Film Capacitors – Power Factor Correction

Thyristor Module TSM-HV for Dynamic PFC

Series/Type: **TSM-HV200**
Ordering code: **B44066T0200E690**

Date: August 2010
Version: 5

Characteristics

- Fast electronically controlled self observing thyristor switch
- Usage in dynamic (fast) power factor correction systems
- For capacitive loads up to 200 kvar up to 690 V line voltage

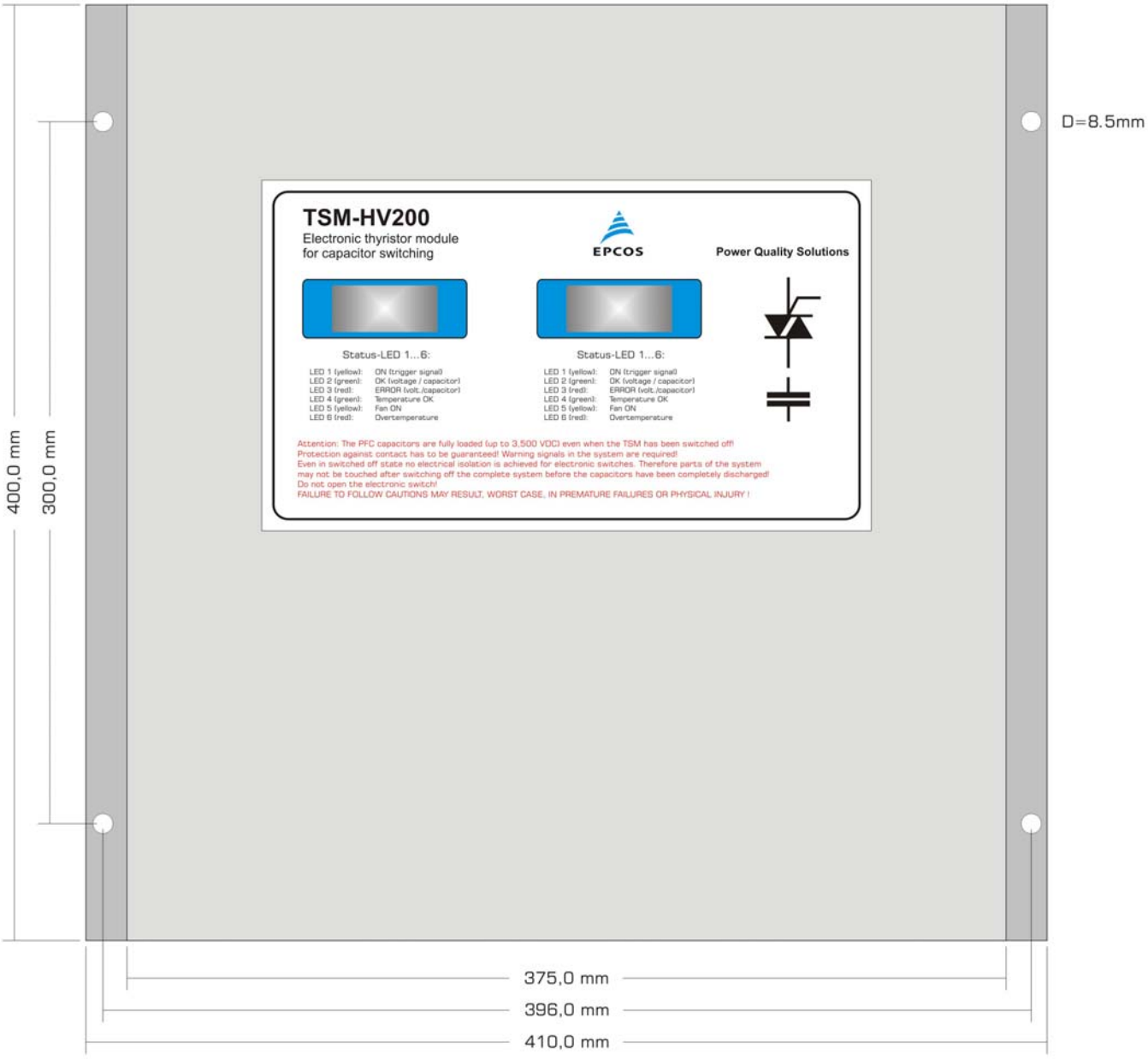
Features

- No neutral conductor required
- Micro-processor controlled thyristor switching module (TSM) for
  standard and detuned capacitor branches for optimized switching behavior
- Permanent self monitoring of voltage, phase sequence, temperature; display of status via LED
- No system perturbation due to switching operations (transients)
- Switching without delay
- Very low maintenance efforts
- Long useful service life
- No noise emission during switching operation
- Compact module ready for connection

