

# Solid State Relays Industrial, 2-Pole ZS Type RA2A

CARLO GAVAZZI



- 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 semiconductor is activated at the first zero crossing of the line volt-

age. 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 <sub>p</sub> 40: 850 V <sub>p</sub> 48: 1200 V <sub>p</sub> 60: 1200 V <sub>p</sub>	M: Inductive

## Selection Guide

Rated operational voltage	Non-rep. voltage	Control voltage	Rated operational current	
			25 AACrms	40 AACrms
230 VACrms	650 V <sub>p</sub>	4.5 to 32 VDC	RA2A23D25 RA2A23D25M	RA2A23D40 RA2A23D40M
400 VACrms	850 V <sub>p</sub>	4.5 to 32 VDC	RA2A40D25 RA2A40D25M	RA2A40D40 RA2A40D40M
480 VACrms	1200 V <sub>p</sub>	4.5 to 32 VDC	RA2A48D25 RA2A48D25M	RA2A48D40 RA2A48D40M
600 VACrms	1200 V <sub>p</sub>	4.5 to 32 VDC	RA2A60D25 RA2A60D25M	RA2A60D40 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	Aluminium, nickel-plated
25, 40 A	Copper, nickel-plated
40 A (M type)	
Relay	
Mounting screws	M5
Mounting torque	≤ 1.5 Nm
Fast on terminals	6.3 mm



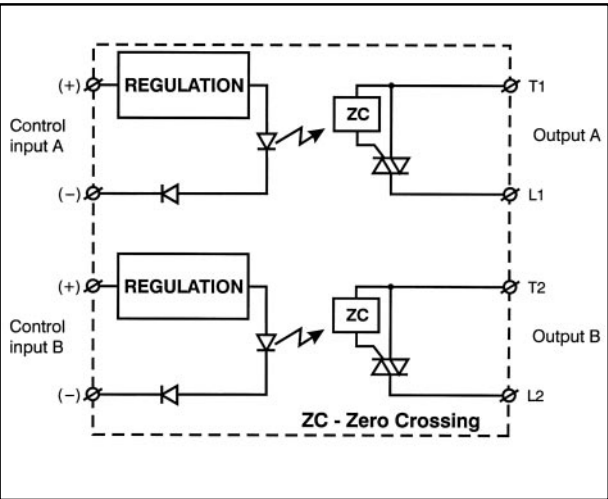
General Specifications

	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 <sub>p</sub>	850 V <sub>p</sub>	1200 V <sub>p</sub>	1200 V <sub>p</sub>
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	≥ 0.95 @ 230 VAC	≥ 0.95 @ 400 VAC	≥ 0.95 @ 480 VAC	≥ 0.95 @ 600 VAC
RA2A..M	≥ 0.50 @ 230 VAC	≥ 0.50 @ 400 VAC	≥ 0.50 @ 480 VAC	≥ 0.50 @ 600 VAC
Zero voltage turn-on	< 15 V	< 15 V	< 15 V	< 15 V
Approvals	UR, cUR	UR, cUR	UR, cUR	UR, cUR
CE-marking	Yes	Yes	Yes	Yes
Conformance	CSA, VDE	CSA, VDE	CSA, VDE	CSA, VDE

