

Solid State Relays

SOLITRON MIDI - With Integrated Heatsink

Types RJ1A, RJ1B



- AC semiconductor contactor
- Zero switching (RJ1A) or instant-on switching (RJ1B)
- Direct copper bonding (DCB) technology
- LED-indication
- Cage clamp output terminals
- 2 input ranges: 4-32 VDC and 24-275 VAC/24-48VDC
- Operational ratings up to 75 AACrms and 600 VAC¹
- Blocking voltage: Up to 1200 Vp
- Opto-isolation > 4000 VACrms
- Over-temperature safety option²
- Integrated fan option
- Option for UL508 listing⁵

Product Description

The SOLITRON Midi is a single-phase Solid State Contactor designed to replace electro-mechanical contactors in industrial heating and motor applications, especially when switching is frequent. The product is ready to mount on DIN-rail or chassis and comes with integral heatsink. For current rating of 75AACrms (AC51) convection cooling is used. The standard housing dimensions enable straightforward replacement of alterna-

tive products and the terminal layout allows both contactor (E) and SSR (U) type connection. Cage clamp terminals are used to ensure secure load connection with cable up to 25mm².

An LED indicates the status of the control input. The superior heat-transfer efficiency combined with a robust power management system make this a high reliability product that can meet the most stringent functional requirements.

Ordering Key

	RJ 1 A 60 D 50 E P
Solid State Relay	
Number of poles	
Switching mode	
Rated operational voltage	
Control voltage	
Rated operational current	
Terminal layout	
Options	

Type Selection

Switching mode	Rated operational voltage ¹	Control voltage	Rated operational current	Terminal layout	Options
A: Zero switching B: Instant-on switching ³	23: 230 VACrms 60: 600 VACrms	D: 4-32 VDC A: 24-275 VAC/ 24-48 VDC	40: 40 AACrms 45: 45 AACrms 50: 50 AACrms 75: 75 AACrms ⁴	U: SSR E: Contactor	P: Over-temp. protection ² V: Integrated Varistor

Selection Guide

Rated operational voltage	Blocking voltage	Control voltage	Rated operational current			
			40 A	45 A	50 A	75 A (FAN+OTP) ²
230 VACrms	650 Vp	4 - 32VDC	RJ1A23D40E RJ1A23D40U	RJ1A23D45E RJ1A23D45U	RJ1A23D50E RJ1A23D50U	RJ1A23D75EP
		24 - 275VAC/ 24 - 48VDC	RJ1A23A40E RJ1A23A40U	RJ1A23A45E RJ1A23A45U	RJ1A23A50E RJ1A23A50U	RJ1A23A75EP
600 VACrms	1200 Vp	4 - 32VDC	RJ1A60D40E RJ1A60D40U	RJ1A60D45E RJ1A60D45U	RJ1A60D50E RJ1A60D50U	RJ1A60D75EP
		24 - 275VAC/ 24 - 48VDC	RJ1A60A40E RJ1A60A40U	RJ1A60A45E RJ1A60A45U	RJ1A60A50E RJ1A60A50U	RJ1A60A75EP

Notes

- 1 690 VACrms rated operational voltage available on request. Example: RJ1A69D45U
- 2 "P" suffix: Over-temperature protection (OTP), available with type "E" terminals only
- 3 Instant-on versions not available with AC control voltage
- 4 With integrated fan and over-temperature protection - fan will automatically switch on when necessary
- 5 "M" suffix available only on request. Product ending with "M" is UL listed with NMFT/ NMFT7 requirements for motor loads.

Motor ratings (UL508)

Part number	110-120VAC		220-240VAC		440-480VAC		550-660VAC	
	HP	FLA	HP	FLA	HP	FLA	HP	FLA
RJ1.23..40..M	1/2	9.8A	2	12.0A	-	-	-	-
RJ1.60..40..M	1/2	9.8A	2	12.0A	3	5A	5	11.2A
RJ1.23..45..M	1	16A	2	12.0A	-	-	-	-
RJ1.60..45..M	1	16A	2	12.0A	5	11.0A	7 1/2	16.0A
RJ1.23..50..M	1	16A	2	12.0A	-	-	-	-
RJ1.60..50..M	1	16A	2	12.0A	5	11.0A	7 1/2	16.0A
RJ1.23..75..M	1 1/2	20A	3	17.0A	-	-	-	-
RJ1.60..75..M	1 1/2	20A	3	11.0A	5	11.0A	10	20.0A

