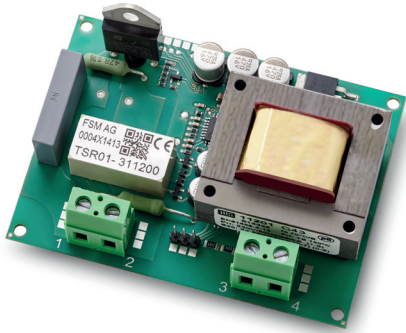


Device Description

Transformer switching relay | Type TSR01



Areas of application

The TSR01 is used, e.g. in isolating, control, heating and vehicle transformers in industry, plant construction and research, as well as in all transformer applications.

Applications: Medical technology, traffic light signal systems, special vehicles, switchgear, railroad signal technology, electrical heating, lighting technology and transmission technology.

Contents

- | | |
|-------------------------------------|----------------------------------|
| 1.0 Safety and warning instructions | 2.3. Mains frequency monitoring |
| 1.1. General safety instructions | 2.4. Half-wave failure detection |
| 1.2. Application | 2.4.1. Slow On |
| 1.3. General mounting instructions | 2.4.2 Quick On |
| 1.4. Maintenance | 3.0 Technical data |
| 2.0 Description | 4.0 Order code |
| 2.1. Soft switch-on procedure | 5.0 Dimensions |
| 2.2. Mains voltage monitoring | 6.0 Connection diagram |

1.0 Safety and warning instructions

1.1. General safety instruction



The notes and warnings contained in this description must be observed to ensure safe operation. The device can be operated within the conditions specified in the technical data without impairing its operational safety.



This device may only be installed and put into operation by qualified electrical personnel! Maintenance and repair may only be carried out by properly and expertly trained persons who are familiar with the associated dangers and warranty regulations.

1.2. Application

The TSR01 may only be used to switch transformers with or without load.

1.3. General mounting instructions

The TSR01 is only suitable for installation in closed devices. Open operation is not permitted.

1.4. Maintenance

The TSR01 does not require any special maintenance. Occasional checking or retightening of the terminals is recommended. Dust deposits on the TSR01 can be removed with dry compressed air if mains voltage is turned off.

2.0 Description

The TSR01 is an electronic relay for switching transformers. It allows inrush-free switching of one or multiple single-phase transformers with or without load. The inrush current is avoided and not only limited by a soft switching process. Occurring short-circuit currents are not limited by the TSR01.

2.1. Smooth switching procedure

The TSR01 premagnetizes the transformer with unipolar voltage impulses before full switch-on. The strength of the premagnetization is the same for each transformer and should reach an inversion point of the hysteresis curve. The width of the voltage pulses required for this must be adapted to the different transformer types such as packet core or toroidal transformers. This is done at the factory via the interface of the TSR01.

2.2. Mains voltage monitoring

The TSR01 monitors the level of the mains voltage to the functional voltage range (undervoltage and overvoltage threshold). If the mains voltage is outside the functional range, the TSR01 switches the connected transformer off and switches it on again when the mains voltage returns to the functional range. The undervoltage and overvoltage threshold, as well as the permissible failure duration are set at the factory via the interface of the TSR01.

2.3. Mains frequency monitoring

The TSR01 monitors the mains frequency for the functional range. If the mains frequency is outside the functional range, the TSR01 switches the connected transformer off and switches it on again when the mains frequency returns to the functional range.

2.4. Half-wave failure recognition

Mains voltage deformations, e.g. half-wave failures, can lead to large saturation currents in the transformer, which can be considerably larger than the inrush current. The TSR01 reacts to the half-wave failures by switching off immediately before the saturation currents occur and then switching on again with a Smooth switching procedure. In this way, fuse tripping is avoided. Via the interface of the TSR01 it is possible to choose between half-wave failure recognition-slow-on or half-wave failure-recognition-fast-on (factory setting) or without half-wave failure recognition.

2.4.1. Slow On

The TSR01 switches off the connected transformer at the end of the mains half-wave in which a failure occurs. The TSR01 switches the transformer on again with the smooth switching procedure.

2.4.2. Quick On

The TSR01 switches off the transformer at the end of the mains half-wave in which a failure occurs. The TSR01 switches the transformer on again using the fast restart-procedure, taking into account the remanence position in the transformer.

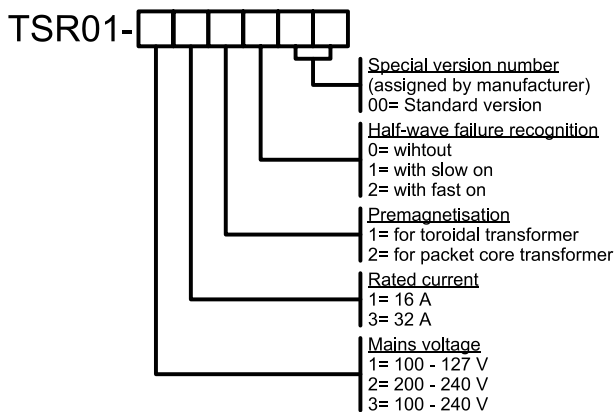
3.0 Technical data

(Switch-on method according to patent no.: DE 42 17 866, EP 05 75 715 B1, US 005 517 380A)

