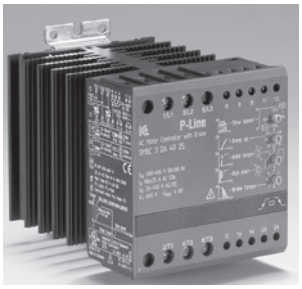
Soft Starter with Dynamic Brake (SMBC 3 two controlled phases)



- Rated operational voltage up to 480VAC 50/60Hz
- Rated operational current 1-25A
- Output signal for By-Pass and control of mechanical brake
- Ramp Up time and initial torque adjustable with kick start
- Adjustable Brake current
- Automatic stop detection
- Fast action brake mode with automatic motor field reduction
- Meets EN 60947-4-2 requirements

Item selection and technical specifications (see also motor table at page 11)

Load ratings	Item number by 208-240VAC 50/60Hz Line Voltage	Item number by 400-480VAC 50/60Hz Line Voltage		Ramp-Up / Brake-adjustment	Torque adjustment	Module-width
25A AC-53a	SMBC 3 DA 2325	SMBC 3 DA 4025		Ramp-up time 0.5 - 10 sec.	0- 85% adjustable of norminal torque with selectable kick start 200ms (break loose function)	90mm
27A AC-53b w. by-pass		SMBC 3 DA 4025		Brake current 0-50ADC.		90mm

Load specified with utilisation category AC-53a

SMBC 3 DA XX25 AC-53a: No by-pass contactors is nessesary during running

Load specified with utilisation category AC53b

SMBC 3 DA 4025 AC-53b: By-pass contactor shall be used for bypassing the soft starter during running of the motor by 27A/15kW 400V load

Output load specification

SMBC 3 DA XX25 (without by-pass contactor)	More info. page 45	**SMBC 3 DA XX25 (with by-pass contactor)**	More info. page 45
Overload current profile AC-53a	X-Tx:8-3 : 100-3000	Overload current profile AC-53b	X-Tx:5-5 : 30
Overload relay trip class AC-53a	10 or 10A	Overload relay trip class AC-53b	10 or 10A
Leakage current	5mA ACmax.	Min. operational current	1A

Control terminal specifications

Control voltage by line voltage 208-240VAC **A1-A2**	24 - 230 VAC/DC
Control voltage by line voltage 400-480VAC **A1-A2**	24 - 480 VAC/DC
Pick-up voltage max.	20.4 VAC/DC
Drop-out voltage min.	5 VAC/DC
Max. control current for no operation	1mA
Response time max.	100msec.
Control current / power max.	15mA / 2VA

AC Auxiliary contacts

Output specifications for SMBC 3 DA XXXX BP

Terminal: 13-14, AC SCR output for start/stop function,
Terminal: 23-24, AC SCR output for connection of by-pass contactor.

Output specifications: SCR: 0.5A AC-14, AC15 24-230/480V 50-60Hz Fusing:gl/gG Max i^2t 72A^2S

Terminal: 11-12, have no connection with the internal circuit. Can be used in conjunction with a thermal overload protection or for other wiring purposes. See under general technical information.

Thermal specification

Power dissipation for continuous operation PDmax	2W/A without BP
Power dissipation with semiconductor by-passed	4 W Max.
Cooling method	Natural convection
Mounting	Vertical +/-30°
Operating temperature range EN 60947-4-2	-5°C to 40°C
Max. operating temperature with current derating	60°C
Storage temperature EN 60947-4-2	-20°C to 80°C

Operation in ambient temperatures exceeding 40°C is possible if the power dissipation is limited either by reducing the steady-state current or by reducing the duty-cycle of the soft starter as shown in the table. Max.cycle time 15min.

By 40°C	By 50°C	By 60°C
100% load Duty-cycle 100%	80% load Duty-cycle max. 0.8	70% load Duty-cycle max. 0.65

Insulation specifications

Rated insulation voltage	Ui 660 Volt
Rated impulse withstand voltage	Uimp. 4 kVolt
Installation catagory	III

Approval

cUL Std No. 508

UL:Use thermal overload protection as required by the National Electric Code. When protected by a non-time delay K5 or H Class fuse, rated 266% of motor FLA, this device is rated for use on a circuit capable of delivering not more than 5,000 rms. symmetrical amperes, 600 V maximum. Maximum surrounding temperature 40°C.