Technical data and specifications

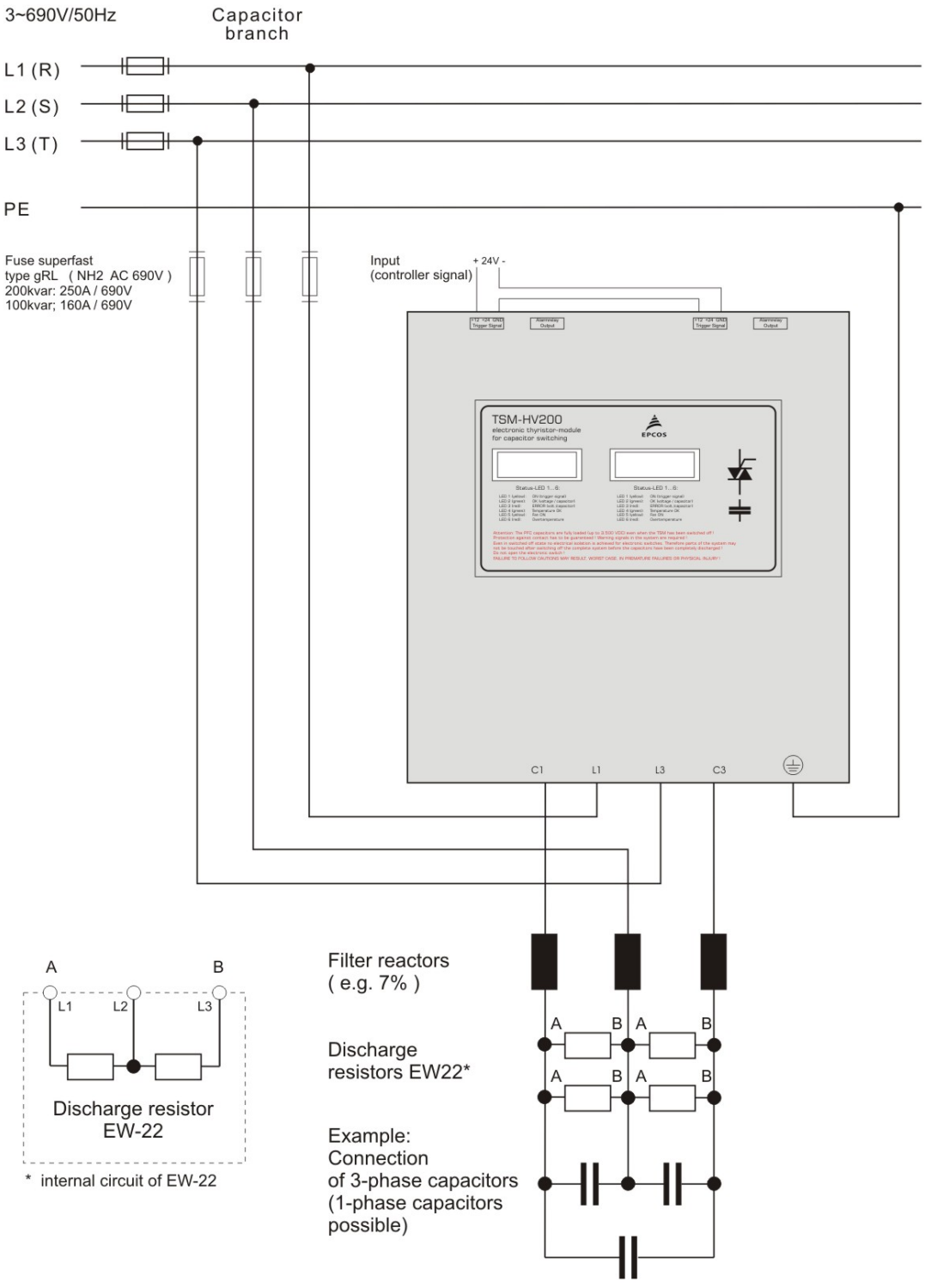
Dimensions	410 × 400 × 250 mm (w × h × d)
Weight	Approx. 17 kg
Rated voltage	690 V
Maximum voltage - in conventional PFC-systems (without reactors) - in detuned PFC-systems (7 % detuning) - in detuned PFC-systems (14 % detuning)	 690 V +/-10% 690 V +/-10% 690 V +/-10%
Frequency	50/60 Hz
Maximum power	200 kvar
Auxiliary supply	Not required
Activation	10 … 24 V DC (approx. 20 mA) via terminal clamp, internally electrically isolated
Monitoring	Grid voltage, temperature and operation status Note: Before re-switching after temperature fault, heat sink temperature must be below 50 °C (hysteresis!)
Display	6 status LEDs per phase: operation/fault and triggering signal, over temperature
Switching time	Approx. 5 ms
Reset time	Depending on degree of detuning and dimension of discharge resistor
Power circuit	Direct connection 4 pole via bus bar cable lug max. 70 mm^2, D = 8 mm Connection inside the device
Power dissipation	P_D (in W) = 2.0 × I (in A); at 690 V/200 kvar typical 350 W thermal Note: Ensure proper air convention; forced cooling inside the panel (switchboard)
Fuses (mandatory for protection of components)	3 × electronic fuse „superfast“ NH2 AC 690 V 100 kvar: 160 A (e.g. SIBA Art.No. 20 212 34-160) 200 kvar: 250 A (e.g. SIBA Art.No. 20 212 34-250)
Ambient operating temperature at nominal load	–10 °C … +55 °C
Mounting position	Vertical; minimum 200 mm distance upwards and downwards
Assembling	Directly on mounting plate

Dimensional drawing



Connection diagram

(three-phase standard)



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 (up to 3500 DC voltage!) even when switched off. Therefore following rules have to be obeyed in any case:

- For standard PFC-systems (without reactors) power capacitors of 440 V nominal voltage have to be used; for detuned systems PFC capacitors of 525 V nominal voltage have to be used.
- Due to the high voltage (2 x peak value of nominal voltage) that occurs, the discharge resistors of the power capacitors have to be replaced by special types (accessory EW22).
- In dynamic systems with TSM modules no fast discharge reactors may be used (reactor = DC-wise short circuit).
- The TSM-HV200 is only for usage in detuned PFC-systems!
- 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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