Data sheet

Transformer Switching Relay | Type 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 our soft start 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. The soft start procedure avoids the inrush.

Fields of application

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

Functions

> Soft start procedure
The TSRLF premagnetises the transformer before complete switching on 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 to the different transformer types, such as packet core transformers or toroidal core transformers. The potentiometer (TP1) in the TSRLF is used for this purpose.

> 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 soft start on operation is again resumed. In this manner triggering of the fuse can be avoided.

> 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.

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> DIP-Switch
  Using the DIP switch the following settings can be applied: Control input application – control output application. (Details: See operating instructions)
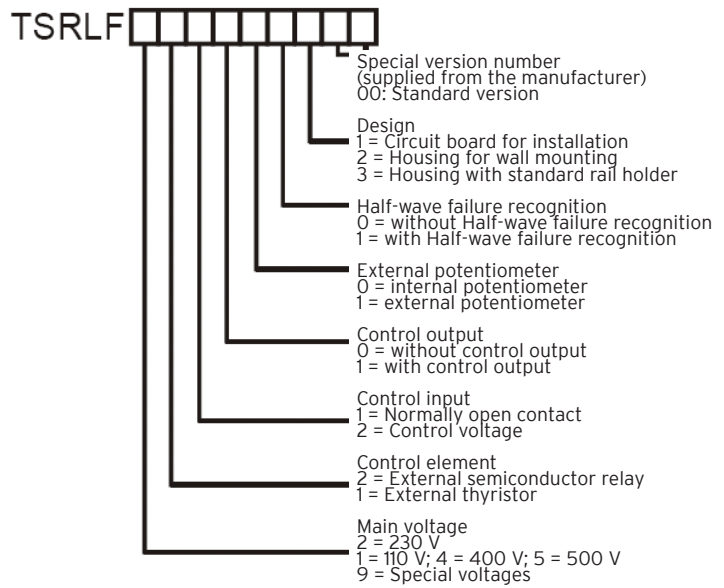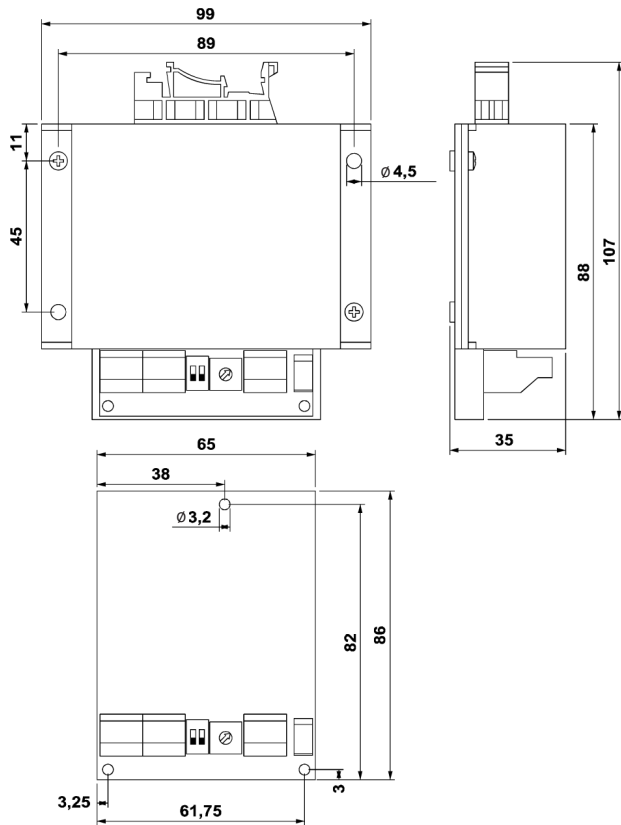
Technical Data

