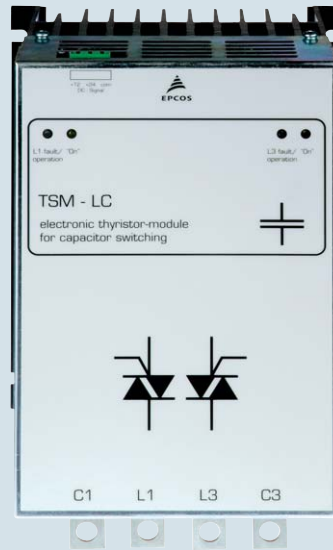


Dynamic Power Factor Correction Thyristor Module TSM-Series

Features

- Easy installation: it can be used similar as a contactor
- All the intelligence needed is offered within the thyristor module itself
- Reaction time: 5 milliseconds only
- Permanent self-controlling of:
 - voltage parameter
 - phase sequence
 - capacitor output
- Display of
 - operation
 - faults
 - activation



General

Conventional systems for power factor correction are used to optimize the power factor and reduce the level of harmonics in the grid. The usage of new technologies in modern industry has negative impacts on electric power quality of the main supply networks, e.g. frequent high load fluctuations and harmonic oscillation. Excessive currents, increased losses and flickering will not only influence the supply capacity but will also have a significant impact on the operation of sensitive electronic devices. The solution for this are dynamic power factor correction systems.

With the thyristor module series TSM-LC and TSM-HV we provide the main component – “electronic switch” – for dynamic power factor correction. The TSM module series are a fast electronically controlled, self-observing thyristor switch for capacitive loads up to 200 kvar, which is capable to switch PFC capacitors within a few milliseconds as often as required.

⚠ Cautions:

Live parts in the PFC equipment must not be touched!

Warning signs in the PFC systems are required!

Wait 10 minutes after the main switch is turned off – until the voltage in the system has dropped to an uncritical value.

In non-detuned systems (400 V grid) capacitors with a higher voltage rating (e.g. 440 V) are needed.

In detuned systems (400 V grid) capacitors with a voltage of 525 V are needed.

For discharging the capacitors, special high-voltage resistors type EW-22 are required. Standard resistors cannot be used!

In dynamic PFC systems discharge reactors cannot be used (this would be a short circuit of the high-voltage DC)!

In PFC systems without filter circuit reactors current limiting reactors are required (e.g. BD-100) for the TSM.

For short circuit protection, superfast electronic fuses for protection of the thyristor are required, standard HRC fuses are not suitable:

TSM-LC 10:	35 A/690 V
TSM-LC 25:	63 A/690 V
TSM-LC 50:	125 A/690 V
TSM-LC 200:	450 A/690 V
TSM-HV 50:	100 A/690 V

3 pieces per module required.

⚠ Failure to follow cautions may result, worst case, in premature failures or physical injury.

