

## TSM - LC - N1

### New thyristor module for dynamic Power Factor Correction (up to 50 kvar)

issue 1.0

#### **General:**

The TSM-LC-N1 for Dynamic PFC is a fast electronically controlled, self-observing thyristor switch for capacitive loads up to 50 kvar (380...440 VAC) which is capable to switch PFC capacitors within a few milliseconds as often and as long as required without abrasion.

Triggering can be done by means of dynamic power factor controllers, programmable logic controllers (PLC) or directly out of the technologic process.

- Thyristor module for dynamic compensation systems in grids from 380 to 440 V, 50/60 Hz, for 25 to 50 kvar
- Follow-on development TSM-LC-N
- 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; status via LEDs
- Switching without delay
- No auxiliary voltage required
- Maintenance free, long service life
- Enhanced connection via plugs
- Enhanced temperature management.



#### **Applications:**

dynamical compensation in fast processes:

- Presses
- Welding machines,
- Elevators,
- Cranes,
- Wind turbines

#### **Mounting and connection**

The mechanical mounting is done directly on a mounting plate. The main terminals can be directly connected via lines to the main fuse resp. capacitor. (max. 35 mm<sup>2</sup>)

Connection is done according picture 1. It is mandatory to use superfast electronic fuses as branch fuses to protect the semiconductor device! Basics of dimensioning must be obeyed!

Triggering of the module is taking place without any time delay by a 10 – 24 VDC signal (coming from the PFC-controller or an adequate control system) fed in at the connection X1 (signal).

If an increase of the stage output is needed, a cascading of several modules is possible.

## **Putting into operation**

After switching on the net voltage (engaging of the branch fuse) the thyristor module is ready for operation.

The thyristor module has 2 status-LEDs with the following meaning:

LED - left side

Green: operating voltage activated, thyristor module standby

Red permanent: capacitor without capacitance or not existent;  
thyristor or fuse defect

Red flashing: net voltage L1/L3 missing or too low

LED - right side:

Green: „Module ON“ (Trigger)

Red flashing: Over-temperature

## **Technical Data**

Net voltage: 380 ... 440 V - 50/60Hz

max. power: max. 75A (up to 50 kvar/400V)

Activation: 10...24 VDC (appr. 10mA) via terminal clamp,  
internally insulated

Switching-on time: app. 5 ms

Re-switching time: Depending on degree of de-tuning and dimension of discharge  
resistor

Display: via 2 LEDs

Monitoring: permanent monitoring of net voltage, true current, temperature and  
operation status. Before re-switching after temperature fault, heat  
sink temperature must be below 50 °C (hysteresis)!

Power circuit: direct connection 4-pole via high-current clamps (cable lug 35 mm<sup>2</sup>)  
Connection from bottom

Max. RMS-current: 100A No continuous current – thermal load has to be considered!

Power dissipation:  $P_v (W) = 2,0 \times I (in A)$ ; at 400V / 50kvar typical 150 W

Max. voltage: 440 V

Fuses: 3 x electronic fuse „superfast“ (NH00 AC 690V )  
50 kvar: 125 A (e.g. SIBA Art.No.: 20 209 20-125)  
25 kvar: 63 A (z.B. SIBA Art.Nr.: 20 477 20-63)

Dimensions: 157 x 200 x 180 (w x h x d)