General Specifications

	RJ1.23..	RJ1.60..
Operational voltage range	24 to 265 VAC	42 to 660 VAC
Blocking voltage	650 V _p	1200 V _p
Operational frequency range	45 to 65 Hz	45 to 65 Hz
Power factor	≥ 0.5 @ 230 VACrms	≥ 0.5 @ 600 VACrms
Integrated Varistor (RJ1.....V)	275V	680V
Over-temperature alarm		
I max	50mADC	50mADC
U max	50VDC	50VDC
Approvals	UL (E80573), cUL (E80573) , CSA (204075)	
CE-marking	Yes	
Pollution degree	2	
RoHS compliance	Yes	

Input Specifications

	RJ1A...D	RJ1B..D	RJ1A...A
Control voltage range	4 - 32 VDC	4.5 - 32 VDC	24-275 VAC/24 - 48 VDC
Pick-up voltage	3.8 VDC	4.25 VDC	22 VAC/DC
Reverse voltage	32 VDC	32 VDC	n/a
Drop-out voltage	1.2 VDC	1.0 VDC	6 VAC/DC
Maximum input current	12 mA	15 mA	17 mA
Response time pick-up	1/2 cycle	1 ms	1 cycle
Response time drop-out	1/2 cycle	1 cycle	1 cycle

Isolation

Rated isolation voltage	
Input to output	≥ 4000 VACrms
Output to case	≥ 4000 VACrms

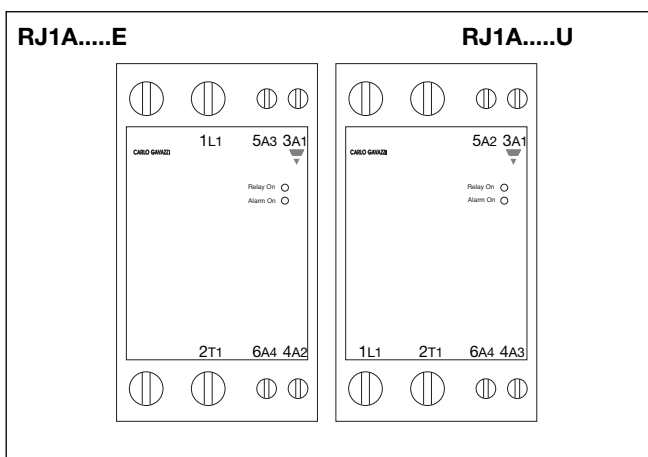
Output Specifications

	RJ..40	RJ..45	RJ..50	RJ..75 (With integrated fan)
Rated operational current AC51 @Ta=25°C AC53a @Ta=25°C	40 AACrms 15 AACrms	45 AACrms 20 AACrms	50 AACrms 30 AACrms	75 AACrms 30 AACrms
Min. operational current	250 mAACrms	400 mAACrms	500mAACrms	500mAACrms
Rep. overload current t = 1s	< 125 AACrms	< 150 AACrms	<200 AACrms	<200 AACrms
Non rep. surge current Tj(init.) = 25°C and t = 10 ms	600 A _p	1150 A _p	1900 A _p	1900 A _p
Off-state leakage current @ rated voltage and frequency	< 3 mArms	< 3 mArms	< 3 mArms	< 3 mArms
I ² t for fusing t = 10 ms	1800 A ² s	6600 A ² s	18000 A ² s	18000 A ² s
On-state voltage drop @ rated current	1,6 Vrms	1,6 Vrms	1,6 Vrms	1,6 Vrms
Critical dV/dt off-state	500 V/μs	500 V/μs	500 V/μs	500 V/μs

