



## Film Capacitors – Power Factor Correction

### Thyristor Module TSM-LC for Dynamic PFC

**Series/Type:** TSM-LC200  
**Ordering code:** B44066T0200E402  
Date: August 2010  
Version: 5

### Characteristics

- Fast electronically controlled self observing thyristor switch
- For capacitive loads up to 200 kvar
- Suitable for designing dynamic PFC-systems in 380 and 400 V grids
- Micro-processor controlled alignment to tuned or detuned capacitor branches (up to 14 %) for optimized switching behaviour
- No system perturbation due to switching operations (transients)
- Switching without delay
- Maintenance-free
- Long useful service life
- No noise emission during switching operation
- Compact module ready for connection

### Features

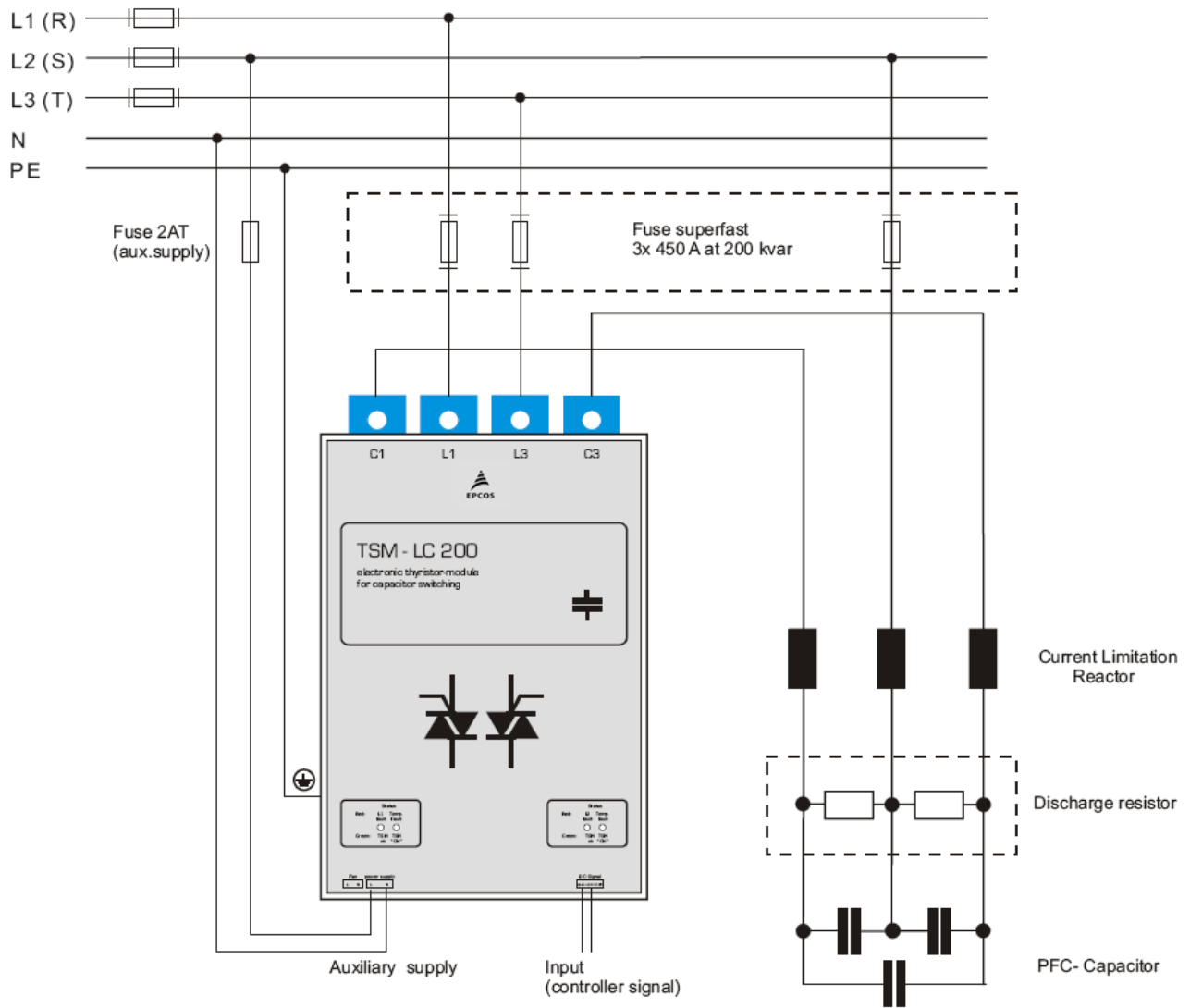
- Easy installation: mechanical assembly directly on a mounting plate
- Self check after turn-on of main voltage
- Optimized switching behaviour to the connected load (tuned/detuned) via the internal processor
- Storage of optimized parameters for optimum switching behaviour
- Mounting position: Upright; minimum 150 mm space on top and below
- Display and control via LED display
  - Operation
  - Faults
  - Activation
- Permanent self-monitoring
  - Temperature
  - Voltage
  - Operating state



