

1-pole, solid state relay for resistive loads



Main features

- Zero cross switching AC solid state relay
- Triac output (100 AAC version with back to back thyristor output)
- Integrated overvoltage protection on output
- DC or AC control voltage
- LED for control presence indication
- Clip-on IP20 protection cover
- Self-lifting terminals

Description

The zero cross switching relay with triac output is an inexpensive solution for resistive loads. The zero switching relay switches ON when the sinusoidal voltage 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 IP20.

Specifications are at a surrounding temperature of 25°C unless otherwise specified.

Applications

Plastic injection machines, extrusion machines, blow moulding machines, thermoformers, dryers, electrical ovens, fryers, shrink tunnels, air handling units, reflow ovens, ambient heating, coffee machines.

Main functions

- 1-pole, zero cross switching
- Rated output voltage up to 528 VAC
- Rated output current up to 100 AAC
- 3-32 VDC or 80-250 VAC control voltage range


Order code

RS1A **E**

 Enter the code option instead of . Refer to the Selection guide section for valid part numbers.

| Code | Option | Description | Comments |
|--------------------------|--------|--|---|
| R | - | Solid State Relay (RS) | |
| S | - | | |
| 1 | - | 1-pole switching | |
| A | - | Zero Cross switching (ZC) | |
| <input type="checkbox"/> | 40 | Rated voltage: 24 - 440 VAC, 600 Vp | |
| | 48 | Rated voltage: 24 - 528 VAC, 800 Vp | 42 - 528 VAC, 1200 Vp for RS1A48..60/80/100E variants |
| <input type="checkbox"/> | D | Control voltage: 3 - 32 VDC | 4 - 32 VDC for RS1A48..60/80/100E variants |
| | A | Control voltage: 80 - 250 VAC | |
| <input type="checkbox"/> | 25 | Rated current: 25 AAC (215 A ² s) | |
| | 40 | Rated current: 40 AAC (560 A ² s) | |
| | 60 | Rated current: 60 AAC (1500 A ² s) | |
| | 80 | Rated current: 80 AAC (3200 A ² s) | |
| | 100 | Rated current: 100 AAC (6000 A ² s) | |
| E | - | Enhanced | |
| <input type="checkbox"/> | B | Bulk packaging x 120 pcs | |


Selection guide: RS..E

| Rated voltage, Blocking voltage, Switching mode | Control voltage | Maximum rated operational current | | | | |
|---|-----------------|-----------------------------------|-------------------------------|--------------------------------|--------------------------------|---------------------------------|
| | | 25 AAC (215 A ² s) | 40 AAC (560 A ² s) | 60 AAC (1500 A ² s) | 80 AAC (3200 A ² s) | 100 AAC (6000 A ² s) |
| 400 VAC, 600 Vp, ZC | 3 - 32 VDC | RS1A40D25E | RS1A40D40E | RS1A40D60E | RS1A40D80E | RS1A40D100E |
| | 80 - 250 VAC | RS1A40A25E | RS1A40A40E | - | - | - |
| 480 VAC, 800 Vp, ZC | 3 - 32 VDC | RS1A48D25E | RS1A48D40E | - | - | - |
| | 80 - 250 VAC | RS1A48A25E | RS1A48A40E | - | - | - |
| 480 VAC, 1200 Vp, ZC | 4 - 32 VDC | - | - | RS1A48D60E | RS1A48D80E | RS1A48D100E |
| | 80 - 250 VAC | - | - | RS1A48A60E | RS1A48A80E | RS1A48A100E |

Selection guide: RS..EB

| Rated voltage, Blocking voltage, Switching mode | Control voltage | Maximum rated operational current | | | | |
|---|-----------------|-----------------------------------|-------------------------------|--------------------------------|--------------------------------|---------------------------------|
| | | 25 AAC (215 A ² s) | 40 AAC (560 A ² s) | 60 AAC (1500 A ² s) | 80 AAC (3200 A ² s) | 100 AAC (6000 A ² s) |
| 400 VAC, 600 Vp, ZC | 3 - 32 VDC | RS1A40D25EB | RS1A40D40EB | RS1A40D60EB | RS1A40D80EB | - |