Environment

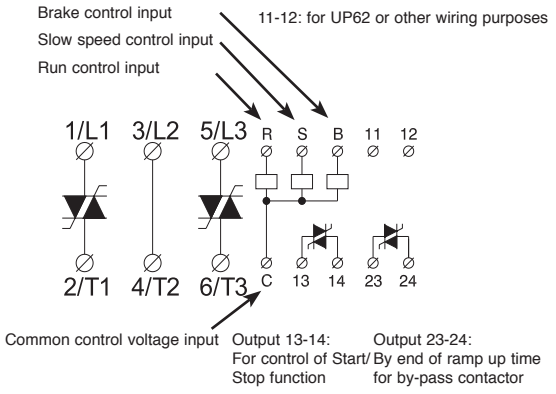
Degree of protection	IP 20	Pollution degree	3

EMC

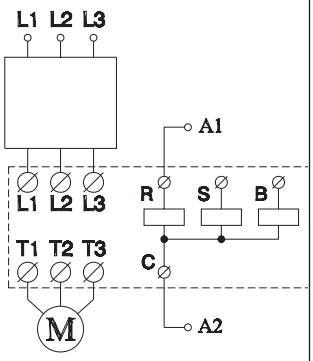
This component meets the requirements of the product standard EN60947-4-2 and is CE marked according to this standard.
This products has been designed for class A equipment. Use of the product in domestic environments may cause radio interference, in which case the user may be required to employ additional mitigation methods.

Soft Starter with Dynamic Brake (SMBC 3 two controlled phases)

Wiring diagram

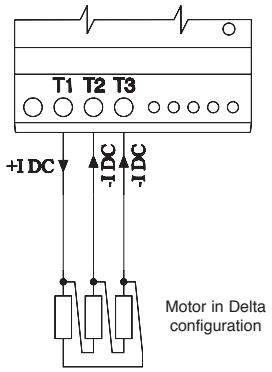


Wiring example: automatic brake to stop function



Set Ramp-Up and Initial Torque adjustments for best start-up function. Adjust brake torque to reach a complete stop after each working cycle

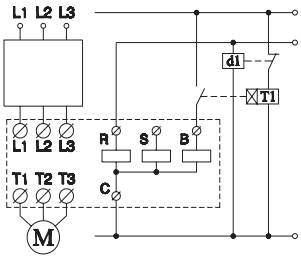
Wiring example: DC brake current configuration



To achieve maximum brake torque the DC current is applied on all 3 motor windings.
Direction of current is from T1 to T2 and T3.

Do not open any switches in the DC current path during the braking cycle as this might cause severe burning of the contacts.

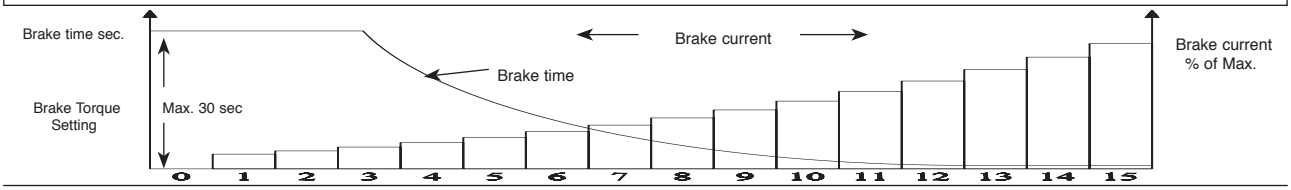
Wiring example: Timer controlled brake cycle



If the application only can accept a low braking torque below the sensing range of the stop detection it is possible to connect an external “delay on” operate timer to the Brake control input.

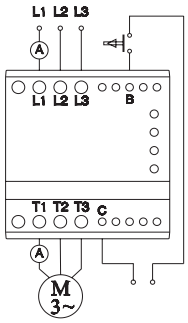
Functional description:
When control relay d1 and Run input is switched off timer T1 will activate the Brake input for the adjusted time.

Adjusting the brake current (connexion between brake torque, setting, brakecurrent and braketime)



When the Brake current is set it is actually a DC voltage that is adjusted. The current is therefore depending on the ohmic resistance of the windings and the actual connection of the motor (Delta).
For small motors a high DC voltage is necessary and for bigger motors a low voltage can produce sufficient brake current. Therefore the brake current must be adjusted for the actual application.
Before start-up of an unknown application set the Brake Torque adjustment to 1. Increase until the desired stop time is achieved.
If it is impossible to reach a time long enough for the application an external timer must be connected. See also application information next page.

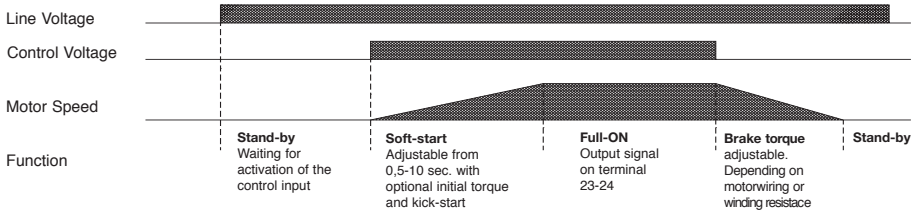
Automatic stop detection



The motor speed is detected by sensing the DC brake current. As this controller can operate a wide range of motors with different wiring configurations, the ohmic resistance of the actual motor has a wide range, it is therefore necessary to adjust the “Brake Torque” (DC Brake current) to achieve correct function in the actual application.
If the current is set to a low value the brake will be switched off before the motor has come to a complete stop. If the current is set too high, it will be out of the detection range and cannot be switched off before end of the build-in maximum time (30 sec.).
The LED’s will flash to indicate failure condition. The mains must be switched off and reapplied to reset this condition

CAUTION ! For bigger motors the current can be adjusted to a value that will destroy the controller or open the circuit breaker or fuse.
Before start-up of an unknown application set the Brake Torque adjustment to 1. To measure the Brake current activate the Brake Control input.
The DC brake current can be measured on the out put of T1 only. The AC value of the Brake current can be measured in L1 or L2. The DC current is approx. 1,5 times the AC current.