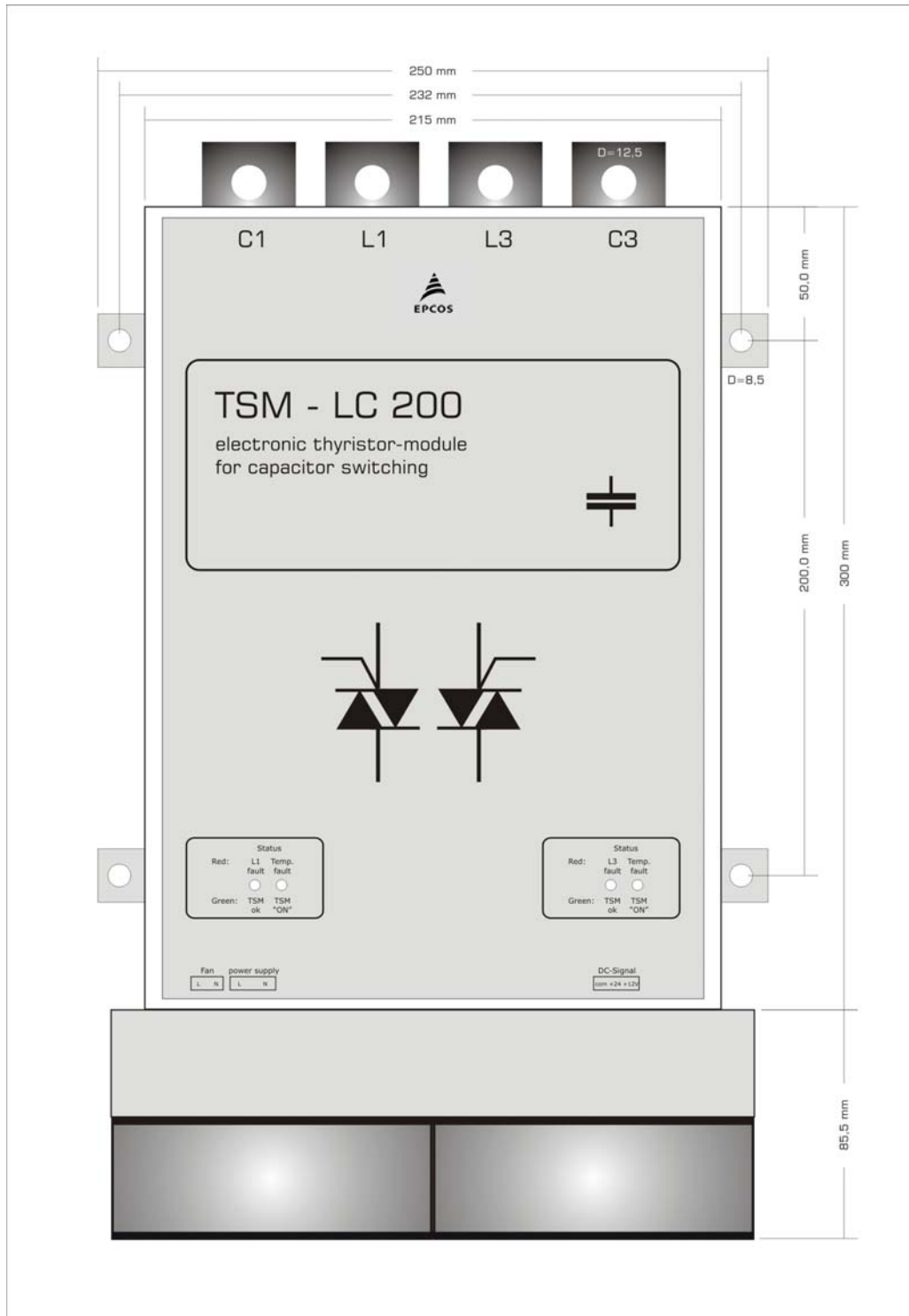
**Technical data and specifications**

Dimensions	250 x 480 x 160 mm (w x h x d)
Weight	11.5 kg
Rated voltage	380 ... 400 V
Maximum voltage	
- in conventional PFC-systems (without reactors)	440 V
- in detuned PFC-systems (7 % detuning)	440 V (no upwards tolerance permitted)
- in detuned PFC-systems (14 % detuning)	400 V
Auxiliary supply	230 V AC
Frequency	50/60 Hz
Switching capability	Max. 200 kvar at 400 V
Activation	10...24 V DC (approx. 20 mA) via terminal clamp, internally electrically isolated
Switching time	Approx. 5 ms
Reset time	Depending on degree of detuning and dimension of discharge resistor
Display	2 status LEDs per phase: operation/fault and triggering signal
Power circuit	Direct connection 4 pole via busbar (cable lug max. 185 mm <sup>2</sup> , D = 12 mm), connection from the top
Power dissipation	$P_D$ (in W) = 2,0 x I (in A) ; at 400 V/200 kvar approx. 580 W thermal
Fuses (mandatory for protection of components)	3 x electronic fuse „superfast“ NH2 AC 690V, characteristic gRL 125 kvar: 315 A (e.g. SIBA Art.Nr. 20.212.20.315) 150 kvar: 350 A (e.g. SIBA Art.Nr. 20.212.20.350) 200 kvar: 450 A (e.g. SIBA Art.Nr. 20 212. 20.450)
Ambient operating temperature at nominal load	-10 °C ... +55 °C

Connection diagram: three-phase load (standard)



Dimensional drawing



## Cautions and Warnings

### General

- Thyristor modules TSM series may only be used for the purpose they have been designed for.
- Thyristor modules TSM series may only be used in combination with appropriate pre-switched grid separator device.
- Thyristor modules have to be projected in such a way that in case of any failure no uncontrolled high current and voltages may occur.
- The devices in operation have to be protected against moisture and dust, sufficient cooling has to be assured.

