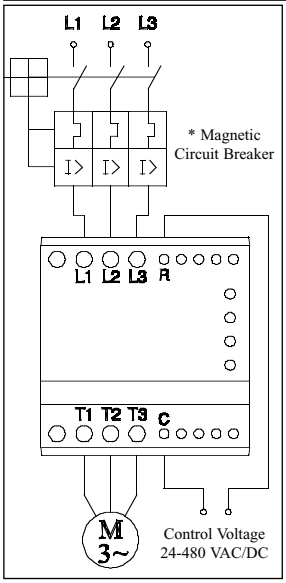
# Application hints Soft Starter with Dynamic Brake type SMBC 3 DA XX25

## Overload and Short-circuit Protection




It is recommended to overload protect the Controller 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.)

**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 Co-ordination 1 / 2
Co-ordination 1: Short-circuit protects the installation.
Co-ordination 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 | |
| | | Co-ordination 1 | Co-ordination 2 |
| 0.63 - 1.00 A | 047B3024 | 50 kA | 50 kA |
| 1.00 - 1.63 A | 047B3025 | 50 kA | 50 kA |
| 1.60 - 2.50 A | 047B3026 | 50 kA | 50 kA |
| 2.50 - 4.00 A | 047B3027 | 50 kA | 50 kA |
| 4.00 - 6.00 A | 047B3028 | 50 kA | 50 kA |
| 6.00 - 10.0 A | 047B3029 | 20 kA | 10 kA |
| 10.0 - 16.0 A | 047B3030 | 10 kA | 5 kA |
| 16.0 - 20.0 A | 047B3031 | 8 kA | 3 kA |
| 20.0 - 25.0 A | 047B3032 | 8 kA | 3 kA |

**b) Short-circuit protection by fuses**
Co-ordination 1: SMBC 3 DA XX 25 protection max 80 A. gL/gG, 63 AT.

Co-ordination 2: SMBC 3 DA XX 25 protection max 25 A gL/gG, 25 AT.
SMBC 3 DA XX 25 protection max $I^2t$ of the fuse 1800 $A^2S$

| Recommended fuse : | Ferraz | Siemens |
|---|---|---|
| SMBC 3 DA XX25 | 6,600 CP URGA 22x58/80 | Sillized 5SD5 100A |

## Utilisation Categories (IEC 947-4-2)

**AC - 52a** Control of slipring motor stators

**AC - 53a** Control of squirrel cage motor

## Rating Index (IEC 947-4-2)

**SMBC 3 DA XX25**

**25A: AC-52a: 4-13 : 100-3000**

**25A: AC-53a: 8-3 : 100-3000**

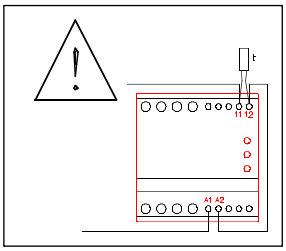
## By heavy duty applications derate according to the below table

| Overload relay trip class | Max. load current |
|---|---|
| 10 A (Light start) | 25 A |
| 10 (Normal start) | 25 A |
| 20 (Heavy start) | 20 A |
| 30 (Heavy start) | 15 A |

## Phase unbalance

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.

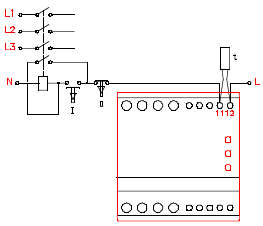
## Thermal Overload Protection Example 1



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. **NB When the temperature has dropped approx. 30°C the MC will automatically be switched on again.**

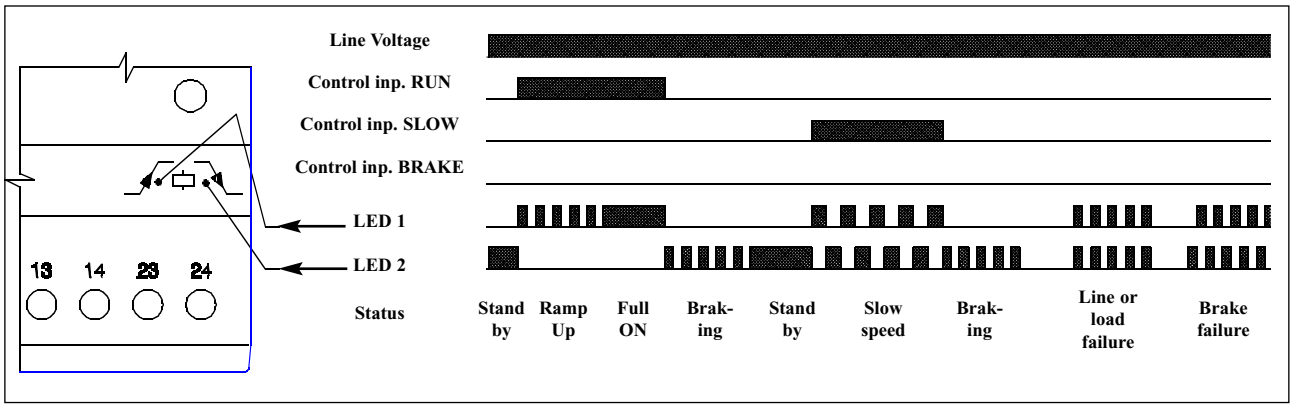
## Thermal Overload Protection Example 2



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.

