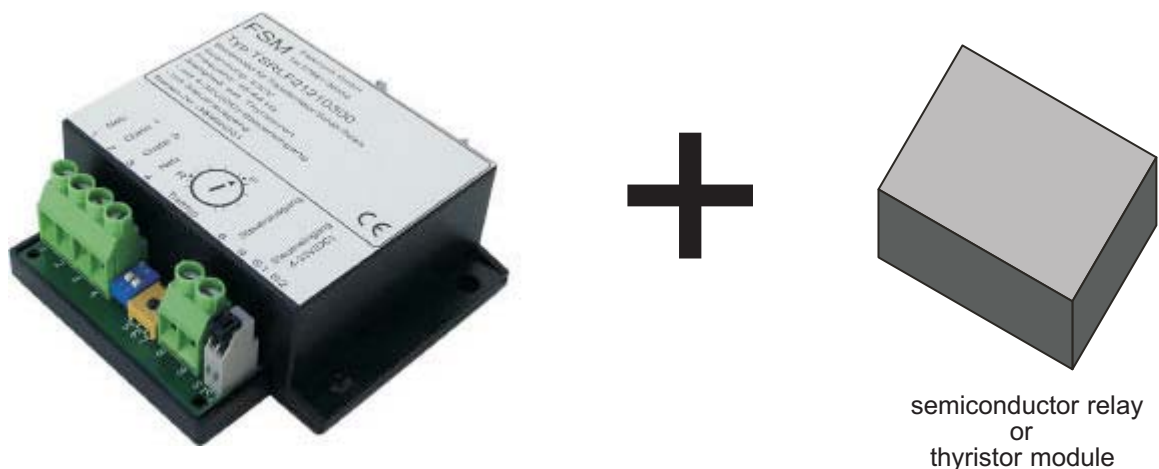


# datasheet

## transformer switching relay TSRLF

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 hysteresis 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 potentiometer TP1 in the TSRLF is used for this purpose (see adjustment 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 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)

# datasheet

## transformer switching relay TSRLF

### Technical Data:

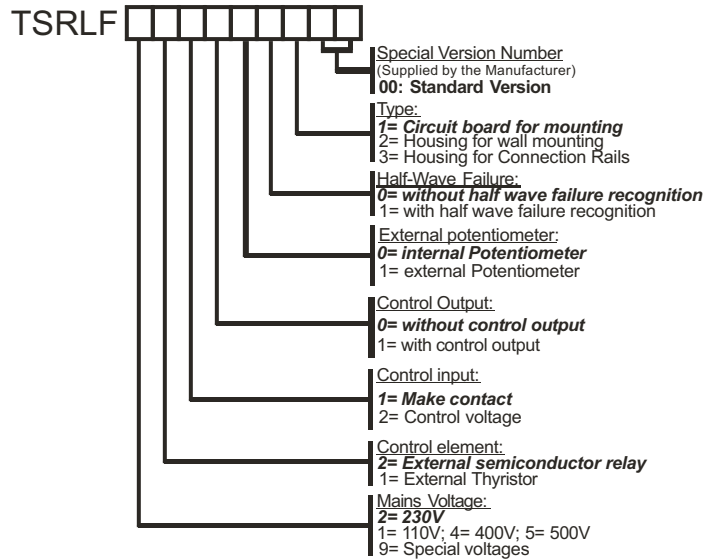
(Switching-on procedure according to Patent No.: DE 42 17 866, EP 05 75 715 B1, US 005 517 380A)

