



Film Capacitors – Power Factor Correction

Thyristor module

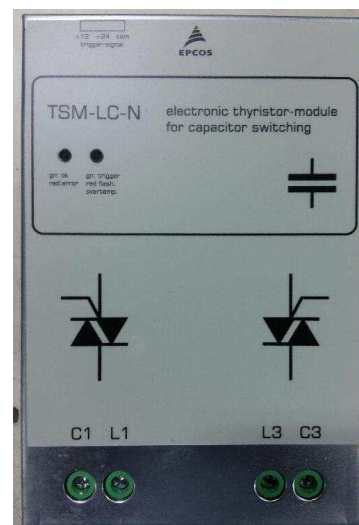
Series/Type:	TSM-LC-N
Ordering code:	B44066T3050R402
Date:	2018-08-22
Version:	4

© EPCOS AG 2018. Reproduction, publication and dissemination of this publication, enclosures hereto and the information contained therein without EPCOS' prior express consent is prohibited.

EPCOS AG is a TDK Group Company.

Characteristics

- Thyristor module for dynamic compensation systems in grids from 380 to 400 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 wearout 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.

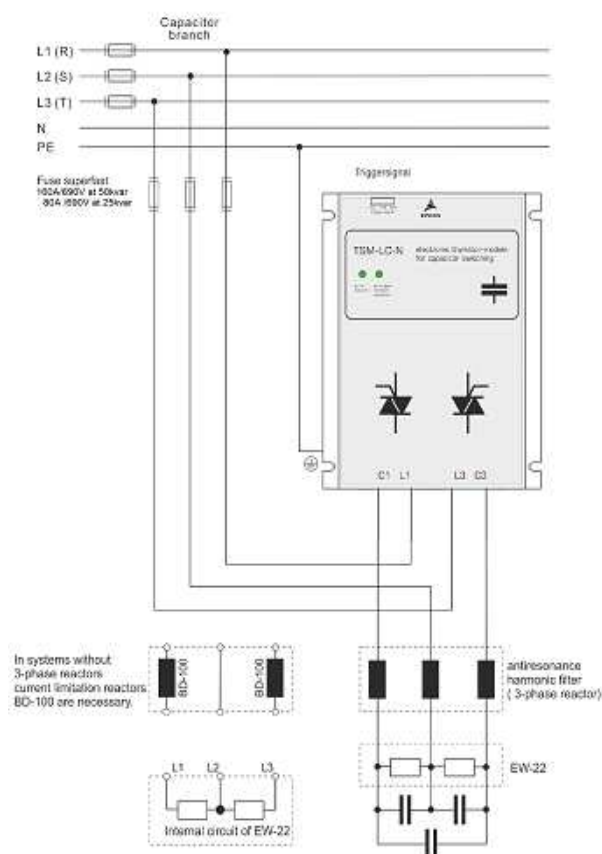
Mounting and connection

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 mm²) 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

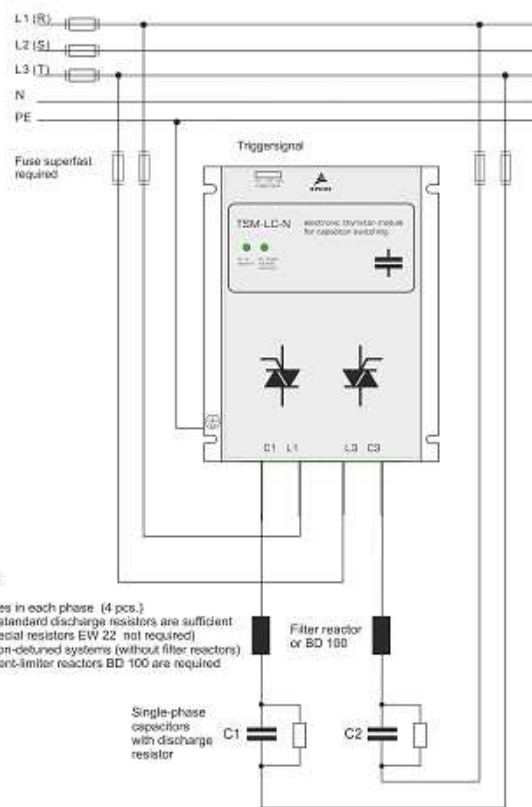
Technical data and specification

dimensions	157 x 200 x 175 mm (W x H x D)
weight	Approx. 4.8 kg
operating voltage	380 ... 400 V AC
frequency	50/60 Hz
max. voltage	In systems without reactors: 400 V 7% detuning: max. 400 V 14% detuning: max. 400 V
triggering	10 ... 24 V DC (ca. 10 mA) via connection clamp, internally galvanic decoupled
switching time	Ca. 5 ms
re-switching time	Depending on de-tuning factor and discharge resistor used
switching capacity	Max. 75 A
display monitoring	2 LEDs 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 clamps; connection from bottom side
power loss	P_v (in W) = $2.0 \cdot I$ (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)