## LED Status indication



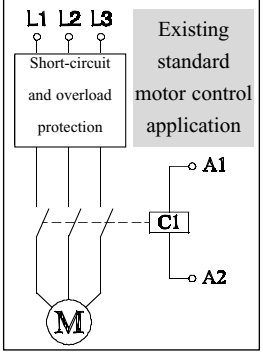

* UL: Use thermal overload protection as required by the National Electric Code. When protected by a non-time delay K5 or H Class fuse, rated 266% of motor FLA, this device is rated for use on a circuit capable of delive ring not more than 5,000 rms. symmetrical amperes, 600 V maximum.Maximum surrounding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

Specifications are subject to change without notice

# Application hints Soft Starter with Dynamic Brake type SMBC 3 DA XX25

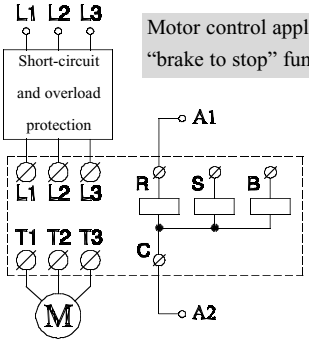
## Upgrading an existing motor control application to an automatic “brake to stop” application.

### Wiring exsamples




Existing standard motor control application

### Wiring exsamples

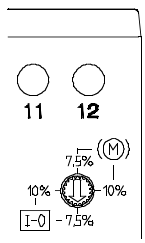



Motor control application with automatic “brake to stop” function

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

### Auxiliary contacts

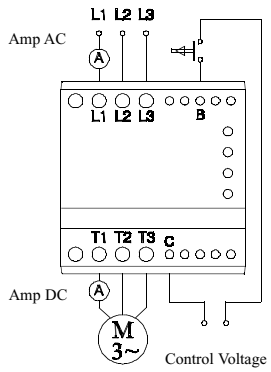
In existing applications where an auxiliary contact is needed, use terminal 13, 14 and adjust the function mode selector to position I-O (7.5% or 10% slow speed)
If more aux. contacts is necessary a small relay controlled from terminal 13, 14 can be used.



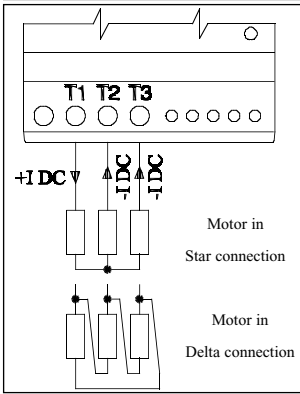

## Automatic stop detection.

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.



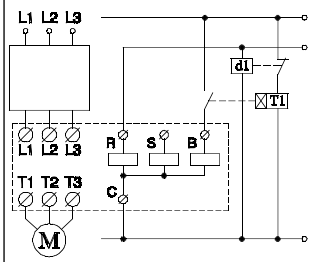

## DC Brake current




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. Braking will be more efficient if the motor is connected in star.

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

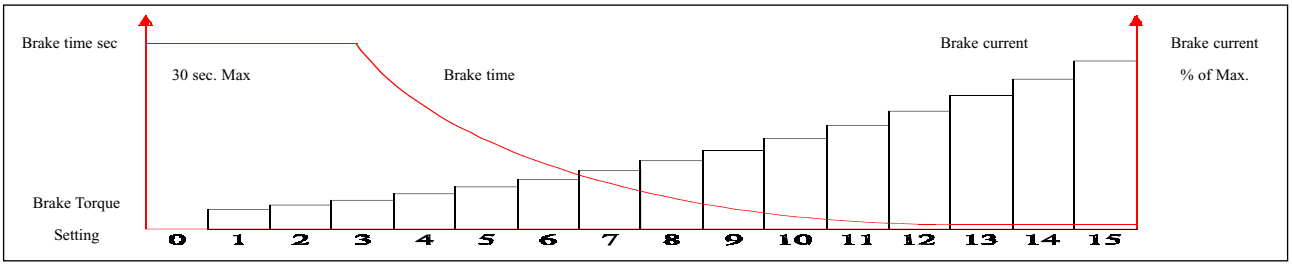
## Timer controlled brake cycle.




If the application can only 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

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, Star or 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 application information.

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