

PCB relay for DC voltage,
neutral, monostable

Features

- Used as a switching element for electrical separation between low-power control circuits and power load circuits
- With 8 mm clearance and creepage distances up to 8 A continuous current (UL, CSA: 10 A)
- Low self-heating thanks to low power consumption
- High packing densities possible
- Suitable for fully automated processing
- General-purpose relay for instrumentation and control
- Mechanical and electrical characteristics comply with the “Rules for electrical relays in power installations” (VDE 0435/9.72)
- Used for safe electrical insulation in the following applications
 - power installations (VDE 0160)
 - open and closed-loop control equipment for domestic use (VDE 0631)
 - electrical equipment for domestic use (VDE 0700)
 - electronic equipment for domestic use (VDE 0860); on request

Typical applications

- Interface technology
- Heating control systems
- Temperature controllers
- Timer switches
- Household equipment



Approx. 1:1 scale

Design

- Size I with 1 make contact
or
Size II with 1 changeover contact
- For printed circuit assembling
- Immersion cleanable or suitable for soldering lines

Approvals

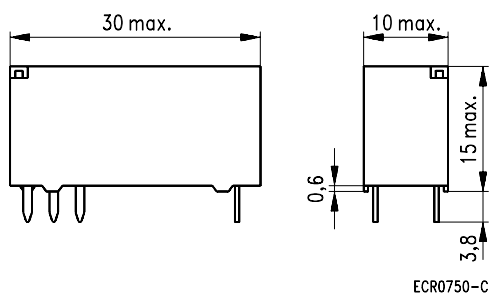
	VDE	Mark of conformity 
	SEV	89.1 02176.02
	CSA	File LR 45064-7
	UL	File E 48393
	SEMKO	9049293
	SETI	142344-01

Miniature Power Relay MSR

Dimensional drawing (in mm)

