

# Solid State Relays Industrial, 1-Phase ZS w. LED Types RS 23, RS 40, RS 48

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- Zero switching AC Solid State Relay
- Direct copper bonding (DCB) technology
- LED indication
- Clip-on IP 20 protection cover
- Self-lifting terminals
- Housing free of moulding mass
- 2 input ranges: 4.5-32 VDC and 18-36 VAC/VDC
- Operational ratings up to 40 AACrms and 480 VAC
- Non-repetitive voltage: Up to 1200 V<sub>p</sub>
- Opto-insulation: > 4000 VACrms

## Product Description

The zero switching relay with triac (10 A) or alternistor output (25 A, 40 A) is an inexpensive solution for resistive loads. The zero switching relay switches ON when the sinusoidal curve crosses zero and

switches OFF when the current crosses zero. The LED indicates the status of the control input. The clip-on cover is securing touch protection to IP 20. Output terminals can take cables up to 16 mm<sup>2</sup>.

## Ordering Key

**RS 1 A 23 D 25**

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

## Type Selection

| Switching mode    | Rated operational voltage                          | Rated operational current                       | Control voltage                        |
|-------------------|----------------------------------------------------|-------------------------------------------------|----------------------------------------|
| A: Zero Switching | 23: 230 VACrms<br>40: 400 VACrms<br>48: 480 VACrms | 10: 10 AACrms<br>25: 25 AACrms<br>40: 40 AACrms | LA: 18 - 36 VAC/VDC<br>D: 4.5 - 32 VDC |

## Selection Guide

| Rated operational voltage | Non-rep. voltage    | Control voltage            | Rated operational current |                         |                         |
|---------------------------|---------------------|----------------------------|---------------------------|-------------------------|-------------------------|
|                           |                     |                            | 10 A                      | 25 A                    | 40 A                    |
| 230 VACrms                | 650 V <sub>p</sub>  | 4.5-32 VDC<br>18-36 VAC/DC | RS1A23D10<br>RS1A23LA10   | RS1A23D25<br>RS1A23LA25 | RS1A23D40<br>RS1A23LA40 |
| 400 VACrms                | 850 V <sub>p</sub>  | 4.5-32 VDC<br>18-36 VAC/DC | RS1A40D10<br>RS1A40LA10   | RS1A40D25<br>RS1A40LA25 | RS1A40D40<br>RS1A40LA40 |
| 480 VACrms                | 1200 V <sub>p</sub> | 4.5-32 VDC<br>18-36 VAC/DC | RS1A48D10<br>RS1A48LA10   | RS1A48D25<br>RS1A48LA25 | RS1A48D40<br>RS1A48LA40 |

## General Specifications

|                                                       | RS1A23...            | RS1A40...            | RS1A48...             |
|-------------------------------------------------------|----------------------|----------------------|-----------------------|
| Operational voltage range                             | 42 to 265 VACrms     | 42 to 440 VACrms     | 42 to 530 VACrms      |
| Non-rep. peak voltage                                 | ≥ 650 V <sub>p</sub> | ≥ 850 V <sub>p</sub> | ≥ 1200 V <sub>p</sub> |
| Zero voltage turn-on                                  | ≤ 15 V               | ≤ 15 V               | ≤ 15 V                |
| Operational frequency range                           | 45 to 65 Hz          | 45 to 65 Hz          | 45 to 65 Hz           |
| Power factor                                          | ≥ 0.95 @ 230 VACrms  | ≥ 0.95 @ 400 VACrms  | ≥ 0.95 @ 480 VACrms   |
| Approvals                                             | UL, CSA              | UL, CSA              | UL, CSA               |
| CE-marking<br>(external filter for EN 50081-1 needed) | Yes                  | Yes                  | Yes                   |

## Input Specifications

|                                   | RS1A..D..   | RS1A..LA...  |
|-----------------------------------|-------------|--------------|
| Control voltage                   | 4.5-32 VDC  | 18-36 VAC/DC |
| Pick-up voltage                   | ≤ 4.25 VDC  | ≤ 18 VAC/DC  |
| Reverse voltage                   | ≤ 32 VDC    | -            |
| Drop out voltage                  | ≥ 2 VDC     | ≥ 5 VAC/DC   |
| Input current @ max input voltage | ≤ 12 mA     | ≤ 15 mA      |
| Response time pick-up             | ≤ 1/2 cycle | ≤ 1 cycle    |
| Response time drop-out            | ≤ 1/2 cycle | ≤ 2 cycles   |