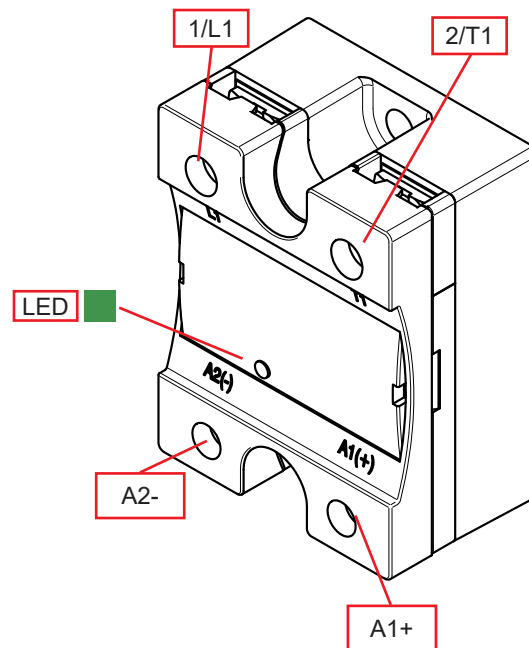
Carlo Gavazzi compatible components

| Description | Component code | Notes |
|----------------------------|----------------|---|
| FASTON terminals | RM48**/F4* | - Faston tabs (pack of 20) - Tab dimensions according to DIN 46342 part 1 - Pure tin-plated brass |
| Fork terminals | RM635FK/P | - Terminal adaptors for 35mm ² cable - Type RM635FK (P version with touch protection) - Pack size: 10 pieces |
| Thermal pads | KK071CUT | - Graphite thermal pad with adhesive on one side - Dimensions: 35 x 43 x 0.25 mm - Packing quantity: 50 pieces |
| Touch safety cover | RMIP20 | - IP20 protection degree - Pack size: 20 pieces |
| Heatsinks | RHS | Heatsinks and fans |
| Mounting screws kit | SRWKITM5X10MM | - M5 x 10 mm with captivated washer - Pack size: 20 pieces |

Carlo Gavazzi further reading

| Information | Where to find it | Notes |
|------------------|---|---|
| Datasheet | https://gavazziautomation.com/images/PIM/DATASHEET/ENG/SSR_Accessories.pdf | Solid state relay Accessories (including Heatsinks) |
| | https://www.gavazziautomation.com/nsc/HQ/EN/heat_sink_selector_tool | Online Heatsink selector tool |

Structure



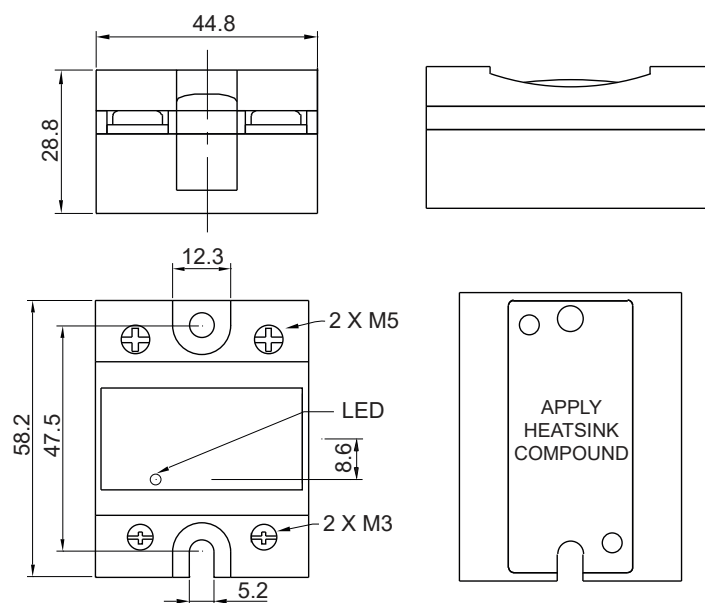
| Element | Component | Function |
|----------|--------------------|---------------------------------------|
| 1/L1 | Power connection | Mains connection |
| 2/T1 | Power connection | Load connection |
| A1+, A2- | Control connection | Terminals for control voltage |
| LED | ON indicator | Indicates presence of control voltage |

Features

General data

| | | |
|-------------------------|---|--|
| Material | Noryl GFN 1, black | |
| Mounting | Panel mount | |
| Touch Protection | IP20 | |
| Baseplate | Aluminium | |
| Isolation | Input to output Input to case Output to case RS1A..25, 40E Output to case RS1A..60, 80, 100E | ≥ 4000 VACrms ≥ 4000 VACrms ≥ 2500 VACrms ≥ 4000 VACrms |
| Weight | RS1A..25, 40, 100E RS1A..60, 80E | approx. 85 g approx. 79 g |

Dimensions



Dimensions in mm.
Tolerances ± 0.5 mm.

