



## Film Capacitors – Power Factor Correction

Thyristor module

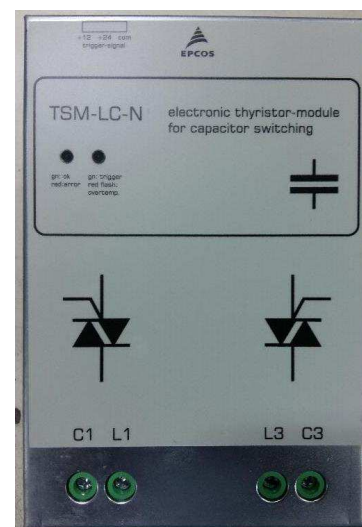
<b>Series/Type:</b>	<b>TSM-LC-N</b>
<b>Ordering code:</b>	<b>B44066T3050R442</b>
Date:	2018-08-22
Version:	4

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### Characteristics

- Thyristor module for dynamic compensation system in grids from 415 to 440 V, 50/60 Hz, for 50 kvar
- Follow-on development of series TSM-LC50
- Optimized switching behaviour by micro-processor controlled alignment to capacitor branches with or without detuning reactor
- No wear-out parts (no fan)
- Monitoring of voltage, phase and temperature
- Switching without delay
- No system perturbation by switching operations (transients)
- No auxiliary voltage required
- Maintenance free
- Long service life
- No switching noise
- Ready to use compact module
- Enhanced connection via high current clamps
- Enhanced temperature management



### Applications

- Presses
- Welding machines
- Elevators
- Cranes
- Wind turbines etc.

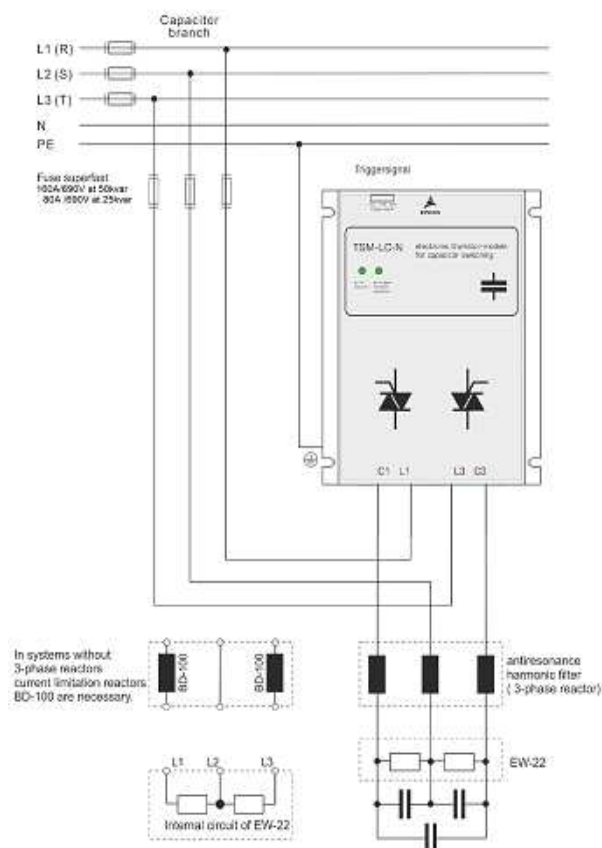
### Mounting and connection

1. Mechanical mounting directly on the mounting plate
2. Connection of main current lines via high current clamps. Can be connected via lines (max. 35 mm<sup>2</sup>) directly to the main fuse resp. capacitor ; minimum torque: 2.0 Nm, maximum torque 4.0 Nm.
3. Connection see figure 1. Main fuses have to be super fast electronic fuses as protection of semiconductor devices. Design basics have to be obeyed!
4. Mounting position vertical; minimum distance 150 mm up and down
5. Triggering of the module via 10 to 24 VDC signal (from the PF controller or an appropriate control which is fed in at connection X1 (trigger signal))
6. If a higher step output is required, cascading of several modules is possible

