

Solid State Relays

SOLITRON MIDI - With Integrated Heatsink

Types RJ1A, RJ1B

CARLO GAVAZZI



- 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 V_p
- 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 V M**

Solid State Relay	_____
Number of poles	_____
Switching mode	_____
Rated operational voltage	_____
Control voltage	_____
Rated operational current	_____
Terminal layout	_____
Overtemp. protection	_____
Varistor	_____
UL listed option	_____

Type Selection

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

Selection Guide

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

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	8.5A	5	11.2A
RJ1.23..45..M	1	16A	2	12.0A	-	-	-	-
RJ1.60..45..M	1	16A	2	12.0A	5	14.0A	7 1/2	16.0A
RJ1.23..50..M	1	16A	2	12.0A	-	-	-	-
RJ1.60..50..M	1	16A	2	12.0A	5	14.0A	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	17.0A	5	14.0A	10	20.0A

Note: surrounding ambient temperature is 40°C for motor rating application.

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
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

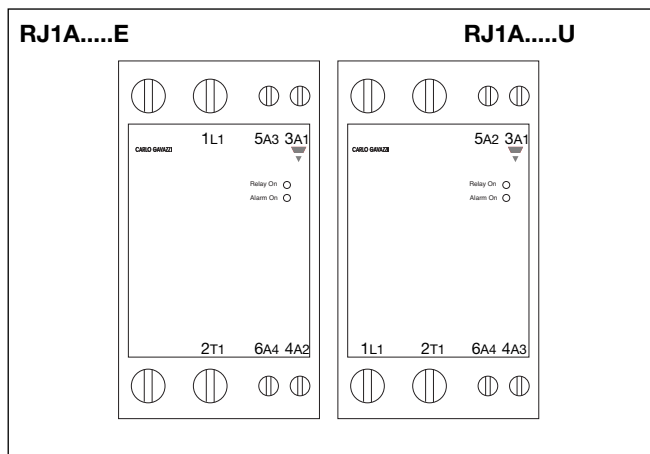
Output Specifications

	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

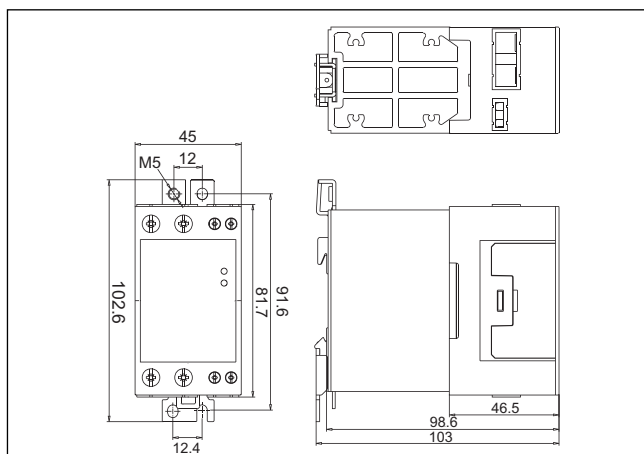
Thermal Specifications

	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



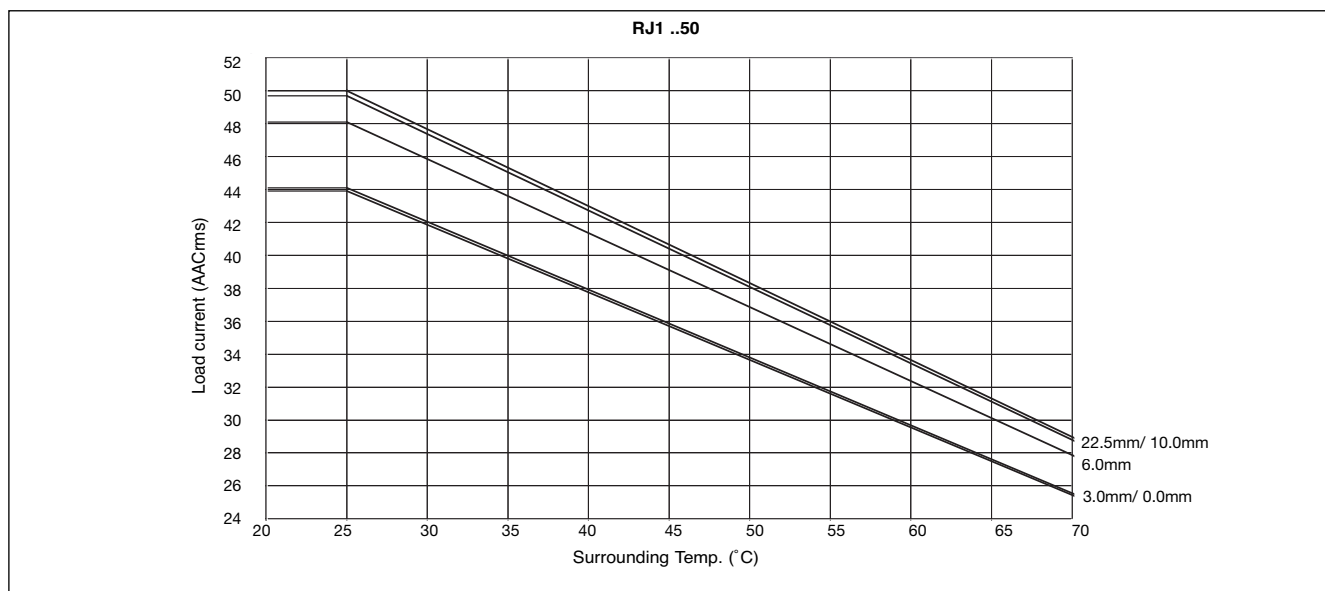
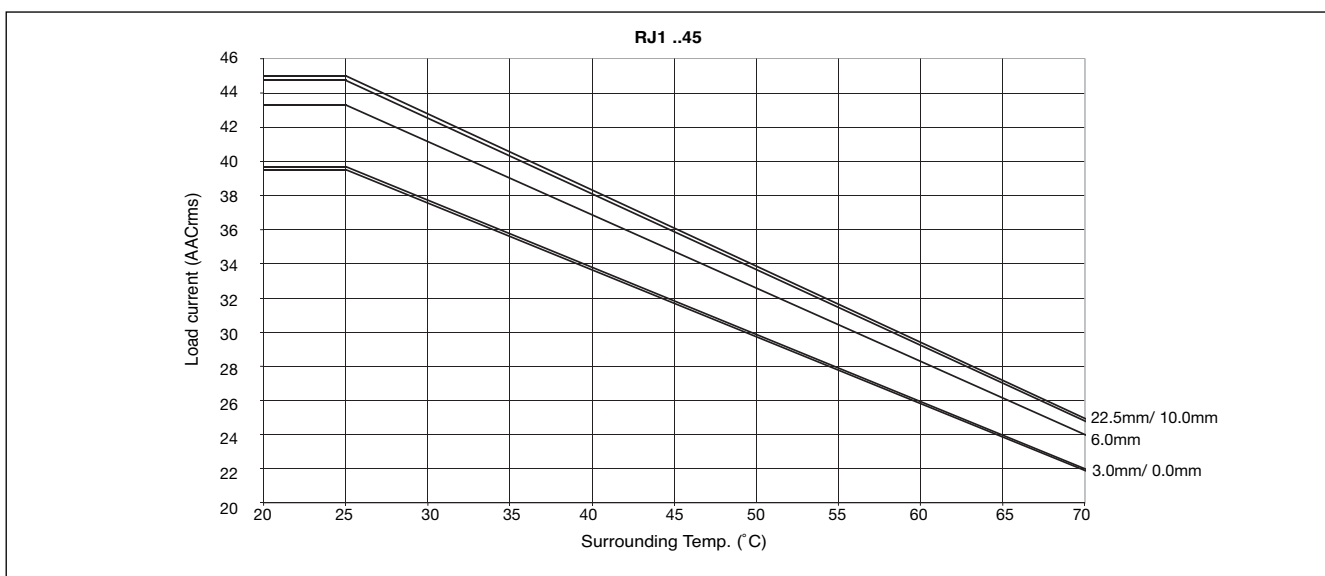
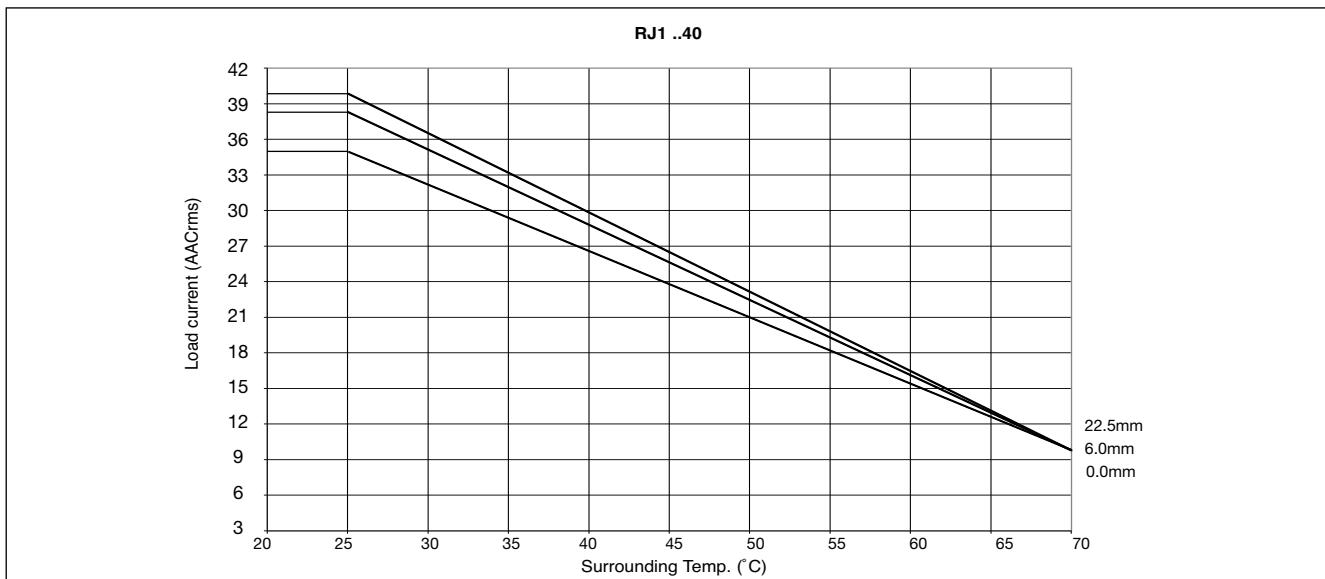
All dimensions in mm