Functional diagram



Basic application.

When the control voltage is applied the motor will soft-start. When the control voltage is switched off the automatic Brake cycle will operate. The application shall be overload- and shortcircuit protected by fuses or circuit breaker.

Application, adjustment hints and general specifications for SMBC 3

Short-circuit protection by circuit breaker or fuses

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 or Type 2**

Co-ordination Type 1: Short-circuit protects the installation

Co-ordination Type 2: Short-circuit protects the installation and the semiconductors inside the motor controller

a) Short-circuit protection
Co-ordination type 1 will be obtained when using magnetic circuit breakers or standard gl/Gl fuses.
Co-ordination type 2 will be obtained when using semiconductor fuses. When using semiconductor fuses the SCR will not be damaged due to transients and short circuits. The table indicates suitable fuses for co-ordination type 2 protection.

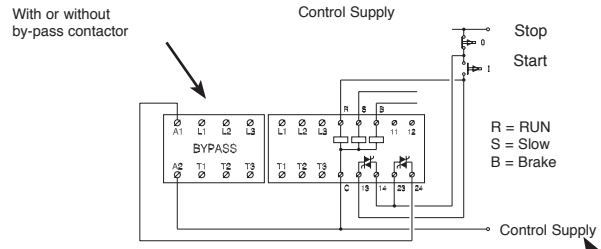
a1) Short-circuit protection by circuit breaker (continued)
It is recommended to overload protect the soft starter by a manual motor starter which is insensitive to the unbalanced operation condition during braking operation. The motor is thus protected also during the brake cycle. The manual motor starter will also short-circuit protect the Controller if prospective short-circuit limits are observed (Co-ordination 2.)
NOTE: Due to the integral brake function the motor is overload protected during the brake cycle. The phase unbalance in this mode might trip an overload relay with high sensitivity to phase unbalance.
Danfoss CTI 25 is not sensitive to unbalanced loads.

b) Short-circuit protection by fuses

Type 1: SMBC 3 DA XX25 — Protection max. 80 A gL/gG 63A T
Type 2: SMBC 3 DA XX25 — Protection max. i^2t of the fuse 6300 A^2S

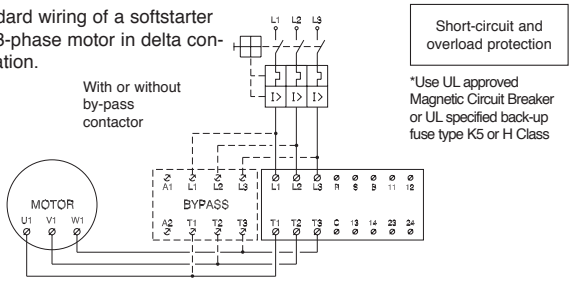
Fuses from e.g. Ferraz, Siba, Bussmann can be used as short-circuit protection Type 2
More information concerning Co-ordination Type 2 see page 45

Wiring example (Start/Stop with or without By-pass contactor)

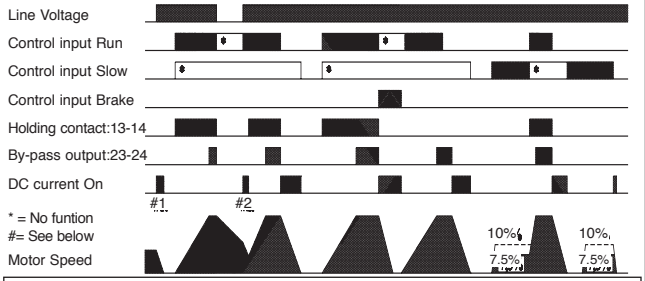


Motor wiring with or without by-pass

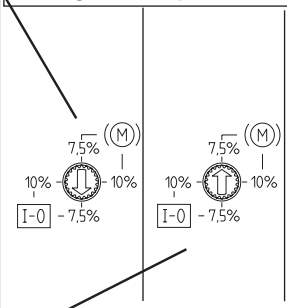
Standard wiring of a softstarter to a 3-phase motor in delta configuration.



