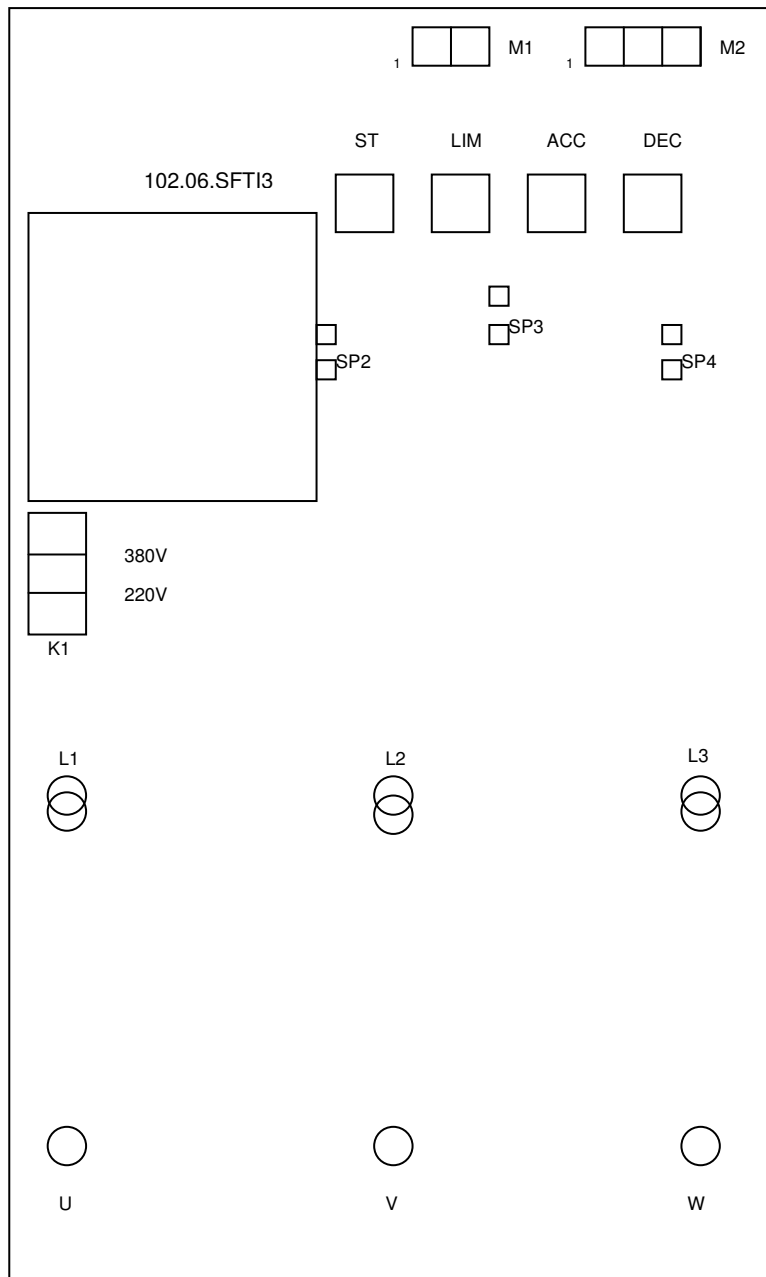


Fig. 5: Position of the regulation trimmers and of the solder point on the board

APPENDIX A

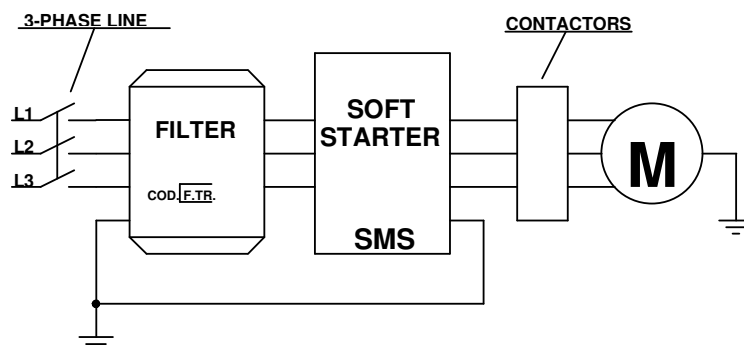
COMPARATIVE SCHEME OF STARTING CURRENT:

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

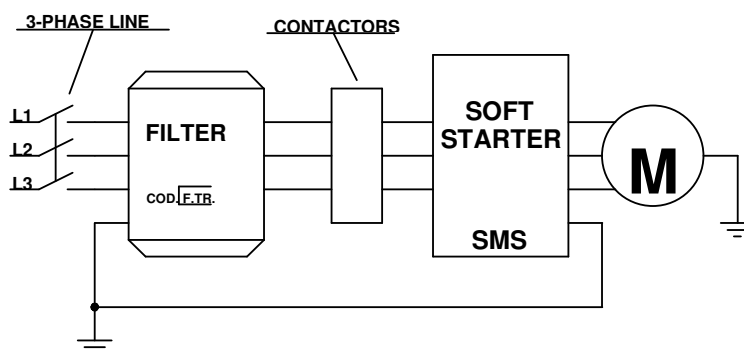
Motor power	Rated current	DIRECT STARTING		SOFT STARTER	
		Starting current	Power used	Starting current	Power used
4.5kW	12A	48A	15KW	21.6A	10KW
6kW	16A	64A	20KW	28.8A	10KW
7.5kW	20A	80A	25KW	36A	15KW
9.5kW	26A	104A	35KW	46.8A	15KW
11kW	30A	120A	40KW	54A	20KW
15kW	40A	160A	50KW	72A	25KW
18.5kW	50A	200A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

SMS SISTEMI e MICROSISTEMI s.r.l. (Gruppo SASSI HOLDING)

Cap. Soc. 260.000 i.v.

Via Guido Rossa, 46/48/50 Loc. Crespellano 40053 Valsamoggia (BO)

R.E.A 272354 CF - Reg. Imprese Bo 03190050371 P.IVA IT 00601981202

Tel. : +39 051 969037 Fax : +39 051 969303 Technical Service: +39 051 6720710

Web : www.sms.bo.it E-mail : sms@sms.bo.it