

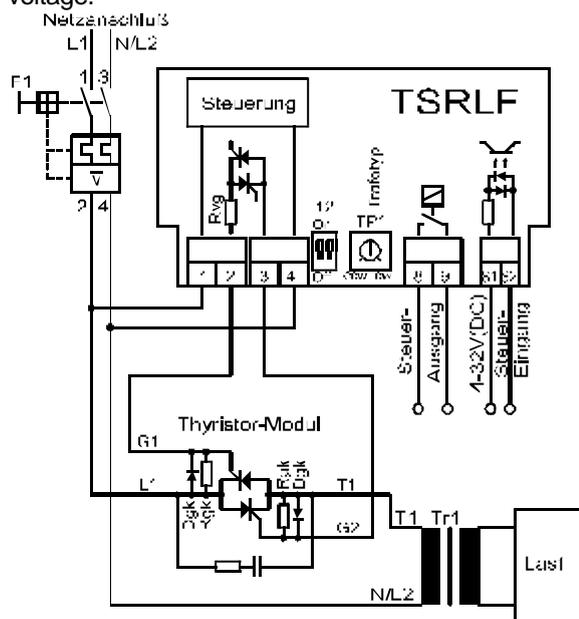
# Operating instructions: Transformer switching relay TSRLF

Country of origin : BRD

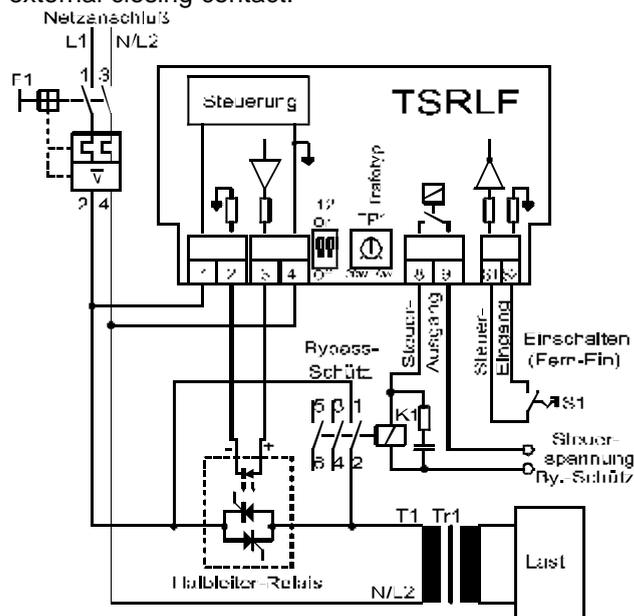
The TSRLF is a control module, that controls Solid state relays of the type of instant switching, in the manner of patented procedures to avoid inrush currents of transformers. Also external Thyristors can be controlled in the same manner, to built a transformer switching unit

The TSRLF and the Switching element, Thyristor or solid state relay, are connected between the mains switch and the transformer. They 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 the use of solid state switchers.

**Abb.1:** the TSRLF module controls external Thyristors. The TSRLF has the option full on signalisation and control input for control voltage.



**Abb.2:** the TSRLF module controls an external Solid state relay with type of instantaneous switching. The TSRLF has the option – Bypasscontactor control and Control input for an external closing contact.

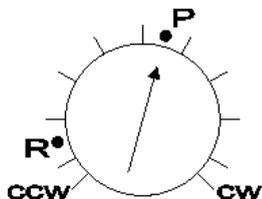


The TSRLF with the external power element - premagnetises the transformer for a short time before each switching-on operation. This is achieved using unipolar voltage impulses. The strength of the premagnetisation is the same for all transformers and should reach the reversing point of the hysteresis 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 TSRLF - to achieve the adjusting of the pulse with.

## Setting the premagnetisation using the Trimming-Potentiometer for transformer types:



**Toroidal 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" .

## Potentiometer setting:

A direct reading instrument for AC **current** in series with the TSRLF - ( 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 TSRLF- 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.

