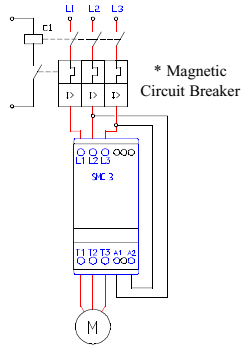
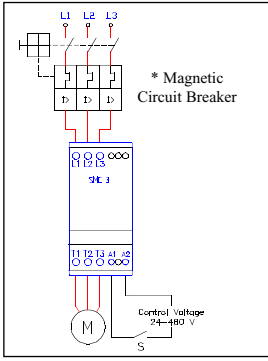
Application hints Soft Starter type SMC 3 DA XXXX

Line Controlled Soft-Start



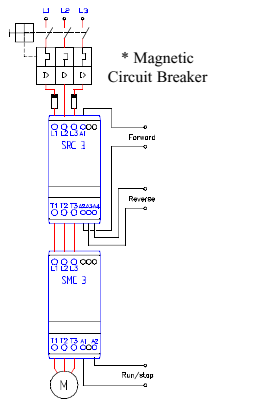
When the contactor C1 is switched to the ON-state, the motor controller will soft start the motor according to the settings of the Ramp-Up time and initial torque adjustments.
When the contactor C1 is switched to the OFF-state, the motor will be switched Off instantaneously.
In this application the contactor will have no load during making operation. The contactor will carry and break the nominal motor current

Input Controlled Soft-Start



When the control input is switched to the ON-state (S closed) the motor controller will soft start the motor according to the settings of the Ramp-Up time and initial torque adjustments. When the control input is switched to the Off-state (S open) the motor will be switched Off instantaneously only if the Ramp-Down time is adjusted to 0. With any other setting the motor will be soft stopped according to the settings of the Ramp-Down time adjustment.

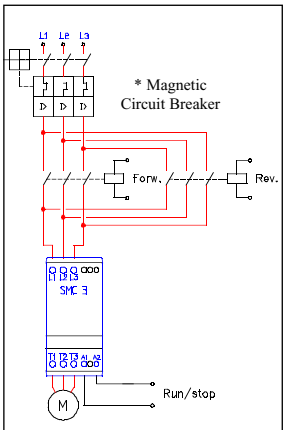
Combining Reversing Electronic Contactor & Soft Starter



Soft-Reversing of motors up to 4 kW

A Soft-Reversing of a motor can easily be achieved by connecting a reversing relay to the Soft Starter. The reversing relay type SRC 3 DX will determine the direction of rotation Forward or Reverse and the Soft Starter type SMC 3 DA XXXX wil perform soft-starting and soft-stopping of the motor. If soft-stop is not required the application can be simplified by connecting the control circuit of the Soft Starter to the main terminals as shown under Line Controlled Soft-Start. A delay of approx. 0.5 sec. between forward and reverse control signal must be allowed to avoid influence from the voltage generated by the motor during turn-Off.

Combining Reversing Mechanical Contactor & Soft Starter



Soft-Reversing of motors up to 11 kW

A Soft-Reversing of motors can easily be achieved when the motor load exceeds 4kW by connecting a mechanical reversing contactor to the Soft Starter. The reversing contactor will determine the direction of rotation forward or reverse and the Soft Starter type SMC 3 DA XXXX wil perform soft-starting and soft-stopping of the motor. If the contactors are always switched in no load conditions the lifetime of the contactors will normally exceed 10 million cycles.

*Use UL approved Magnetic Circuit Breaker or UL specified back-up fuse type K5 or H Class

Specifications are subject to change without notice

Short-circuit Protection

Two type of short-circuit protection can be used:
a) Short-circuit protection by circuit breaker.
b) Short-circuit protection by fuses.
Short-circuit protection is divided into 2 levels Type 1 / Type 2
Type 1: Short-circuit protects the installation
Type 2: Short-circuit protects the installation and the semiconductors inside the motor controller

a) Short-circuit protection by circuit breaker
A 3-Phase motor with correctly installed and adjusted overload relay will not short circuit totally to earth or between the 3 phases. Part of the winding will normally limit the short circuit current to a value that will cause instantaneous magnetic tripping of the circuit breaker without damage to the Soft Starter. The magnetic trip response current is approx. 11 times the max. adjustable current. A short-circuit coordination test has been made with the Danfoss CTI 25.

