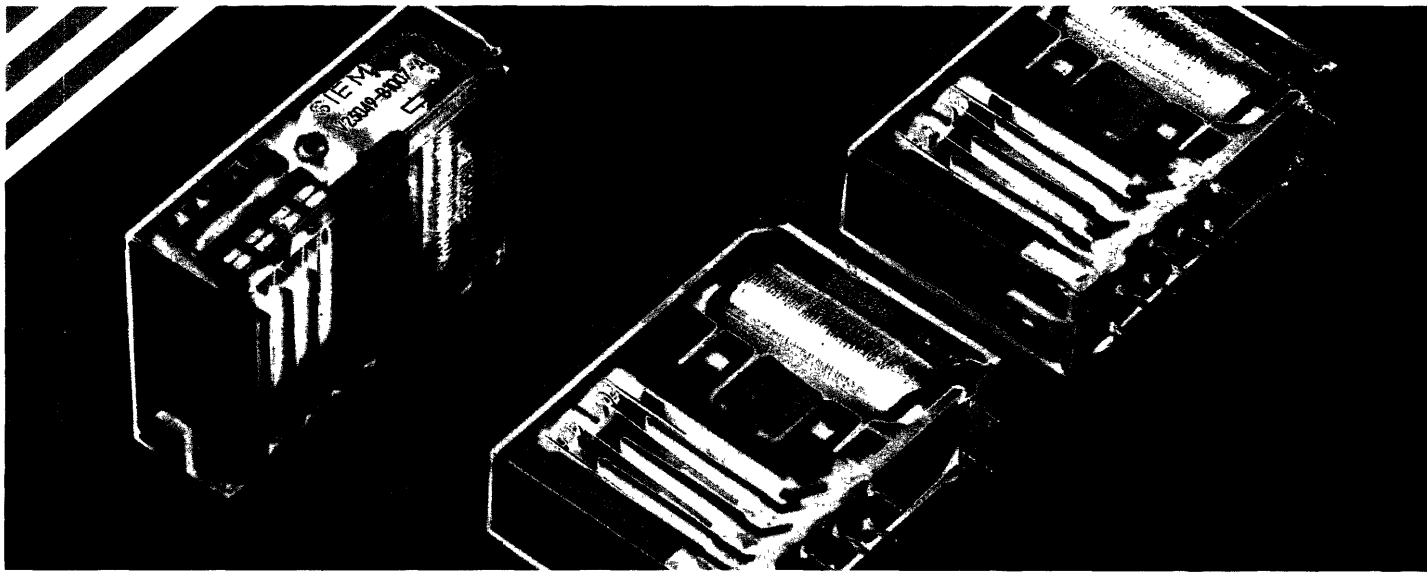
SIEMENS

Safety Relays SR2 and SR4



Product Information

Safety relays SR2 and SR4 with forcibly actuated contacts for DC voltage, polarized, monostable

General

In our highly technical world, it is absolutely essential that electrical equipment should comply with regulations designed protect against personal injury and material damage. There are national and international specifications which cover a wide variety of hazards. Among other things, these safety regulations define certain requirements that components which contribute to the functional safety of an installation, machine or other facilities have to meet.

Safety relays SR2 and SR4 meet the requirements of the "Employer's Liability Insurance Associations" for the forcible actuation of contact pile-up. According to Specification ZH1/457: "... the contacts must be mechanically joined together so that a break contact and a make contact can never be closed at the same time. Throughout the entire life of the relay, even in the event of relay failure (if the contacts tend to stick and weld, for example), there must always be a contact clearance of at least 0.5 mm".

Features

- Compliance with the "Safety Rules for Controls for Power-Operated Presses in Metal Working (ZH1/457)".
- Separate contact chambers; this ensures that the actuating system is reliably isolated from the contact spring set even if a wire or spring breaks.
- Clearance and creepage distances according to VDE 0110, insulation group C 250.
- Compact dimensions.

