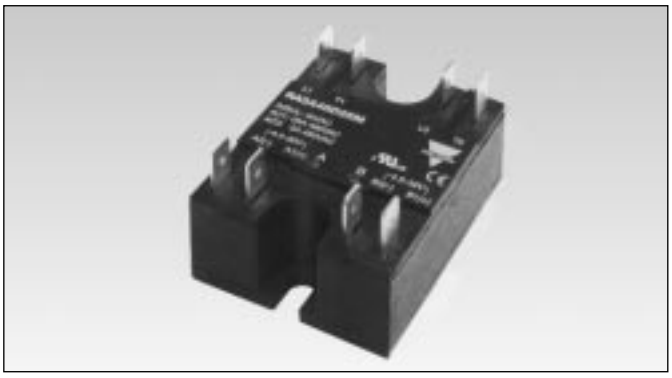
Solid State Relays
Industrial, 2-Pole ZS
Type RA2A



- **2-Pole AC Solid State Relay**
- **Zero switching**
- **For resistive and inductive AC loads**
- **Direct copper bonding (DCB) technology**
- **LED indication**
- **Rated operational current: 25 and 40 AACrms**
- **Rated operational voltage: 230 - 600 VACrms**
- **Input range: 4.5 to 32 VDC**
- **Non-repetitive peak voltage: Up to 1200 Vp**
- **Opto-isolation: 4000 VACrms**

Product Description

This 2-pole industrial relay minimises the space requirements in a control cabinet without compromising performance. By applying an input voltage on control A, the corresponding output semicondcutor is activated at the first zero crossing of the line voltage.The same applies to control B. LEDs indicate the control status of each pole. The optimised design is free of moulding mass to reduce internal mechanical stress.
The RA2A..M types have been specially customised for demanding inductive loads.

Ordering Key

RA 2 A 48 D 25 M

- **Solid State Relay**
- **Number of poles**
- **Zero switching**
- **Rated operational voltage**
- **Control voltage**
- **Rated operational current**
- **Load type**

Type Selection

Switching mode	Rated operational voltage	Rated operational current	Control voltage	Non-rep. voltage	Load type
A: Zero switching	23: 230 VAC 40: 400 VAC 48: 480 VAC 60: 600 VAC	25: 25 A 40: 40 A	D: 4.5 to 32 VAC	23: 650 V_p 40: 850 V_p 48: 1200 V_p 60: 1200 V_p	M: Inductive

Selection Guide

Rated operational voltage	Non-rep. voltage	Control voltage	Rated operational current 25 AACrms	40 AACrms
230 VACrms	650 V_p	4.5 to 32 VDC	**RA2A23D25**	**RA2A23D40**
			RA2A23D25M	**RA2A23D40M**
400 VACrms	850 V_p	4.5 to 32 VDC	**RA2A40D25**	**RA2A40D40**
			RA2A40D25M	**RA2A40D40M**
480 VACrms	1200 V_p	4.5 to 32 VDC	**RA2A48D25**	**RA2A48D40**
			RA2A48D25M	**RA2A48D40M**
600 VACrms	1200 V_p	4.5 to 32 VDC	**RA2A60D25**	**RA2A60D40**
			RA2A60D25M	**RA2A60D40M**

Input Specifications

Control voltage range	4.5 to 32 VDC
Pick-up voltage	4.25 VDC
Drop-out voltage	2 VDC
Input current per pole	10 mA
Response time pick-up @ 50 Hz	10 ms
Response time drop-out @ 50 Hz	10 ms

Housing Specifications

Weight	Approx. 85 g
Housing material	Noryl GFN 1, black
Base plate 25, 40 A 25, 40 A (M type)	 Aluminium, nickel-plated Copper, nickel-plated
Fast on terminals	6.3 mm