Dynamic Power Factor Correction Thyristor Module TSM-Series

TSM-Series

Technical data		
Voltage	TSM-LC-series:	3 x 400 V, TSM-HV-series: 690 V
Max. power	TSM-LC 10: TSM-LC 25/50/200: TSM-HV 50:	10 kvar for PFC systems with / without reactors up to 14% (up to max. 12.5 kvar at 400 V with ambient temperature < 40 °C) 25 kvar/50 kvar/200 kvar for PFC systems with / without reactors up to 14% up to max. 60 kvar at 690 V A cascading of several modules is possible for increasing the kvar output.
Activation	10 ... 24 V DC, internal insulated	
Switching time	approx. 5 ms	
Control features	voltage (availability and value), phase sequence, capacitor output	
Power circuit	TSM-LC 10: TSM-LC 25/50: TSM-LC 200: TSM-HV 50:	Direct connection 4 pole via terminal clamps (D = 6 mm ² resp., 4 mm ²) Direct connection 4 pole via busbar (cable lug 25 mm ² , D = 8 mm ²) Direct connection 4 pole via busbar (cable lug 185 mm ² , D = 12 mm ²) Direct connection 4 pole via busbar (cable lug 25 mm ² , D = 8 mm ²)
Losses	TSM-LC 10: TSM-LC 25/50: TSM-LC 200: TSM-HV 50:	P_D (in W) = 2.0 · I (in A); at 400 V/12.5 approx. 35 W P_D (in W) = 2.0 · I (in A); typical 75 W/150 W (thermal) P_D (in W) = 2.0 · I (in A); at 400 V/200 kvar approx. 580 W (thermal) P_D (in W) = 3.0 · I (in A); at 690 V/50 kvar approx. 125 W (thermal)
Fuses	TSM-LC 10: TSM-LC 25/50: TSM-LC 200: TSM-HV 50:	3x electronic fuse "superfast" NH00 AC 690 V, characteristic gRL, 12.5 kvar: 35 A (e.g. SIBA Art. No. 20.477.20-35) Electronic fuse "superfast" NH00 AC 690 V – 63 A/125 A 3x electronic fuse "superfast" NH2 AC 690 V, characteristic gRL, 125 kvar: 315 A (e.g. SIBA Art. No. 20.212.20.315) 150 kvar: 350 A (e.g. SIBA Art. No. 20.212.20.350) 200 kvar: 450 A (e.g. SIBA Art. No. 20.212.20.450) 3x electronic fuse "superfast" NH00 AC 690 V 50/60 kvar: max. 100 A (e.g. SIBA Art. No. 20.209.20-100) 25 kvar: max. 63 A (e.g. SIBA Art. No. 20.209.20-63)
Dimensions (w x h x d)	TSM-LC 10: TSM-LC 200:	162 x 150 x 75 mm, TSM-LC 25/50: 157 x 200 x 180 mm 250 x 480 x 160 mm, TSM-HV 50: 157 x 200 x 195 mm

Thyristor modules for dynamic power factor correction					
Type	Description	Voltage	Output kvar	Ordering code	Packing unit
		V	at 50 Hz		
TSM-LC 10	RT PFC module	400	10	B44066T0010E402	1
TSM-LC 25	RT PFC module	400	25	B44066T0025E402	1
TSM-LC 50	RT PFC module	400	50	B44066T0050E402	1
TSM-LC 200	RT PFC module	400	200	B44066T0200E402	1
TSM-HV 50	RT PFC module	690	50	B44066T0050E690	1

Accessories for TSM-LC modules 10/25/50		
Type / Description	Ordering code	Packing unit
Discharge resistors EW-22 ¹⁾ to be used for 10, 25 kvar or 50 kvar stage, one unit per stage required ²⁾	B44066T0022E400	1
Current limitation reactor BD-100 for PFC systems without detuning reactors to be used for 10, 25 kvar or 50 kvar step, two units per step required ²⁾	B44066T0100E400	1