## Output Specifications

|                                                            | RS1A...10             | RS1A...25              | RS1A...40              |
|------------------------------------------------------------|-----------------------|------------------------|------------------------|
| Rated operational current<br>AC1 @ Ta=25°C                 | 10 Arms               | 25 Arms                | 40 Arms                |
| Min. operational current                                   | 150 mA                | 150 mA                 | 150 mA                 |
| Rep. overload current t=1 s                                | < 12 AACrms           | < 37 AACrms            | < 60 AACrms            |
| Non-rep. surge current t=10 ms                             | 100 Ap                | 230 Ap                 | 300 Ap                 |
| Off-state leakage current @ rated<br>voltage and frequency | < 3 mArms             | < 3 mArms              | < 3 mArms              |
| I <sup>2</sup> t for fusing t=1-10 ms                      | ≤ 50 A <sup>2</sup> s | ≤ 310 A <sup>2</sup> s | ≤ 450 A <sup>2</sup> s |
| Critical dI/dt                                             | ≥ 10 A/μs             | ≥ 50 A/μs              | ≥ 100 A/μs             |
| On-state voltage drop @ rated current                      | ≤ 1.6 Vrms            | ≤ 1.6 Vrms             | ≤ 1.6 Vrms             |
| Critical dV/dt off-state                                   | ≥ 250 V/μs            | ≥ 250 V/μs             | ≥ 250 V/μs             |

## Thermal Specifications

|                                     | RS1A...10     | RS1A...25     | RS1A...40     |
|-------------------------------------|---------------|---------------|---------------|
| Operating temperature               | -20° to 70°C  | -20° to 70°C  | -20° to 70°C  |
| Storage temperature                 | -40° to 100°C | -40° to 100°C | -40° to 100°C |
| Junction temperature                | ≤ 125°C       | ≤ 125°C       | ≤ 125°C       |
| R <sub>th</sub> junction to case    | ≤ 4.80 K/W    | ≤ 1.10 K/W    | ≤ 0.90 K/W    |
| R <sub>th</sub> junction to ambient | ≤ 40 K/W      | ≤ 20 K/W      | ≤ 20 K/W      |

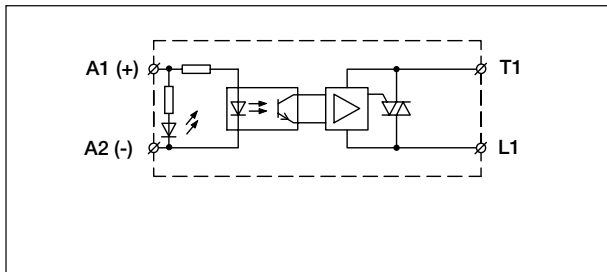
## Housing Specifications

|                  |                    |
|------------------|--------------------|
| Weight           | Approx. 60 g       |
| Housing material | Noryl GFN 1, black |
| Baseplate        | Aluminium          |
| Potting compound | None               |
| Relay            |                    |
| Mounting screws  | M5                 |
| Mounting torque  | 1.5-2.0 Nm         |
| Control terminal |                    |
| Mounting screws  | M3 x 9             |
| Mounting torque  | 0.5 Nm             |
| Power terminal   |                    |
| Mounting screws  | M5 x 9             |
| Mounting torque  | 2.4 Nm             |