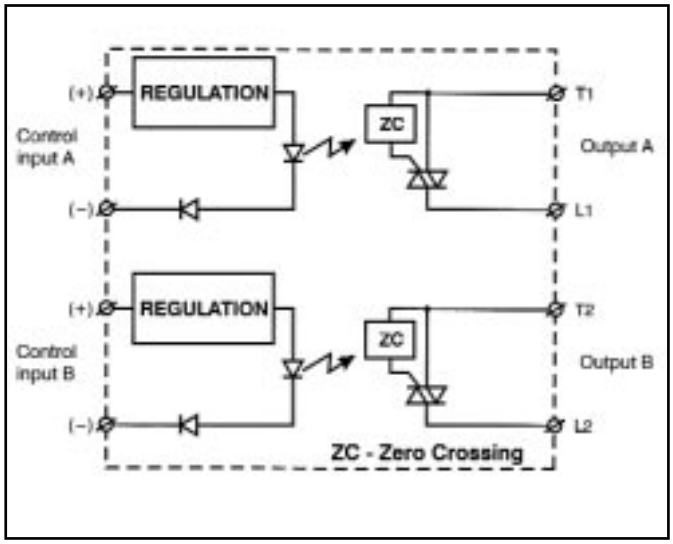
General Specifications

	RA2A23...	RA2A40...	RA2A48...	RA2A60...
Operational voltage range	24 to 265 VAC	42 to 440 VAC	42 to 530 VAC	42 to 660 VAC
Non-rep. peak voltage	650 V_p	850 V_p	1200 V_p	1200 V_p
Rated insulation input -output/output - heatsink	4 kV	4 kV	4 kV	4 kV
Operational frequency range	45 to 65 Hz	45 to 65 Hz	45 to 65 Hz	45 to 65 Hz
LED ON indication (x2)	Yes (green)	Yes (green)	Yes (green)	Yes (green)
Power factor RA2A RA2A..M	 ≥ 0.95 @ 230 VAC ≥ 0.50 @ 230 VAC	 ≥ 0.95 @ 400 VAC ≥ 0.50 @ 400 VAC	 ≥ 0.95 @ 480 VAC ≥ 0.50 @ 480 VAC	 ≥ 0.95 @ 600 VAC ≥ 0.50 @ 600 VAC
Zero voltage turn-on	< 15 V	< 15 V	< 15 V	< 15 V
Approvals	UL, cUL	UL, cUL	UL, cUL	UL, cUL
CE-marking	Yes	Yes	Yes	Yes
Conformance	CSA, VDE	CSA, VDE	CSA, VDE	CSA, VDE