### Attention

Due to the switching principle of the thyristor module the power capacitors are permanently loaded to the peak value of the grid voltage (DC voltage) even when switched off. Therefore following rules have to be obeyed in any case:

- For standard PFC-systems (without reactors) power capacitors of 440 V nominal voltage have to be used; for detuned systems PFC capacitors of 525 V nominal voltage have to be used.
- Due to the high voltage (2 x peak value of nominal voltage) that occurs, the discharge resistors of the power capacitors have to be replaced by special types (accessory EW22).
- In dynamic systems with TSM modules no fast discharge reactors may be used (reactor = DC-wise short circuit).
- For standard PFC-systems 2 current limiting reactors are mandatory per thyristor module (accessory BD100).
- Thyristor modules in general have to be protected by superfast electronic fuses. Principles for dimensioning have to be considered. Fuses in the system have to be marked.
- Due to the special switching, the PFC capacitors are fully loaded even when the particular step has been switched off. Protection against contact has to be guaranteed. Warning signals in the systems are required.
- Even in switched off state no electrical isolation is achieved for electronic switches. Therefore parts of the systems may not be touched after switching off the complete system before the capacitors have been completely discharged.

FAILURE TO FOLLOW CAUTIONS MAY RESULT, WORST CASE, IN PREMATURE FAILURES OR PHYSICAL INJURY.

### Note

For detailed information about PFC capacitors and cautions, refer to the latest version of EPCOS PFC Product Profile.

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