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

Description	
Main voltage Option Option Option Option	230 V: 190 VAC – 260 VAC; Peak voltage max. 800 V 110 V: 90 VAC – 135 VAC; Peak voltage max. 600 V 400 V: 330 VAC – 450 VAC; Peak voltage max. 1200 V 500 V: 410 VAC – 560 VAC; Peak voltage max. 1600 V 990 VAC–260 VAC; Peak voltage. max. 800 V
Frequency	45-65 Hz
Overvoltage category	III
Control element	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: $U_{320} = 5$ V DC internal resistance: $R_{32} = 120\,\Omega$ Maximum available control current: $I_{32} = 10$ mA Maximum permissible switching on delay: $t_{ein} = 0{,}2$ ms Maximum permissible switching off delay: $t_{aus} = 0{,}25$ ms
Option (thyristor)	Triggering through Opto-Triacs across protection resistor RVG inside TSRLF V_{rat} 110 V 230 V 400 V 500 V R_{VG} 68 Ω 130 Ω 240 Ω 300 Ω Characteristics of the Thyristors: Max. available Gate current: $I_{Gt} = 220$ mA Max. pemissible trigerring delay: $t_{gd} = 0{,}2$ ms Max. permissible release time: $t_q = 0{,}25$ ms Gate cathode resistance: $R_{GK} = 120\,\Omega\,/\,0{,}25$ W Gate cathode diode: $D_{GK} =$ for example: 1N4004
Power supply failure	After a power supply failure >= 60ms soft start on take place when power is returned
Option Half-wave failure recognition	After a power supply failure > 2ms soft start 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 prox. 0.86 s prox. 0.13 s prox. 0.93 s prox. 0.43 s Switching on using control input prox. 0.23 s prox. 0.04 s prox. 0.33 s prox. 0.28 s
Turn-off delay	Switching off using control input: Without bypass-protection: prox. 0.03-0.05s With bypass-protection: prox. 0.33-0.35s
Switching frequency	Unlimited
Control input	Using an external make contact (Test voltage to earth 2,5 kV) Contact voltage: 5 V; contact current 14 mA; connectors S1/ S2 are connected to the mains

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Description	
Opto coupler input option Control output option	Using control voltage (Isolation voltage 2,5kV) Control voltage: 4 - 32 VDC; control current: 1 - 12 mA Relay contact Max. switching power (resistive load): 2000VA Max.switching voltage: 380VAC Max.switching current: 10A Rated load (Resistive Load): 8A/250VAC, 5A/380VAC, 8A/24VDC Life time: Mechanical 20×10^6 Electrical 100×10^3
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: For special functions	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 61000-6-2; Interference emission: EN 61000-6-3 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 Control input Control output Ext. potentiometer	Screw terminals, connection cross-section, 0.2-4 mm², tightening torque 0.5-0.6 Nm Spring terminals, connection cross-section 0.1 – 0.5 mm² Screw terminals, connection cross-section 0.2-4 mm², tightening torque 0.5-0.6 Nm Spring terminals, connection cross-section 0.1-0.5 mm²
Mounting	Quick connection to 35 mm standard rail according to DIN EN 50 022 or DIN EN 50035
Type	- Wall mounting of the housing using two ø 4.5 mm bore holes - Circuit board mounting (without housing) using three ø 3.2 mm bore holes 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	II
Dimensions (LxWxH)	With housing: 99 x 88 x 35 mm; Circuit board: 65 x 86 x 30 mm
Housing	Flammability class UL94 VO
Installation	Minimum distance from heat-emitting devices, 10 mm
Weight	0.2 kg
Shock resistance	10 g
Humidity	95 %rh, no condensation
Operating temperature	-20°C to 80°C
Storage temperature	-20°C to 80°C

Dimensions and order code

TSRLF □ □ □ □ □ □ □ □

Special version number
(supplied from the manufacturer)
00: Standard version

Design
1 = Circuit board for installation
2 = Housing for wall mounting
3 = Housing with standard rail holder

Half-wave failure recognition
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 = Normally open contact
2 = Control voltage

Control element
2 = External semiconductor relay
1 = External thyristor

Main voltage
2 = 230 V
1 = 110 V; 4 = 400 V; 5 = 500 V
9 = Special voltages
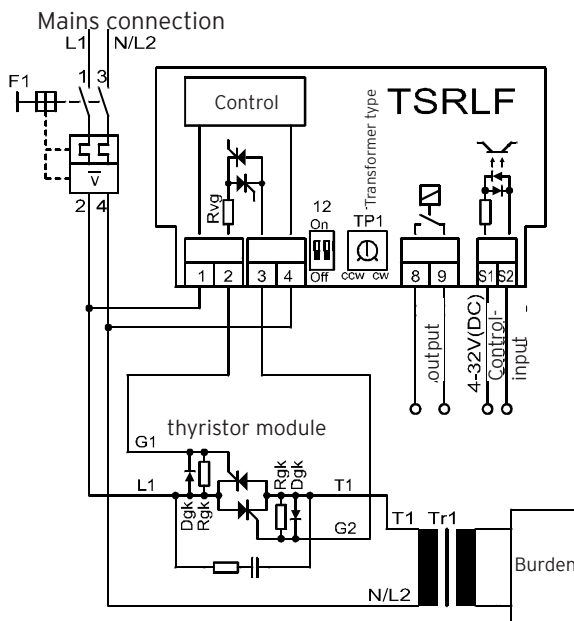
Fields of Application

Example 1

The TSRLF module controls external thyristors. The TSRLF has the option full on signalisation and control input for control voltage.

Example 2

The TSRLF module controls an external semiconductor relay with type of instantaneous switching. The TSRLF has the option bypass-contactor-control and control input for an external closing contact.