



Film Capacitors – Power Factor Correction

Thyristor module

Series/Type: TSM-LC-I
Ordering code: B44066T1022E520
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Version: 2

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Characteristics

- Single phase fast electronic switching device, self monitoring, designed for dynamic compensation systems
- For direct 2-phase switching of capacitive loads (L-N) or (L-L)
- For de-tuned and conventional applications
- For grid voltages from 110 to 525 V
- Switching of capacitors in 3-phase-network possible by cascading
- No neutral conductor required
- No system distortion caused by switching operations
- Monitoring of temperature, voltage and capacitor drop

Applications

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

Mounting and connection

- Mechanical mounting directly on the mounting plate
- Mounting position vertical; minimum distance 100 mm up and down
- Connection of main current lines via plug connections (included in the delivery)
- Auxiliary supply (24 V DC) necessary
- Cascading of 3 switches for switching of capacitors in 3-phase-networks possible; mounting directly side-by-side (see connection example 2)



Technical data and specifications

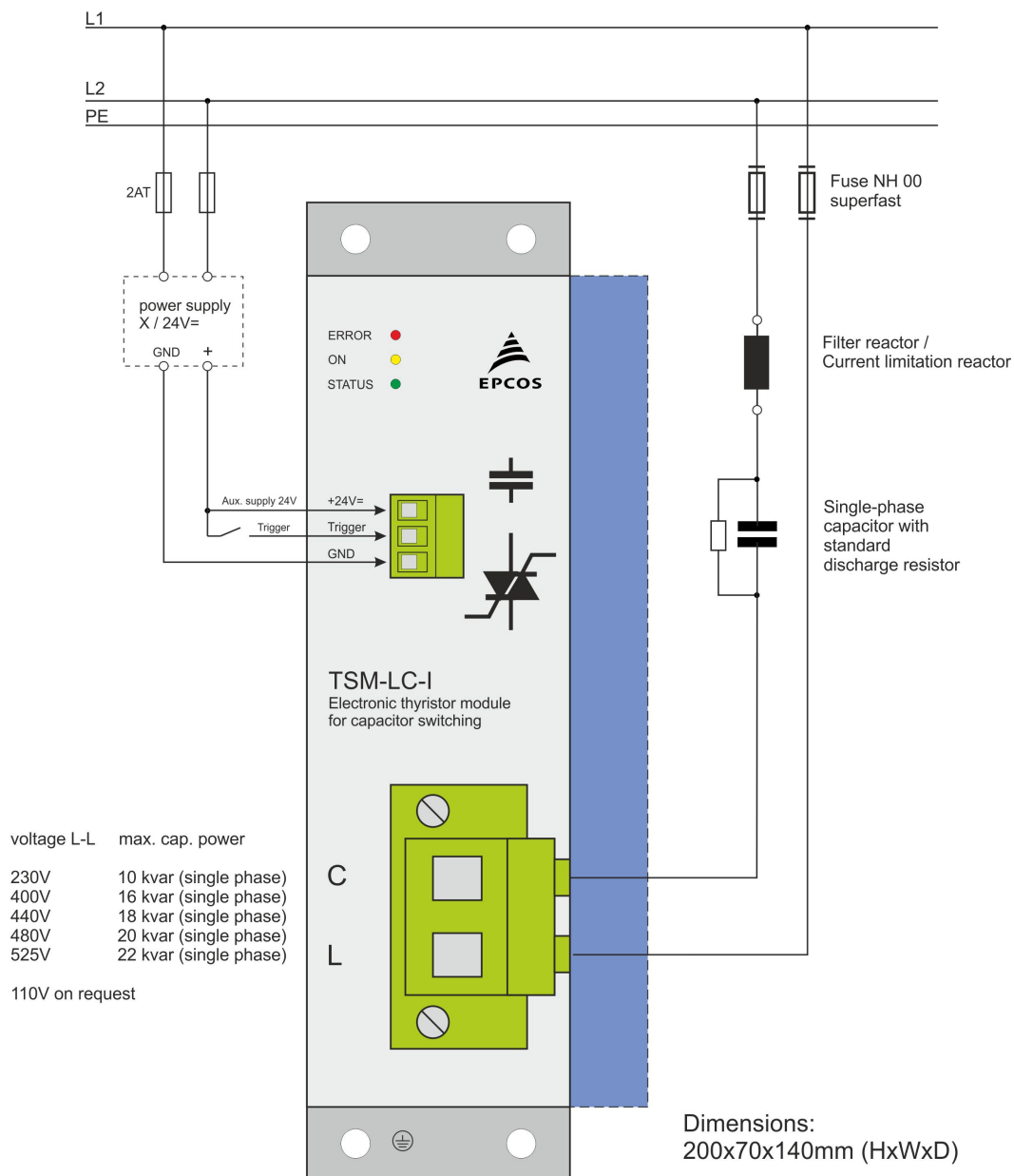
Dimensions	70 x 200 x 150 mm (W x H x D)
Weight	1.5 kg
Operating voltage	230 ... 525 V (110 V upon request)
Maximum step output possible at grid voltage	Single-phase step size:
- 230 V	10 kvar
- 400 V	16 kvar
- 440 V	18 kvar
- 480 V	20 kvar
- 525 V	22 kvar
Frequency	50/60 Hz
Auxiliary supply	24 V DC
Triggering	10 ... 24 V DC (ca. 20 mA) via connection clamp; galvanically internal coupling
Switching time	ca. 5 ms
Re-switching time	Depending on de-tuning factor and discharge resistor used
Display and monitoring	LED-display: operation/disturbance/triggering signal Permanent monitoring of grid voltage, capacitor current, operating status and temperature
Power circuit	Connection via plug connector from the front Conductor cross section steep or flexible max. 2 x 35 mm ²
Power loss	$P_v \text{ (in W)} = 1.0 \cdot I \text{ (in A)}$; At nominal power: ca. 45 W thermal
Ambient operating temperature at nominal load	-10 ... + 55 °C

