

> Operating instructions

Transformer switching relay | type TSRL

intelligent electronics

FSM[®]



Note: Installation and commissioning may be performed by qualified person or under survey of a qualified person.

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The transformer switching relay (low cost) TSRL- is used for the smooth switching of single phase transformers. The TSRL- is connected between the mains switch and the transformer. It can also be used itself as a mains switch when operated using the control input. In this application potential separation is not available, because of solid state switcher inside of TSRL.

Attention

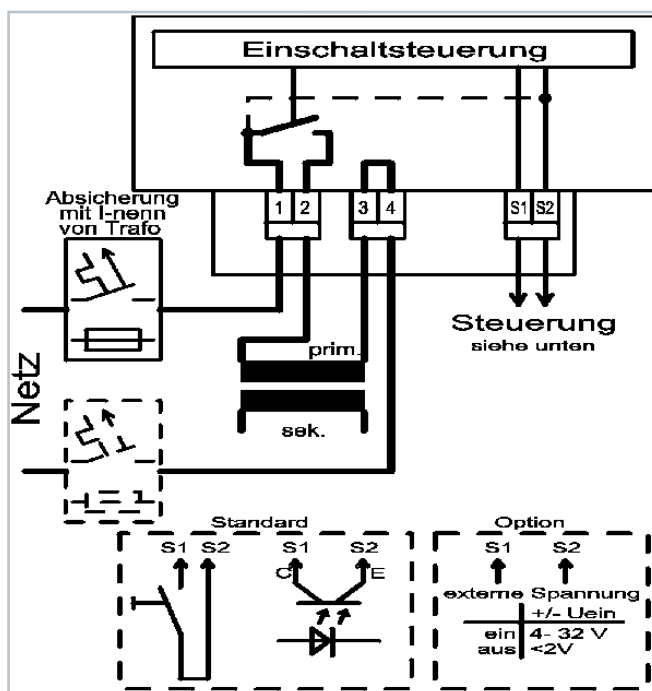
Do not apply an external voltage to the control input (terminals S1/S2) for the standard version. The terminals S1 and S2 refer to the lines voltage. The connected contact or opto-coupler transistor should therefore be potential-free and should indicate a testing voltage of 2,5kV. If a wire strap jumper is used instead of a contact between terminals S1 and S2, this should be suitably isolated.

Safety precautions

Operating the TSRL- using the control input and without the mains switch results in non-potential isolated switching as parallel to terminals 1 and 2 a thyristor is connected with an additional Snubber- R-C element. Therefore any action on connected transformers or loads on the secondary side, disconnect the TSRL-.

General Notes

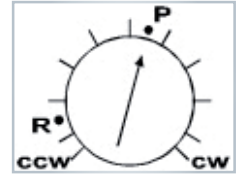
The TSRL- premagnetises the transformer for a short time before each switching on operation. This is achieved using unipolar voltage impulses. The strength of the premagnetisation is the same for all transformers and should reach the reversing point of the hysteresis curve in the working state. The width of the required voltage impulse must be matched to the various type of transformer such as packet core transformers or toroidal core transformers. (The width of the premagnetising voltage pulses correspond with the width of the air gap in the iron core. No gap, at toroid cores = narrow pulses, broad air gap at welded cores = broad pulses.) A potentiometer is available on the TSRL - to achieve the adjusting of the pulse with.



Setting the premagnetisation using the Trimming-Potentiometer for transformer types

- › Torroidal core transformers: Use the setting nearly R. (nine o'clock)
- › Coil form transformers (Packet-core-transformers). Use the setting P (preset in the factory from FSM - Elektronik). The correct setting for cut-core transformers (P) can vary between „10 and 2 o'clock“.
- › C-core transformers: Potentiometer setting between „P“ and „R“.
- › Switching power supply: Setting potentiometer at 4:30 o'clock.

View on device for correct setting of the potentiometer: Adjusting diagram have to be readable.



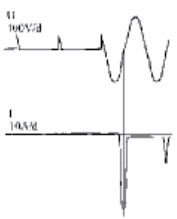
Potentiometer setting

A direct reading instrument for AC current in series with the TSRL - (i.e. parallel to opened fusing device) indicates whether or not switching occurs with surge currents. If current peaks do not arise either during or at the end of premagnetisation, then the TSR- is correctly set to the transformer (than the indicator on the current meter stand still). Optimum setting: see the setting instructions below. (The with of the air gap of the Transformer core is the criteria. The with of the premagnetising pulses correspond with the width of the air gap.) The more width of air gap, the more with of premagnetising pulses.

Adjustments using a toroidal core transformer as an example

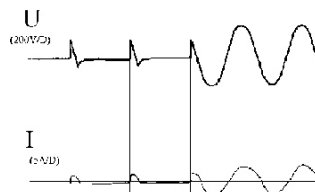
Incorrect setting

The premagnetisation is too weak. The Potentiometer is too far to the left. The positive magnetising-voltage pulses are too small. A large negative inrush current is visible after premagnetising.



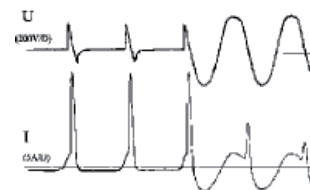
Correct setting

The premagnetisation is just strong enough. The potentiometer setting is correct. Inrush current is not present. (fits for loaded or unload transformer) Setting of potentiometer is independent of load.



Incorrect setting

The premagnetisation is too strong. The potentiometer is too far to the right. Large positive magnetisation current peaks are visible. Current peaks are visible while premagnetisation.



Housing