Performance

Output specifications

| | RS1A..25E | RS1A..40E | RS1A..60E | RS1A..80E | RS1A..100E |
|--|-------------------------|----------------------|-----------------------|-----------------------|-----------------------|
| Max. operational current ¹ : AC-51 | 25 AAC | 40 AAC | 60 AAC | 80 AAC | 100 AAC |
| Operational frequency range | 45 to 65 Hz | | | | |
| Output protection | Integrated varistor | | | | |
| Leakage current @ rated voltage | < 3 mAAC | | | | |
| Minimum operational current | 250 mAAC | 400 mAAC | 250 mAAC | 400 mAAC | 500 mAAC |
| Non-repetitive surge current (I_{TSM}), t=20 ms | 175 Ap | 280 Ap | 550 Ap | 800 Ap | 1096 Ap |
| I ² t for fusing (t=10 ms), minimum | 215 A ² s | 560 A ² s | 1500 A ² s | 3200 A ² s | 6000 A ² s |
| Power factor | > 0.95 at rated voltage | | | | |
| Critical dV/dt (@T _J init = 40°C) | ≥ 1000 V/μs | | | | |

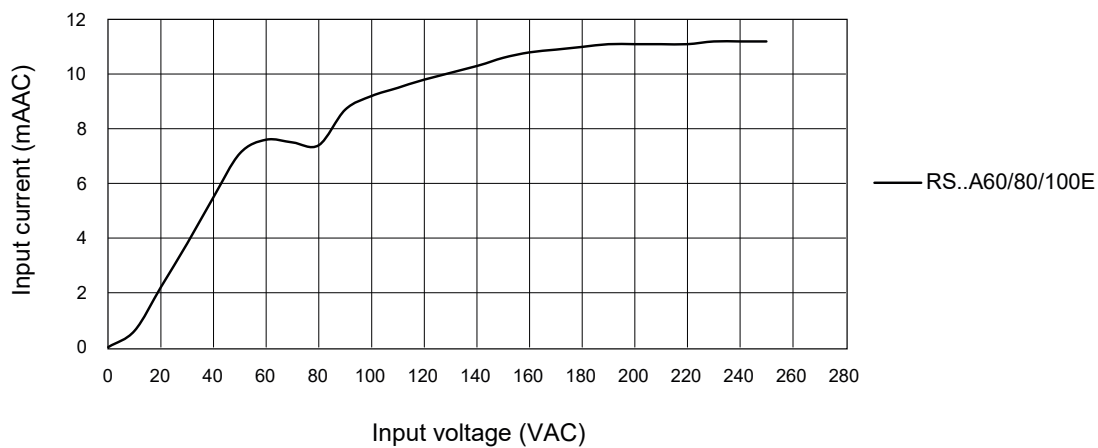
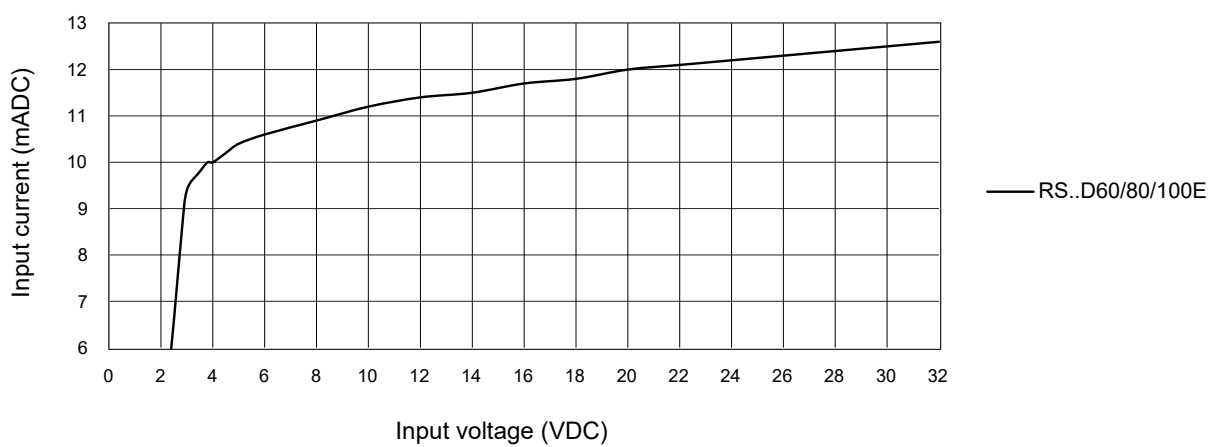
1. Refer to Heatsink selection section

