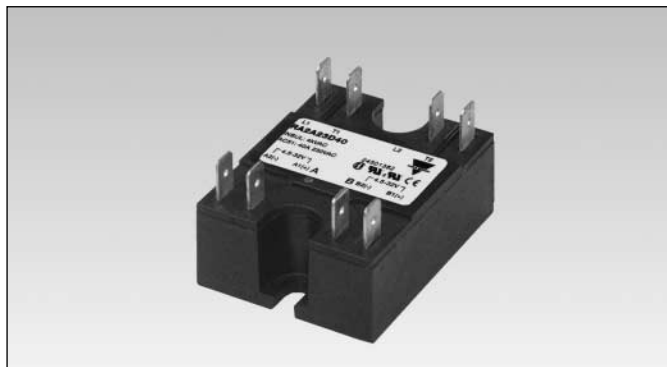


# Solid State Relays Industrial, 2-Pole ZS Type RA2A



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

## 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 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 | Blocking voltage                                                                                   | Load type    |
|-------------------|------------------------------------------------------------------|--------------------------------------|-----------------|----------------------------------------------------------------------------------------------------|--------------|
| A: Zero switching | 23: 230VACrms<br>40: 400VACrms<br>48: 480VACrms<br>60: 600VACrms | 25: 2 x 25AACrms<br>40: 2 x 40AACrms | D: 4.5 - 32VDC  | 23: 650V <sub>p</sub><br>40: 850V <sub>p</sub><br>48: 1200V <sub>p</sub><br>60: 1200V <sub>p</sub> | M: Inductive |

## Selection Guide

| Rated operational voltage | Blocking voltage   | Control voltage | Rated operational current |              |
|---------------------------|--------------------|-----------------|---------------------------|--------------|
|                           |                    |                 | 2 x 25AACrms              | 2 x 40AACrms |
| 230VACrms                 | 650V <sub>p</sub>  | 4.5 - 32VDC     | RA2A23D25                 | RA2A23D40    |
|                           |                    |                 | RA2A23D25M                | RA2A23D40M   |
| 400VACrms                 | 850V <sub>p</sub>  | 4.5 - 32VDC     | RA2A40D25                 | RA2A40D40    |
|                           |                    |                 | RA2A40D25M                | RA2A40D40M   |
| 480VACrms                 | 1200V <sub>p</sub> | 4.5 - 32VDC     | RA2A48D25                 | RA2A48D40    |
|                           |                    |                 | RA2A48D25M                | RA2A48D40M   |
| 600VACrms                 | 1200V <sub>p</sub> | 4.5 - 32VDC     | RA2A60D25                 | RA2A60D40    |
|                           |                    |                 | RA2A60D25M                | RA2A60D40M   |