Motor full load current in A	Short-circuit protection (Line voltage 380 - 415)		
	MCB Danfoss CTI 25	Max. prospective short-circuit current	
		Type 1 (15/25A)	Type 2 (15/25A)
0.10 - 0.16 A	047B3020	50 kA (15 A type)	50 kA (15 A type)
0.16 - 0.25 A	047B3021	50 kA (15 A type)	50 kA (15 A type)
0.25 - 0.40 A	047B3022	50 kA (15 A type)	50 kA (15 A type)
0.40 - 0.63 A	047B3023	50 kA (15 A type)	50 kA (15 A type)
0.63 - 1.00 A	047B3024	50 kA (15 A type)	50 kA (15 A type)
1.00 - 1.63 A	047B3025	50 kA (15 A type)	50 kA (15 A type)
1.60 - 2.50 A	047B3026	50 kA (15 A type)	10 kA (15 A type)
2.50 - 4.00 A	047B3027	50 kA (15 A type)	6 kA (15 A type)
4.00 - 6.00 A	047B3028	50 kA (15 A type)	3 kA (15 A type)
6.00 - 10.0 A	047B3029	20 kA (15 A type)	1 kA (15 A type)
10.0 - 16.0 A	047B3030	10 kA (15 A type)	1 kA (15 A type)
10.0 - 16.0 A	047B3030	10 kA (25 A type)	5 kA (25 A type)
16.0 - 20.0 A	047B3031	8 kA (25 A type)	3 kA (25 A type)
20.0 - 25.0 A	047B3032	8 kA (25 A type)	3 kA (25 A type)

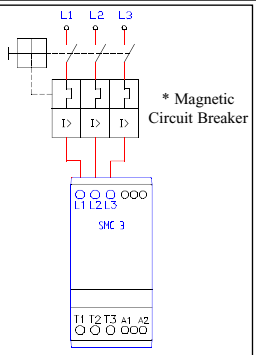
b) Short-circuit protection by fuses

Type 1: SMC 3 DA XX 15 protection max 50 A. gI/gL/gG.
: SMC 3 DA XX 25 protection max 80 A. gI/gL/gG. 63A T

Type 2: SMC 3 DA XX 15 protection max I^2t of the fuse 1800 A^2S
: SMC 3 DA XX 25 protection max I^2t of the fuse 6300 A^2S

Recommended fuse :	**Ferraz**	**Siemens**
SMC 3 DA XX15	6,600 CP URGB 14.51/50	Sillized 5SD4 80 A
SMC 3 DA XX25	6,600 CP URGA 22x58/80	Sillized 5SD5 100A

Overload Protection with Thermal Magnetic Circuit Breaker



Overload protection of the motor is easily achieved by installing a manual thermal magnetic circuit breaker on the supply side of the motor.
The circuit breaker provides means for padlocking and the necessary clearance for use as a circuit isolator according to EN 60204-1. Select the manual circuit breaker from the selection table or equivalent according to the rated current of the motor.
Adjust the current limit on the MCB according to the rated nominal current of the motor

Selection Table of Thermal Magnetic Circuit Breaker

Motor full load current in A	MCB Danfoss CTI 25	MCB ABB MS 325	MCB Telemecanique GV
0.10 - 0.16 A	047B3020	MS 325 - 0.16	GV 2-M 01
0.16 - 0.25 A	047B3021	MS 325 - 0.25	GV 2-M 02
0.25 - 0.40 A	047B3022	MS 325 - 0.40	GV 2-M 03
0.40 - 0.63 A	047B3023	MS 325 - 0.63	GV 2-M 04
0.63 - 1.00 A	047B3024	MS 325 - 1.00	GV 2-M 05
1.00 - 1.63 A	047B3025	MS 325 - 1.60	GV 2-M 06
1.60 - 2.50 A	047B3026	MS 325 - 2.50	GV 2-M 07
2.50 - 4.00 A	047B3027	MS 325 - 4.00	GV 2-M 08
4.00 - 6.00 A	047B3028	MS 325 - 6.30	GV 2-M 10
6.00 - 10.0 A	047B3029	MS 325 - 10.0	GV 2-M 14
10.0 - 16.0 A	047B3030	MS 325 - 16.0	GV 2-M 20
16.0 - 20.0 A	047B3031	MS 325 - 23.0	GV 2-M 21
20.0 - 25.0 A	047B3032	MS 325 - 25.0	GV 2-M 22

Application hints Soft Starter type SMC 3 DA XXXX

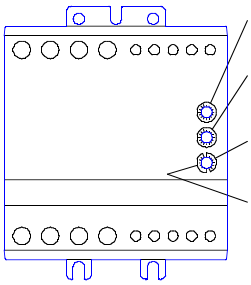
Utilisation Categories (IEC 947-4-2)

