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Solid State Relays Industrial, 2-Pole Zero Cross Switching Type RA2..C

CARLO GAVAZZI



- 2 Pole AC Solid State Relay
- Zero Cross or Instant On Switching
- Resistive AC loads
- Direct copper bonding (DCB) technology
- LED indication
- Rated operational current: up to 2x 40AACrms
- Rated operational voltage: up to 600VACrms
- Input range: 4.5- 32VDC
- Blocking voltage: up to 1200Vp
- Opto-isolation: 4000VACrms
- Integrated overvoltage protection

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 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 integrated varistor across each pole ensures protection against overvoltages.

Ordering Key

RA 2 A 23 D 40 C _

Solid State Relay _____
 Number of poles _____
 Zero switching _____
 Rated operational voltage _____
 Control voltage _____
 Rated operational current _____
 PIN connectors for control _____
 Option _____

Selection Guide

Rated operational voltage	Blocking voltage	Control voltage	Max. operational current (with suitable heatsink)	
			2 x 25AACrms	2 x 40AACrms
230VACrms, ZC	650V _p	4.5 - 32VDC	RA2A23D25C	RA2A23D40C
600VACrms, ZC	1200V _p	4.5 - 32VDC	RA2A60D25C	RA2A60D40C

ZC = Zero Cross Switching

Selection Guide - RA2A..H53 (RA2A mounted on heatsink RHS38)

Rated operational voltage	Blocking voltage	Control voltage	Rated operational current at 40°C 2 x 20AACrms*
230VACrms, ZC	650V _p	4.5 - 32VDC	RA2A23D40CH53

* Refer to Derating Curve for other ratings

Selection Guide - RA2A..S18 (attached thermal pad)

Rated operational voltage	Blocking voltage	Control voltage	Rated operational current (with suitable heatsink)	
			2 x 25AACrms	2 x 40 AACrms
230VACrms, ZC	650V _p	4.5 - 32VDC	-	RA2A23D40CS18