## Safety Precautions:

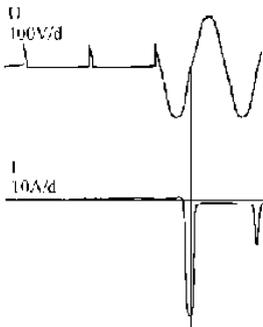
The TSRLF- should be installed and commissioned only by suitably trained personnel. Operating the TSRLF- using the control input and without the mains switch results in non-potential isolated switching as parallel to terminals 1 and 2 a thyristor is connected with an additional Snubber- R-C element. Therefore any action on connected transformers or loads on the secondary side, disconnect the TSRLF-.

**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.

## Adjustments using a toroidal core transformer as an example:

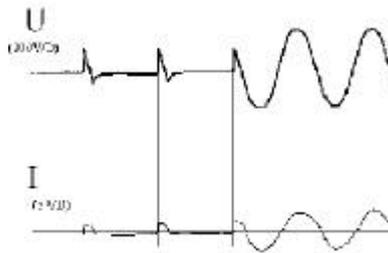
### Incorrect setting:

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.



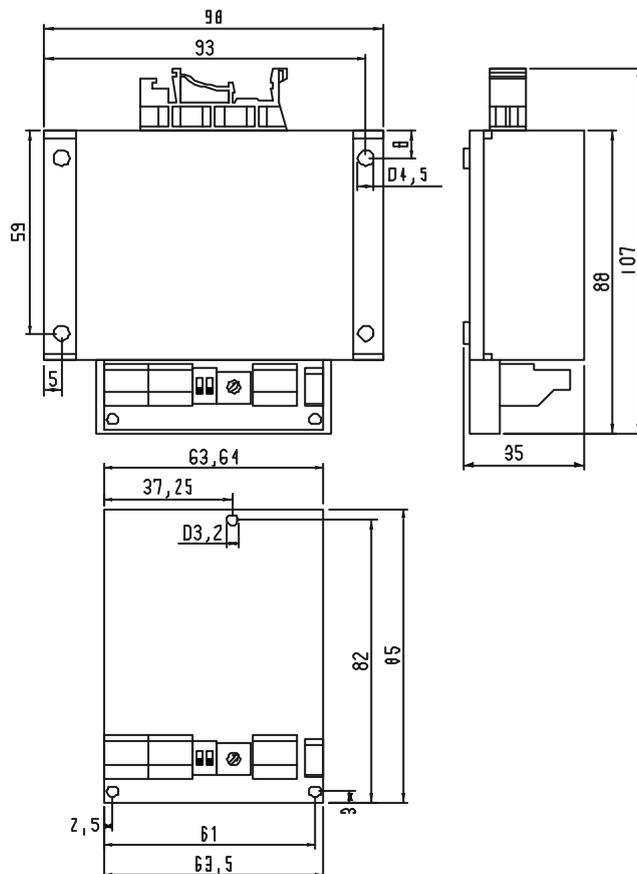
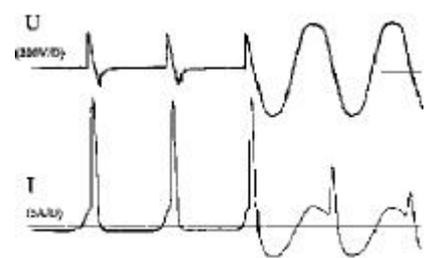
### Correct setting:

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



## Adjustment of DIP-Switch

The Dip switches are allowed to change only in the state with no line voltage at the TSRLF.

Switch	Function
1	Control input (Fern-Ein-Eingang): <b>Off:</b> Control input is active to control the TSRLF <b>On:</b> Self switch on of the TSRLF; When line voltage occurs.
2	Function of the control Output: <b>Off:</b> Full on signalisation <b>On:</b> control of Bypass contactor.

## Emeko Ing. Büro, M.Konstanzer

Customer-consulting – Application- Marketing  
Britzingerstr. 36 D 79114 Freiburg  
Telefon: 0(049)761/441803  
Telefax: 0(049)761/441888  
Mobil: 0170 241 0655  
e-mail: Emeko@t-online.de

## FSM Elektronik GmbH

Development – Production – Sales  
Scheffelstr. 49  
D 79199 Kirchzarten  
Telefon: 0(049)7661/9855-0  
Telefax: 0(049)7661/985511  
e-mail: info@fsm-elektronik.de  
Internet: <http://www.fsm-elektronik.de>