› Data sheet

Transformer Switching Relay | Type TSRL

intelligent electronics | FSM®

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The TSRL is an electronic relay used in the switching of transformers. Using a patent smooth switching procedure, one or more single phase transformers can be switched, either from an idle state or loaded state without inrush current. Smooth switching procedure eliminates inrush and not only reduces it.

Application areas

The TSRL can be used in isolating, control, filament and automotive transformers for industrial applications, plant construction and research.

Operation principal

› Smooth switching procedure

The TSRL premagnetises the transformer before 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 to the different transformer types, such as packet core transformers or toroidal mains transformers. The potentiometer (TP1) in the TSRL is used for this purpose (see adjusting instructions).

› Additional features

1. Half-wave failure recognition
Line voltage distortions such as half-wave failures can result in saturation currents larger than the inrush current in the transformer. The TSRL 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. Half-wave failure recognition with fast re turn-on
Full turn-on to the earliest possible time. Delay max. 40 msec. after incoming voltage.

3. Dimming
The TSRL can also be used in the smooth switching of filter capacitor elements such as frequency converters used in network input circuits. Large filter capacitors following a transformer can also be switched smoothly In this case the voltage impulses are continuously increased up to the potentiometer set values before complete switching (see adjusting instructions).

4. Additional features are possible. Please contact our technical contact person Mr. Konstanzer

Technical data

Rated voltage: Standard Option Option Option Option	 230 V: 190 VAC – 260 VAC; Peak voltage max. 800 V 110 V: 95 VAC – 135 VAC; Peak Voltage max. 600 V 400 V: 350 VAC – 450 VAC; Peak voltage max. 1200 V 500 V: 410 VAC – 560 VAC; Peak voltage max. 1600 V 90 VAC – 260 VAC; Peak voltage max. 800 V (Half-wave failure recognition not possible)
Frequency:	45 - 65 Hz
Overvoltage category	III
Rated current: Standard Option	ambient temperature 30°C 40°C 50°C 60°C 70°C max. load current 16 A 16 A 16 A 14 A 12 A Max. peak current: 400A (tpeak=10ms), Leakage current 11mA bei 230VAC Load integral limit: 800A2s (t=10ms) ambient temperature 30°C 40°C 50°C 60°C 70°C max. load current 32 A 28 A 25 A 22 A 19 A Max.: peak current 500A (tpeak=10ms),, Leakage current 11mA bei 230VAC Load integral limit : 1250A2s (t=10ms)

Power supply failure	For power supply failure > 60ms smooth switching-on takes place after power recovery
Option half-wave failure recognition: Protection	For power supply failure > 2ms smooth switching-on takes place after power recovery Protection maximum to the rated current of the TSRL, for example for circuit breakers with B characteristics, or melting fuses with g/R characteristics the TSRL is short circuit protected.
Turn-on delay Turn-off delay	Setting TP1 — on R — on P — Dimmer R — Dimmer P Switching mains (control input on) — ca. 0,88s — ca. 0,15s — ca. 0,95s — ca. 0,45s Switching ON using control input — ca. 0,25s — ca. 0,06s — ca. 0,35s — ca. 0,30s Switching off using the control input approx. 0,03 - 0,05s
Lifetime	Typically 25 switching cycles in succession, then 60 sec pause required (packet core Transformer), up to unlimited switching cycles without a pause (Toroidal transformer)
Control input: Standard Option	Over an external normally open contact, or through the transistor of an external optical coupler Contact voltage: 5 V Contact current:14 mA Terminals S1/ S2 area connected to the mains Through control voltage Control voltage: 4- 32 VDC Control current: 1-12 mA
Ext. Potentiometer: For special functions Electromagnetic compatibility (CE):	Resistance: 1-2,5 k Ohm, max. cable length 0,5m, Ucw-ccw= 5VDC Interference immunity: EN 50082-2; Interference emission: EN 50081-1 To comply to the limits of the interference emission (crackle interference) the TSRL may be switched on and off only five times per minute without external mains filtering.
Connections: 16A Mains/Load connectors: 32A Mains/Load connectors: Control input: ext.Potentiometer:	Screw terminals, connection cross-section 0.2-2.5mm2, tightening torque 0.5-0.6Nm Screw terminals, connection cross-section 0.2-4mm2, tightening torque 0.5-0.6Nm Spring terminals, connection cross-section 0.1-2mm2 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
Type: Housing: Circuit board:	- Wall mounting using two 4.5mm connection bore holes - Circuit boart mounting (without housing) using three 3.2mm connection bore holes Encapsulated, housing made from insulating material 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; for 500 V: 98x88x45mm; Circuit board 77.5x85x30mm
Housing:	Material ABS, Flammability class UL94 VO
Weight	0,2kg
Shock resistance	10 g
Humidity max.	95 %, no condensation
Ambient temperature	0°C to 60°C, special version: -20°C to +70°C
Storage temperature	-20°C to 70°C

Dimensions and order code