



## Film Capacitors – Power Factor Correction

Thyristor module

**Series/Type:** TSM-LC-S  
**Ordering code:** B44066T1050E402  
**Date:** February 2014  
**Version:** 1

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### Characteristics

- Thyristor module for dynamic compensation system in grids from 200 to 440 V, 50/60 Hz, up to 50 kvar
- Installation via system bus (interface)
- Real-time monitoring of capacitor current, status, voltage and temperature (capacitor protection)
- Configuration, display of measuring values, alarm and error messages via high-contrast OLED-display
- Transmission of all measured values via interface for further processing in the controller
- Storage of maximum values/temperature
- Easy installation via standard patch cable
- Manual switch on possible
- No wear parts (no fan)
- Switching without delay
- No system perturbation by transients
- Maintenance free, no switching noises
- Compact module, ready to use



### Applications

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

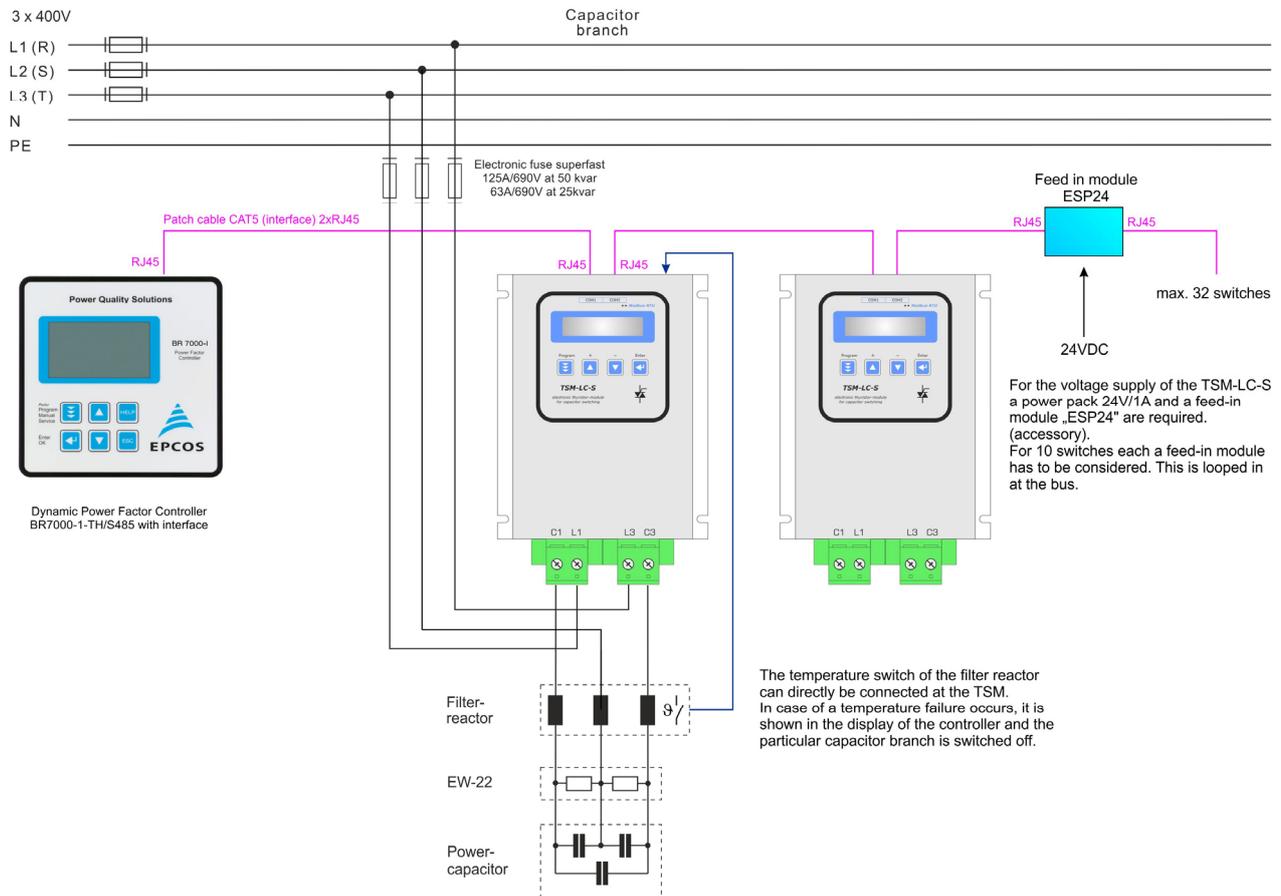
### Mounting and connection

- Mechanical mounting directly on the mounting plate
- Connection of main current lines via high current plug connections (included in the delivery); can be connected via lines (max. 35 mm<sup>2</sup>) directly to the main fuse resp. capacitor
- Mounting position vertical; minimum distance 150 mm up and down
- Auxiliary supply (24 V DC) necessary, fed by the patch cable. Per max. 10 switches one feed-in adapter ESP24 is required as accessory (see switching diagram).
- Main fuses have to be super fast electronic fuses as protection of semiconductor devices. Design basics have to be obeyed!
- Triggering of the module via the system bus (patch cable RJ45) from PF-controller BR7000-I-TH/S485.  
Up to 32 devices at bus supported by the controller

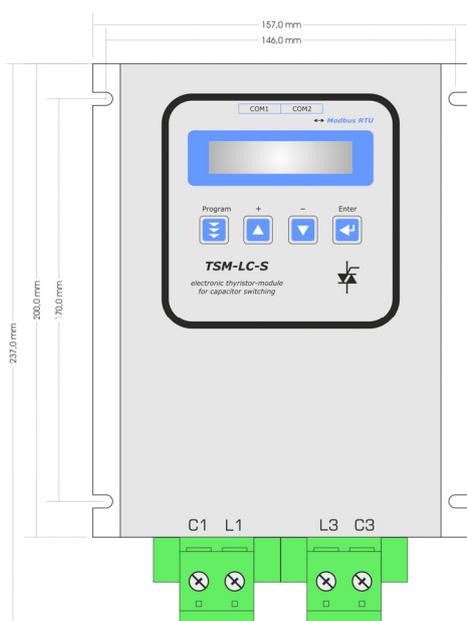