## Input Specifications

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

## Housing Specifications

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

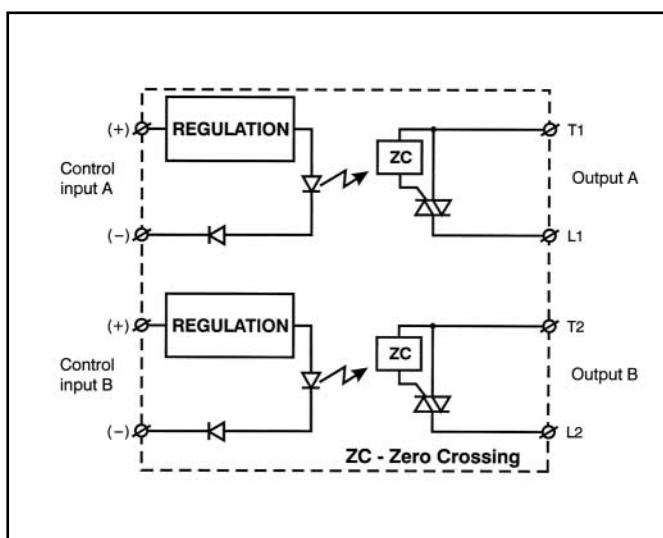
## General Specifications

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

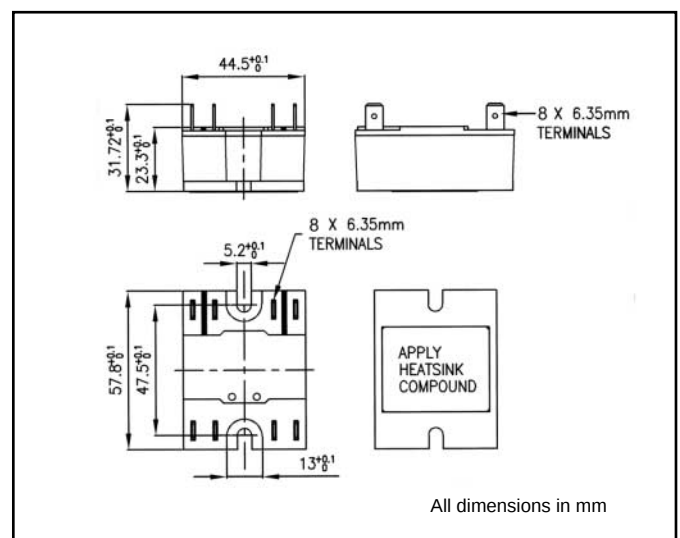
## Output Specifications

|                                           | RA2A...25           | RA2A...40           | RA2A..D25M                  | RA2A..D40M                   |
|-------------------------------------------|---------------------|---------------------|-----------------------------|------------------------------|
| Rated operational current AC 51<br>AC 53a | 2 x 25AACrms<br>-   | 2 x 40AACrms<br>-   | 2 x 25AACrms<br>2 x 5AACrms | 2 x 40AACrms<br>2 x 15AACrms |
| Minimum operational current               | 150mA               | 250mA               | 150mA                       | 250mA                        |
| Non-rep. surge current t=10 ms            | 300A <sub>p</sub>   | 390A <sub>p</sub>   | 300A <sub>p</sub>           | 600A <sub>p</sub>            |
| Off-state leakage current                 | < 3mA               | < 3mA               | < 3mA                       | < 3mA                        |
| I <sup>2</sup> t for fusing t=10 ms       | 450A <sup>2</sup> s | 760A <sup>2</sup> s | 450A <sup>2</sup> s         | 1800A <sup>2</sup> s         |
| On-state voltage drop<br>@ rated current  | ≤ 1.6Vrms           | ≤ 1.6Vrms           | ≤ 1.6Vrms                   | ≤ 1.6Vrms                    |
| Critical dV/dt off-state min.             | 500V/μs             | 500V/μs             | 500V/μs                     | 500V/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] |
|------------------|--------------------------|------|------|------|------|------|-----------------------|
|                  | 20                       | 30   | 40   | 50   | 60   | 70   | T <sub>A</sub>        |
| 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                     |

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               | 0.68                     | 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]

RA 2....40M

| Load current [A] | Thermal resistance [K/W] |      |      |      |      |      | Power dissipation [W] |
|------------------|--------------------------|------|------|------|------|------|-----------------------|
|                  | 20                       | 30   | 40   | 50   | 60   | 70   | T <sub>A</sub>        |
| 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                     |

Ambient temp. [°C]

## Heatsink Selection

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

## Accessories

Heatsinks  
DIN rail adapter  
Varistors  
Fuses

For further information refer to "General Accessories".

## Applications

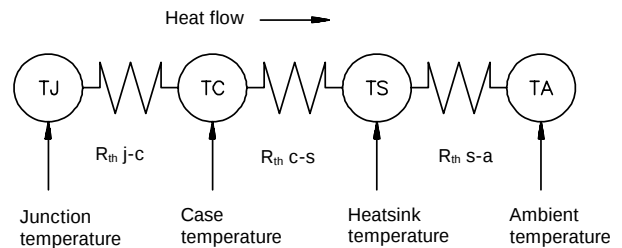
This relay is designed for use in applications in which it is exposed to high surge conditions. Care must be taken to ensure proper heatsinking when the relay is to be used at high sustained currents. Adequate electrical connection between relay terminals and cable must be ensured.

### 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

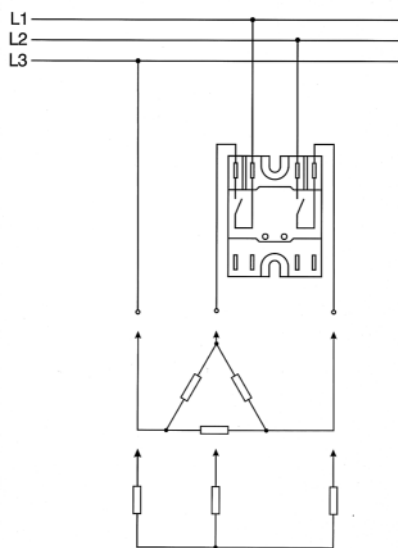
$R_{th\ c-s}$  = case to heatsink  
 $R_{th\ s-a}$  = heatsink to ambient

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