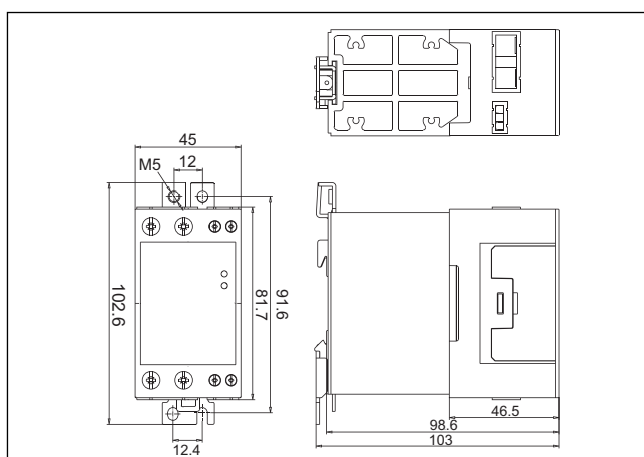
Thermal Specifications

	RJ...D	RJ...A
Operating temperature	-30 to +70°C (-22 to +158°F)	-30 to +70°C (-22 to +158°F)
Storage temperature	-40 to +100°C (-40 to +176°F)	-40 to +100°C (-40 to +176°F)

Terminal Layout



Dimensions

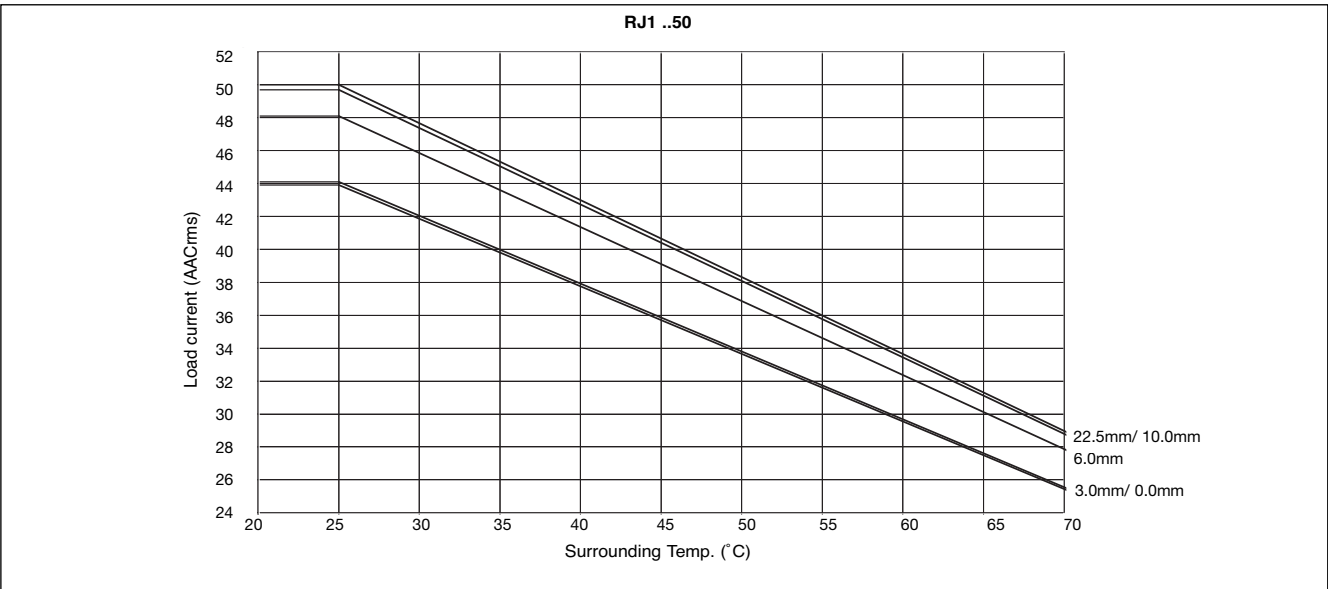
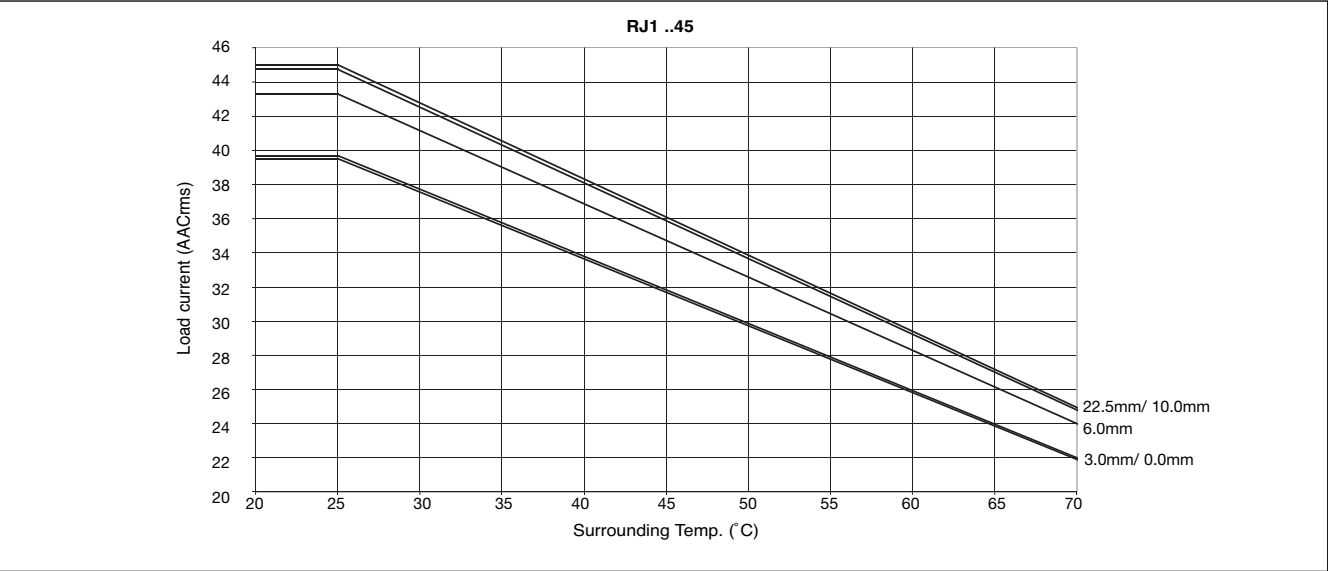
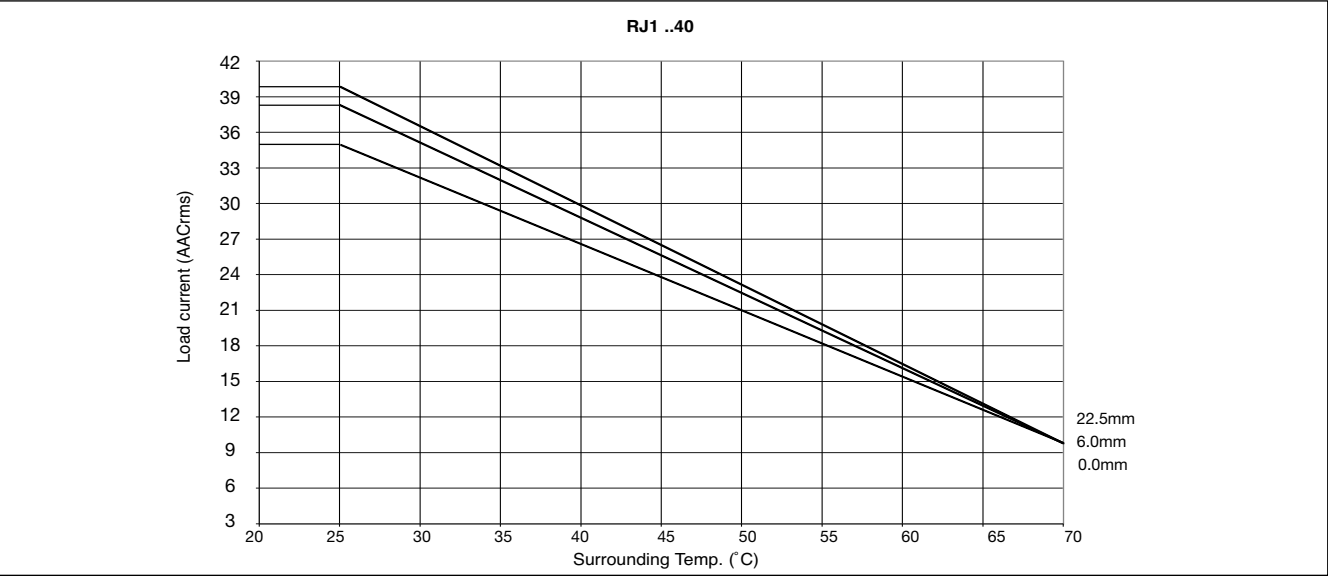