Housing Specifications

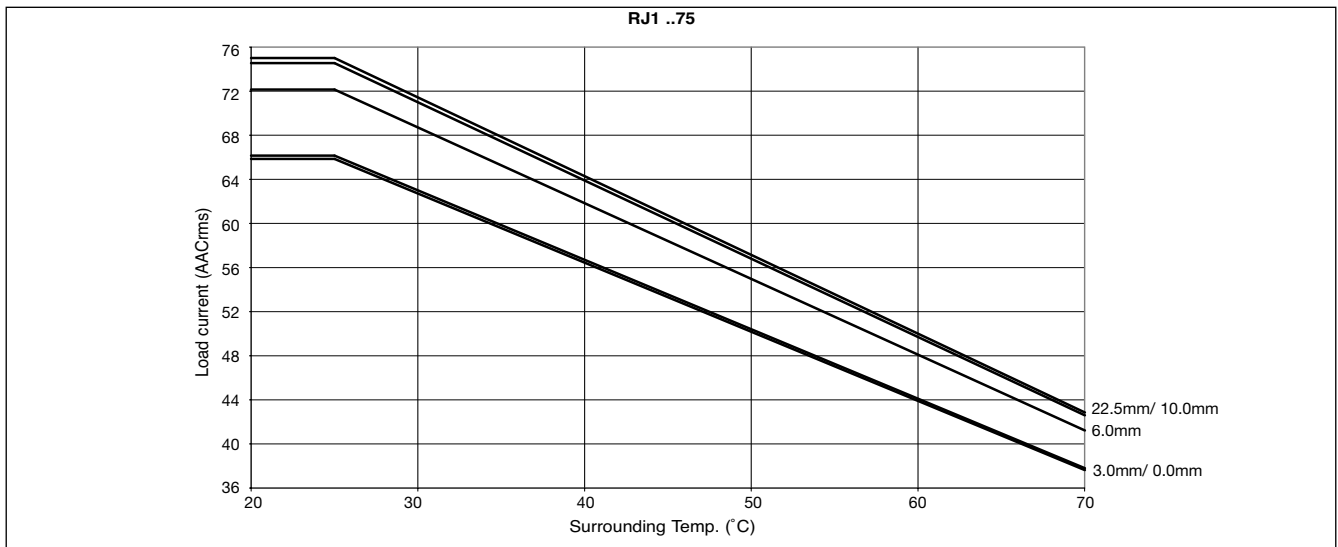
Weight			
RJ MIDI		Approx. 430g	
RJ MIDI w. fan		Approx. 460g	
Housing material		PBT Flame retardant	
Control terminal A1, A2			
Cable size			
IEC data:	Min	1 x 0.5 mm ² (1 x AWG20)	
	Max	1 x 4.0 mm ² (1 x AWG12) or 2 x 2.5 mm ² (2 x AWG14)	
UL data	Min	1 x AWG 18 (Stranded & Solid)	
	Max	1 x AWG 12 (Stranded & Solid) 2 x AWG 14 (Stranded & Solid)	
Mounting torque max.		0.6 Nm with Pozidriv 0 bit	
Control terminal screws		M3	
Power terminal L1, T1			
Cable size			
IEC data:	Min	1 x 4 mm ² (1 x AWG12)	
	Max	1 x 25 mm ² (1 x AWG3) or 2 x 10 mm ² (2 x AWG6)	
UL data	Min	1 x AWG 12 (Stranded & Solid)	
	Max	1 x AWG 3 (Stranded) 1 x AWG 10 (Solid) 2 x AWG 10 (Solid)	
Mounting torque max.		2.5 Nm with Pozidriv 2 bit	
Power terminal screws		M5	