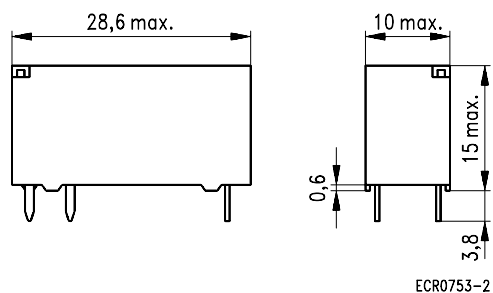
Size II

with 1 changeover contact



Size I

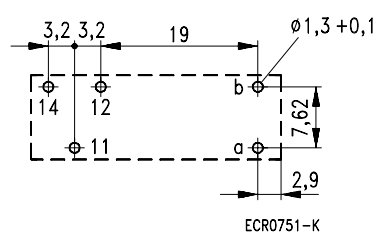
with 1 make contact



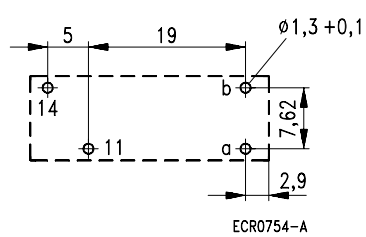
Mounting hole layout

View on the terminals

1 changeover contact



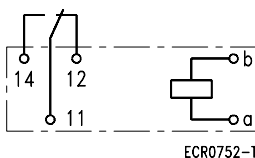
1 make contact



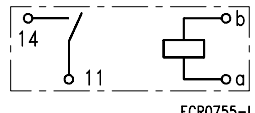
Terminal assignment

View on the terminals

1 changeover contact



1 make contact



Miniature Power Relay MSR

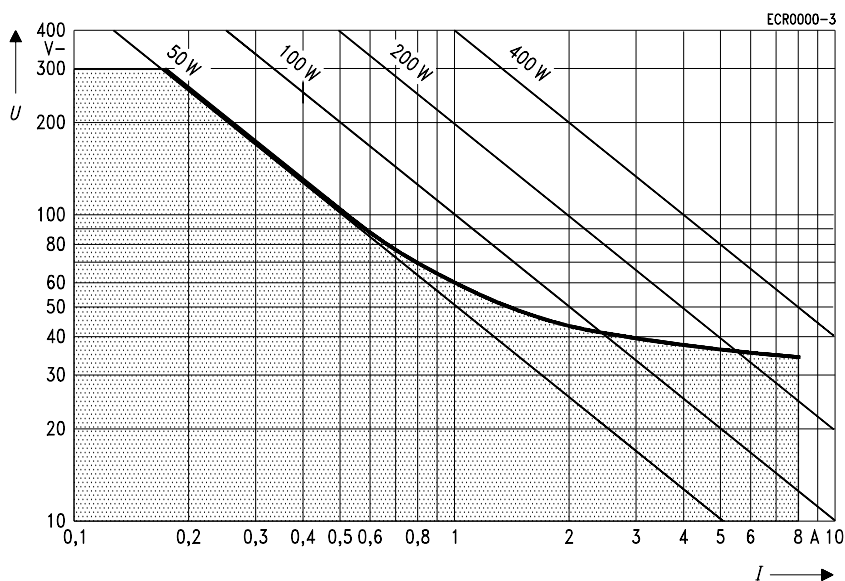
Contact data

Contact category III according to VDE 0435 Part 120/10.81, Appendix B

Ordering code, block 3	A301/A302	A401/A402	A501/A502	A601/A602
Number of contacts and type	1 changeover contact or 1 make contact			
Contact assembly	Single contacts			
Contact material	AgSnO ₂	AgCdO	AgNi 0,15 gold-flashed	AgCdO gold-plated
Max. continuous current at max. ambient temperature	8 A			
Inrush current (max. 4 s at 10% duty cycle)	15 A			
Maximum switching voltage	440 V~ 300 V–			
Maximum switching capacity AC voltage DC voltage	2000 VA See load limit curve			
Recommended for loads >	500 mA, 12 V~/V–	500 mA, 12 V~	1 mA, 6 V–	μW
Contact resistance (initial value)/measuring current/driver voltage	≤ 100 mΩ/1 A/24 V	≤ 100 mΩ/1 A/24 V	≤ 100 mΩ/100 mA/6 V	≤ 30 mΩ/100 mA/6 V

Note: Inrush currents up to 80 A possible on request.

Load limit curve



I = switching current

U = switching voltage

Definition of the load limit curve:

In 1000 operations there must be no arc with a burning time > 10 ms.

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Coil data

Nominal voltages	From 3 V– to 60 V– Special voltages on request
Nominal power consumption, typ., at 20 °C	210 ... 270 mW
Pull-in power, at 20 °C	100 ... 120 mW
Operating range/class of energizing voltage according to DIN IEC 255 Part 1-00 or VDE 0435 Part 201	2/b
Minimum release voltage	10 % of nominal voltage

Coil versions

Nominal voltage U_{nom} V–	Operate voltage at 20 °C $U_{op\ cold}$ V–	Operating voltage range at 20 °C		Resistance at 20 °C Ω	Number of coil, ordering code, block 2
		Oper. voltage U_I V–	Max. voltage U_{II} V–		
3	2.1	2.1	7.5	40 ± 4	001
5	3.4	3.6	12.5	118 ± 12	002
6	4.1	4.3	15.0	165 ± 17	003
9	6.1	6.4	22.0	365 ± 37	004
12	8.2	8.5	30.0	650 ± 65	005
18	12.2	12.8	45.0	1455 ± 145	006
24	16.3	17.2	56.0	2270 ± 230	007
36	24.5	25.4	88.0	5640 ± 565	008
48	32.6	34.5	110.0	8790 ± 880	009
60	40.8	42.8	142.0	15265 ± 2290	010

Other coil versions available on request

$U_{op\ cold}$ = Operate voltage at 20 °C without pre-energizing the coil

U_I = Operate voltage at 20 °C after pre-energizing with U_{nom} without contact current

U_{II} = Maximum continuous voltage at 20 °C for $T_{c\ max} = 115\ ^\circ\text{C}$ without contact load

Operating voltage limits U_I and U_{II} depend on temperature and can be calculated by:

$$U_{I\ t_{amb}} = k_I \cdot U_{I\ 20\ ^\circ\text{C}} \text{ and } U_{II\ t_{amb}} = k_{II} \cdot U_{II\ 20\ ^\circ\text{C}}$$