Functional diagram of start-stop/control/by-pass contator



Setting of the operation mode selector

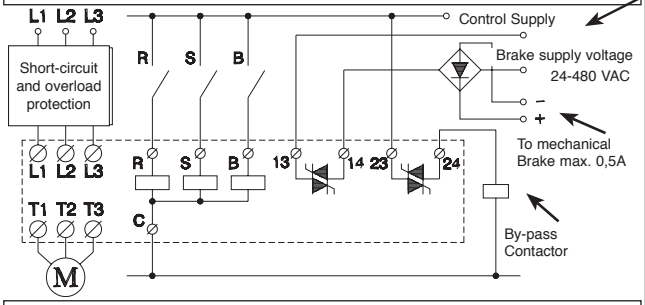


NOTE:

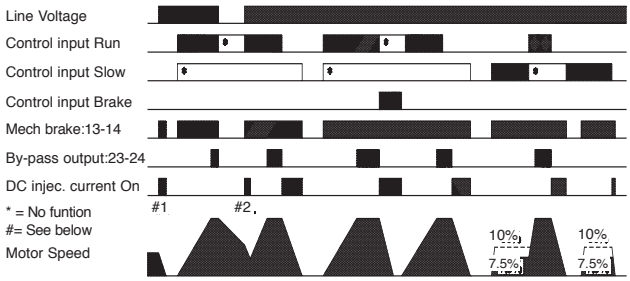
When terminal 13-14 is used as Start/Stop function, and 23-24 is used for by-pass:
Set the selector in position I-0
(7.5% or 10% if slow speed is used)

When terminal 13-14 & 23-24 is used as brake control:
Set the selector in position M
(7.5% or 10% if slow speed is used)

Control of mechanical brake and by-pass contactor

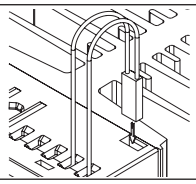


Functional diagram of mechanical brake/by-pass contact.

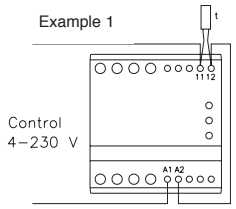


Note: #1. If the motor is running when the soft starter is switched On, the Auto Brake mode will stop the rotation.
Note: #2. With "RUN" signal present on Power-Up the soft starter will start the motor.

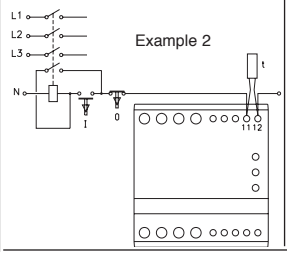
Thermal overload protection (see also page 44)



Optional thermal overload protection is possible by inserting a thermostat in a slot on the right hand side of the soft starter. Type number UP62



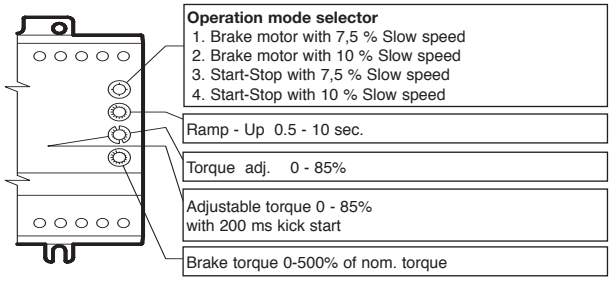
The thermostat can be connected in series with the control circuit of the soft starter.
When the temperature of the heatsink exceeds 90°C the soft starter will switch Off.
Note:
When the temperature has dropped approx. 30°C the soft starter will automatically be switched on again.

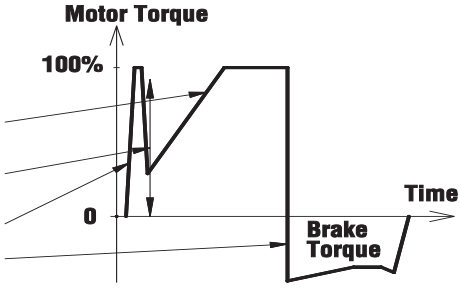


The thermostat is connected in series with the control circuit of the main contactor.
When the temperature of the heatsink exceeds 90°C the main contactor will switch Off.
Note: A manual reset is necessary to restart this circuit.

Application, adjustment hints and general specifications for SMBC 3

How to adjust ramp time, initial torque and brake torque





A. Standard load with automatic brake cycle

A1) Set the *Ramp-Up* switch to maximum.

A2) Set the *Brake Torque* switch to 1

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 desired starting time (scale is in seconds) is obtained.

A6) Adjust *Brake Torque* until the desired stop time is obtained
Note. If the current is set too high, the zero speed detect will not function.
If the current is set too low, the zero speed detect will not function.
To achieve a longer braking time an external timer must be installed as shown in application example page 15

B. High inertia loads with stiction

If it is not possible to reach a smoth start for an application it might be it may be necessary to kick-start / Break loose function.

B1) Set the *Ramp-Up* switch to maximum.

B2) Set the *Brake-Torque* switch to 1.