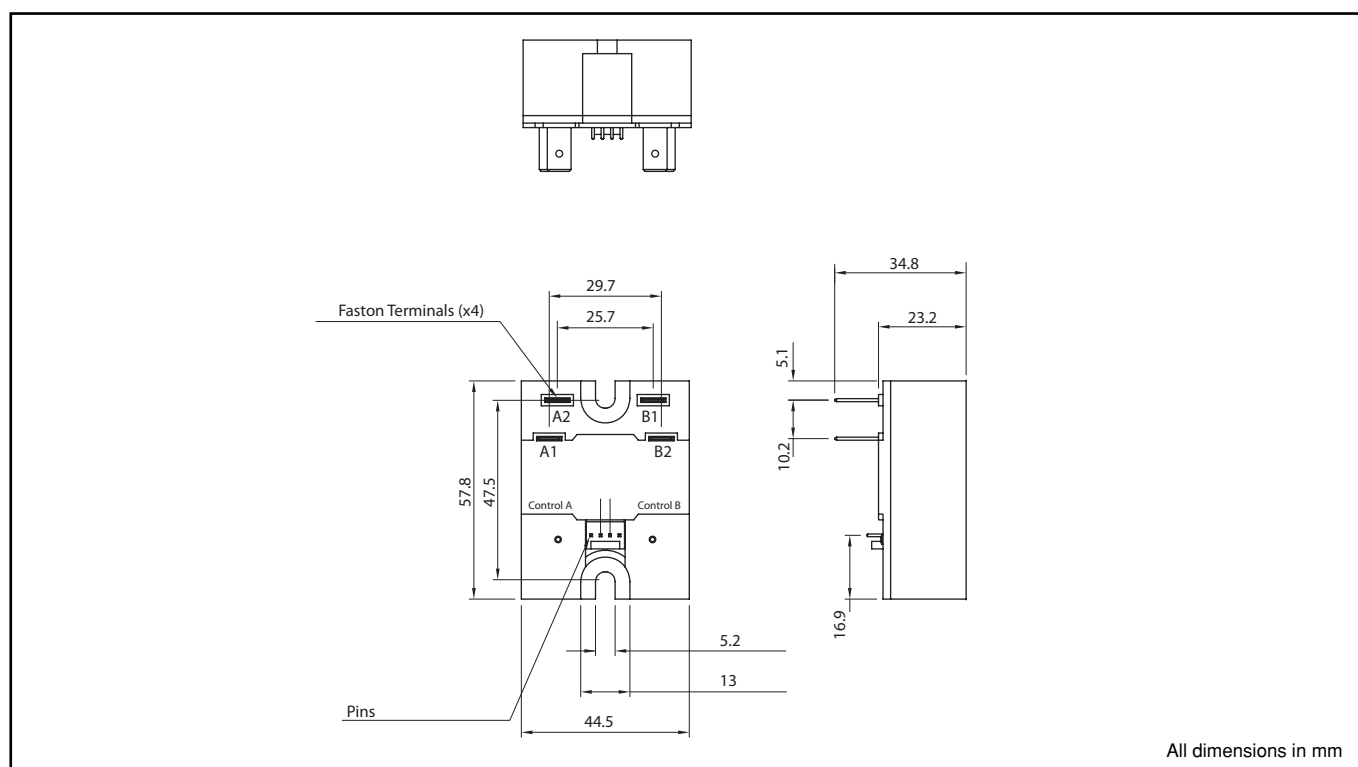
General Specifications

	RA2A23..	RA2A60..
Operational voltage range	24 to 265VACrms	42 to 660VACrms
Blocking voltage	650Vp	1200Vp
Rated isolation		
Input to Output	4kVrms	4kVrms
Output to heatsink	4kVrms	4kVrms
Operational frequency	45 to 65Hz	45 to 65Hz
Power factor	>0.95 @ 230VACrms	>0.95 @ 600VACrms
Zero voltage turn-on	<15V	<15V
LED ON indication (x2)	Yes (green)	Yes (green)
CE marking	Yes	Yes
Approvals	UR, cUR	UR, cUR

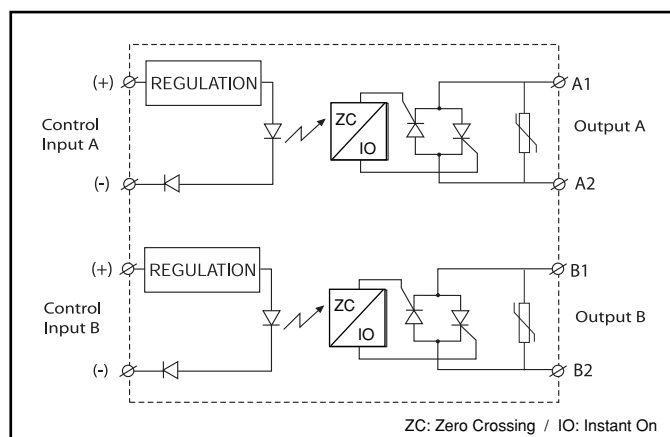
Output Specifications

	RA2...25	RA2...40
Rated operational current AC 51	2 x 25AACrms	2 x 40AACrms
Minimum operational current	150mA	250mA
Non-rep. surge current t=10 ms	325A _p	600A _p
Off-state leakage current	< 3mA	< 3mA
I ² t for fusing t=10 ms	525A ² s	1800A ² s
On-state voltage drop @ rated current	≤ 1.6Vrms	≤ 1.6Vrms
Critical dV/dt off-state min.	1000V/μs	1000V/μs
Zero crossing detection	Yes	Yes

Dimensions



Functional Diagram



Input Specifications

Control voltage range ¹	4.5 - 32VDC
Pick-up voltage	4.25VDC
Drop-out voltage	2VDC
Reverse Protection	32VDC
Input current per pole @ max. input voltage	≤10mA
Response time pick-up @ 50Hz	≤10ms
Response time drop-out @ 50Hz	≤10ms

1. DC control to be supplied by class 2 power source

Housing Specifications

Control terminals ²	4 PIN connector 0.64mm square pin with 2.54mm centre distance
Power terminals	4 x Fastons; 6.35 x 0.8mm
Baseplate	Aluminium
Weight	Approx. 85g
Max. Pull out force for power terminals	130N

2: Possible mating connector model CE100F22-4-D from MAS-CON

Thermal Specifications

Operating temperature	-20° to 70°C (-4°F to +158°F)
Storage temperature	-20° to 80°C (-4°F to +176°F)
Junction temperature	≤ 125°C
R _{th} junction to case	
1 pole	1K/W
2 pole	0.5K/W
R _{th} junction to ambient	≤ 20K/W

Heatsink Dimensions (load current versus ambient temperature)

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 RA2A23D40C can handle a maximum of 40A.