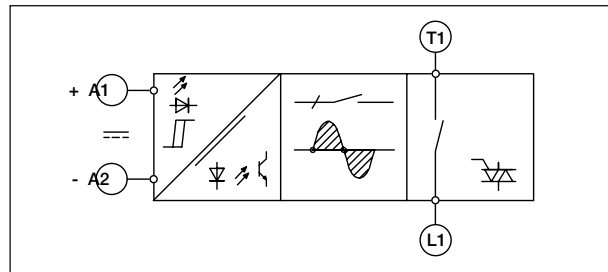
## Insulation

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

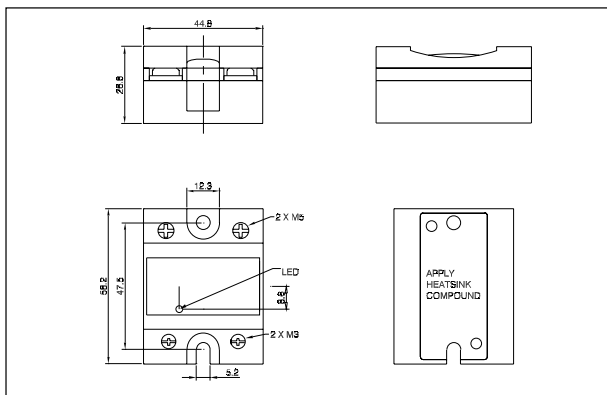
## Wiring Diagram



## Functional Diagram



## Dimensions



## Heatsink Dimensions (load current versus ambient temperature)

### RS10.

| Load current [A] | Thermal resistance [K/W] |      |       |      |       |       | Power dissipation [W] |
|------------------|--------------------------|------|-------|------|-------|-------|-----------------------|
| 10.0             | 3.14                     | 2.38 | 1.61  | 0.84 | 0.07  | -     | 14                    |
| 9.0              | 4.05                     | 3.17 | 2.29  | 1.41 | 0.53  | -     | 12                    |
| 8.0              | 5.21                     | 4.18 | 3.16  | 2.13 | 1.11  | 0.08  | 11                    |
| 7.0              | 6.72                     | 5.50 | 4.29  | 3.07 | 1.86  | 0.64  | 9                     |
| 6.0              | 8.76                     | 7.29 | 5.82  | 4.35 | 2.88  | 1.41  | 7                     |
| 5.0              | 11.65                    | 9.82 | 7.99  | 6.16 | 4.33  | 2.49  | 6                     |
| 4.0              | 16.0                     | 13.7 | 11.29 | 8.90 | 6.52  | 4.14  | 5                     |
| 3.0              | 23.5                     | 20.1 | 16.8  | 13.5 | 10.23 | 6.92  | 3                     |
| 2.0              | 38.4                     | 33.2 | 28.1  | 22.9 | 17.7  | 12.53 | 2                     |
| 1.0              | -                        | -    | -     | -    | -     | 29.5  | 1                     |
|                  | 20                       | 30   | 40    | 50   | 60    | 70    |                       |

$T_A$   
Ambient temp. [°C]

|                                                       |        |       |
|-------------------------------------------------------|--------|-------|
| Junction to ambient thermal resistance, $R_{th\ j-a}$ | < 40.0 | K/W   |
| Junction to BTB tab thermal resistance, $R_{th\ j-t}$ | < 2.00 | K/W   |
| BTB tab to case thermal resistance, $R_{th\ t-s}$     | < 2.80 | K/W   |
| Case to heatsink thermal resistance, $R_{th\ c-s}$    | < 0.20 | K/W   |
| Maximum allowable BTB case temperature                | 100    | deg.C |
| Maximum allowable junction temperature                | 125    | deg.C |

### RS25.

| Load current [A] | Thermal resistance [K/W] |      |      |       |      |      | Power dissipation [W] |
|------------------|--------------------------|------|------|-------|------|------|-----------------------|
| 25.0             | 1.92                     | 1.61 | 1.30 | 1.00  | 0.69 | 0.39 | 33                    |
| 22.5             | 2.39                     | 2.04 | 1.69 | 1.34  | 0.99 | 0.63 | 28                    |
| 20.0             | 3.00                     | 2.59 | 2.18 | 1.77  | 1.36 | 0.95 | 24                    |
| 17.5             | 3.68                     | 3.19 | 2.71 | 2.22  | 1.74 | 1.25 | 21                    |
| 15.0             | 4.49                     | 3.90 | 3.32 | 2.73  | 2.14 | 1.56 | 17                    |
| 12.5             | 5.64                     | 4.91 | 4.18 | 3.45  | 2.72 | 1.99 | 14                    |
| 10.0             | 7.39                     | 6.44 | 5.49 | 4.55  | 3.60 | 2.65 | 11                    |
| 7.5              | 10.34                    | 9.03 | 7.71 | 6.39  | 5.07 | 3.75 | 8                     |
| 5.0              | 16.3                     | 14.2 | 12.2 | 10.11 | 8.05 | 5.99 | 5                     |
| 2.5              | -                        | -    | 25.7 | 21.4  | 17.0 | 12.7 | 2                     |
|                  | 20                       | 30   | 40   | 50    | 60   | 70   |                       |