B3) Set the *Initial Torque* switch to minimum in the *Kick-start* mode.

B4) Apply control signal for a few sec. If the motor stops right after the 200 ms “kick” increment the *initial torque* and try again. Repeat until the load continues to rotate after the “kick”.

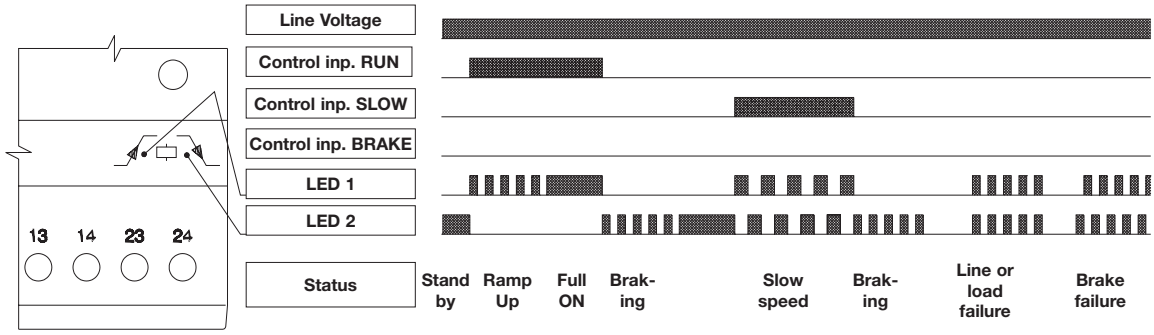
B5) Adjust *Ramp-Up* time to the desired start time (the scale is in seconds) and start the motor.

B6) Adjust *Brake Torque* until the desired stop time is obtained

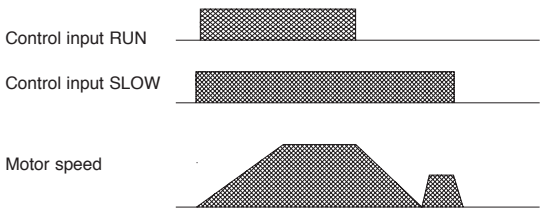
LED information:
Note: When both LED’s are flashing, no connection to the motor

Please note:
a) The Soft Starter will read time and torque settings in stand by mode i.e. after the Brake cycle. Repeated starts may trip the motor protection relay.
b) 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
c) Caution: Set the Brake Torque switch to 1, before switching the controller ON
CAUTION!
For bigger motors the Brake Torque can be adjusted to a value that will destroy the controller or open the circuit breaker or fuse. Only increase Brake Torque in single steps for an unknown application.

LED status indication



Slow speed-operation (funtional diagram)



The Slow speed option is intended for short time operation in applications where an exact positioning is needed, for example cranes. The motor operates at full speed until the application reaches the early limit switch, where the motor is braked until stop is detected, then it will continue until final position and brake down to stop in the exact position. There is 2 selectable speeds 7,5 % and 10 % of nominal speed. **NB.Torque levels are lower than nominal torque.** In slow speed 7,5 % mode the operational current in L2 is approx. 2.5 times the nominal current. In slow speed 10 % mode the operational current in L2 is approx. 2 times the nominal current but with lower torque.
Note: RUN input signal has priority over SLOW input signal. If Brake Torque is adjusted to “0” Slow speed will be ignored.

Mounting and cable wiring information

Mounting information see page 44 / Cable wiring see page 45

Dimensions (se also page 44)

Type	H	D	W
90 mm module	94 mm	128.1 mm	90 mm

3-Phase electronic reversing contactor (SRC)

- Rated operational voltage up to 480 VAC 50/60Hz
- Rated operational current up to 10A AC-53
- Two separate control inputs with mutual interlock
- Control voltage from 5-24VDC or 24-230VAC/DC
- LED Status indication
- Meets EN 60947-4-2 requirements
- Requires only 45 mm DIN rail space

Item selection and technical specifications

Load ratings AC-53 motor load stand. AC-4 motor load inching / plugging	Control voltage		Item number by 24-480VAC 50/60Hz Line Voltage		Module-width
10A AC-53 / 8A AC-4	5-24 VDC		SRC 3 DD 4010		45mm
10A AC-53 / 8A AC-4	24-230 VAC/DC		SRC 3 DA 4010		45mm

Output load specification

Operational current AC-53	10A	Leakage current	5mA ACmax.
Operational current AC-4	8A	Min. operational current	50mA
Duty cycle	100%		

Control terminal specifications

SRC 3 DD 4010		**SRC 3 DA 4010**	
Control voltage	5 - 24 VDC	Control voltage	24- 230 VAC/DC
Pick-up voltage max.	4.25 VDC	Pick-up voltage max.	20.4 VAC/DC
Drop-out voltage min.	1.5 VDC	Drop-out voltage min.	7.2 VAC/DC
Control current	25mA @ 4VDC	Control current / power max.	6mA / 1.5VA@24VDC
Response time max.	1/2 cycle	Response time max.	1cycle
Interlock time max.	80 msec.	Interlock time max.	150 msec.