RA 2....25

Load current [A]	Thermal resistance [°C/W]						Power dissipation [W]
	20	30	40	50	60	70	T _A
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	1.7	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

Ambient temp. [°C]

RA 2....40

Load current [A]	Thermal resistance [°C/W]						Power dissipation [W]
	20	30	40	50	60	70	T _A
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

Ambient temp. [°C]

Note: The thermal resistance values indicated above are applicable if a fine layer of thermal paste, HTS02S, is applied between heatsink and SSR.

RA 2....25..S18

Load current [A]	Thermal resistance [°C/W]						Power dissipation [W]
	20	30	40	50	60	70	T _A
50	0.61	0.44	0.28	0.12	---	---	62
45	0.86	0.67	0.49	0.30	0.11	---	54
40	1.18	0.97	0.75	0.53	0.31	0.10	46
35	1.60	1.35	1.09	0.83	0.57	0.32	39
30	2.17	1.86	1.55	1.24	0.93	0.61	32
25	2.98	2.59	2.20	1.81	1.43	1.04	26
20	4.04	3.54	3.03	2.53	2.02	1.52	20
15	5.62	4.92	4.22	3.51	2.81	2.11	14
10	9	8	7	6	4.40	3.30	9
5	18	16	14	12	9	7	4

Ambient temp. [°C]

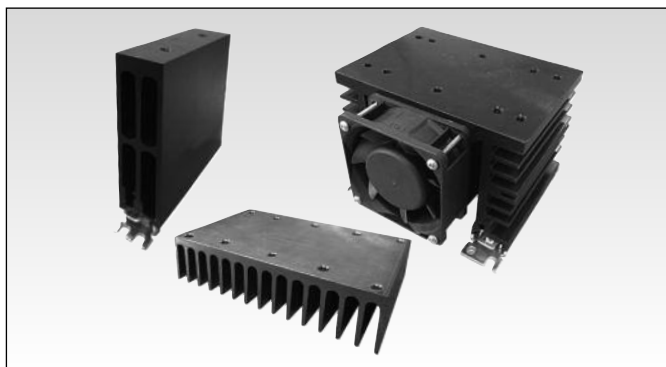
RA 2....40..S18

Load current [A]	Thermal resistance [°C/W]						Power dissipation [W]
	20	30	40	50	60	70	T _A
80	0.18	0.06	---	---	---	---	82
72	0.37	0.23	0.09	---	---	---	72
64	0.60	0.44	0.28	0.12	---	---	62
56	0.91	0.72	0.53	0.33	0.14	---	52
48	1.32	1.09	0.86	0.63	0.40	---	43
40	1.90	1.62	1.33	1.05	0.76	0.47	35
32	2.79	3.42	2.05	1.68	1.31	0.94	27
24	4.09	3.58	3.07	2.56	2.05	1.54	20
16	6	6	5	3.98	3.19	2.39	13
8	13	12	10	8	7	5	6

Ambient temp. [°C]

Note: The thermal resistance values indicated above are applicable for models which have an attached thermal pad, KK071CUT. Refer to Accessories section.

Heatsink Selection



Ordering Key

RHS..

- Heatsinks and fans
- 5.40°C/W to 0.12°C/W thermal resistance
- DIN, panel or thru wall mounting
- Single or multiple SSR mounting

Heatsink Range Overview:

http://www.productselection.net/PDF/UK/ssr_accessories.pdf

Heatsink Selector Tool:

<http://www.productselection.net/heatsink/heatsinkselector.php?LANG=UK>

Applications

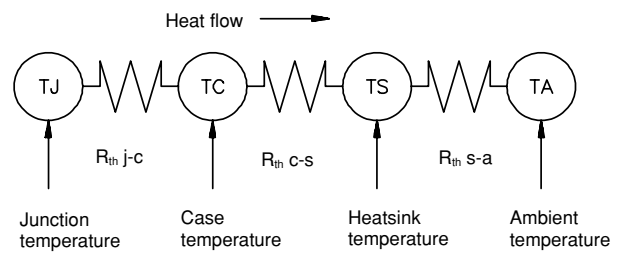
Thermal stress will reduce the lifetime of the SSR. Care must be taken to ensure proper heatsinking when the relay is is to be used at high sustained currents. Adequate electrical connection between relay terminals and cable must be ensured.