$T_A$   
Ambient temp. [°C]

|                                                       |        |       |
|-------------------------------------------------------|--------|-------|
| Junction to ambient thermal resistance, $R_{th\ j-a}$ | < 20.0 | K/W   |
| Junction to case thermal resistance, $R_{th\ j-c}$    | < 1.10 | K/W   |
| Case to heatsink thermal resistance, $R_{th\ c-s}$    | < 0.20 | K/W   |
| Maximum allowable case temperature                    | 100    | deg.C |
| Maximum allowable junction temperature                | 125    | deg.C |



Heatsink Dimensions (cont.)

RS40..

| Load current [A] | Thermal resistance [K/W] |      |      |      |      |      | Power dissipation [W] |
|------------------|--------------------------|------|------|------|------|------|-----------------------|
|                  |                          |      |      |      |      |      |                       |
| 40.0             | 1.10                     | 0.89 | 0.68 | 0.47 | 0.26 | 0.05 | 48                    |
| 36.0             | 1.41                     | 1.18 | 0.94 | 0.70 | 0.46 | 0.22 | 42                    |
| 32.0             | 1.81                     | 1.54 | 1.26 | 0.98 | 0.70 | 0.43 | 36                    |
| 28.0             | 2.33                     | 2.01 | 1.68 | 1.35 | 1.03 | 0.70 | 31                    |
| 24.0             | 2.95                     | 2.56 | 2.16 | 1.77 | 1.38 | 0.98 | 25                    |
| 20.0             | 3.71                     | 3.22 | 2.73 | 2.24 | 1.75 | 1.27 | 20                    |
| 16.0             | 4.85                     | 4.22 | 3.59 | 2.96 | 2.33 | 1.69 | 16                    |
| 12.0             | 6.78                     | 5.91 | 5.03 | 4.16 | 3.29 | 2.41 | 11                    |
| 8.0              | 10.65                    | 9.30 | 7.94 | 6.58 | 5.23 | 3.87 | 7                     |
| 4.0              | 22.3                     | 19.5 | 16.7 | 13.9 | 11.1 | 8.25 | 4                     |
|                  | 20                       | 30   | 40   | 50   | 60   | 70   |                       |

$T_A$   
Ambient temp. [°C]

|                                                       |        |       |
|-------------------------------------------------------|--------|-------|
| Junction to ambient thermal resistance, $R_{th\ j-a}$ | < 20.0 | K/W   |
| Junction to case thermal resistance, $R_{th\ j-c}$    | < 0.90 | K/W   |
| Case to heatsink thermal resistance, $R_{th\ c-s}$    | < 0.20 | K/W   |
| Maximum allowable case temperature                    | 100    | deg.C |
| Maximum allowable junction temperature                | 125    | deg.C |

Fast-on terminals



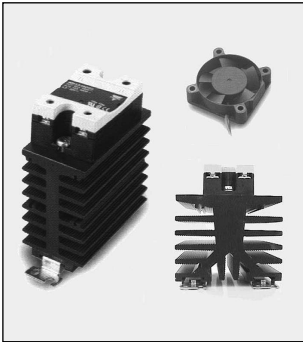
- Fast-on tabs
- Type R..F.
- Screw mounted fast-on terminals
- Flat (0°) and angled (45°) orientation
- Input tab width: 4.8mm
- Output tab width: 6.3mm
- Tab dimensions according to DIN 46342 part 1
- Pure tin-plated brass

Ordering Key

|                          |                  |            |   |
|--------------------------|------------------|------------|---|
|                          | <b>RS1A48D40</b> | <b>F 4</b> | * |
| RS, RM Solid State Relay |                  |            |   |
| Fast-on terminals        |                  |            |   |
| Tab orientation          |                  |            |   |

\* 0: Flat (0°)  
4: Angled (45°)

Other Accessories



- Heatsinks and fans
- Type RHS....
- 0.25 to 5.00 k/W
- Single and dual relay types



- Touch safety cover
- Type RMIP20
- IP20 protection degree
- Pack size: 20 pieces

All accessories can be ordered pre-assembled with Solid State Relays.  
Other accessories include DIN rail adaptors, fuses, varistors and spacers.  
For further information refer to Accessories datasheets.