All dimensions in mm

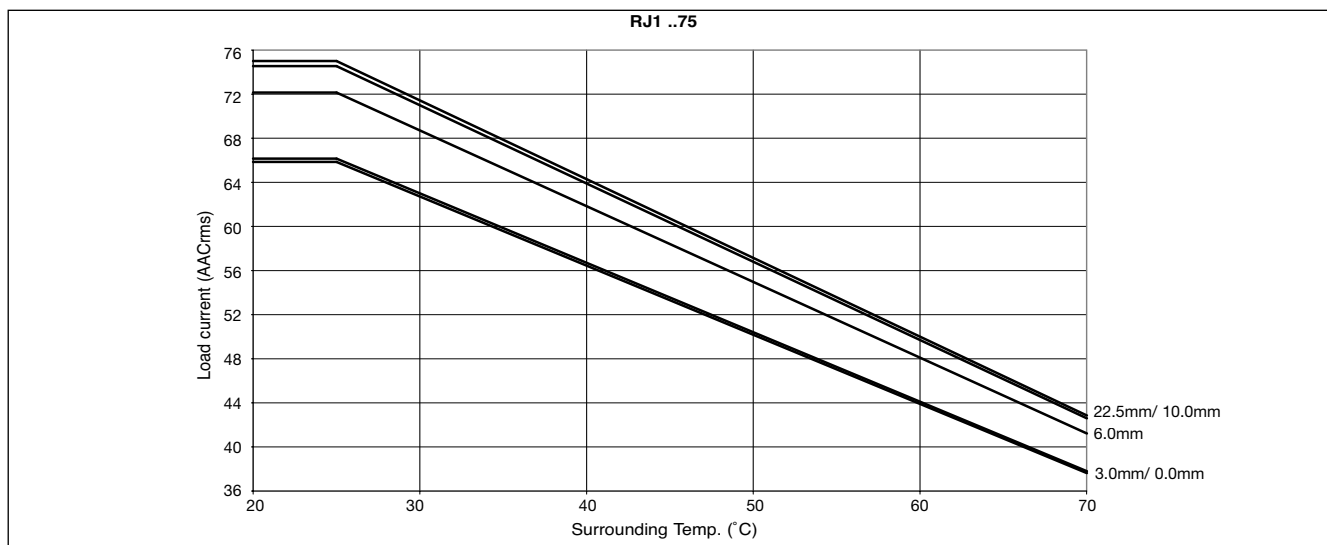
Housing Specifications

Weight RJ MIDI RJ MIDI w. fan	Approx. 430g Approx. 460g	Power terminal L1, T1 Cable size Min Max	1 x 4 mm ² (1 x AWG12) 1 x 25 mm ² (1 x AWG3) or 2 x 10 mm ² (2 x AWG6)
Housing material	PBT Flame retardant	Mounting torque max.	2.5 Nm with Pozidriv 2 bit
Control terminal A1, A2 Cable size Min Max	1 x 0.5 mm ² (1 x AWG20) 1 x 4.0 mm ² (1 x AWG12) or 2 x 2.5 mm ² (2 x AWG14)	Power terminal screws	M5
Mounting torque max.	0.6 Nm with Pozidriv 0 bit		
Control terminal screws	M3		