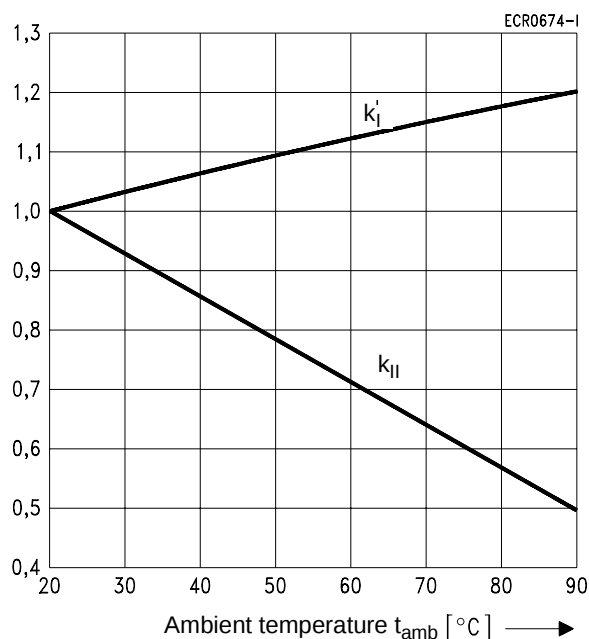
t_{amb} = Ambient temperature

$U_{I\ t_{amb}}$ = Minimum voltage at ambient temperature t_{amb}

$U_{II\ t_{amb}}$ = Maximum voltage at ambient temperature t_{amb}

k_I a. k_{II} = Factors (dependent on temperature), see diagram

$T_{c\ max}$ = Maximum coil temperature



Miniature Power Relay MSR

General data				
Operate time at U_{nom} and 20 °C, typ.	6 ms			
Release time without/with parallel diode, typ.	2.5 ms / 10 ms			
Bounce time, make/break contact typ.	0.5 ms / 4 ms			
Maximum switching rate without load	1200 min ⁻¹			
Maximum switching rate with rated load	30 min ⁻¹			
Ambient temperature range according to DIN IEC 255 Part 1-00 or VDE 0435 Part 201	-40 °C ... 70 °C			
Thermal resistance	75 K/W			
Coil temp. rise due to rated contact current	Approx. 7 K			
Maximum permissible coil temperature	115 °C			
Protection class according to DIN 40050/IEC 529	Immersion cleanable IP 67 Suitable for soldering lines IP 50			
Electrical endurance	Load	Contact material	Contact	Endurance, typ., operations
	Rated load 8 A, 230 V~	AgCdO	Make	1 x 10 ⁵
	Motor load 230 V~ Inrush current 18 A cosφ 0.5 Rated current 1.8 A cosφ 0.5	AgCdO	Make	4 x 10 ⁵
	AC15 3A according to VDE 660 / IEC 947, 230 V~	AgSnO ₂	Make	2 x 10 ⁵
	Valve load 0.1 A, 230 V~	AgCdO	Make	1 x 10 ⁶
	Hydraulic valves 2 A, 24 V~	AgNi 0,15	Make	1 x 10 ⁶
	Lamp load 6 A, 230 V~	AgSnO ₂	Make	1 x 10 ⁴
Mechanical endurance	Approx. 1 x 10 ⁷ operations			
Flammability according to UL 94	V-0			
Solder bath temperature/max. duration	260 °C / 5 s			
Mounting position	Any			
Processing information	Wherever possible, ultrasonic cleaning should not be used; if absolutely necessary, then only after consultation with the manufacturer.			
Weight	11 g			

Insulation	
According to IEC 664/VDE 110 (1/89): rated voltage pollution severity overvoltage category	250 V 3 III
According to VDE 0110 (2/79): insulation group/rated voltage	C/250 B/380
Dielectric test voltage, contact – coil (1 min)	4000 V _{rms}
Surge voltage, contact – coil (1.2 – 50 μs)	8000 V
Dielectric test voltage between open contacts (1 min)	1000 V _{rms}
Clearance/creepage distances	8 mm / 8 mm
Insulation resistance at 500 V (initial value)	> 10 ⁵ MΩ
Tracking resistance of the fundamental frame according to DIN IEC 112	CTI 250

Miniature Power Relay MSR

Ordering code

	Block 1						Block 2					Block 3			
Data position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	V	2	3	0	6	1	-					-	A		
Identifier for Miniature Power Relay MSR															
Size A = Size I, with 1 make contact B = Size II, with 1 changeover contact															
Version 1 = immersion cleanable 2 = suitable for soldering lines															
Coil number 001 = 3 V– nominal voltage 002 = 5 V– 003 = 6 V– 004 = 9 V– 005 = 12 V– 006 = 18 V– 007 = 24 V– 008 = 36 V– 009 = 48 V– 010 = 60 V–															
Contact pile-up A = Standard															
Contact material 3 = AgSnO ₂ 4 = AgCdO 5 = AgNi 0,15, gold-flashed 6 = AgCdO, hard gold-plated															
Contact arrangement 01 = 1 changeover contact 02 = 1 make contact															

Ordering example: V23061-B1005-A401
MSR relay with 1 changeover contact (Size II), coil 12 V nominal voltage,
contact material silver cadmium oxide (AgCdO)