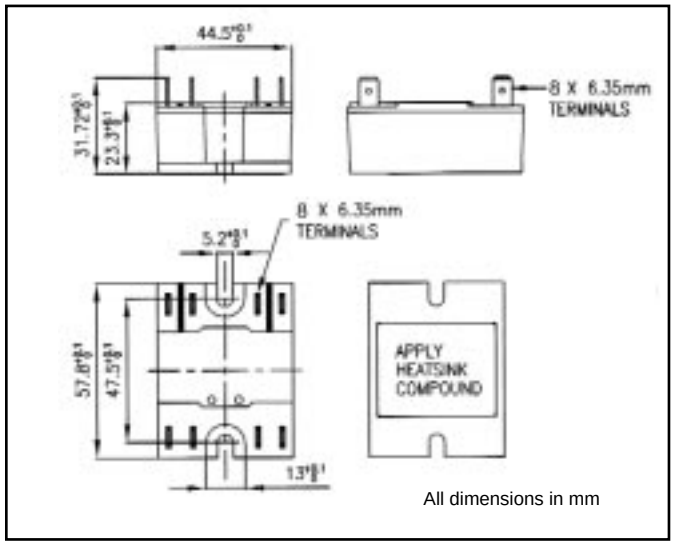
Output Specifications

	RA2A...25	RA2A...40	RA2A..D25M	RA2A..D40M
Rated operational current AC 51 AC 53a	25 A -	40 A -	25 A 5 A	40 A 15 A
Minimum operational current	150 mA	150 mA	150 mA	200 mA
Rep. overload current t=1 s	37 A	60 A	37 A	85 A
Non-rep. surge current t=10 ms	230 A_p	300 A_p	230 A_p	550 A_p
Off-state leakage current	< 3 mA	< 3 mA	< 3 mA	< 3 mA
I^2t for fusing t=1-10 ms	265 A^2s	450 A^2s	265 A^2s	1800 A^2s
Critical dI/dt @ 50 hz.	≥ 100 A/µs	≥ 100 A/µs	≥ 100 A/µs	≥ 100 A/µs
On-state voltage drop @ rated current	≤ 1.6 Vrms	≤ 1.6 Vrms	≤ 1.6 Vrms	≤ 1.6 Vrms
Critical dV/dt off-state min.	500 V/µs	500 V/µs	500 V/µs	500 V/µs
Zero crossing detection	Yes	Yes	Yes	Yes

Functional Diagram



Dimensions



Heatsink Dimensions (load current versus ambient temperature)

RA 2....25/25M

Load current [A]	Thermal resistance [K/W]					Power dissipation [W]
50	1.11	0.94	0.78	0.62	0.46	0.29	62
45	1.36	1.17	0.99	0.80	0.61	0.43	54
40	1.68	1.47	1.25	1.03	0.81	0.60	46
35	2.06	1.80	1.54	1.29	1.03	0.77	39
30	2.5	2.2	1.87	1.56	1.25	0.94	32
25	3.1	2.7	2.3	1.9	1.6	1.17	26
20	4.0	3.5	3.0	2.5	2.0	1.52	20
15	6	5	4	3.5	2.8	2.1	14
10	9	8	7	6	4	3.3	9
5	18	16	14	12	9	7	4
	20	30	40	50	60	70	T_A

Ambient temp. [°C]

RA 2....40

Load current [A]	Thermal resistance [K/W]					Power dissipation [W]
80	0.68	0.56	0.44	0.32	0.19	0.07	82
72	0.87	0.73	0.59	0.45	0.31	0.17	72
64	1.10	0.94	0.78	0.62	0.45	0.29	62
56	1.41	1.22	1.03	0.83	0.64	0.45	52
48	1.8	1.6	1.36	1.13	0.90	0.67	43
40	2.3	2.0	1.7	1.4	1.1	0.86	35
32	3.0	2.6	2.2	1.9	1.5	1.11	27
24	4	4	3	2.6	2.0	1.5	20
16	6	6	5	4	3	2.4	13
8	13	12	10	8	7	5	6
	20	30	40	50	60	70	T_A

Ambient temp. [°C]

RA 2....40M

Load current [A]	Thermal resistance [K/W]					Power dissipation [W]
100	0.41	0.32	0.23	0.13	0.04	-	108
90	0.55	0.44	0.34	0.23	0.13	0.02	95
80	0.72	0.60	0.48	0.35	0.23	0.11	82
70	0.95	0.80	0.66	0.52	0.37	0.23	70
60	1.25	1.08	0.90	0.73	0.56	0.39	58
50	1.7	1.5	1.25	1.04	0.83	0.61	47
40	2.2	1.9	1.6	1.4	1.1	0.82	36
30	3	2.7	2.3	1.9	1.5	1.14	26
20	5	4	4	2.9	2.3	1.8	17
10	10	9	7	6	5	3.6	8
5	20	17	15	12	10	7	4
	20	30	40	50	60	70	T_A

Ambient temp. [°C]