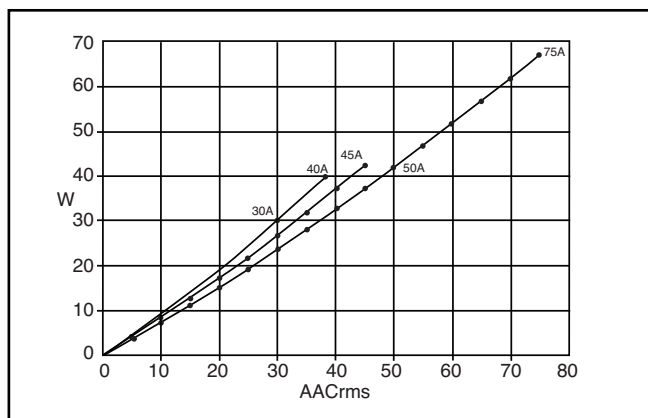
Derating vs spacing curves



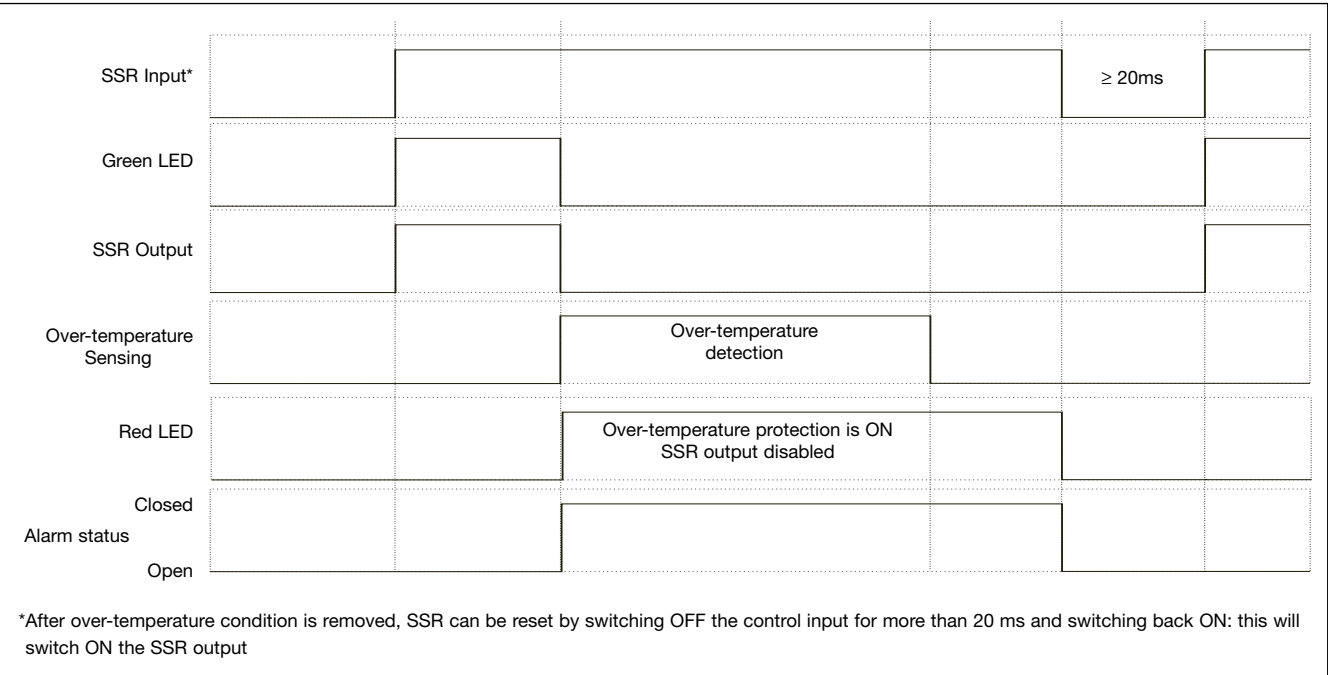
Derating vs spacing curves (cont.)