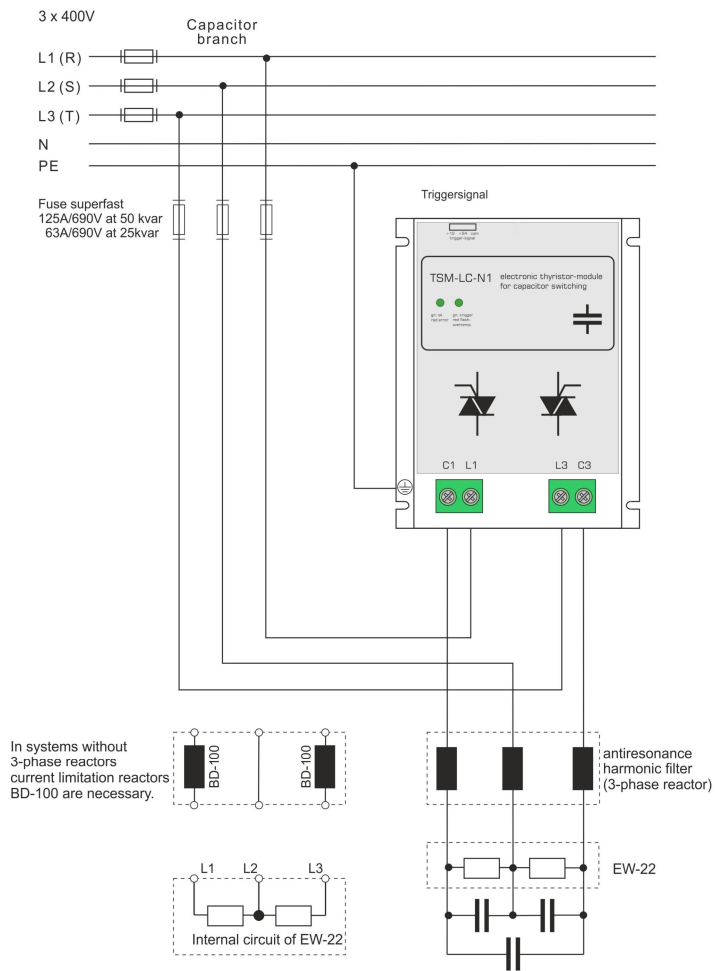
Weight : 4.8 kg

Assembling : direct mounting on mounting plate

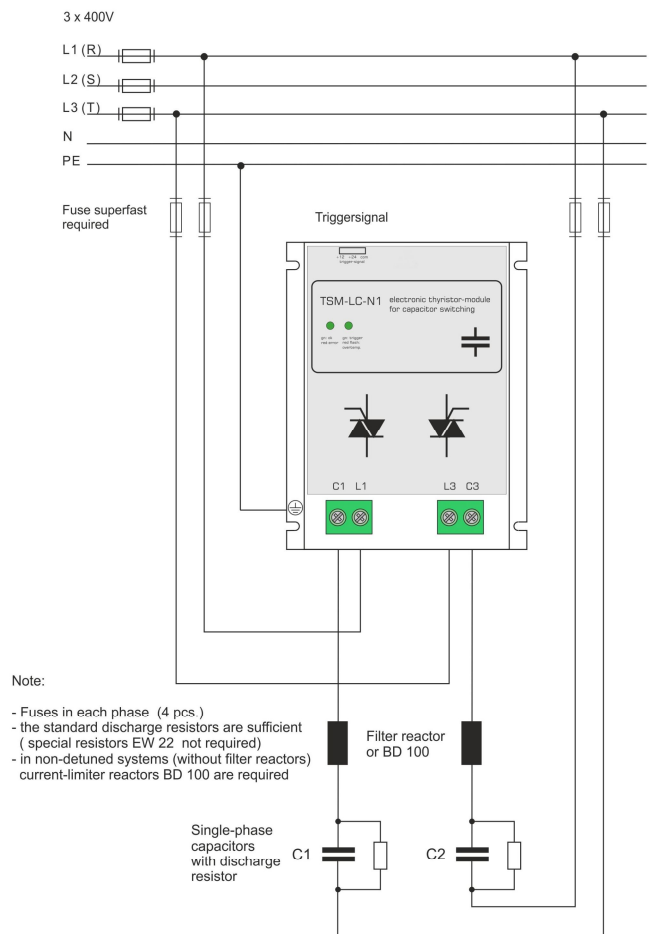
Mounting position : vertical, minimum 150 mm distance upwards and downwards

