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
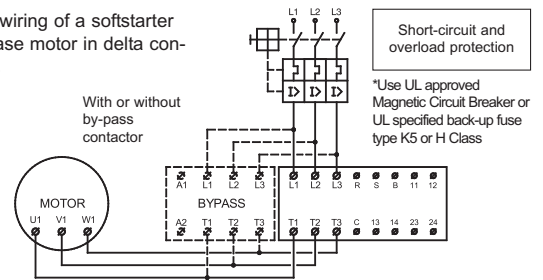Type 2: SMBC 3 DA XX25   Protection max. i^2t of the fuse 6300 A^2S

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

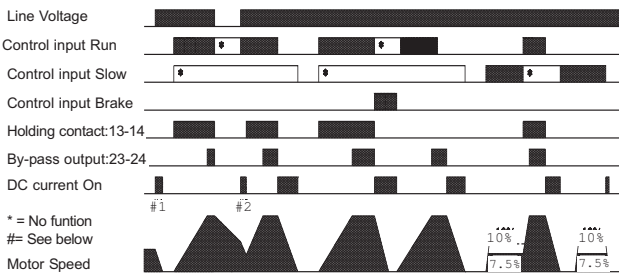## Wiring example (Start/Stop with or without By-pass contactor)
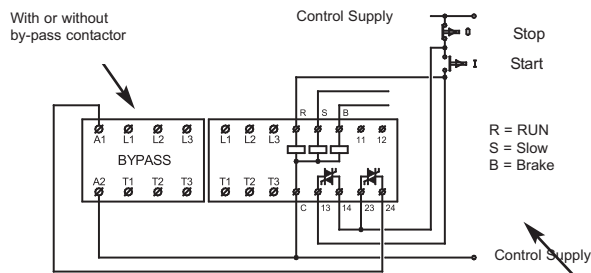
Motor wiring with or without by-pass

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

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

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

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.

Setting of the operation mode selector

NOTE:

When terminal 13-14 is used as Start/Stop function, and 23-24 to 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
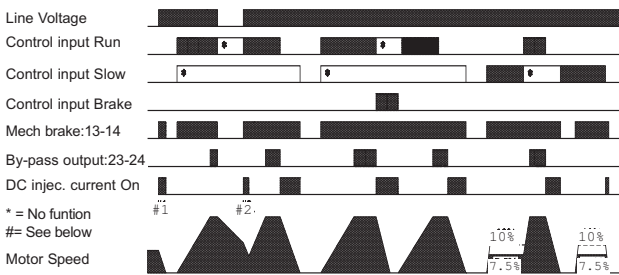(7.5% or 10% if slow speed is used)

Control of mechanical brake and by-pass contactor

Functional diagram of mechanical brake/by-pass contact.
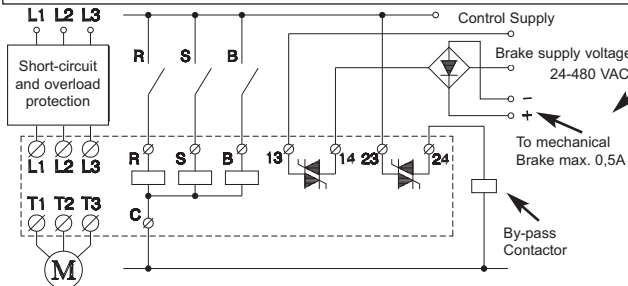
Thermal overload protection (see also page 44)

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:
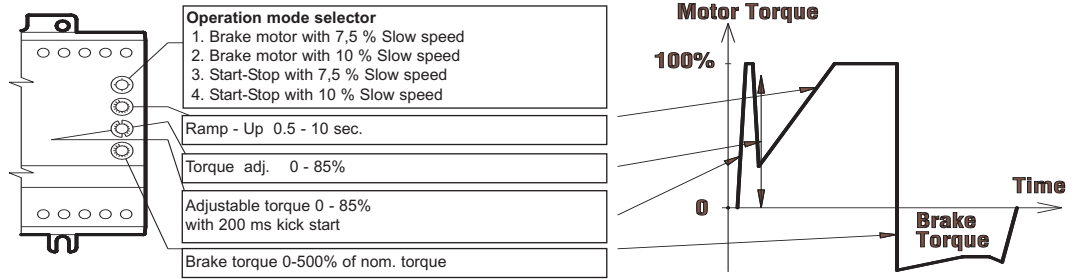When the temperature has dropped approx. 30°C the soft starter will automatically be switched on again.

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.

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Application, adjustment hints and general specifications for SMBC 3

How to adjust ramp time, initial torque and brake torque

Operation mode selector
1. Brake motor with 7,5 % Slow speed
2. Brake motor with 10 % Slow speed
3. Start-Stop with 7,5 % Slow speed
4. Start-Stop with 10 % Slow speed

Ramp - Up 0.5 - 10 sec.

Torque adj.   0 - 85%

Adjustable torque 0 - 85%
with 200 ms kick start

Brake torque 0-500% of nom. torque

Motor Torque

100%

0

Time

Brake Torque

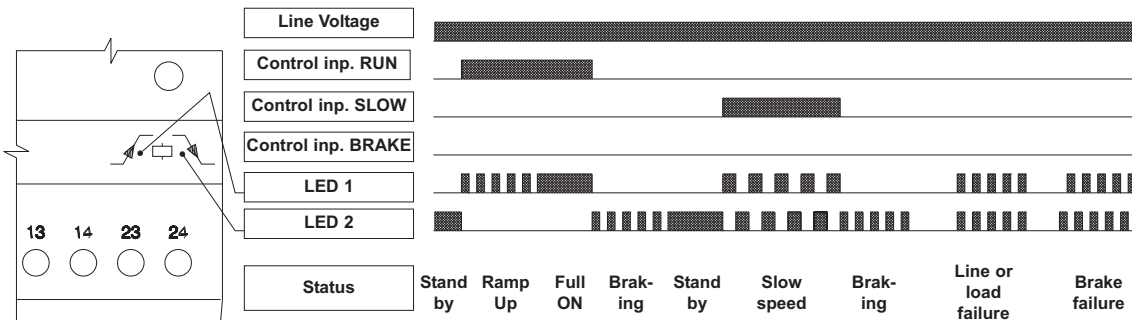| A. Standard load with automatic brake cycle	B. High inertia loads with stiction
	If it is not possible to reach a smoth start for an application it might be it may be necessary to kick-start / Break loose function.
A1) Set the *Ramp-Up* switch to maximum.	B1) Set the *Ramp-Up* switch to maximum.
A2) Set the *Brake Torque* switch to 1	B2) Set the *Brake-Torque* switch to 1.
A3) Set the *Initial Torque* switch to minimum.	B3) Set the *Initial Torque* switch to minimum in the *Kick-start* mode.
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.	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".
A5) Adjust *Ramp-Up* time to the desired starting time (scale is in seconds) is obtained.	B5) Adjust *Ramp-Up* time to the desired start time (the scale is in seconds) and start the motor.
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	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

		Line Voltage								
		Control inp. RUN								
		Control inp. SLOW								
		Control inp. BRAKE								
		LED 1								
13 14 23 24		LED 2								
		Status	Stand by	Ramp Up	Full ON	Brak-ing	Stand by	Slow speed	Brak-ing	Line or load failure	Brake failure

Slow speed-operation (funtional diagram)

Control input RUN

Control input SLOW

Motor speed

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

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