Preliminay datasheet

TSM-LC-S
Thyristor module for dynamic compensation-systems triggering via system-bus

version 1.4

Characteristics

The direct triggering of the thyristor-module via interface enables a bidirectional communication between controller and thyristor-switch. This featured a complete new quality of the dynamic capacitor-system.

This device is designed especially for the new P.F.Controller BR7000-I-TH/S485.
Der TSM-LC-S is capable to switch PFC capacitors within a few milliseconds as often and as long as required without abrasion.

- Thyristor module for dynamic compensation system in grids from 200 to 440 V, 50/60 Hz, up to 50 kvar
- Installation via system bus (interface)
- Real-time monitoring of capacitor current, status, voltage and temperature (capacitor protection)
- Configuration, display of measuring values, alarm and error messages via high-contrast OLED-display
- Transmission of all measured values via interface for further processing in the controller
- Storage of maximum values/temperature
- Easy installation via standard patch cable
- Manual switch on possible
- No wear parts (no fan)
- Switching without delay
- No system perturbation by transients
- Maintenance free, no switching noises
- Compact module, ready to use .

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Applications

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

Mounting and connection

- Mechanical mounting directly on the mounting plate
- Connection of main current lines via high current plug connections (included in the delivery); can be connected via lines (max. 35 mm^2) directly to the main fuse resp. capacitor
- Mounting position vertical; minimum distance 150 mm up and down
- Auxiliary supply (24 V DC) necessary, feeded by the patch cable. Per max. 10 switches one feed-in adapter "ESP24" is required as accessory (see switching diagram).
- Main fuses have to be super fast electronic fuses as protection of semiconductor devices. Design basics have to be obeyed!
- Triggering of the module via the system bus (patch cable RJ45) from PF-controller BR7000-I-TH/S485. Up to 32 devices at bus supported by the controller

After activating of the system the TSM-LC-S is in Automatic-Mode.

- top line of the display: state (capacitor symbol = ON)
- 2nd line of the display: monitoring the measured power of this stage

By repeated pressing of the ENTER-key following values are available:

1 Voltage
2 Current L1 / L3
3 Temperature
4 Aux. voltage 24V
5 Software version

Putting into operation / Configuration in Program-Mode

With the "Program" key the following menus are reached:
PROGRAM-MODE and SERVICE-MODE

Voltage and frequency have to be set to the values of the grid.
The values are changed by pressing the keys +/-
Pressing of the ENTER-key stores the values and takes the user to the next parameter.

Settings in **PROGRAM MODE**:

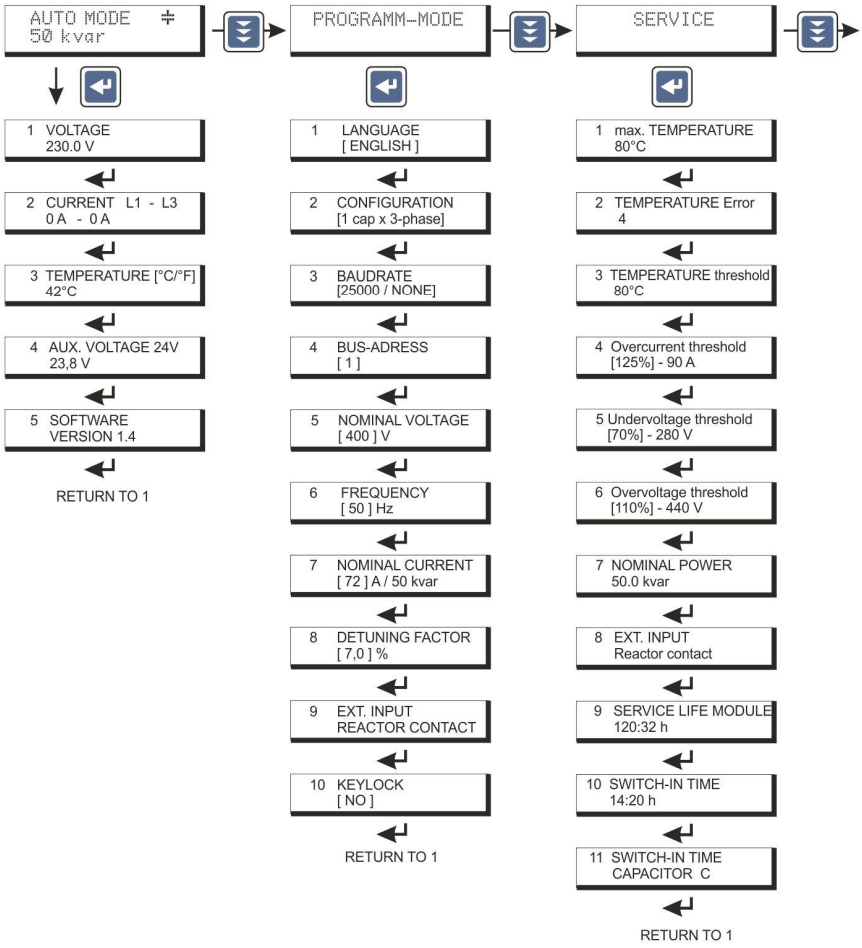
	PROGRAM-MODE	Selection (**Factory settings**)	Remarks
1	LANGUAGE	**Deutsch** / English	
2	CONFIGURATION	**1 cap 3-phase**/ 2cap 1-phase	Switching of an 3-phase capacitor or of two single-phase capacitors
3	BAUDRATE	9600...256000 **250000**	Factory setting corresponds to the setting at P.F.Controller
4	BUS-ADRESS	**1** ...32	According to settings in the controller
5	NOMINAL VOLTAGE	200...440V **400V**	Grid voltage
6	FREQUENCY	**50Hz** / 60Hz	
7	NOMINAL CURRENT	15...**72A**	Value for current-monitoring
8	DE-TUNING FACTOR	0 / 5,67% / **7%** / 14%	
9	EXT. INPUT X5	---- **Reactor temp. switch** Trigger input	No reactor-switch connected Connected reactor temp.switch will switch-off the module at reactor overtemperature External trigger of the module in special cases (has priority over bus-triggering)
10	KEYLOCK	YES / **NO**	Prevention of incorrect operation