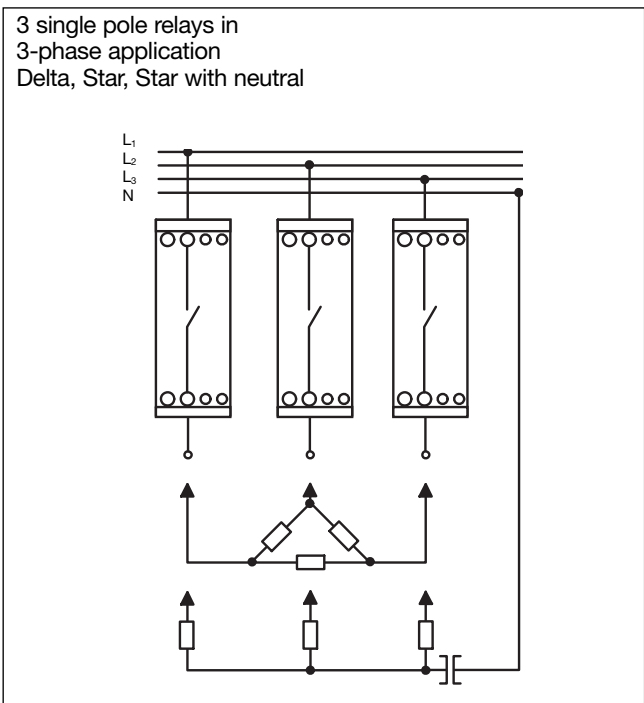
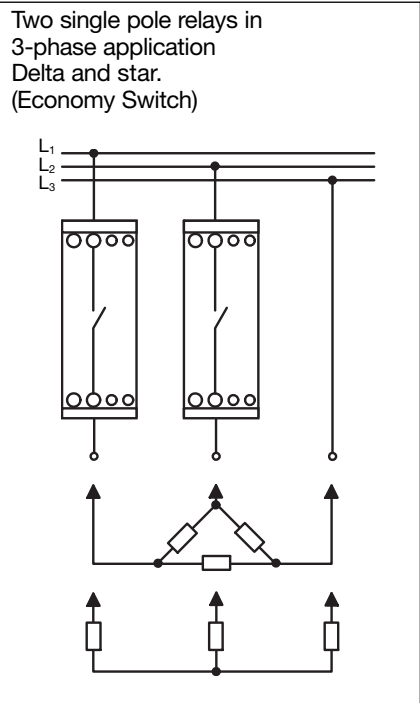
Dissipation Curve