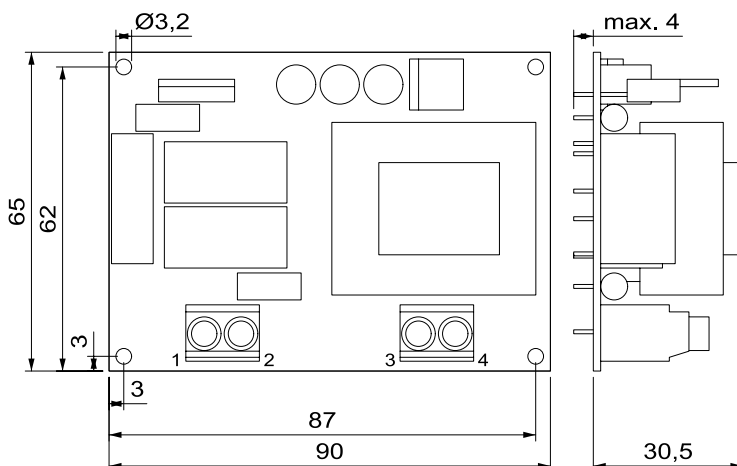
Designation														
Nominal voltages Option Option	100-240 V: 55 VAC-275 VAC 100- 127 V: 55 VAC- 146 VAC 200-240 V: 110 VAC-275 VAC Peak voltage: max. 800 V													
Frequency	45-65 Hz													
Overvoltage category	III													
Power consumption	5 W													
Rated current	(1 Relais) 16 A													
	<table border="1"> <tr> <td>Ambient temperature</td> <td>30 °C</td> <td>40 °C</td> <td>50 °C</td> <td>60 °C</td> <td>70 °C</td> <td></td> </tr> <tr> <td>Load current (max.)</td> <td>16 A</td> <td>16 A</td> <td>16 A</td> <td>14 A</td> <td>12 A</td> <td></td> </tr> </table>	Ambient temperature	30 °C	40 °C	50 °C	60 °C	70 °C		Load current (max.)	16 A	16 A	16 A	14 A	12 A
Ambient temperature	30 °C	40 °C	50 °C	60 °C	70 °C									
Load current (max.)	16 A	16 A	16 A	14 A	12 A									
Option	(2 Relais) 32 A													
	<table border="1"> <tr> <td>Ambient temperature</td> <td>30 °C</td> <td>40 °C</td> <td>50 °C</td> <td>60 °C</td> <td>70 °C</td> <td></td> </tr> <tr> <td>Load current (max.)</td> <td>32 A</td> <td>28 A</td> <td>25 A</td> <td>22 A</td> <td>19 A</td> <td></td> </tr> </table>	Ambient temperature	30 °C	40 °C	50 °C	60 °C	70 °C		Load current (max.)	32 A	28 A	25 A	22 A	19 A
Ambient temperature	30 °C	40 °C	50 °C	60 °C	70 °C									
Load current (max.)	32 A	28 A	25 A	22 A	19 A									
Max. Peak current: 500 A ($t_{peak} = 10$ ms), leakage current 11 mA at 230 VAC Limiting load integral: 1250 A ² s ($t = 10$ ms)														
Mains interruption	Undervoltage	If the mains voltage falls below the undervoltage threshold for longer than 0.3 s, the TSR01 switches off.												
	Without Half-wave failure recognition	In the event of a mains interruption > 60 ms, soft switch-on takes place on mains recovery.												
	With Half-wave failure recognition-Slow On	In case of a mains interruption > 2 ms, the soft switch-on takes place when the mains returns.												
	With Half-wave failure recognition-Quick On	In case of a mains interruption > 2 ms the TSR01 executes the Half-wave failure recognition and switches on with the fast restart-procedure. The switch-off gap is at least one mains period.												
Fuse protection	The fuse protection must comply with the limit values defined under „Rated current“.													
Turn-on delay	Premagnetization	1 (toroidal transformer)	2 (packet core transformer)											
	Turn-on delay	appr. 0.88 s	appr. 0.15 s											
Switching cycles	Depending on the premagnetization (packet core or toroidal transformer). Typ. 25 switching cycles in succession, then 60 s pause required (packet core transformer) to any number of switching cycles without pause (toroidal core transformer).													
Lifetime	Typ. 5 million switching cycles													
EMC (CE)	Interference immunity:	IEC 61000-6-2												
	Interference emission:	IEC 61000-6-3												

Designation	
Connections	16A: screw terminals, connection cross-section 0.2 - 2.5 mm ² , tightening torque 0.5 - 0.6 Nm 32A: screw terminals, connection cross-section 0.2 - 4 mm ² , tightening torque 0.5 - 0.6 Nm
Mounting	PCB mounting by using four mounting holes Ø 3.2 mm
Design	open / PCBs
Pollution degree	2
Protection type	IP00
Dimensions (LxWxH)	90 x 65 x 34.5 mm
Mounting	Minimum distance to heat-emitting devices 20 mm. The necessary clearances and creepage distances must be observed during installation.
Weight	250 g
Impact resistance	10 g
Humidity	95 %, non condensing
Operating temperature	-20 °C to 70 °C
Storage temperature	-20 °C to 70 °C

4.0 Order Code



5.0 Dimensions



6.0 Connection diagram