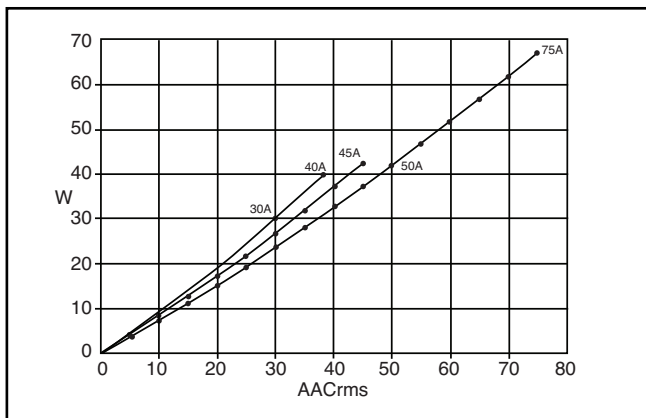
Derating vs spacing curves



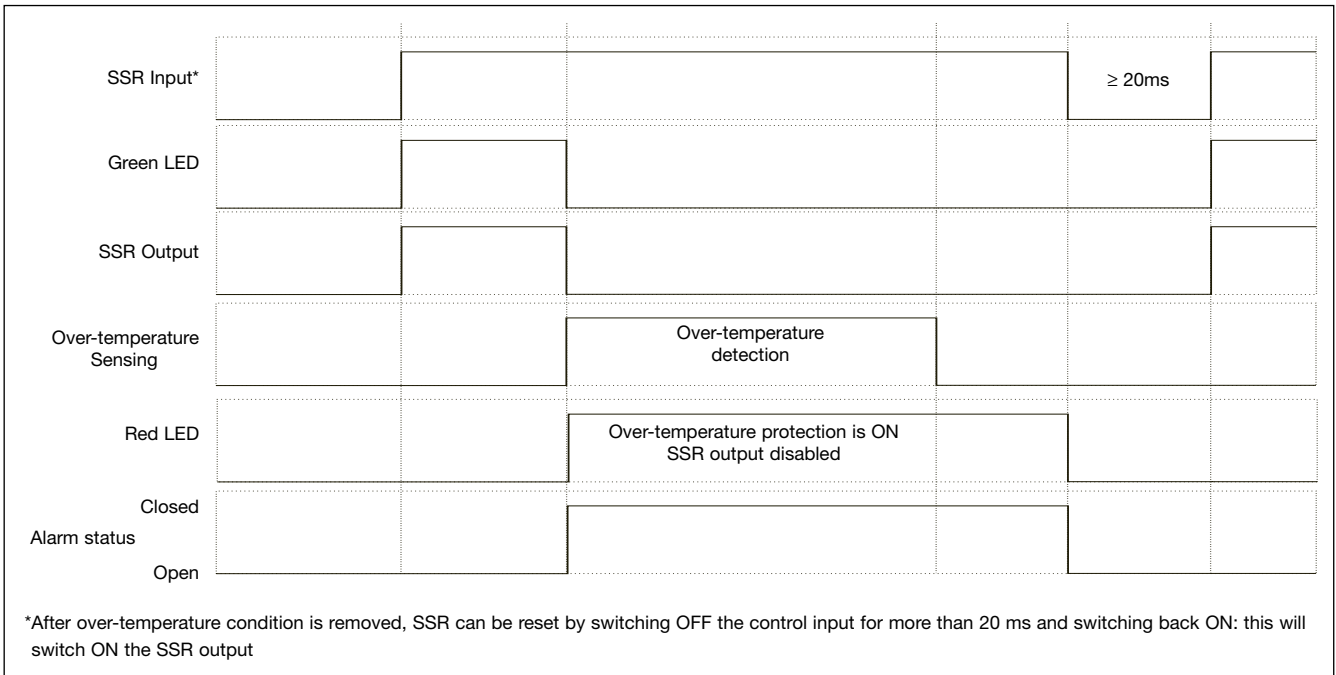
Derating vs spacing curves (cont.)