Thermal specification

Power dissipation for continuous operation PDmax	2.2 W/A
Power dissipation for intermittent operation PD	2.2 W/A x dutycycle
Cooling method	Natural convection
Mounting	Vertical +/-30^{o}
Operating temperature range EN 60947-4-2	-5^{o}C to 40^{o}C
Max. operating temperature with current derating	60^{o}C
Storage temperature EN 60947-4-2	-20^{o}C to 80^{o}C

Operation in ambient temperatures exceeding 40^{o}C is possible if the power dissipation is limited either by reducing the steady-state current or by reducing the duty-cycle of the contactor as shown in the table. Max.cycle time 15min.

By 40^{o}C	By 50^{o}C	By 60^{o}C
100% load Duty-cycle 100%	80% load Duty-cycle max. 0.8	70% load Duty-cycle max. 0.65

Insulation specifications

Rated insulation voltage	Ui 660 Volt
Rated impulse withstand voltage	Uimp. 4 kVolt
Installation catagory	III

Environment

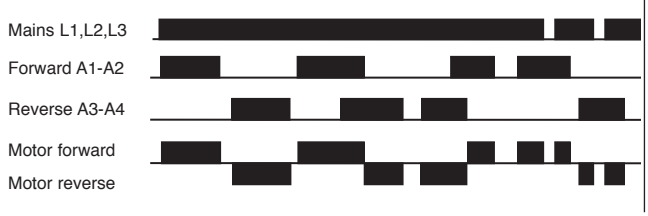
Degree of protection	IP 20	Pollution degree	3

Approval

cUL Std No. 508

*UL:Use thermal overload protection as required by the National Electric Code. When protected by a non-time delay K5 or H Class fuse, rated 266% of motor FLA, this device is rated for use on a circuit capable of delivering not more than 5,000 rms. symmetrical amperes, 600 V maximum. Maximum surrounding temperature 40°C.

Functional diagram



EMC

This component meets the requirements of the product standard EN60947-4-2 and is CE marked according to this standard. This products has been designed for class A equipment. Use of the product in domestic environments may cause radio interference, in which case the user may be required to employ additional mitigation methods.

Dimensions (se also page 44)

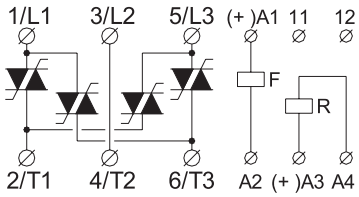
Type	H	D	W
45 mm module	94 mm	128.1 mm	45 mm

3-Phase electronic reversing contactor (SRC)

Wiring specifications

SRC 3 DX 4010

11-12: for UP 62 or other wiring purposes



Control voltage A1-A2 Control voltage A3-A4

Short-circuit protection by circuit breaker or fuses

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 or Type 2**

Co-ordination Type 1: Short-circuit protects the installation

Co-ordination Type 2: Short-circuit protects the installation and the semi-conductors inside the motor controller

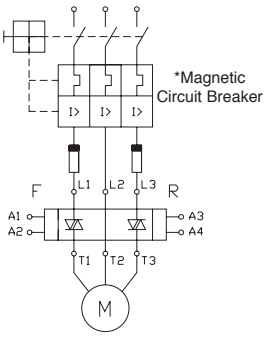
a) Short-circuit protection
Co-ordination type 1 will be obtained when using magnetic circuit breakers or standard gl/Gl fuses.
Co-ordination type 2 will be obtained when using semiconductor fuses. When using semiconductor fuses the SCR will not be damaged due to transients and short circuits. The table indicates suitable fuses for co-ordination type 2 protection.

b) Short-circuit protection by fuses

Type 1: SRC 3 DX 4010 Protection max. 50 A gL/gG
Type 2: SRC 3 DX 4010 Protection max. i^2t of the fuse 610 A^2S

Fuses from e.g. Ferraz, Siba, Bussmann can be used as short-circuit protection Type 2
More information concerning Co-ordination Type 2 see page 45

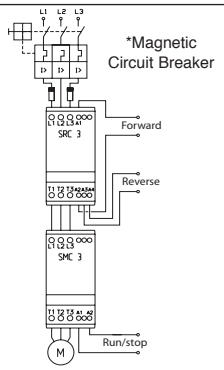
Overload Protection in Motor Control Reversing



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.