Heatsink Selection

Carlo Gavazzi Heatsink (see Accessories)	Thermal resistance...	...for power dissipation
No heatsink required	---	N/A
RHS 300	5.00 K/W	> 0 W
RHS 100	3.00 K/W	> 25 W
RHS 45A	2.70 K/W	> 60 W
RHS 45B	2.00 K/W	> 60 W
RHS 90	1.35 K/W	> 60 W
RHS 45A plus fan	1.25 K/W	> 0 W
RHS 45B plus fan	1.20 K/W	> 0 W
RHS 112	1.10 K/W	> 100 W
RHS 301	0.80 K/W	> 70 W
RHS 90 plus fan	0.45 K/W	> 0 W
RHS 112 plus fan	0.40 K/W	> 0 W
RHS 301 plus fan	0.25 K/W	> 0 W
Consult your distribution	> 0.25 K/W	N/A
Infinite heatsink - No solution	---	N/A

Note: Add the currents of both poles and compare with datasheets for proper heatsink.
Each pole can handle up to the maximum current specified. Example: Each pole of the RA2A23D25 can handle a maximum of 25 A.

Insulation

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

Accessories

Heatsinks
DIN rail adapter
Varistors
Fuses

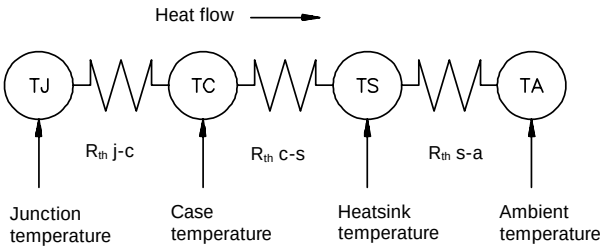
For further information refer to "General Accessories".

Applications

This relay is designed for use in applications in which it is exposed to high surge conditions. Care must be taken to ensure proper heatsinking when the relay is to be used at high sustained currents. Adequate electrical connection between relay terminals and cable must be ensured.

Thermal characteristics
The thermal design of Solid State Relays is very important. It is essential that the user makes sure that cooling is adequate and that the maximum junction temperature of the relay is not exceeded.

If the heatsink is placed in a small closed room, control panel or the like, the power dissipation can cause the ambient temperature to rise. The heatsink is to be calculated on the basis of the ambient temperature and the increase in temperature.



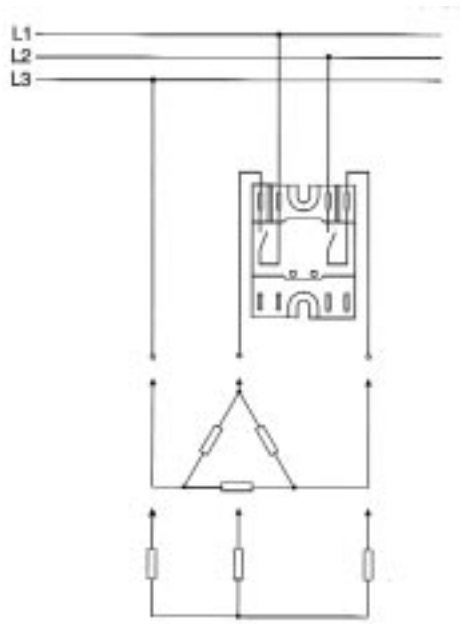
Thermal resistance:
R_{th} j-c = junction to case
R_{th} c-s = case to heatsink
R_{th} s-a = heatsink to ambient

Thermal Specifications

	RA2A...25.	RA2A...40	RA2A...40M
Operating temperature	-20° to 70°C	-20° to 70°C	-20° to 70°C
Storage temperature	-20° to 80°C	-20° to 80°C	-20° to 80°C
Junction temperature	≤ 125°C	≤ 125°C	≤ 125°C
R_{th} junction to case 1 pole 2 pole	 1 K/W 0.5 K/W	 1 K/W 0.5 K/W	 0.92 K/W 0.46 K/W
R_{th} junction to ambient	≤ 20 K/W	≤ 20 K/W	≤ 20 K/W

Applications

A single two pole relay in a three phase application. Star and Delta (Economy switch)



A two pole relay and a single pole relay connected on a three phase application. Delta, star and star with a neutral point.