Typical applications

- Emergency stop switches
- Automatic door controls
- Two-hand controls
- Elevator control systems
- Escalator control systems
- Press control systems
- Photoelectric barriers/light-beam curtains
- System controls

Design

- Size I: SR2 with 1 make and 1 break contact
  or
  Size II: SR4 with 2 make and 2 break contacts
  or
  SR4 with 3 make and 1 break contact
- For printed circuit assembling
- Immersion cleanable

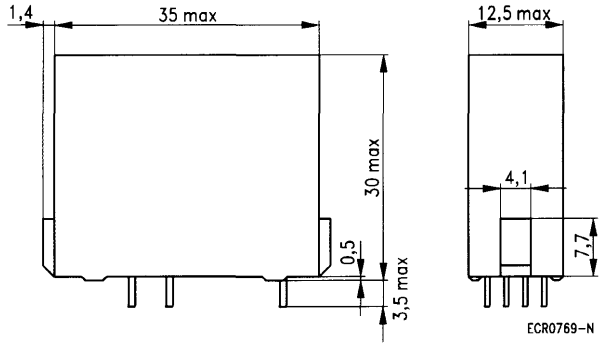
Approvals

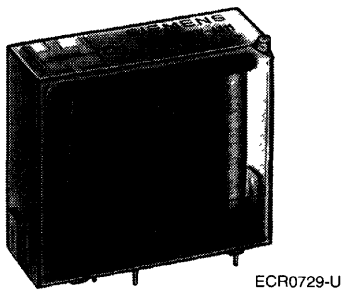
VDE	VDE	Mark of conformity 6019
	TÜV-Rheinland	applied for
	CSA	applied for
	UL	applied for
	SEMKO	applied for
	SEV	applied for

Dimensional drawing (in mm)

Size I

With 1 make contact and 1 break contact

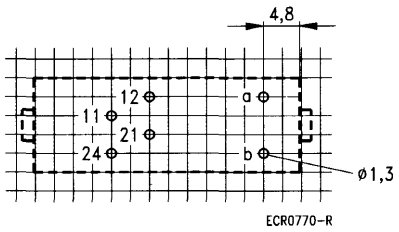




Approx 1 1 scale

Mounting hole layout

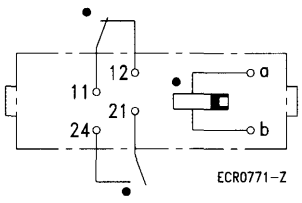
View on the terminals



2.5 mm basic grid according to EN 60097 and DIN 40803

Terminal assignment

View on the terminals

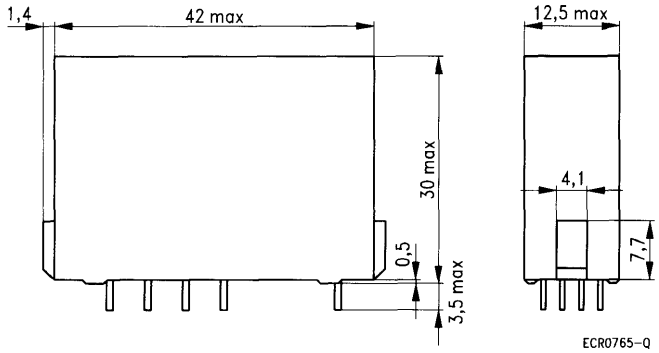


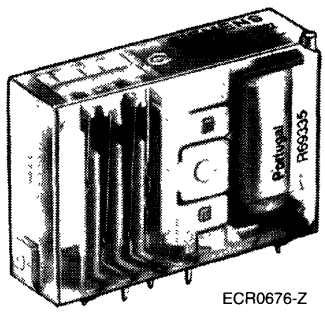
Release condition corresponds to the switch position shown. If there is positive potential at terminal a, the relay changes to its operate condition.

Dimensional drawing (in mm)

Size II

With 2 make contacts and 2 break contacts
or 3 make contacts and 1 break contact

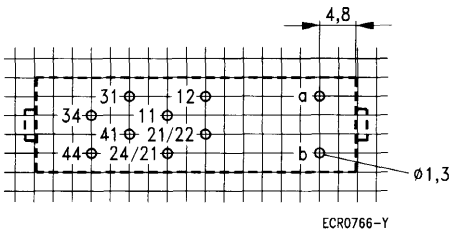




Approx 1 1 scale

Mounting hole layout

View on the terminals

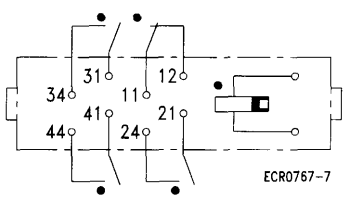


2.5 mm basic grid according to EN 60097 and DIN 40803

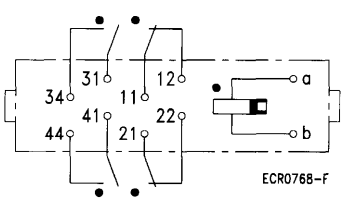
Terminal assignment

View on the terminals

3 make contacts and 1 break contact



2 make contacts and 2 break contacts



Release condition corresponds to the switch position shown. If there is positive potential at terminal a, the relay changes to its operate condition.