SERVICE-MODE

In SERVICE-MODE the following values can be displayed by pressing (ENTER)

1 max. temperature
2 temperature ERROR (number of temp. errors - overtemperature)
3 temperature threshold (not modificable)
4 overcurrent threshold (Schaltschwelle - not modificable)
5 undervoltage threshold (Schaltschwelle - not modificable)
6 overvoltage threshold (Schaltschwelle - not modificable)
7 nominal power (in kvar)
8 external input (state)
9 service life (sum)
10 switch-on time (module) (from last switching-in)
11 switch-on time capacitor (sum)

Display / Programming- and service menu



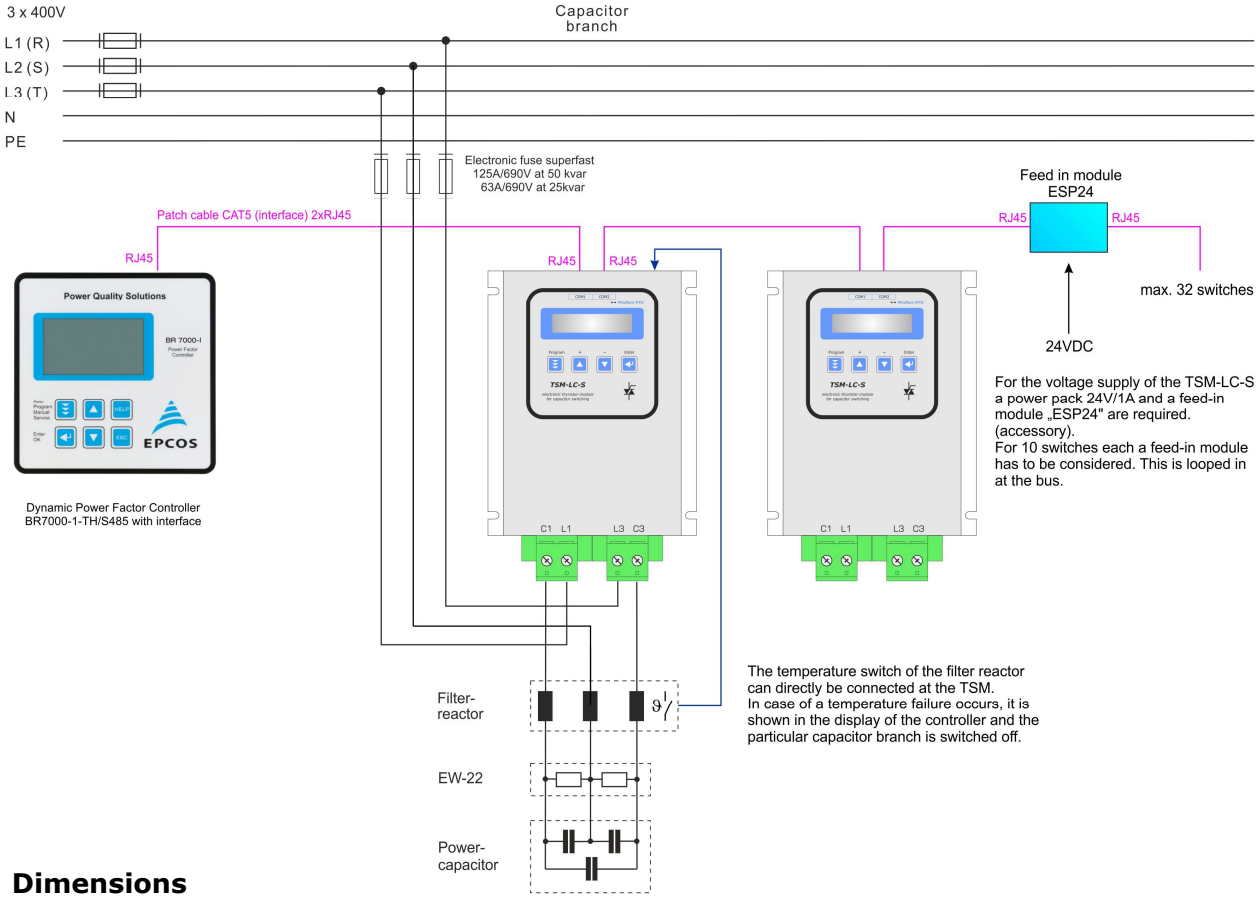
Technical data

Operating voltage:	200 ...440 VAC
Aux. supply:	24V / 0,1A - via system bus (see connecting diagram) Per cabinet one feed-in module "ESP24" is required. To be ordered as accessory
Switching capacity:	max. 75A
Triggering:	via system-bus (standard patch-cable)
Switching time: Re-switching time:	approx. 5 ms depending on de-tuning factor and discharge resistor used
Display Operating	high contrast OLED-display 2x16 digits 4 button
Monitoring	voltage, capacitor current/ -output, temperature, switching stage
Error messages:	over-/ under voltage (auxiliary voltage and grid voltage), overcurrent L1/L3, overtemperature, C-error