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.

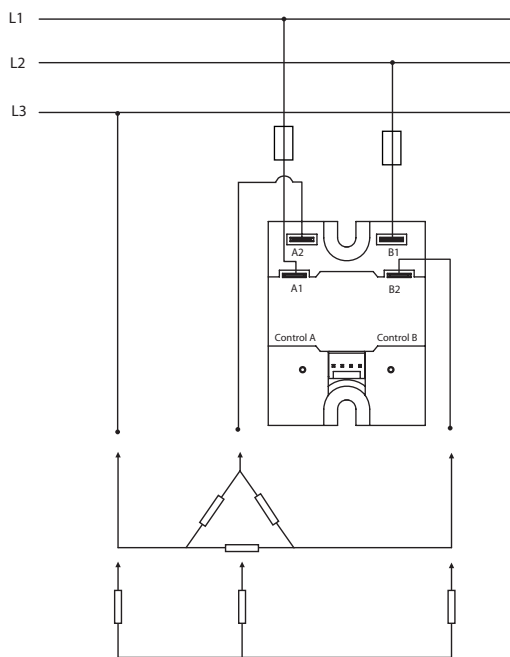


Thermal resistance:
 $R_{th\ j-c}$ = junction to case

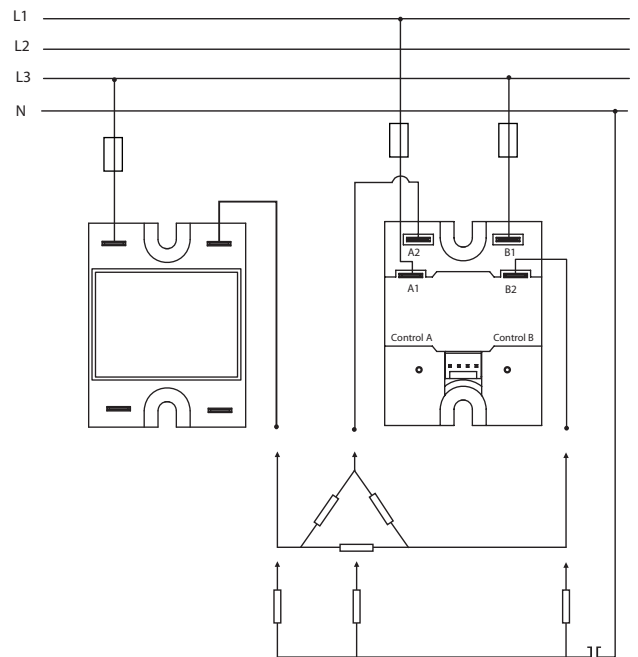
$R_{th\ c-s}$ = case to heatsink
 $R_{th\ s-a}$ = heatsink to ambient

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.



For use in a circuit where devices or systems, including filters or air gaps, are used to control overvoltages at the maximum rated impulse withstand voltage peak of 6.0kV. Devices or systems shall be evaluated using the requirements in the standard for Transient Voltage Surge Suppressors, UL1449 and shall also withstand the available short circuit current in accordance with UL 1449.

Short Circuit Protection - Co-ordination type 2 (IEC/EN 60947-4-3)

Part No.	Ferraz Shawmut Max. size [A]	Size	Part number	Current [kA]	Voltage [Vac]
RA2A..25	25A	10.3 x 38	6.9 gRC 10 - 25	10	600
RA2A..40	40A	14 x 51	6.9xx CP gRC 14x51/40	10	600

xx= 00 without fuse trip indication

xx = 21 with fuse trip indication

Protection with Miniature Circuit Breakers

Part No.	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] ³
RA2A..25	S201 - Z4 (4A) S201 - Z6 UC (6A)	S201-B2 (2A) S201-B2 (2A)	1.0	21.0
			1.5	21.0
			2.5	31.5
RA2A..40	S201 - Z10 (10A)	S201-B4 (4A)	1.0	7.6
			1.5	11.4
			2.5	19.0
	S201 - Z16 (16A)	S201-B6 (6A)	1.0	5.2
			1.5	7.8
			2.5	13.0
			4.0	20.8
	S201 - Z20 (20A)	S201-B10 (10A)	1.5	12.6
			2.5	21.0
	S201 - Z25 (25A)	S201-B13 (13A)	2.5	25.0
			4.0	40.0
	S202 - Z25 (25A)	S202-B13 (13A)	2.5	19.0
			4.0	30.4

3: Between MCB and Load (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. Specifications are per pole.