Connection examples

1. Switching of single phase loads

Connection possible between L-N as well as between L-L

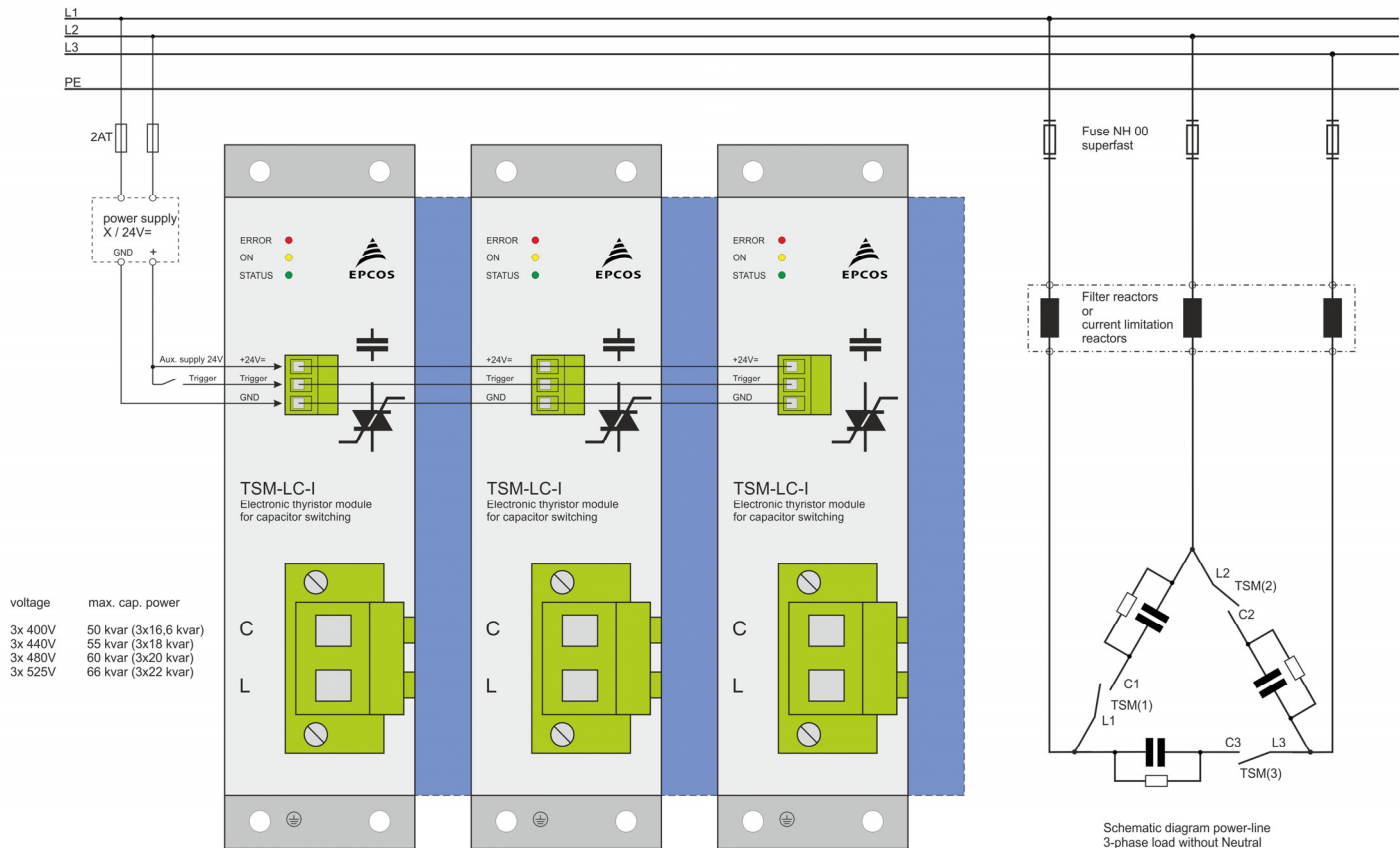
Application: single-phase switching with new TSM-LC-I (standard connection)
Load: Line to Line



2. Switching of capacitive loads in 3-phase-grids

Capacitors can be switched in 3-phase in grids up to 525 V by cascading.

Application: three-phase switching with new TSM-LC-I (3 pcs. required)
Load: 3-phase without Neutral



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 dynamic PFC-systems with TSM-LC-I standard power capacitors with voltage according to the grid-voltage have to be used. It should be the same voltage as used in standard systems with capacitor contactors (e.g. grid voltage 400 V, detuning factor 7% → capacitor voltage 440 V).
- In case a very fast re-switching time is needed by the process and a high detuning factor is needed (e.g. 14 %), it is recommended to replace the discharge resistors of the power capacitors 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 (without reactors) one current limiting reactor per thyristor module is mandatory.
- 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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