Output voltage specifications

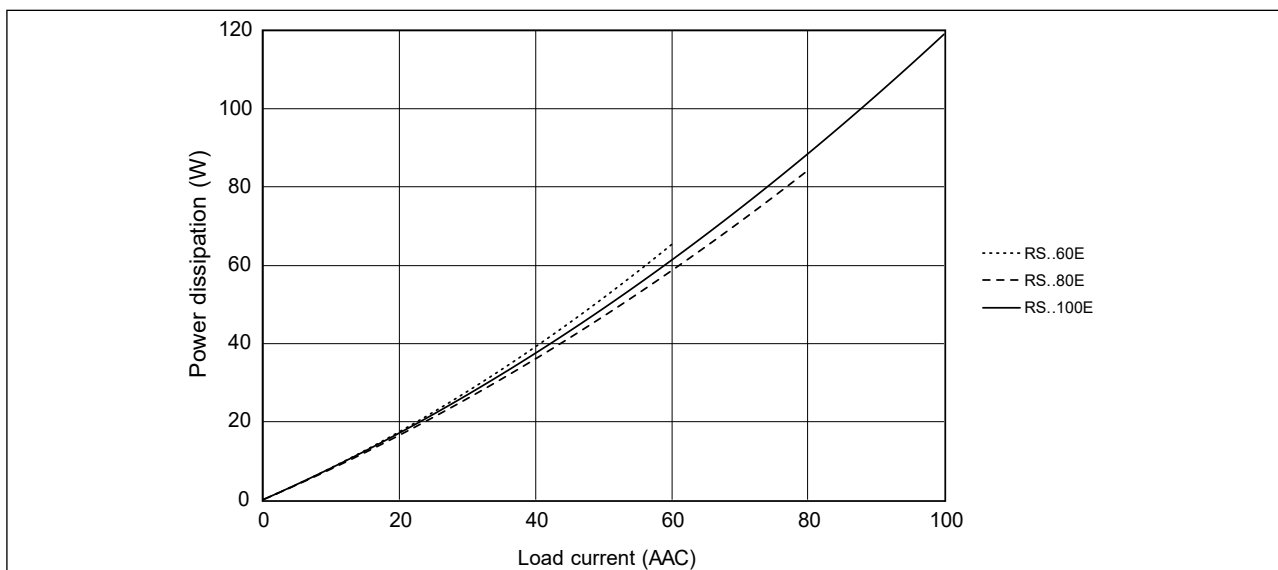
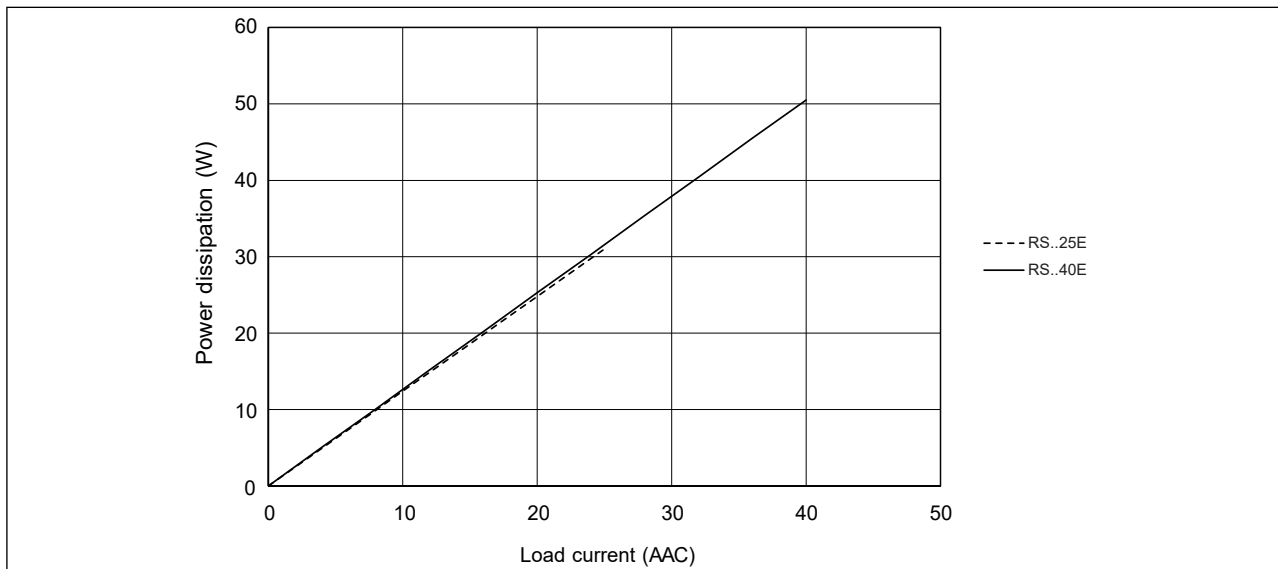
| | RS1A40..E | RS1A48..E |
|--|---------------|--------------------------------|
| Operational voltage range 25 A, 40 A 60 A, 80 A, 100 A | 24 to 440 VAC | 24 to 528 VAC 42 to 528 VAC |
| Blocking voltage 25 A, 40 A 60 A, 80 A, 100 A | 600 Vp | 800 Vp 1200 Vp |