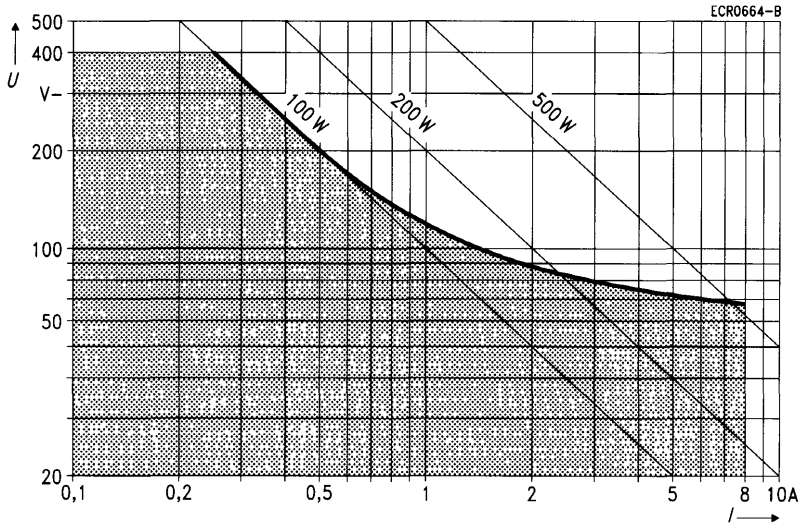
Contact data

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

Ordering code, block 3/ No. of contacts and type/ contact assembly	A111	A122	A131	A211	A222	A231	A311	A322	A331
	1 make and 1 break	2 make and 2 break	3 make and 1 break	1 make and 1 break	2 make and 2 break	3 make and 1 break	1 make and 1 break	2 make and 2 break	3 make and 1 break
	Single contacts								
Contact material	AgCdO			AgCdO, hard gold-plated			AgNi 0,15, hard gold-plated		
Max. cont. current at max. ambient temperature	1 contact loaded 6 A 2 contacts loaded 4.2 A 3 contacts loaded 3.5 A								
Maximum switching current	8 A								
Maximum switching voltage	400 V~ 250 V–								
Maximum switching capacity AC voltage DC voltage	1500 VA See load limit curve								
Recommended for loads >	500 mA, 12 V~/V–			μW			μW		
Contact resistance (initial value)/measuring current/driver voltage	≤ 100 mΩ/1 A/24 V			< 50 mΩ/100 mA/6 V			< 50 mΩ/100 mA/6 V		

Note: Contact clearance even in faulty condition > 0.5 mm.

Load limit curve



I = switching current
U = switching voltage

Safe shutdown, no stationary arc > 10 ms

Coil data

Nominal voltages	From 6 V– to 110 V–
Nominal power consumption, typ.	420 ... 540 (2 contacts), 540...640 (4 contacts)
Maximum pull-in power	300 mW (2 contacts), 350 mW (4 contacts)
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 V–	Operate voltage at 20 °C $U_{on\ cold}$ V–	Operating voltage range at 20 °C Oper. voltage U_I V–	Max. voltage U_{II} V–	Resistance at 20 °C Ω	Number of coil, ordering code block 2
Safety relay SR2					
6	4.5	4.6	12.9	85 ± 8.5	103
12	8.9	9.2	25.1	315 ± 32	105
24	17.8	18.4	50.4	1300 ± 130	107
48	35.8	37.0	98.3	4850 ± 728	109
60	45.3	46.7	122.5	7900 ± 1185	110
110	81.8	84.9	212.3	22500 ± 3375	112
Safety relay SR4					
6	4.5	4.6	12.9	67 ± 7	003
12	8.9	9.2	25.1	255 ± 26	005
24	17.8	18.4	50.4	1020 ± 102	007
48	35.8	37.0	98.3	3910 ± 587	009
60	45.3	46.7	122.5	6140 ± 921	010
110	81.8	84.9	212.3	18855 ± 2829	012

Other coil versions on request.
To guarantee the contact gap of the make contacts for a welded break contact, the operating voltage value must not be more than 8 times the value of minimum voltage U_I.