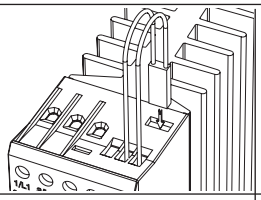
Adjust the current limit on the MCB according to the rated nominal current of the motor
*Use UL approved Magnetic Circuit Breaker or UL specified back-up fuse type K5 or H Class

Combining Reversing Electronic Contactor & Soft Starter

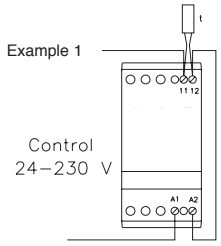


Soft-reversing of motors up to 10A
A Soft-Reversing of a motor can easily be achieved by connecting a reversing relay to the Soft Starter. The reversing relay type SRC 3 DX will determine the direction of rotation Forward or Reverse and the Soft Starter type SMC 3/32/33 will perform soft-starting and 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.

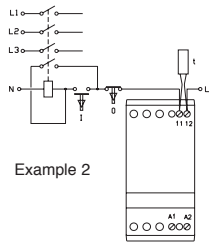
Thermal overload protection (see also page 44)



Optional thermal overload protection is possible by inserting a thermostat in a slot on the right hand side of the contactor. Type number UP62



The thermostat can be connected in series with the control circuit of the contactor.
When the temperature of the heatsink exceeds 90°C the soft starter will switch Off.
Note:
When the temperature has dropped approx. 30°C the contactor will automatically be switched on again.



The thermostat is connected in series with the control circuit of the main contactor.
When the temperature of the heatsink exceeds 90°C the main contactor will switch Off.
Note: A manual reset is necessary to restart this circuit.

Utilisation Categories EN60947-4-2

Category AC-53: Starting, switching off motors during running

Category AC-4: Starting, plugging, reversing the motors rapidly while the motor is during.

Mounting and cable wiring information

Mounting information see page 44 / Cable wiring see page 45

3-Phase electronic motor contactor (SMC 3 DOL Direct On Line)

- For Direct On Line start of 3 phase motors
- Rated operational voltage up to 600 VAC 50/60 Hz
- Rated operational current up to 15A AC-53
- Control voltage: 24-60VDC / 24-480VAC
- High number of start/stop operations / hour
- LED Status indication
- Meets EN 60947-4-2 requirements
- Requires only 45 mm DIN rail space

Item selection and technical specifications

Load ratings **AC-53 motor load stand.** **AC-4 motor load inching / plugging**	**Control voltage**	**Item number by 208-240VAC 50/60Hz Line Voltage**	**Item number by 400-480VAC 50/60Hz Line Voltage**	**Item number by 550-600VAC 50/60Hz Line Voltage**	**Module-width**
15A AC-53	24-60VDC / 24-480VAC	SMC 3 DA 2315 DOL	SMC 3 DA 4015 DOL	SMC 3 DA 6015 DOL	45mm

Output load specification

Operational current AC-53	15A	Min. operational current	50mA
Leakage current	5mA ACmax.	Duty cycle	100%

Control terminal specifications

Control voltage	24-60 VDC/24-480 VAC	Control current / power max.	6mA / 1.5 VA
Pick-up voltage max.	20.4 VAC / DC	Max. control voltage	510 VAC
Drop-out voltage min.	5 VAC / DC	Response time max.	1 cycle

Thermal specification

Power dissipation for continuous operation PDmax	2.2 W/A
Power dissipation for intermittent operation PD	2.2 W/A x dutycycle
Cooling method	Natural convection
Mounting	Vertical +/-30^{o}
Operating temperature range EN 60947-4-2	-5^{o}C to 40^{o}C
Max. operating temperature with current derating	60^{o}C
Storage temperature EN 60947-4-2	-20^{o}C to 80^{o}C

Operation in ambient temperatures exceeding 40^{o}C is possible if the power dissipation is limited either by reducing the steady-state current or by reducing the duty-cycle of the soft starter as shown in the table.

By 40^{o}C	By 50^{o}C	By 60^{o}C
100% load Duty-cycle 100%	80% load Duty-cycle max. 0.8	70% load Duty-cycle max. 0.65

Insulation specifications

Rated insulation voltage	Ui 660 Volt
Rated impulse withstand voltage	Uimp. 4 kVolt
Installation catagory	III

Environment

Degree of protection	IP 20	Pollution degree	3

Approval

cUL Std No. 508
*UL:Use thermal overload protection as required by the National Electric Code. When protected by a non-time delay K5 or H Class fuse, rated 266% of motor FLA, this device is rated for use on a circuit capable of delivering not more than 5,000 rms. symmetrical amperes, 600 V maximum. Maximum surrounding temperature 40°C.

Utilisation Categories EN60947-4-2

Category AC - 53	Starting, switching off motors during running.
Category AC - 4	Starting, plugging, reversing the motor rapidly while the motor is running.
CategoryAC - 52a	Control of slipring motor stators
CategoryAC - 53a	Control of squirrel cage motor
Category AC - 58a	Control of hermetic refrigerant compressors with automatic resetting of overload releases

EMC

This component meets the requirements of the product standard EN60947-4-2 and is CE marked according to this standard.
This products has been designed for class A equipment. Use of the product in domestic environments may cause radio interference, in which case the user may be required to employ additional mitigation methods.