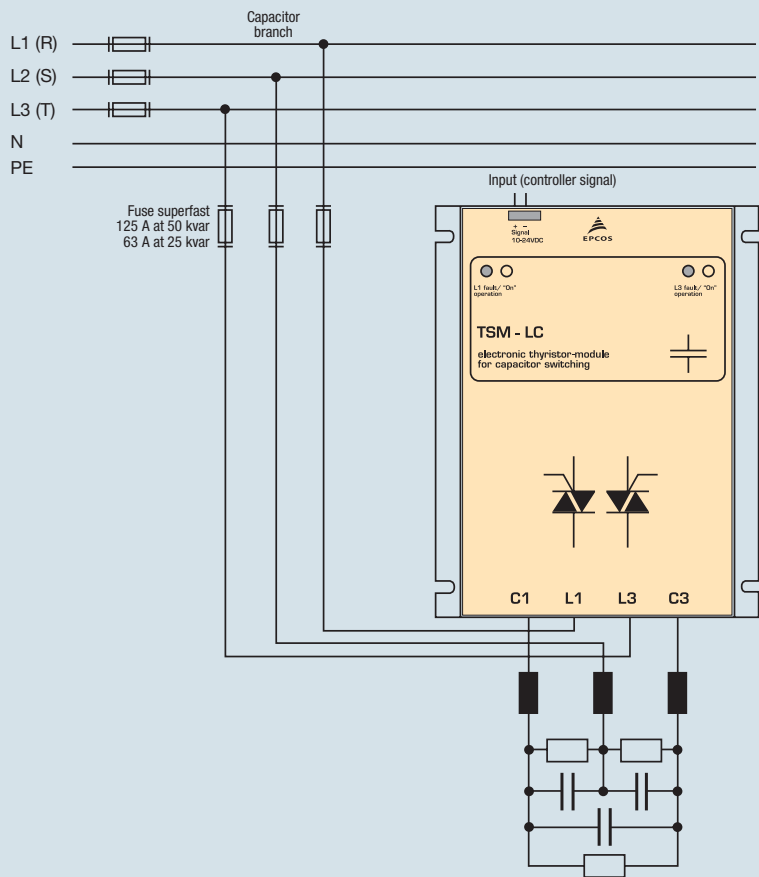


¹⁾ Consisting of two single resistors of 22 kΩ each
²⁾ Not suitable for TSM-LC 200 and TSM-HV 50

EW-22

Dynamic Power Factor Correction Thyristor Module TSM-Series

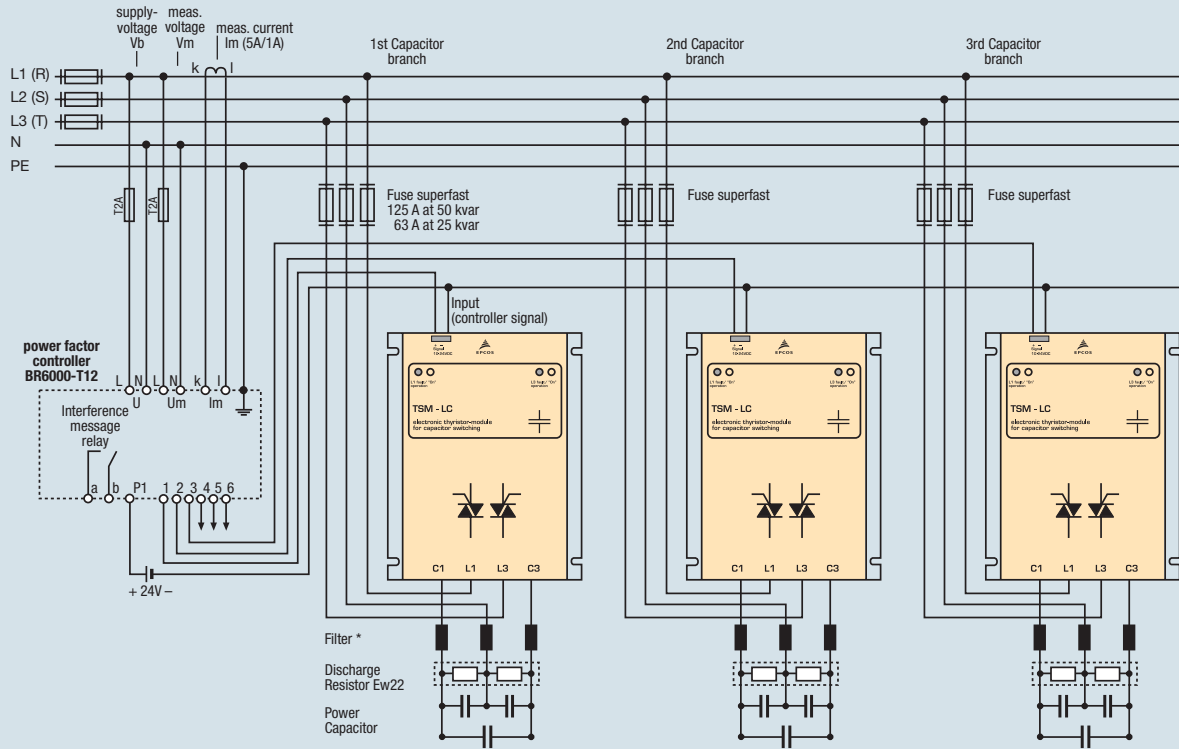
Dynamic PFC network: one stage



TSM-Series

Dynamic Power Factor Correction Thyristor Module TSM-Series

Dynamic PFC network: multiple stages



TSM-Series