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

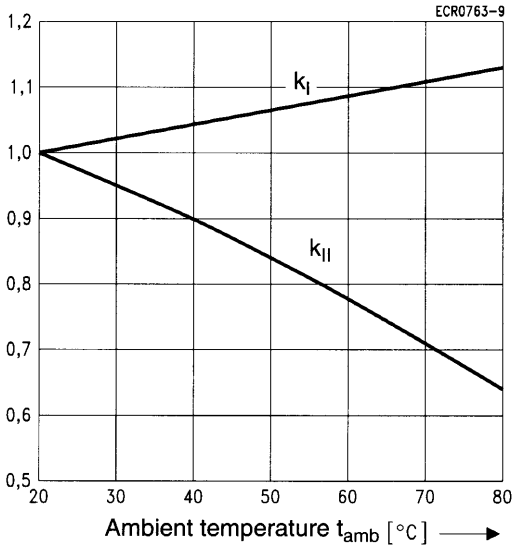
U_I = Operate voltage at 20 °C after pre-energizing with U_I without contact current

U_{II} = Maximum continuous voltage at 20 °C for $T_{c\ max}$ = 120 °C without contact loading

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

$U_{I\ tamb} = k_I \cdot U_{I\ 20\ °C}$ and $U_{II\ tamb} = k_{II} \cdot U_{II\ 20\ °C}$

t_{amb} = Ambient temperature
$U_{I\ tamb}$ = Minimum voltage at ambient temperature t_{amb}
$U_{II\ tamb}$= Maximum voltage at ambient temperature t_{amb}
k_I a. k_{II}= Factors (dependent on temperature), see diagram
$T_{c\ max}$= Maximum coil temperature



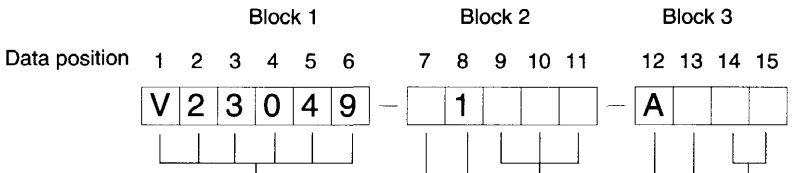
General data

Operate time at U_{nom} and 20 °C, typ.	20 ms
Release time without/with parallel diode, typ.	8 ms/22 ms
Maximum switching rate without load	1200 min^{-1}
Maximum switching rate with rated load	15 min^{-1}
Ambient temperature range according to DIN IEC 255 Part 1-00 or VDE 0435 Part 201	-40 °C ... +85 °C
Thermal resistance	53 K/W
Coil temperature rise due to rated contact current	< 10 K
Maximum permissible coil temperature	120 °C
Vibration resistance, frequency range	4 g 10 ... 55 Hz
Shock resistance	10 g at 11 ms half-sine wave
Protection class according to DIN 40050/IEC 529	Immersion cleanable IP 67
Electrical endurance at rated load	Approx. 1 x 10^5 operations
Mechanical endurance	Approx. 1 x 10^7 operations
Solder bath temperature/max. duration	260 °C/5 s
Mounting position	Any
Processing information	Ultrasonic cleaning is inadvisable
Weight SR2/SR4	28 g/32 g

Insulation

According to IEC 664/VDE 110 (1/89): rated voltage pollution severity overvoltage category	 300 V 2 III
According to VDE 0110 (2/97): insulation group/rated voltage	C/250
Dielectric test voltage, contact – coil (1min)	2500 $V_{~rms}$
Dielectric test voltage, contact – contact (1min)	2000 $V_{~rms}$
Dielectric test voltage between open contacts (1 min)	1500 $V_{~rms}$
Clearances/creepage distances	3 mm/4 mm
Tracking resistance of the fundamental frame according to DIN IEC 112	CTI 250

Ordering code



Identifier for
Safety Relays SR2 and SR4

Version
A = SR2 (2 contacts), Size I
B = SR4 (4 contacts), Size II

Terminals
1 = PCB version

Coil number

Safety relay SR2:	Safety relay SR4:
103 = 6 V nominal voltage	003 = 6 V nominal voltage
105 = 12 V	005 = 12 V
107 = 24 V	007 = 24 V
109 = 48 V	009 = 48 V
110 = 60 V	010 = 60 V
112 = 110 V	012 = 110 V

Type of contact
A = Single contact

Contact material
1 = AgCdO
2 = AgCdO, hard gold-plated
3 = AgNi0,15, hard gold-plated

Contact arrangement
11 = 1 make contact and 1 break contact (SR2)
22 = 2 make contacts and 2 break contacts (SR4)
31 = 3 make contacts and 1 break contact (SR4)

Ordering example: V23049-B1007-A322
SR4 with 2 make contacts and 2 break contacts, coil 24 V nominal voltage, contact material AgNi 0,15, hard gold-plated