Data Sheet:
Transformer Switching Relay TSRLF

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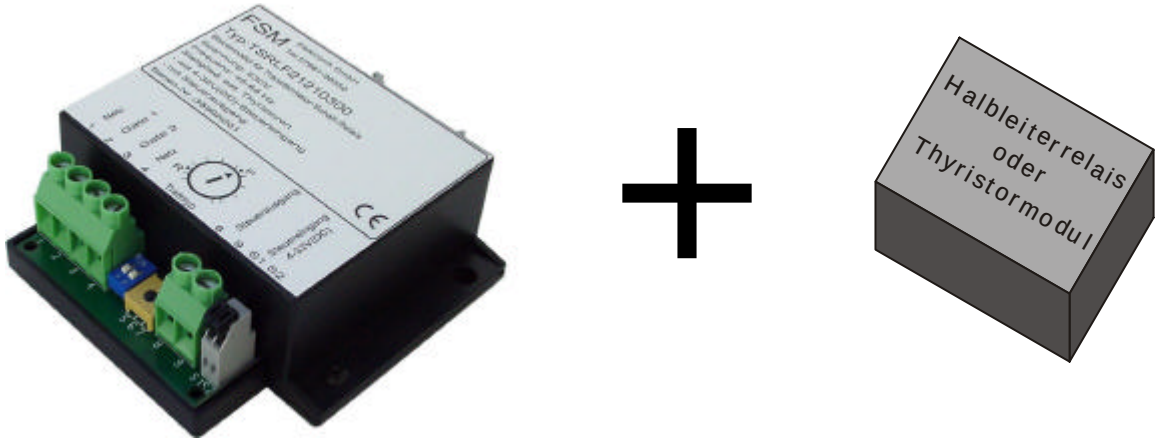
The TSRLF is a control module which can be used as a control element of a transformer switching relay when used in combination with external thyristors or semiconductor relays. Using the TSRLF transformers can be frequently switched. Applying a patented smooth switching procedure the TSRLF controls the connected control element so that one or more single phase transformers running in parallel can be operated from an idle state or loaded state without inrush current. Smooth switching procedure eliminates inrush.

The TSRLF can be delivered to control external thyristors or for other applications using quick action switches for semiconductor relays. The TSRLF is positioned with the control element between the mains and the transformer.



Application Areas:

The TSRLF can be used in frequently switched welding or filament transformers for industrial applications, plant construction or research.

Operating Principle:

1. Smooth Switching Procedure:
The TSRLF premagnetises the transformer prior to complete switching using unipolar voltage impulses. The strength of the premagnetisation is the same for all transformers and its value should amount to the turning point of the hysterysis curve. The width of the required voltage impulses must be matched the different transformer types, such as packet core transformers or toroidal mains transformers. The potentiomer TP1 in the TSRLF is used for this purpose (see adjustion instructions)

2. Half-wave Failure Recognition (Option):
Line voltage distortions such as half-wave failures can result in saturation currents larger than the inrush current in the the transformer. The TSRLF reacts to half-wave failures by immediately switching off before saturation currents arise, and then the smooth switching on operation is again resumed. In this manner triggering of the fuse can be avoided.

2. Control Output (Option):
The control output can be used either to send a fully-on signal, or can be used to drive a bypass protection used to bridge the control element in the switched on state. DIP switch 2 is used to activate the control output. In bypass-protection mode, the TSRLF switches the control element after complete switching on as soon as the bypass protection is bridged. On switching off, the TSRLF switches the control element back on before the bypass-protection is switched off. In this manner wear of the contact used for switching is avoided.

3. DIP- Switch
Using the DIP switch the following settings can be applied:
Control input application – control output application (For details see the operating instructions)

Technical Data:

(Switching-on procedure according to Patent No.: DE 42 17 866, EP 05 75 715 B1, US 005 517 380A)