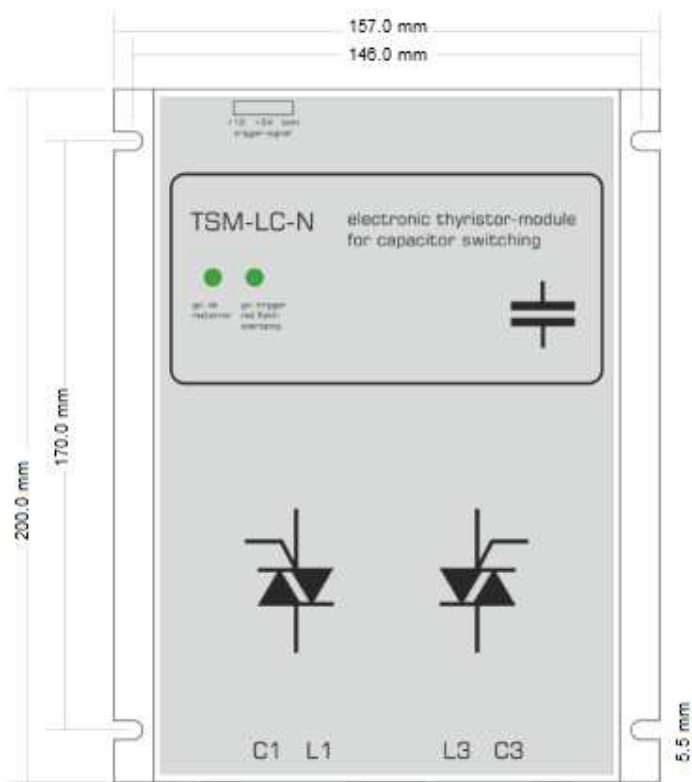
**Connection diagram
three phase load (standard)**



**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 (400 V grid) power factor correction capacitors with nominal voltage of 480 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.

Important notes

The following applies to all products named in this publication:

1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule, EPCOS is either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether an EPCOS product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of an electronic component.
3. **The warnings, cautions and product-specific notes must be observed.**
4. In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as hazardous)**. Useful information on this will be found in our Material Data Sheets on the Internet (www.epcos.com/material). Should you have any more detailed questions, please contact our sales offices.
5. We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order. We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available. The aforementioned does not apply in the case of individual agreements deviating from the foregoing for customer-specific products.
6. Unless otherwise agreed in individual contracts, **all orders are subject to the current version of the "General Terms of Delivery for Products and Services in the Electrical Industry" published by the German Electrical and Electronics Industry Association (ZVEI)**.
7. **Our manufacturing sites serving the automotive business apply the IATF 16949 standard**. The IATF certifications confirm our compliance with requirements regarding the quality management system in the automotive industry. Referring to customer requirements and customer specific requirements ("CSR") TDK always has and will continue to have the policy of respecting individual agreements. Even if IATF 16949 may appear to support the acceptance of unilateral requirements, we hereby like to emphasize that **only requirements mutually agreed upon can and will be implemented in our Quality Management System**. For clarification purposes we like to point out that obligations from IATF 16949 shall only become legally binding if individually agreed upon.

Important notes

8. The trade names EPCOS, CeraCharge, CeraDiode, CeraLink, CeraPad, CeraPlas, CSMP, CTVS, DeltaCap, DigiSiMic, ExoCore, FilterCap, FormFit, LeaXield, MiniBlue, MiniCell, MKD, MKK, MotorCap, PCC, PhaseCap, PhaseCube, PhaseMod, PhiCap, PowerHap, PQSine, PQvar, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SiMic, SIMID, SineFormer, SIOV, ThermoFuse, WindCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.epcos.com/trademarks.

Release 2018-06