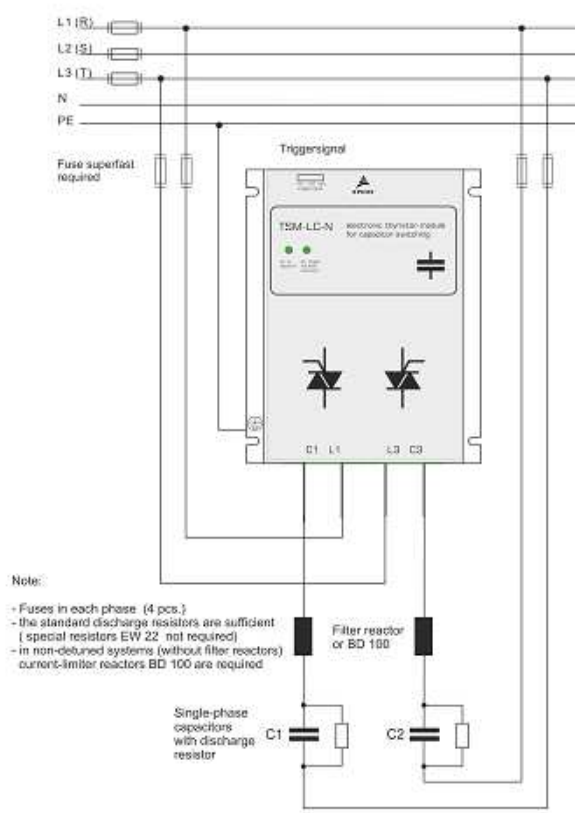
**Technical data and specification**

dimensions	157 x 200 x 175 mm (W x H x D)
weight	Approx. 4.8 kg
operating voltage	380 ... 440 V AC
frequency	50/60 Hz
max. voltage	In systems without reactors: 440 V 7% detuning: max. 440 V 14% detuning: max. 440 V
triggering	10 ... 24 V DC (ca. 10 mA) via connection clamp, internally galvanical decoupled
switching time	Ca. 5 ms
re-switching time	Depending on de-tuning factor and discharge resistor used
switching capacity	Max. 75 A
display	2 LEDs
monitoring	Voltage, operation status and temperature For re-switching after a temperature failure, cooling element must be below 50 °C (hysteresis)
power circuit	Connection 4 pole via high current clamp ; connection from bottom side
power loss	$P_v \text{ (in W)} = 2.0 \bullet I \text{ (in A)}$ ; at nominal voltage ca. 150 W thermal
ambient operating temperature at nominal load	-10 ... + 55 °C
protection	3x electronic fuse "Cooper Bussmann" (BS88 AC 690 V) 50 kvar: 160 A (e.g. Cooper Bussmann 160EET)

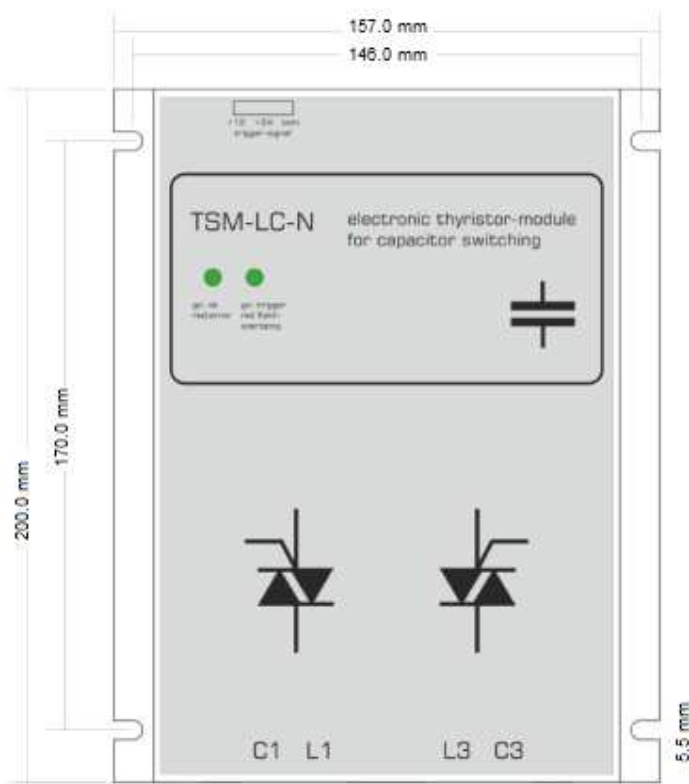
**Connection diagram  
three phase load (standard)**



**Connection diagram  
two phase load**



## Dimensions



Mounting depth: 175.0 mm

## 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.
- As the devices are cooled in passive way (no fan), enough space (min. 150 mm distance up and down) must be guaranteed.
- Do not mount several devices one above the other (heat accumulation)!
- Thyristor switches may only be connected to the grid when a possible harm to humans and devices are eliminated.

### 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:

- In systems without reactors power factor correction capacitors with nominal voltage 440 V have to be used; in detuned systems (440 V grid) power factor correction capacitors with nominal voltage of 525 V have to be used!
- The discharge resistors of the power capacitors have to be replaced by special voltage resistant types due to the high voltages that occur (2x peak value of grid voltage); accessory EW22 see connection diagram.
- In dynamic systems with TSM modules no fast discharge reactors may be used (reactor = DC-wise short circuit).
- For standard systems (without reactors) per thyristor switch 2 current limitation reactors are mandatory. Available as 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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## Important notes

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