Rated voltage:	
Standard:	**230V:** 190VAC - 260VAC ; Peak voltage max. 800V
Option:	**110V:** 95VAC - 135VAC; Peak voltage max. 600V
Option:	**400V:** 350VAC - 450VAC; Peak voltage max. 1200 V
Option	**500V:** 410VAC - 560VAC; Peak voltage max. 1600V
Option:	90VAC - 260VAC; Peak voltage max. 800V (Half-wave failure recognition not available, only with semiconductor relays)
Frequency:	45-65 Hz
Overvoltage category:	III
Control element:	
Standard:	Semiconductor relays quick action switching, 2.5 kV Test voltage between the control and load circuit.
	Charactistic quantities for the semiconductor relay:
	Open-circuit control voltage DC U_{320}= 5V
	DC internal resistance: R_{32}=120Ohm
	Maximum available control current: I_{32}=10mA
	Maximum permissible switching-on delay: t_{ein}=0,2ms
	Maximum permissible switching-off delay: t_{aus}=0,25ms
Thyristors option:	Triggering through Opto-Triacs across protection resistor R_{VG} inside TSRLF
	Vrat 110 V 230 V 400 V 500 V
	R_{VG} 68 Ohm 130 Ohm 240 Ohm 300 Ohm
	Characteristics of the Thyristors:
	Max. available Gate current: I_{Gt}=220mA
	Max. pemissible trigerring delay: t_{gd}=0,2ms
	Max. permissible release time: t_q=0,25ms
	Gate cathode resistance: R_{GK}=120Ohm/ 0,25W
	Gate cathode diode: D_{GK}= z.B.: 1N4004
Power supply failure:	After a power supply failure >= 60ms smooth switching on take place when power is returned
Option: Half-wave failure recognition	After a power supply failure > 2ms smooth switching on take place when power is returned
Turn-on delay:	TP1 setting: on R on P Dimmer R Dimmer P
	Mains on with activated control input ca. 0.86s ca. 0.13s ca. 0.93s ca. 0.43s
	Switching on using control input ca. 0.23s ca. 0.04s ca. 0.33s ca. 0.28s
Turn-off delay:	Switching off using control input:: Without bypass-protection: ca. 0,03-0,05s
	With bypass-protection: ca. 0,33-0,35s
Switching frequency:	Unlimited
Control input:	
Standard:	Using an external make contact (Test voltage to earth 2,5kV)
	Contact voltage: 5V
	Contact current 14mA
	Connectors S1/ S2 are connected to the mains
Opto coupler input option:	Using control voltage (Isolation voltage 2,5kV)
	Control voltage: 4- 32 VDC
	Control current: 1-12 mA
Control output option:	Relay contact
	Max. switching power (ohmic load): 2000VA
	Max.switching voltage: 380VAC
	Max.switching current: 10A
	Rated load (ohmsche Load): 8A/250VAC, 5A/380VAC, 8A/24VDC
	Life time Mechanical $20x10^6$
	Electrical $100x10^3$
Bypass-protection::	Max. permissible response delay: 0,3s at 50Hz, 0,23s at 60Hz
	Max. permissible release delay: 0,3s at 50Hz, 0,23s at 60Hz
ext. Potentiometer:	Resistance: 1-2,5 k Ohm, max. cable length 0,5m, Ucw -ccw= 5VDC
For special functions	Potentiometer is connected to the mains (test voltage: 2,5kV)
EMC (CE):	Interference immunity: EN 50082-2
	Interference emission: EN 50081-1
	To comply to the limits of the interference emission (crackle interference) the TSRLF may be switched on and off maximum five times per minute without external mains filtering.
Connections:	
Mains/load connections:	Screw terminals, connection cross-section, 0.2-4mm2, tightening torque 0.5-0.6Nm
Control input:	Spring terminals, connection cross-section 0.1-2mm2
Control output:	Screw terminals, connection cross-section 0.2-4mm2, tightening torque 0.5-0.6Nm
ext.Potentiometer:	Spring terminals, connection cross-section 0.1-0.5mm2
Fixture:	- Quick connection to 35mm connection rails according to DIN EN 50 022 or DIN EN50035
	- Wall mounting of the housing using two 4.5mm bore holes
	- Circuit board mounting (without housing) using three 3.2mm bore holes
Type : Housing	Encapsulated, housing made from insulating material
Circuit board:	Open
Cleanliness class:	In the housing: 3, circuit board: 2
Degree of protection:	In the housing: IP20 circuit board: IP00
Protection class:	Protection class II
Dimensions (LxWxH):	With housing: 98x88x35mm
	Circuit board: 63,5x85x30mm
Housing:	Material ABS, Flammability class UL94 HB
Weight:	0.2kg
Shock resistance:	10g
Humidity max.:	95%, no condensation
Ambient temperature:	0°C to 60°C, special version: -20°C to +80°C
Storage temperature:	-10°C to 70°C

Ordering key:

TSRLF

Special Version Number
(Supplied by the Manufacturer)
00: Standard Version

Type:
1= Circuit board for mounting
2= Housing for wall mounting
3= Housing for Connection Rails

Half-Wave Failure:
0= without half wave failure recognition
1= with half wave failure recognition

External potentiometer:
0= internal Potentiometer
1= external Potentiometer

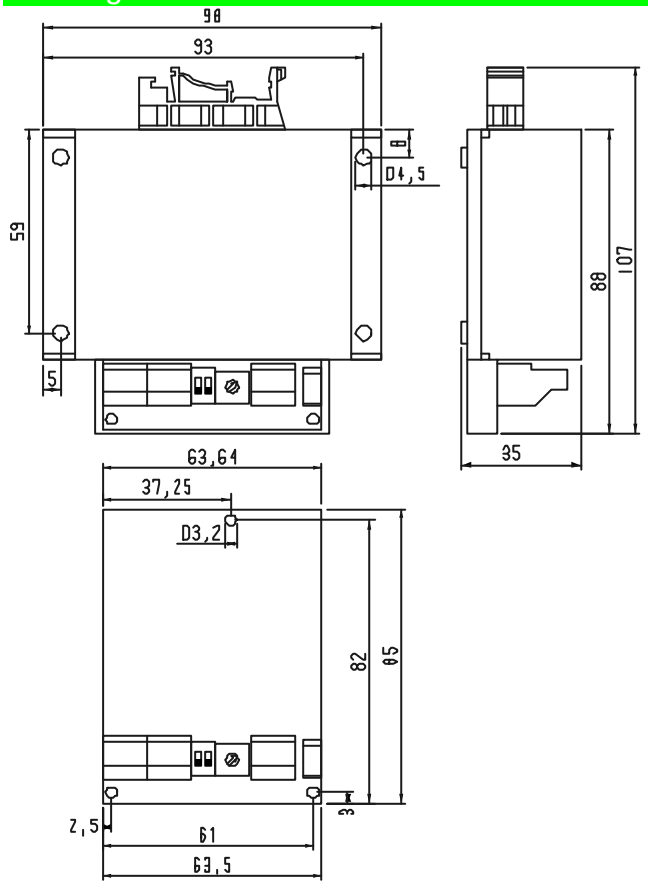
Control Output:
0= without control output
1= with control output

Control input:
1= Make contact
2= Control voltage

Control element:
2= External semiconductor relay
1= External Thyristor

Mains Voltage:
2= 230V
1= 110V; 4= 400V; 5= 500V
9= Special voltages

Housing:



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