<b>Rated voltage:</b>					
<b>Standard:</b>	230V: 190VAC - 260VAC ; Peak voltage max. 800V				
<b>Option:</b>	110V: 95VAC - 135VAC; Peak voltage max. 600V				
<b>Option:</b>	400V: 350VAC - 450VAC; Peak voltage max. 1200 V				
<b>Option:</b>	500V: 410VAC - 560VAC; Peak voltage max. 1600V				
<b>Option:</b>	90VAC - 260VAC; Peak voltage max. 800V (Half-wave failure recognition not available, only with semiconductor relays)				
<b>Frequency:</b>	45-65 Hz				
<b>Overvoltage category:</b>	III				
<b>Control element:</b>					
<b>Standard:</b>	Semiconductor relays quick action switching, 2.5 kV Test voltage between the control and load circuit. Characteristic quantities for the semiconductor relay: Open-circuit control voltage DC $U_{320}=5V$ DC internal resistance: $R_{32}=120\Omega$ Maximum available control current: $I_{32}=10mA$ Maximum permissible switching-on delay: $t_{ein}=0,2ms$ Maximum permissible switching-off delay: $t_{aus}=0,25ms$				
<b>Thyristors option:</b>	Triggering through Opto-Triacs across protection resistor $R_{VG}$ inside TSRLF				
	V <sub>rat</sub>	110 V	230 V	400 V	500 V
	R <sub>VG</sub>	68 Ohm	130 Ohm	240 Ohm	300 Ohm
	Characteristics of the Thyristors:				
	Max. available Gate current:	$I_G=220mA$			
	Max. permissible triggering delay:	$t_{gd}=0,2ms$			
	Max. permissible release time:	$t_q=0,25ms$			
	Gate cathode resistance:	$R_{GK}=120\Omega/0,25W$			
	Gate cathode diode:	D <sub>GK</sub> = z.B.: 1N4004			
<b>Power supply failure:</b>	After a power supply failure $\geq 60ms$ smooth switching on take place when power is returned				
<b>Option: Half-wave failure recognition</b>	After a power supply failure $> 2ms$ smooth switching on take place when power is returned				
<b>Turn-on delay:</b>	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
<b>Turn-off delay:</b>	Switching off using control input:	Without bypass-protection:		ca. 0,03-0,05s	
		With bypass-protection:		ca. 0,33-0,35s	
<b>Switching frequency:</b>	Unlimited				
<b>Control input:</b>					
<b>Standard:</b>	Using an external make contact (Test voltage to earth 2,5kV) Contact voltage: 5V Contact current 14mA Connectors S1/ S2 are switched to the mains				
<b>Opto coupler input option:</b>	Using control voltage (Isolation voltage 2,5kV) Control voltage: 4- 32 VDC Control current: 1- 12 mA				
<b>Control output option:</b>	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: $20 \times 10^6$ Electrical: $100 \times 10^3$				
<b>Bypass-protection:</b>	Max. permissible response delay:	0,3s at 50Hz, 0,23s at 60Hz			
	Max. permissible release delay:	0,3s at 50Hz, 0,23s at 60Hz			
<b>ext. Potentiometer:</b>	Resistance: 1-2,5 k Ohm, max. cable length 0,5m, U <sub>cw-ccw</sub> = 5VDC				
<b>For special functions</b>	Potentiometer is connected to the mains (test voltage: 2,5kV)				
<b>EMC (CE):</b>	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.				
<b>Connections:</b>					
<b>Mains/load connections:</b>	Screw terminals, connection cross-section, 0,2-4mm <sup>2</sup> , tightening torque 0.5-0.6Nm				
<b>Control input:</b>	Spring terminals, connection cross-section 0.1-2mm <sup>2</sup>				
<b>Control output:</b>	Screw terminals, connection cross-section 0.2-4mm <sup>2</sup> , tightening torque 0.5-0.6Nm				
<b>ext. Potentiometer:</b>	Spring terminals, connection cross-section 0.1-0.5mm <sup>2</sup>				
<b>Fixture:</b>	- 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				
<b>Type:</b>	Housing Encapsulated, housing made from insulating material Circuit board: Open				
<b>Cleanliness class:</b>	In the housing: 3, circuit board: 2				
<b>Degree of protection:</b>	In the housing: IP20 circuit board: IP00				
<b>Protection class:</b>	Protection class II				
<b>Dimensions (LxWxH):</b>	With housing: 98x88x35mm Circuit board: 63,5x85x30mm				
<b>Housing:</b>	Material ABS, Flammability class UL94 HB				
<b>Weight:</b>	0.2kg				
<b>Shock resistance:</b>	10g				
<b>Humidity max.:</b>	95%, no condensation				
<b>Ambient temperature:</b>	0°C to 60°C, special version: -20°C to +80°C				
<b>Storage temperature:</b>	-10°C to 70°C				

# datasheet

## transformer switching relay TSRLF

### Ordering key:



### Housing:

