

# Solid State Relays Industrial, 3-Phase ZS Type RZ3A



- 3-phase Solid State Relay
- Zero switching
- Rated operational current: 3 x 25, 40, 55 or 75 A
- Rated operational voltage: Up to 600 VAC
- Control voltage 5 VDC, 4-32 VDC or 20-275 VAC/DC
- Integral snubber networks
- Over-temperature protection option with alarm output
- IP 10 back-of-hand protection
- LED indication of control input and over-temperature alarm status

## Product Description

A Solid State Relay family designed to switch various loads such as heating elements, motors and transformers. The relay is capable of switching high voltages up to 600 VACrms.

For higher reliability and load cycle capability three semiconductor power units are soldered directly on to the direct copper bonded (DCB) substrate.

AC- or DC-controlled versions are available. Built-in LED status indication for applied control voltage and over-temperature alarm (optional). A version that can be controlled with 5 VDC @ 15 mA (max) is also available (LD).

The series covers a range of load currents up to 75 AACrms.

## Ordering Key

**RZ 3 A 60 D 75 P**

Solid State Relay \_\_\_\_\_  
Number of poles \_\_\_\_\_  
Switching mode \_\_\_\_\_  
Rated operational voltage \_\_\_\_\_  
Control voltage \_\_\_\_\_  
Rated operational current \_\_\_\_\_  
Options \_\_\_\_\_

## Type Selection

| Switching mode    | Rated operational voltage        | Rated operational current                                        | Control voltage                                     | Option                                                                                |
|-------------------|----------------------------------|------------------------------------------------------------------|-----------------------------------------------------|---------------------------------------------------------------------------------------|
| A: Zero Switching | 40: 400 VACrms<br>60: 600 VACrms | 25: 25 AACrms<br>40: 40 AACrms<br>55: 55 AACrms<br>75: 75 AACrms | LD: 5 VDC<br>D: 4-32 VDC<br>A: 24-275 VAC/24-50 VDC | P: Over-temperature protection and alarm output<br>(available only for A and D input) |

## Selection Guide

| Rated operational voltage | Control voltage      | Rated operational current |                   |                   |                   |
|---------------------------|----------------------|---------------------------|-------------------|-------------------|-------------------|
|                           |                      | 25 A                      | 40 A              | 55 A              | 75 A              |
| 400 VACrms                | 5 VDC                | <b>RZ3A40LD25</b>         | <b>RZ3A40LD40</b> | <b>RZ3A40LD55</b> | <b>RZ3A40LD75</b> |
|                           | 4-32 VDC             | <b>RZ3A40D25</b>          | <b>RZ3A40D40</b>  | <b>RZ3A40D55</b>  | <b>RZ3A40D75</b>  |
|                           | 24-275 VAC/24-50 VDC | <b>RZ3A40A25</b>          | <b>RZ3A40A40</b>  | <b>RZ3A40A55</b>  | <b>RZ3A40A75</b>  |
| 600 VACrms                | 5 VDC                | <b>RZ3A60LD25</b>         | <b>RZ3A60LD40</b> | <b>RZ3A60LD55</b> | <b>RZ3A60LD75</b> |
|                           | 4-32 VDC             | <b>RZ3A60D25</b>          | <b>RZ3A60D40</b>  | <b>RZ3A60D55</b>  | <b>RZ3A60D75</b>  |
|                           | 24-275 VAC/24-50 VDC | <b>RZ3A60A25</b>          | <b>RZ3A60A40</b>  | <b>RZ3A60A55</b>  | <b>RZ3A60A75</b>  |

### Options

Protection: Over-temperature protection and alarm output: add suffix P to include over-temperature protection and alarm output. Example: RZ3A60D75P

## General Specifications

|                             | <b>RZ3A40..</b>    | <b>RZ3A60..</b>     |
|-----------------------------|--------------------|---------------------|
| Operational voltage ranges  | 24-440 VAC         | 42-660 VAC          |
| Non-rep. peak voltage       | 850 V <sub>p</sub> | 1200 V <sub>p</sub> |
| Operational frequency range | 45 to 65 Hz        | 45 to 65 Hz         |
| Overvoltage category        | III                | III                 |
| Pollution degree            | 3                  | 2                   |
| Approvals*                  | UL, CSA            | UL, CSA             |
| CE-marking                  | Yes                | Yes                 |

\*Approvals pending

## Input Specifications

|                                                | <b>RZ3A..LD..</b> | <b>RZ3A..D..</b> | <b>RZ3A..A..</b>    |
|------------------------------------------------|-------------------|------------------|---------------------|
| Control voltage range                          | 5 VDC             | 4-32 VDC         | 24-50 VDC/24-275VAC |
| Pick-up voltage                                | 4.5 VDC           | 3.8 VDC          | 18 VAC/20 VDC       |
| Drop-out voltage                               | 1.2 VDC           | 1.2 VDC          | 9 VAC               |
| Input current                                  | ≤ 15 mA           | ≤ 23 mA          | ≤ 15 mA             |
| Response time pick-up<br>Power output = 50 Hz  | 10 ms             | 10 ms            | 20 ms               |
| Response time drop-out<br>Power output = 50 Hz | 10 ms             | 10 ms            | 30 ms               |

All data at 25°C

## Output Specifications

|                                                                | <b>RZ3A..25..</b>    | <b>RZ3A..40..</b>    | <b>RZ3A..55..</b>     | <b>RZ3A..75..</b>     |
|----------------------------------------------------------------|----------------------|----------------------|-----------------------|-----------------------|
| Rated operational current<br>AC51 @ Ta=25°C<br>AC53a @ Ta=25°C | 25 Arms<br>5 Arms    | 40 Arms<br>8 Arms    | 55 Arms<br>15 Arms    | 75 Arms<br>20 Arms    |
| Minimum operational current                                    | 150 mArms            | 150 mArms            | 150 mArms             | 150 mArms             |
| Rep. overload current t=1 s                                    | 37 Arms              | 60 Arms              | < 125 Arms            | < 150 Arms            |
| Non-rep. surge current t = 10 ms                               | 230 A <sub>p</sub>   | 300 A <sub>p</sub>   | 600 A <sub>p</sub>    | 1000 A <sub>p</sub>   |
| Off-state leakage current                                      | < 3 mArms            | < 3 mArms            | < 3 mArms             | < 3 mArms             |
| I <sup>2</sup> t for fusing t = 10 ms                          | 265 A <sup>2</sup> s | 450 A <sup>2</sup> s | 1800 A <sup>2</sup> s | 6600 A <sup>2</sup> s |
| Critical dI/dt @ 50 Hz                                         | ≥ 100 A/μs           | ≥ 100 A/μs           | ≥ 100 A/μs            | ≥ 100 A/μs            |
| On-state voltage drop                                          | ≤ 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            |

## Alarm Output Specifications

|                             |        |
|-----------------------------|--------|
| Collector - emitter voltage | 35 Vdc |
| Emitter - collector voltage | 6 Vdc  |
| Collector current           | 50 mA  |
| Delay time on reset         | 20 mS  |

## Thermal Specifications

|                       |                                   |
|-----------------------|-----------------------------------|
| Operating temperature | -30° to +80°C (-22° to +158° F)   |
| Storage temperature   | -40° to +100°C (-40° to + 212° F) |
| Junction temperature  | ≤ +125°C (+ 257°F)                |

## Insulation

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

## Heatsink Dimensions (load current versus ambient temperature)

### RZ ..25

| Load current [A] | Thermal resistance [K/W] |       |      |      |      |      |      | Power dissipation [W] |
|------------------|--------------------------|-------|------|------|------|------|------|-----------------------|
|                  | 20                       | 30    | 40   | 50   | 60   | 70   | 80   | T <sub>A</sub>        |
| 25.0             | 0.44                     | 0.34  | 0.23 | 0.12 | 0.01 | --   | --   | 92                    |
| 22.5             | 0.62                     | 0.49  | 0.37 | 0.24 | 0.12 | --   | --   | 80                    |
| 20.0             | 0.84                     | 0.69  | 0.54 | 0.40 | 0.25 | 0.10 | --   | 68                    |
| 17.5             | 1.12                     | 0.95  | 0.78 | 0.60 | 0.43 | 0.25 | 0.08 | 58                    |
| 15.0             | 1.51                     | 1.30  | 1.09 | 0.88 | 0.67 | 0.46 | 0.25 | 47                    |
| 12.5             | 2.06                     | 1.80  | 1.54 | 1.27 | 1.01 | 0.75 | 0.48 | 38                    |
| 10.0             | 2.75                     | 2.40  | 2.06 | 1.72 | 1.37 | 1.03 | 0.69 | 29                    |
| 7.5              | 3.83                     | 3.35  | 2.87 | 2.39 | 1.91 | 1.43 | 0.96 | 21                    |
| 5.0              | 6.01                     | 5.26  | 4.51 | 3.76 | 3.01 | 2.25 | 1.50 | 13                    |
| 2.5              | 12.62                    | 11.04 | 9.46 | 7.89 | 6.31 | 4.73 | 3.15 | 6                     |

### RZ ..40

| Load current [A] | Thermal resistance [K/W] |      |      |      |      |      |      | Power dissipation [W] |
|------------------|--------------------------|------|------|------|------|------|------|-----------------------|
|                  | 20                       | 30   | 40   | 50   | 60   | 70   | 80   | T <sub>A</sub>        |
| 40.0             | 0.54                     | 0.44 | 0.34 | 0.24 | 0.14 | 0.04 | --   | 101                   |
| 36.0             | 0.66                     | 0.55 | 0.44 | 0.33 | 0.22 | 0.11 | --   | 91                    |
| 32.0             | 0.81                     | 0.68 | 0.56 | 0.43 | 0.31 | 0.18 | 0.06 | 80                    |
| 28.0             | 1.00                     | 0.86 | 0.72 | 0.57 | 0.43 | 0.29 | 0.14 | 70                    |
| 24.0             | 1.26                     | 1.09 | 0.93 | 0.76 | 0.59 | 0.42 | 0.25 | 60                    |
| 20.0             | 1.62                     | 1.42 | 1.21 | 1.01 | 0.81 | 0.61 | 0.41 | 49                    |
| 16.0             | 2.03                     | 1.78 | 1.52 | 1.27 | 1.02 | 0.76 | 0.64 | 39                    |
| 12.0             | 2.72                     | 2.38 | 2.04 | 1.70 | 1.36 | 1.02 | 1.03 | 29                    |
| 8.0              | 4.11                     | 3.59 | 3.08 | 2.57 | 2.05 | 1.54 | 1.81 | 19                    |
| 4.0              | 8.26                     | 7.22 | 6.19 | 5.16 | 4.13 | 3.10 | 4.14 | 10                    |

### RZ ..55

| Load current [A] | Thermal resistance [K/W] |      |      |      |      |      |      | Power dissipation [W] |
|------------------|--------------------------|------|------|------|------|------|------|-----------------------|
|                  | 20                       | 30   | 40   | 50   | 60   | 70   | 80   | T <sub>A</sub>        |
| 55.0             | 0.29                     | 0.23 | 0.17 | 0.11 | 0.05 | --   | --   | 164                   |
| 50.0             | 0.36                     | 0.29 | 0.22 | 0.16 | 0.09 | 0.02 | --   | 148                   |
| 45.0             | 0.44                     | 0.36 | 0.29 | 0.21 | 0.14 | 0.06 | --   | 133                   |
| 40.0             | 0.54                     | 0.46 | 0.37 | 0.29 | 0.20 | 0.12 | 0.03 | 118                   |
| 35.0             | 0.67                     | 0.58 | 0.48 | 0.38 | 0.28 | 0.19 | 0.09 | 103                   |
| 30.0             | 0.85                     | 0.74 | 0.62 | 0.51 | 0.39 | 0.28 | 0.16 | 87                    |
| 25.0             | 1.10                     | 0.96 | 0.82 | 0.68 | 0.55 | 0.41 | 0.27 | 73                    |
| 20.0             | 1.38                     | 1.21 | 1.04 | 0.87 | 0.69 | 0.52 | 0.35 | 58                    |
| 15.0             | 1.85                     | 1.62 | 1.39 | 1.16 | 0.93 | 0.70 | 0.46 | 43                    |
| 10.0             | 2.80                     | 2.45 | 2.10 | 1.75 | 1.40 | 1.05 | 0.70 | 29                    |
| 5.0              | 5.62                     | 4.92 | 4.21 | 3.51 | 2.81 | 2.11 | 1.40 | 14                    |
| 2.5              | 11.26                    | 9.85 | 8.45 | 7.04 | 5.63 | 4.22 | 2.82 | 7                     |

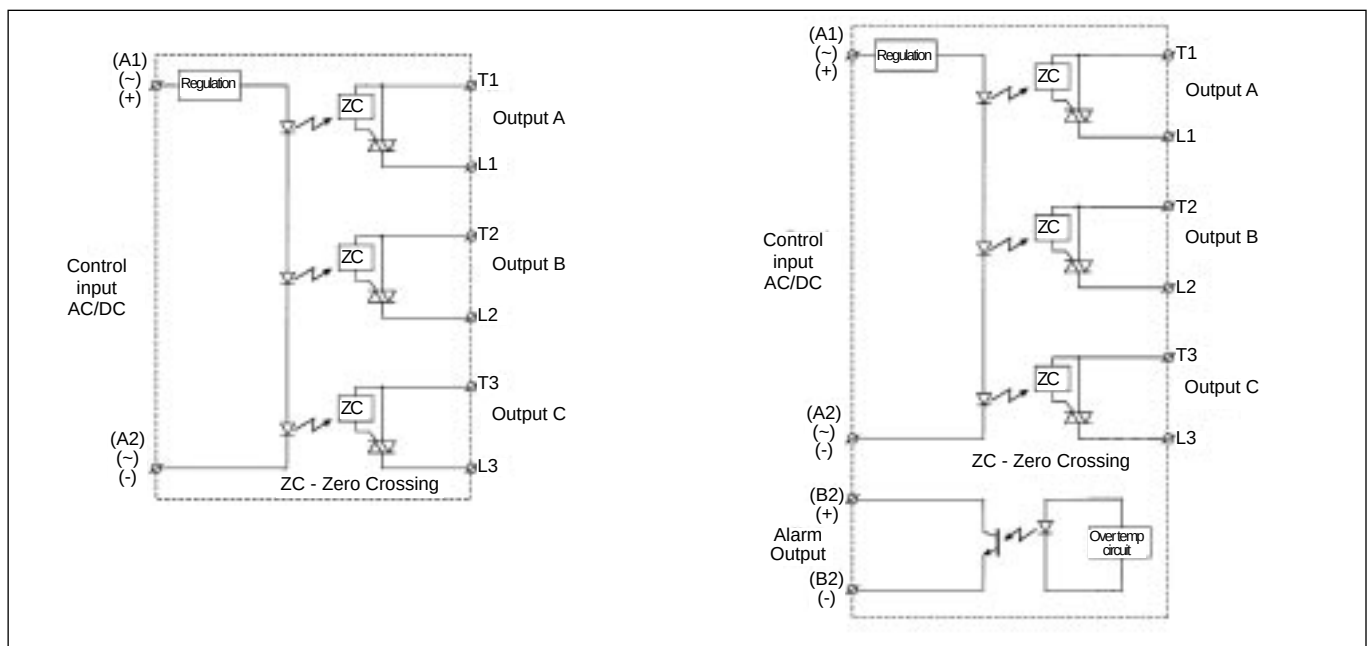
### RZ ..75

| Load current [A] | Thermal resistance [K/W] |      |      |      |      |      |      | Power dissipation [W] |
|------------------|--------------------------|------|------|------|------|------|------|-----------------------|
|                  | 20                       | 30   | 40   | 50   | 60   | 70   | 80   | T <sub>A</sub>        |
| 75.0             | 0.27                     | 0.22 | 0.17 | 0.12 | 0.07 | 0.02 | --   | 201                   |
| 70.0             | 0.32                     | 0.27 | 0.21 | 0.16 | 0.10 | 0.05 | --   | 184                   |
| 65.0             | 0.38                     | 0.32 | 0.26 | 0.20 | 0.14 | 0.08 | 0.02 | 167                   |
| 60.0             | 0.44                     | 0.38 | 0.31 | 0.25 | 0.18 | 0.11 | 0.05 | 151                   |
| 55.0             | 0.52                     | 0.45 | 0.38 | 0.30 | 0.23 | 0.16 | 0.08 | 136                   |
| 50.0             | 0.62                     | 0.54 | 0.45 | 0.37 | 0.29 | 0.21 | 0.12 | 121                   |
| 45.0             | 0.74                     | 0.64 | 0.55 | 0.46 | 0.36 | 0.27 | 0.17 | 106                   |
| 40.0             | 0.87                     | 0.76 | 0.65 | 0.54 | 0.43 | 0.32 | 0.22 | 92                    |
| 35.0             | 1.01                     | 0.89 | 0.76 | 0.63 | 0.51 | 0.38 | 0.25 | 79                    |
| 30.0             | 1.21                     | 1.06 | 0.91 | 0.76 | 0.60 | 0.45 | 0.30 | 66                    |
| 25.0             | 1.49                     | 1.30 | 1.11 | 0.93 | 0.74 | 0.56 | 0.37 | 54                    |
| 20.0             | 1.90                     | 1.67 | 1.43 | 1.19 | 0.95 | 0.71 | 0.48 | 42                    |
| 15.0             | 2.60                     | 2.28 | 1.95 | 1.63 | 1.30 | 0.98 | 0.65 | 31                    |
| 10.0             | 4.01                     | 3.51 | 3.01 | 2.51 | 2.01 | 1.50 | 1.00 | 20                    |
| 5.0              | 8.24                     | 7.21 | 6.18 | 5.15 | 4.12 | 3.09 | 2.06 | 10                    |