Operating ambient temperature with nominal load: -10°C ... 55°C

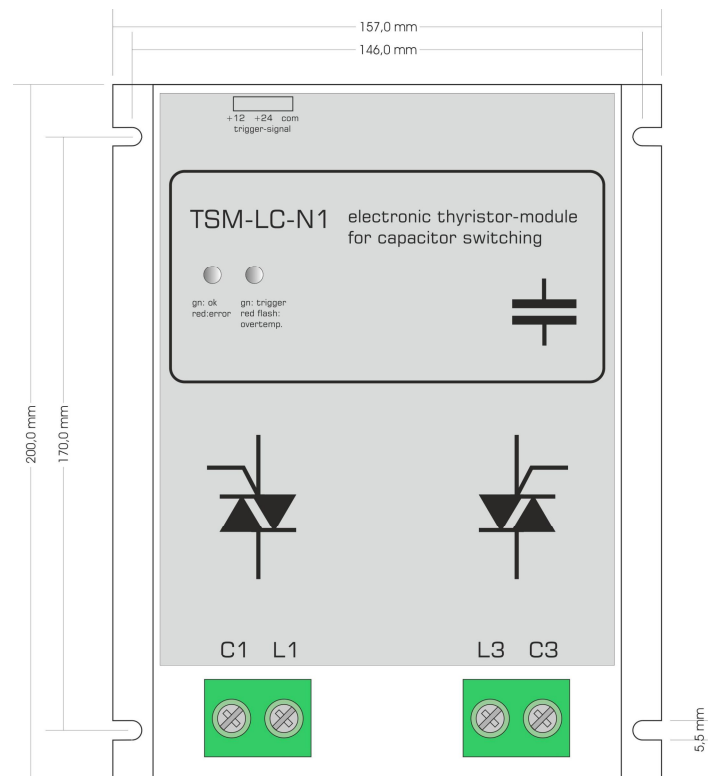
Pict.1: connection diagram  
three phase load (standard)



Pict.2: connection diagram  
two phase load



Pict.3: dimensions TSM-LC-N1:



## **Attention: Please follow SAFETY INSTRUCTIONS !**

### **GENERAL:**

- The TSM-LC thyristor-modules may only be used according their intended utilization.
- The TSM-LC thyristor-modules must only be used in combination appropriate safety devices (e.g. superfast fuses).
- The TSM-LC thyristor-modules have to be projected in such a way that no uncontrolled high currents and voltages can occur in case of faults.
- The devices have to be protected against humidity and dust – a sufficient ventilation has to be assured.
- The TSM-LC thyristor-modules must only be switched to the net if any harm or danger to human beings or the PFC-system is eliminated.

Due to the switching principle of the thyristor modules the PFC-capacitors are permanently loaded at the peak value of the grid voltage (DC current) even when they are disconnected! Therefore, the following instructions have to be obeyed:

- In non-detuned systes (400V grid) you need capacitors with a voltage of 440V!  
In detuned systems (400V grid) you need capacitors with a voltage of 480V!
- For discharging the capacitors special high-voltage resistors are required (e.g. type EW22) Standard resistors cannot be used.
- In dynamic PFC-systems with TSM-LC thyristor-modules fast discharge reactors must not be used (reactor = direct current short circuit.)
- In non-detuned PFC-systems (without reactors) 2 current limitation reactors per thyristor-module are mandatory! Available as accessory (BD100).
- The TSM-LC-thyristor modules have to be protected by superfast electronic fuses in any case. Dimensioning principles have to be observed. Fuses in the PFC-system must be marked!
- Due to the special switching the PFC-capacitors are fully loaded even if the step is switched off. An appropriate protection against touch must be assured!
- Even when electronic switches are turned off, no electrical isolation is given. Therefore even after switching off the complete PFC-system (main circuit breaker), parts of the PFC-system must only be touched after the discharge-time of the PFC-capacitor elapsed.
- In the PFC-system warning signs indicating the presence of residual voltage even at disconnected stage have to be visible.

### **MAINTENANCE, REPAIR**

The TSM-LC thyristor-switch has to be deactivated for maintenance purpose and main circuit breaker must be released. It must be assured that it cannot be switched on during maintenance. It must be checked that there is no voltage at all. Maintenance must only be executed by specially skilled personnel.

In case any repairs are needed, this must only be done from the manufacturers of the TSM- thyristor-module!