Connections:	2x RJ45 (system bus) 2x 2 pole high current plug (35 mm^2) for main circuit 1x 2 pole input for the external temperature contact of the harmonic filter reactor
Power loss:	P therm. (in W) = 2 x I (in A); at 50kvar/400V: appr. 150W therm
Dimensions:	157 x 200 x 180 (W x H x D) - without connection clamps
Weight:	approx. 5 kg
Mounting position:	vertical, minimum 150mm distance upwards and downwards direct mounting on mounting plate
Ambient operating temperature at nominal load	-10 ... 55°C

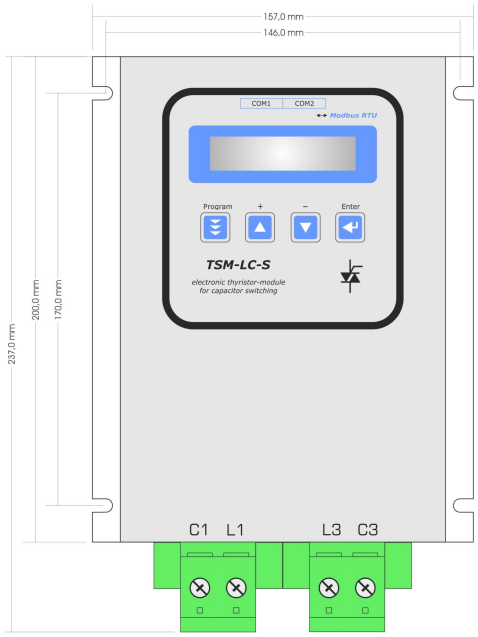
Fuse protection

Nominal voltage (Phase voltage)	Step output	Current/phase	Electronic fuse "super fast" (NH00 AC690V)
230V	15 kvar	ca. 36A	3x 63A/ 690V
400V	25 kvar	ca. 36A	3x 63A/ 690V
440V	28 kvar	ca. 36A	3x 63A/ 690V
230V	30 kvar	ca. 72A	3x 125A/ 690V
400V	50 kvar	ca. 72A	3x 125A/ 690V
440V	55 kvar	ca. 72A	3x 125A/ 690V

Connecting diagram (three phase load)



Dimensions



CAUTION 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:

- The discharge resistors of the power capacitors have to be replaced by special voltage resistant types due to the high voltages that occur (2 x 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.