## Heatsink Selection

| Carlo Gavazzi Heatsink<br>(see Accessories) | Thermal resistance      |
|---------------------------------------------|-------------------------|
| No heatsink required                        | $R_{th\ s-a} > 8.0$ K/W |
| RHS 300 Assy or backplate                   | 5.0 K/W                 |
| RHS 112 Assy                                | 1.1 K/W                 |
| RHS 301 Assy                                | 0.8 K/W                 |
| RHS 112 F Assy                              | 0.4 K/W                 |
| RHS 301 F Assy                              | 0.25 K/W                |
| Consult your distributor                    | $< 0.25$ K/W            |

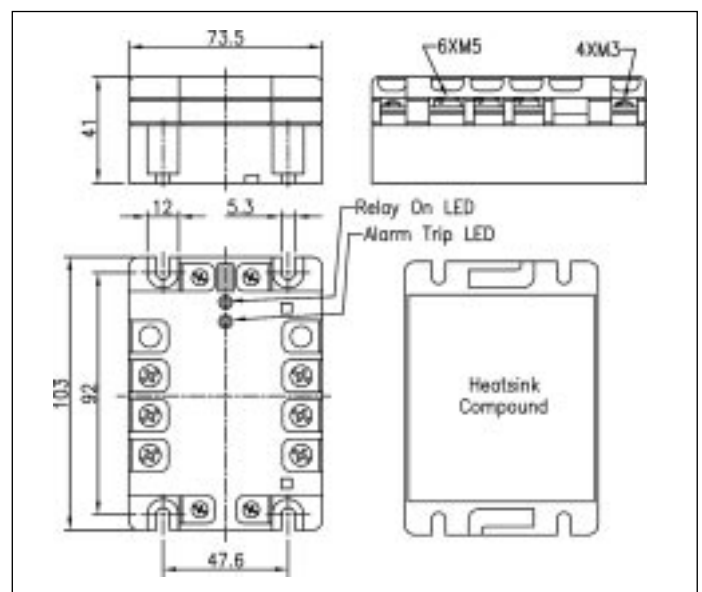
## Functional Diagram



## Housing Specifications

|                  |                              |
|------------------|------------------------------|
| Weight           | Approx. 380 g                |
| Material         | Noryl                        |
| Base plate       |                              |
| 25, 40, 55A      | Aluminum, nickel-plated      |
| 75A              | Copper, nickel-plated        |
| Potting compound | Polyurethane                 |
| Relay            |                              |
| Mounting screws  | M5                           |
| Mounting torque  | ≤ 1.5 Nm                     |
| Control terminal |                              |
| Mounting screws  | M3                           |
| Mounting torque  | ≤ 0.5 Nm                     |
| Wire size        | Max. 2 x 2.5 mm <sup>2</sup> |
|                  | Min. 2 x 1.0 mm <sup>2</sup> |
| Power terminal   |                              |
| Mounting screws  | M5                           |
| Mounting torque  | ≤ 2.5 Nm                     |
|                  | 2 x 6 mm <sup>2</sup> (AWG8) |
| Wire size        | Max. 2 x 6 mm <sup>2</sup>   |
|                  | Min. 2 x 1 mm <sup>2</sup>   |

## Dimensions



## Alarm Output Connection