Heatsink RHS38

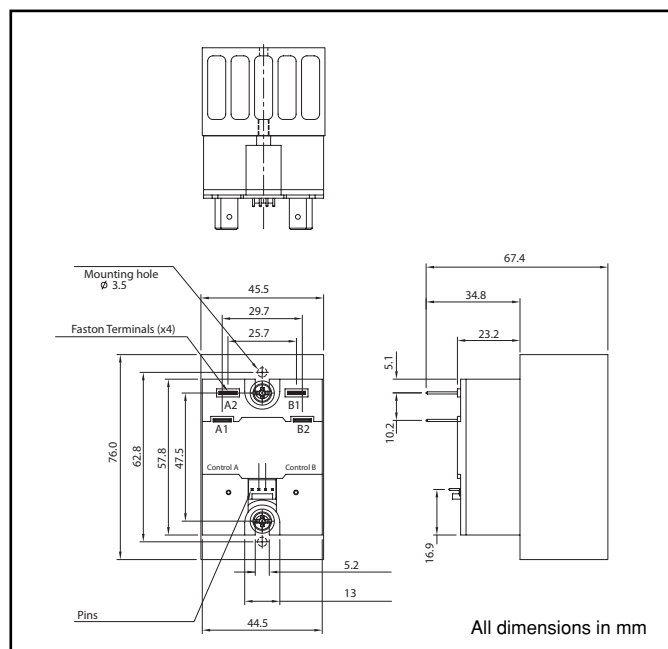


Ordering Key

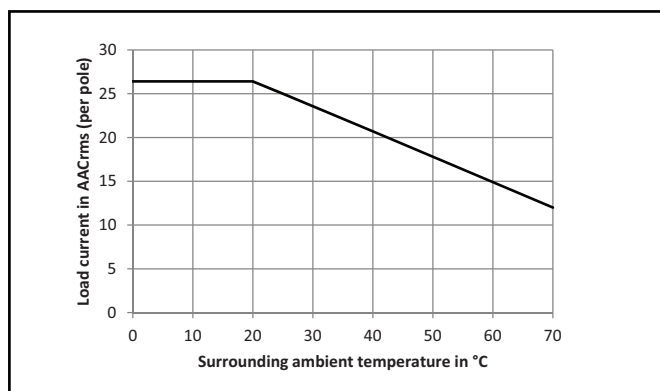
Heatsink

RHS38ADFactory mounted
heatsink to RA2A**RA2A...H53**

Dimensions

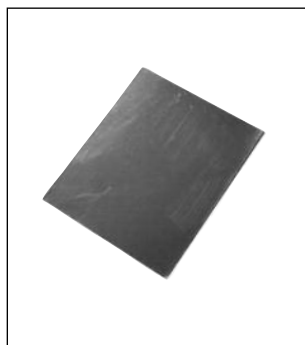


Derating Curve for RA2A..H53

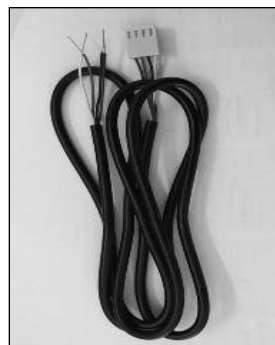


Applicable for vertical mounting

Other Accessories



- Graphite thermal pad with adhesive on one side
- Type KK071CUT
- Dimensions: 35 x 43 x 0.25mm
- Packing quantity: 50pcs.



- Cable accessory for RA2A..C
- Type RCS4-xxx-1

xxx = 100 for 100cm length
xxx = 400 for 400cm length

Other accessories include DIN rail adaptors, fuses, varistors and spacers.

For further information refer to Accessories datasheets at:
www.productselection.net/PDF/UK/SSR_Accessories.pdf