AC - 52a	Control of slipring motor stators
AC - 53a	Control of squirrel cage motor
AC - 58a	Control of hermetic refrigerant compressors with automatic resetting of overload releases

Rating Index

SMC 3 DA XX15	SMC 3 DA XX25
15A: AC-52a: 4-13 : 100 - 3000	25A: AC-52a: 4-13 : 100 - 3000
15A: AC-53a: 8-3 : 100 - 3000	25A: AC-53a: 8-3 : 100 - 3000
15A: AC-58a: 6-6 : 100 - 3000	25A: AC-58a: 6-6 : 100 - 3000

How to adjust time and torque

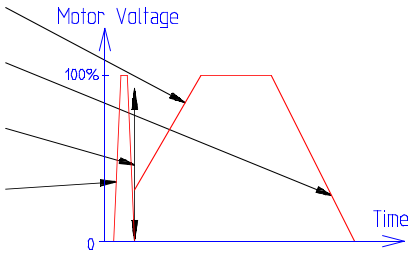


Ramp - Up 0.5 - 10 sec.

Ramp - Down 0.5 - 10 sec.

Torque adj. 0 - 85%

200 ms kick start with adj. torque 0 - 85%



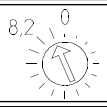
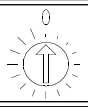
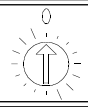
Control of the motor torque is achieved by acting on the motor voltage.
The motor speed depends on the torque produced by the motor and the load on the motor shaft.
A motor with little or no load will reach full speed before the voltage has reached its maximum value.

Please note:
The Soft Starter will read time and torque settings in the off state. Repeated starts may trip the motor protection relay.

Make sure NOT to set the rotary switches in between positions as this corrupts the time and torque adjustment.

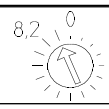
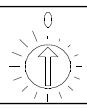
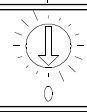
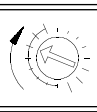
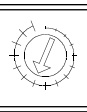
Use screwdriver 2 mm x 0.5 mm

A. Ramp-Up Time and Initial Torque (Standard Load)

	A1) Set the *Ramp-Up* switch to maximum
	A2) Set the *Ramp-Down* switch to minimum
	A3) Set the *Initial Torque* switch to minimum
	A4) Apply control signal for a few seconds. If the load does not rotate immediately increment the *Initial Torque* and try again. Repeat until the load starts to rotate immediately on start-up
	A5) Adjust *Ramp-Up* time to the estimated start time (scale is in seconds) and start the motor
	A6) Decrease the *Ram-Up* time until mechanical surge is observed during start
	A7) Increase the time one step to eliminate the surge

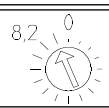
B. Kick-Start / Break loose. High inertia loads.

If it is not possible to reach a time sufficient for the application (step A7) it may be necessary to kick-start the load.

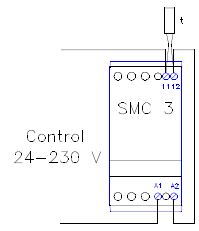
	B1) Set the *Ramp-Up* switch to maximum
	B2) Set the *Ramp-Down* switch to minimum
	B3) Set the *Initial Torque* switch to minimum Kick-start torque
	B4) Apply control signal for a few sec. If the load stops right after the 200 ms "kick" increment the initial torque and try again. Repeat until the load continues to rotate after the "kick"
	B5) Adjust *Ramp-Up* time to the desired start time (the scale is in seconds) and start the motor

C. Ramp-Down time. E.g. Pump loads

Follow procedure A or B to set *Ramp-Up* and *Initial Torque*

	C1). Set the *Ramp-Down* switch to maximum
	C2) Switch off the control voltage and observe any mechanical surges on the load. If none decrement *Ramp-Down* switch and try again. Repeat until mechanical surges on the load is observed
	C3) Increase the time one step to eliminate the surge

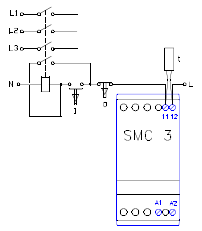
Thermal Overload Protection Example 1



The thermostat can be connected in series with the control circuit of the Soft Starter.

When the temperature of the heatsink exceeds 100°C the Soft Starter will switch Off.

Thermal Overload Protection Example 2



The thermostat is connected in series with the control circuit of the main contactor.

When the temperature of the heatsink exceeds 100°C the main contactor will switch Off. A manual reset is necessary to restart this circuit.

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