**Technical data and specifications**

Dimensions	157 x 200 x 180 mm (W x H x D) – without connection clamps		
Weight	Approx. 5 kg		
Operating voltage	200 ... 440 V AC		
Nominal voltage (phase voltage)	Step output:	Current/phase	Electronic fuse “super fast” (NH00 AC 690 V)
- 230 V	15 kvar	ca. 36 A	3 x 63 A/690 V
- 400 V	25 kvar	ca. 36 A	3 x 63 A/690 V
- 440 V	28 kvar	ca. 36 A	3 x 63 A/690 V
- 230 V	30 kvar	ca. 72 A	3 x 125 A/690 V
- 400 V	50 kvar	ca. 72 A	3 x 125 A/690 V
- 440 V	55 kvar	ca. 72 A	3 x 125 A/690 V
Frequency	50/60 Hz		
Auxiliary supply	24 V DC/0.1 A (via system bus) – per 10 switches one feed-in module ESP24 is required. To be ordered as accessory B44066T0002E400		
Triggering	Via system bus (standard patch cable)		
Switching time	Ca. 5 ms		
Re-switching time	Depending on de-tuning factor and discharge resistor used		
Switching capacity	Max. 75 A		
Display	High contrast OLED-display, 2 x 16 digits		
Monitoring	Voltage, capacitor current /-output, temperature, switching stage		
Operating	4 buttons		
Power circuit	Connection via plug connector from the bottom Conductor cross section steep or flexible max. 2 x 35 mm <sup>2</sup>		
Power loss	P <sub>v</sub> (in W) = 2.0 • I (in A); At 50 kvar/400 V: ca. 150 W thermal		
Ambient operating temperature at nominal load	-10 ... + 55 °C		
Error messages	Over-/under voltage (auxiliary voltage and grid voltage), over current L1/L3, C-error		
Connections:	2 x RJ45 (system bus) 2 x 2 pole high current plug (35 mm <sup>2</sup> ) for main circuit		

Connection diagram (three phase load)



Dimensions



### 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:

- The discharge resistors of the power capacitors have to be replaced by special voltage resistant types due to the high voltages that occur (2 x 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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