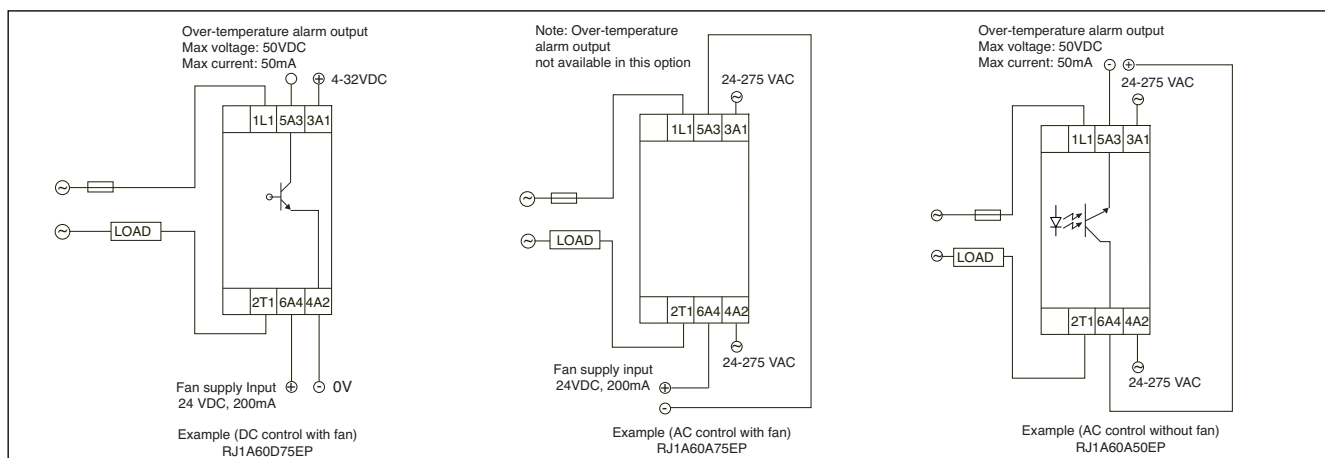
Over-temperature Protection



Applications



Connection Examples



Agency Approvals & EMC

CE marking		Approvals	cURus, CSA
Low Voltage Directive	IEC / EN 60947-4-3	Restrictions of hazardous substances	RoHS
EMC Immunity	IEC / EN 61000-6-3	Radiated Radio Frequency Immunity	EN 61000-4-3
EMC Emission	IEC / EN 61000-6-1	10V/m, 80 - 1000 Mhz	Performance criteria 1
Electrostatic Discharge (ESD) Immunity	IEC / EN 61000-4-2	Conducted Radio Frequency Immunity	IEC / EN 61000-4-6
8kV, PC2 Air discharge		10V/m, 0.15 - 80 MHz	Performance criteria 1
4kV, PC2 Contact		Voltage Dips Immunity	IEC / EN 61000-4-11
Electrical Fast Transient Burst Immunity	IEC / EN 61000-4-4	0% for 10ms/20ms, 70% for 500ms	Performance criteria 2
Output	2kV, performance criteria 1	40% for 200ms	Performance criteria 3
Input	1kV, performance criteria 1	Voltage Interruptions Immunity	IEC / EN 61000-4-11
Electrical Surge Immunity	IEC / EN 61000-4-5	0% for 5000ms	Performance criteria 3
Output, line to line	1kV, performance criteria 2	Radio Interference voltage emissions (conducted)	IEC / EN 55011
Output, line to earth	2kV, performance criteria 2		Class A (industrial)
Input, line to line	1kV, performance criteria 2		
Input, line to earth	2kV, performance criteria 2		
Radio Interference field emissions (radiated)	IEC / EN 55011		
	Class B (light industry)		

Protection with Semiconductor Fuses

Relay type	Rated oper. voltage	Max. fuse	Fuse Size Ferraz (mm)	Fuse type Ferraz	Fuseholder Ferraz	Fuse Size Siba (mm)	Fuse type Siba	Fuseholder Siba
45A								
22 I ² t = 6600A ² s	230 VAC	40 A	14 x 51	6.9xx CP gRC 14 x 51/40	CMS14 1P	14 x 51	50 124 34.40	50 058 04
	600 VAC	40 A	14 x 51	6.9xx CP gRC 14 x 51/40	CMS14 1P	14 x 51	50 124 34.40	50 058 04
50A								
22 I ² t = 18000A ² s	230 VAC	50 A	14 x 51	6.9xx CP gRC 14 x 51/40	CMS14 1P	22x58	50 140 34.50	51 060 04
	600 VAC	50 A	14 x 51	6.9xx CP gRC 14 x 51/40	CMS14 1P	22x58	50 140 34.50	51 060 04

Protection for 65kArms Short Circuit Current Rating (according to UL508)

Suitable for use on a circuit capable of delivering not more than 65,000 Arms symmetrical amperes, 600 volts maximum

when protected by Class J fuses. The maximum allowed current value of the fuses is reported in the table below.

Use fuses only

Type	Maximum allowed ampere rating of the fuse
RJ1yxxx40	40A
RJ1yxxx45	60A
RJ1yxxx50	90A
RJ1yxxx75	90A

Protection with Circuit Breakers (ABB)

Solid State Relay type	Model no. for Z - type M. C. B. (rated current)	Model no. for B - type M. C. B. (rated current)	Wire cross sectional area [mm ²]	Minimum length of Cu wire conductor [m] ¹
RJ 45	S201 - Z20 (20A)	S201-B10 (10A)	1.5	4.2
			2.5	7.0
			4.0	11.2
	S202 - Z20 (20A)	S202-B10 (10A)	1.5	1.8
			2.5	3.0
			4.0	4.8
	S201 - Z32 (32A)	S201-B16 (16A)	2.5	13.0
			4.0	20.8
			6.0	31.2
	S202 - Z32 (32A)	S202-B16 (16A)	2.5	5.0
			4.0	8.0
			6.0	12.0
			10.0	20.0
RJ 50, RJ 75	S202 - Z50 (50A)	S202-B25 (25A)	4.0	14.8
			6.0	22.2
			10.0	37.0
	S201 - Z50 (50A)	S201-B25 (25A)	4.0	4.8
			6.0	7.2
			10.0	12.0
			16.0	19.2
		S201-B32 (32A)	6.0	7.2
			10.0	12.0
			16.0	19.2

1. between MCB and SSR Relay (including return path which goes back to the mains).

Note: A prospective current of 6kA and a 230/400V power supply system is assumed for the above suggested specifications. For cables with different cross section than those mentioned above please consult Carlo Gavazzi's Technical Support Group.