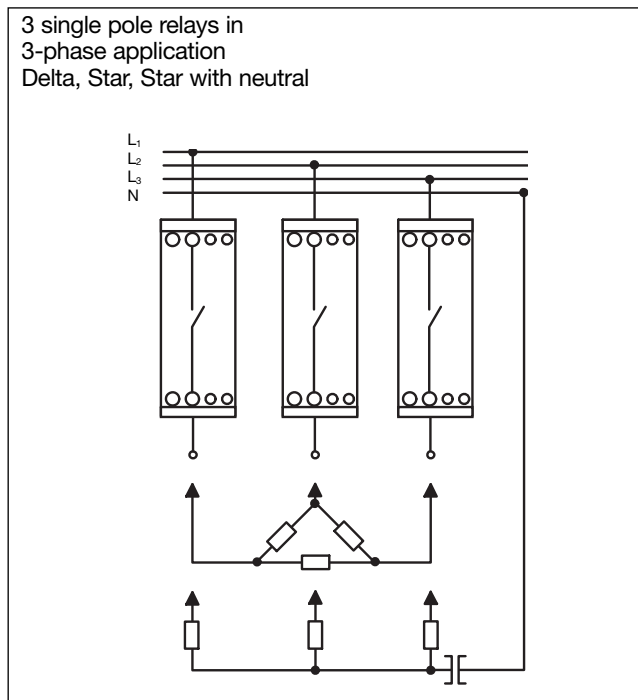
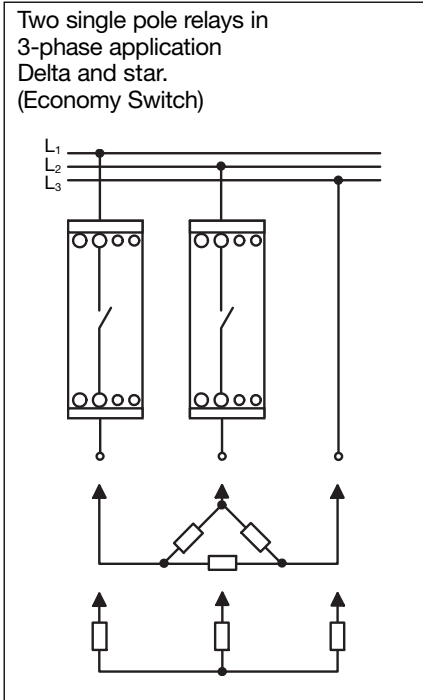
Dissipation Curve