Mounting and cable wiring information

Mounting information see page 44 / Cable wiring see page 45

Dimensions (se also page 44)

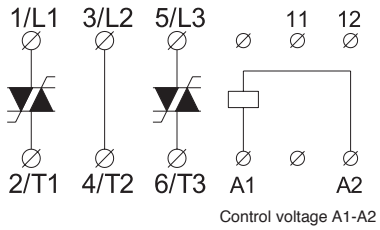
Type	H	D	W
45 mm module	94 mm	128.1 mm	45 mm

3-Phase electronic motor contactor (SMC 3 DOL Direct On Line)

Wiring specifications

SMC 3 DA XX15 DOL

11-12: For UP62 or other wiring purposes



Control voltage A1-A2

Short-circuit protection by circuit breaker or fuses

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 or Type 2**

Co-ordination Type 1: Short-circuit protects the installation

Co-ordination Type 2: Short-circuit protects the installation and the semi-conductors inside the motor controller

a) Short-circuit protection
Co-ordination type 1 will be obtained when using magnetic circuit breakers or standard gl/Gl fuses.
Co-ordination type 2 will be obtained when using semiconductor fuses. When using semiconductor fuses the SCR will not be damaged due to transients and short circuits. The table indicates suitable fuses for co-ordination type 2 protection.

b) Short-circuit protection by fuses

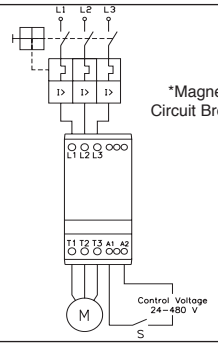
Type 1: SMC 3 DA XX15 DOL — Protection max. 50 A gL/gG

Type 2: SMC 3 DA XX15 DOL — Protection max. i^2t of the fuse 1800 A^2S

Fuses from e.g. Ferraz, Siba, Bussmann can be used as short-circuit protection Type 2

More information concerning Co-ordination Type 2 see page 45

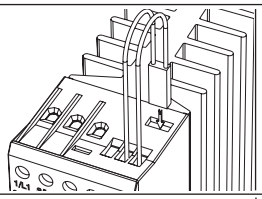
Overload Protection in Motor Control Reversing



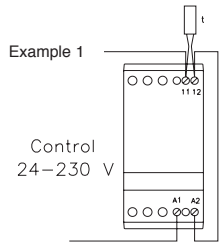
Overload protection of the motor is easily achieved by installing a manual thermal magnetic circuit breaker on the supply side of the motor.
The circuit breaker provides means for padlocking and the necessary clearance for use as a circuit isolator according to EN 60204-1.

Adjust the current limit on the MCB according to the rated nominal current of the motor
*Use UL approved Magnetic Circuit Breaker or UL specified back-up fuse type K5 or H Class

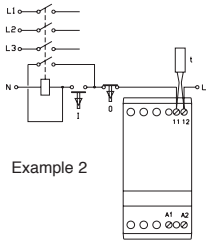
Thermal overload protection (see also page 44)



Optional thermal overload protection is possible by inserting a thermostat in a slot on the right hand side of the soft starter. Type number UP62



The thermostat can be connected in series with the control circuit of the soft starter.
When the temperature of the heatsink exceeds 90°C the soft starter will switch Off.
Note:
When the temperature has dropped approx. 30°C the soft starter will automatically be switched on again.



The thermostat is connected in series with the control circuit of the main contactor.
When the temperature of the heatsink exceeds 90°C the main contactor will switch Off.
Note:
A manual reset is necessary to restart this circuit.

SMC 3 DOL General application information

The SMC 3 DOL has been developed for cranes and other harsh applications where inching, jogging and plugging is frequently used and where a high number of operating cycles are essential. In such applications the lifetime of the equipment is normally limited by the short lifetime of the electromechanical contactor. Electromechanical contactors are not designed to switch off motors in locked rotor- or overload conditions where the current is 6 times the nominal operational current (AC-4). The servere arcing will burn the contact elements resulting in unreliable contact function.The Semiconductor Contactor will close the contacts in the zero crossing of the mains voltage and switch-Off will always occur in the zero crossing of the motor current in this way voltage kickback from the inductive motor windings is avoided. The lifetime, therefore, of the Semiconductoc Contactor will always be at least one decade longer than the electromechanical contactor.

Comparison of lifetime in different utilization categories

Utilization-categories	Typical applications	Electro-mechanical Contactor	Semiconductor Contactors SMC3DA....DOL
AC-52a	Control of slip-ring motors, starting, switching Off	0.7 Mill. Cycles	25 Mill. Cycles
AC-53a	Control of squirrel-cage motors, starting, switching Off	1.3 Mill. Cycles	25 Mill. Cycles
AC-4	Control of squirrel-cage motors, starting, plugging, inching	0.06 Mill. Cycles	5 Mill. Cycles