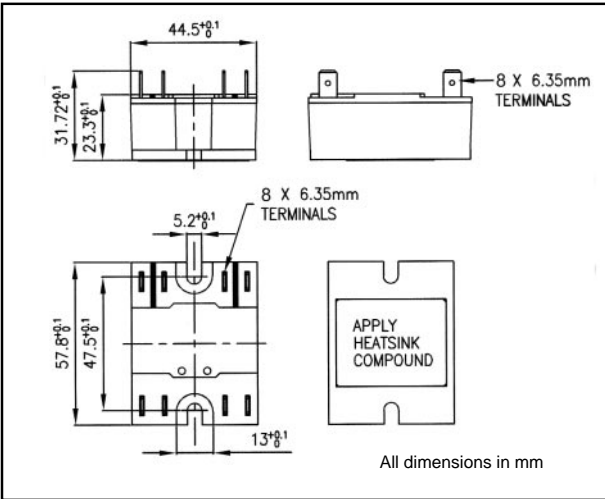
Output Specifications

	RA2A...25	RA2A...40	RA2A..D25M	RA2A..D40M
Rated operational current AC 1	25 A	40 A	25 A	40 A
AC 3	-	-	5 A	15 A
Minimum operational current	150 mA	150 mA	150 mA	200 mA
Rep. overload current t=1 s	37 A	60A	37 A	85A
Non-rep. surge current t=10 ms	230 A <sub>p</sub>	300 A <sub>p</sub>	230 A <sub>p</sub>	550 A <sub>p</sub>
Off-state leakage current	< 3 mA	< 3 mA	< 3 mA	< 3 mA
I²t for fusing t=1-10 ms	265 A²s	450 A²s	265 A²s	1800 A²s
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.

Load current [A]	Thermal resistance [K/W]						Power dissipation [W]
	20	30	40	50	60	70	T <sub>A</sub>
50	1.11	0.96	0.80	0.65	0.49	0.33	64
45	1.37	1.19	1.01	0.83	0.65	0.47	56
40	1.67	1.46	1.25	1.04	0.83	0.63	48
35	1.97	1.73	1.48	1.23	0.99	0.74	41
30	2.4	2.1	1.79	1.49	1.19	0.90	33
25	3.0	2.6	2.2	1.9	1.5	1.12	27
20	3.9	3.4	2.9	2.4	1.9	1.45	21
15	5	5	4	3.4	2.7	2.0	15
10	8	7	6	5	4	3.2	9
5	18	15	13	11	9	7	5

Ambient temp. [°C]

RA 2....40

Load current [A]	Thermal resistance [K/W]						Power dissipation [W]
	20	30	40	50	60	70	T <sub>A</sub>
80	0.66	0.54	0.43	0.31	0.20	0.09	87
72	0.84	0.71	0.58	0.45	0.32	0.19	76
64	1.07	0.92	0.77	0.62	0.46	0.31	66
56	1.37	1.19	1.01	0.84	0.66	0.48	56
48	1.7	1.5	1.3	1.08	0.87	0.65	46
40	2.2	1.9	1.6	1.3	1.1	0.81	37
32	2.8	2.4	2.1	1.7	1.4	1.04	29
24	4	3	3	2.4	1.9	1.4	21
16	6	5	5	4	3	2.3	13
8	13	11	9	8	6	5	6

Ambient temp. [°C]

RA 2....40M

Load current [A]	Thermal resistance [K/W]						Power dissipation [W]
	20	30	40	50	60	70	T <sub>A</sub>
110	0.19	0.12	0.05	-	-	-	145
100	0.29	0.21	0.13	0.05	-	-	128
90	0.42	0.32	0.23	0.14	0.04	-	112
85	0.57	0.46	0.36	0.25	0.14	0.03	97
70	0.77	0.65	0.52	0.39	0.27	0.14	82
65	1	0.9	0.74	0.59	0.43	0.28	68
50	1.4	1.2	1.1	0.9	0.7	0.48	55
45	2	1.7	1.5	1.2	1	0.74	43
30	3	2	2	1.7	1.4	1	31
20	4	4	3	3	2	1.6	20
10	9	8	7	5	4	3	10

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".



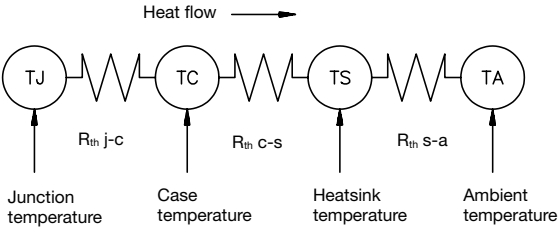
Applications

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	1 K/W	1 K/W	0.92 K/W
2 pole	0.5 K/W	0.5 K/W	0.46 K/W
$R_{th}$ junction to ambient	≤ 20 K/W	≤ 20 K/W	≤ 20 K/W

Applications