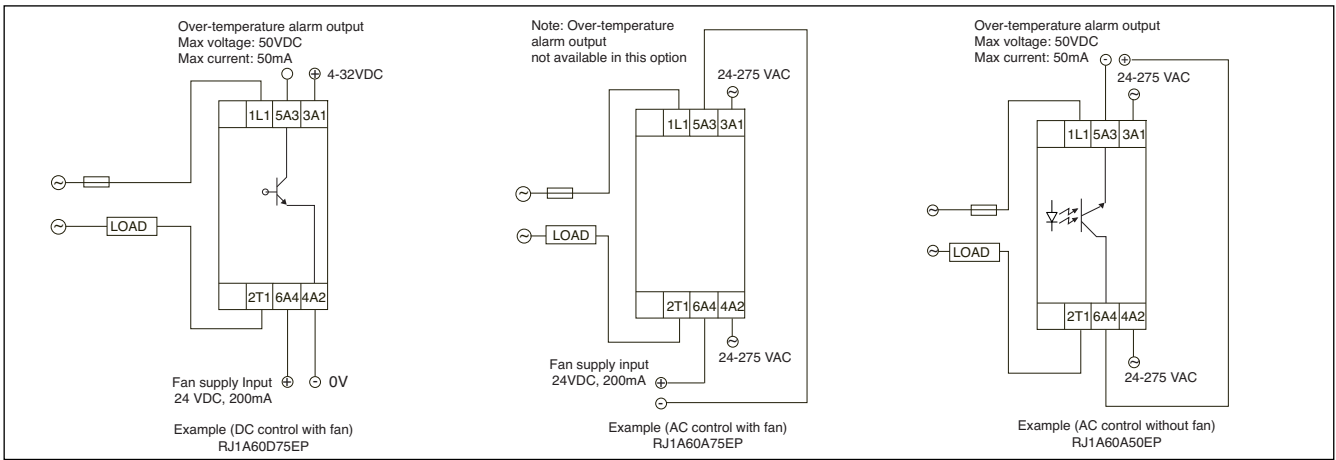
Over-temperature Protection



Applications



Connection Examples



Agency Approvals & EMC

CE marking Low Voltage Directive	IEC / EN 60947-4-3	Approvals RJ..... RJ.....M	UL (E80573), cUL (E80573), CSA (204075) UL (172877), cUL (172877)
EMC Immunity	IEC / EN 61000-6-3	Restrictions of hazardous substances	RoHS
EMC Emission	IEC / EN 61000-6-1	Radiated Radio Frequency Immunity 10V/m, 80 - 1000 Mhz	EN 61000-4-3 Performance criteria 1
Electrostatic Discharge (ESD) Immunity	IEC / EN 61000-4-2 8kV, PC2 Air discharge 4kV, PC2 Contact	Conducted Radio Frequency Immunity 10V/m, 0.15 - 80 MHz	IEC / EN 61000-4-6 Performance criteria 1
Electrical Fast Transient Burst Immunity	IEC / EN 61000-4-4 Output 2kV, performance criteria 1 Input 1kV, performance criteria 1	Voltage Dips Immunity 0% for 10ms/20ms, 70% for 500ms 40% for 200ms	IEC / EN 61000-4-11 Performance criteria 2 Performance criteria 3
Electrical Surge Immunity	IEC / EN 61000-4-5 Output, line to line 1kV, performance criteria 2 Output, line to earth 2kV, performance criteria 2 Input, line to line 1kV, performance criteria 2 Input, line to earth 2kV, performance criteria 2	Voltage Interruptions Immunity 0% for 5000ms	IEC / EN 61000-4-11 Performance criteria 3
Radio Interference field emissions (radiated)	IEC / EN 55011 Class B (light industry)	Radio Interference voltage emissions (conducted)	IEC / EN 55011 Class A (industrial)

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 600 VAC	40 A 40 A	14 x 51 14 x 51	6.9xx CP gRC 14 x 51/40 6.9xx CP gRC 14 x 51/40	CMS14 1P CMS14 1P	14 x 51 14 x 51	50 124 34.40 50 124 34.40	50 058 04 50 058 04
50A								
22 I ² t = 18000A ² s	230 VAC 600 VAC	50 A 50 A	14 x 51 14 x 51	6.9xx CP gRC 14 x 51/40 6.9xx CP gRC 14 x 51/40	CMS14 1P CMS14 1P	22x58 22x58	50 140 34.50 50 140 34.50	51 060 04 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	
S202 - Z50 (50A)	S202-B25 (25A)	4.0	14.8	
		6.0	22.2	
		10.0	37.0	
RJ 50, RJ 75	S201 - Z50 (50A)	S201-B25 (25A)	4.0	4.8
			6.0	7.2
			10.0	12.0
			16.0	19.2
	S201 - Z63 (63A)	S201-B32 (32A)	6.0	7.2
			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.