Inputs

| | RS1A40D..E | RS1A48D..E | RS1A..A..E |
|--|-------------|--------------------------|--------------|
| Control voltage range 25 A, 40 A 60 A, 80 A, 100 A | 3 - 32 VDC | 3 - 32 VDC 4 - 32 VDC | 80 - 250 VAC |
| Pick-up voltage 25 A, 40 A 60 A, 80 A, 100 A | 3 VDC | 3 VDC 4 VDC | 70 VAC |
| Drop-out voltage | 1.2 VDC | | 15 VAC |
| Maximum reverse voltage | 32 VDC | | - |
| Maximum response time pick-up | 1/2 cycle | | 1 cycle |
| Response time drop-out | ≤ 1/2 cycle | | 2.5 cycles |
| Input current @ max input voltage | ≤ 15 mA | | ≤ 12.5 mA |

Input current vs. input voltage**AC input****DC input**

Output power dissipation



Thermal data

| | RS1A..25E | RS1A..40E | RS1A..60E | RS1A..80E | RS1A..100E |
|---|-------------|-------------|-----------|-----------|------------|
| Max. junction temperature | 125°C | | | | |
| Junction to case thermal resistance, R_{thjc} | <2.31°C/W | <1.68°C/W | <0.90°C/W | <0.63°C/W | <0.35°C/W |
| Case to heatsink thermal resistance, R_{thcs}^2 | < 0.054°C/W | < 0.054°C/W | <0.20°C/W | <0.15°C/W | <0.10°C/W |

2. Thermal resistance case to heatsink values are applicable upon application of a fine layer of silicon based thermal paste HTS02S from Electrolube between SSR and heatsink.

Heatsink selection

Thermal resistance [°C/W] of RS1A..25E

| Load current [A] | Surrounding ambient temperature [°C] | | | | | |
|------------------|--------------------------------------|------|------|------|------|------|
| | 20 | 30 | 40 | 50 | 60 | 70 |
| 25.0 | 1.02 | 0.70 | 0.37 | 0.05 | - | - |
| 22.5 | 1.39 | 1.04 | 0.68 | 0.32 | - | - |
| 20.0 | 1.86 | 1.46 | 1.06 | 0.65 | 0.25 | - |
| 17.5 | 2.47 | 2.00 | 1.54 | 1.08 | 0.62 | 0.16 |
| 15.0 | 3.27 | 2.73 | 2.19 | 1.66 | 1.12 | 0.58 |
| 12.5 | 4.39 | 3.75 | 3.10 | 2.46 | 1.18 | 1.17 |
| 10.0 | 6.08 | 5.28 | 4.47 | 3.66 | 2.86 | 2.05 |
| 7.5 | 8.89 | 7.82 | 6.74 | 5.67 | 4.59 | 3.50 |
| 5.0 | 13.7 | 12.0 | 10.4 | 8.82 | 7.20 | 5.59 |
| 2.5 | nh | nh | nh | 17.7 | 14.5 | 11.2 |

Thermal resistance [°C/W] of RS1A..40E

| Load current [A] | Surrounding ambient temperature [°C] | | | | | |
|------------------|--------------------------------------|------|------|------|------|------|
| | 20 | 30 | 40 | 50 | 60 | 70 |
| 40.0 | 0.36 | 0.16 | - | - | - | - |
| 36.0 | 0.60 | 0.38 | 0.16 | - | - | - |
| 32.0 | 0.89 | 0.65 | 0.40 | 0.15 | - | - |
| 28.0 | 1.27 | 0.99 | 0.71 | 0.43 | 0.14 | - |
| 24.0 | 1.78 | 1.45 | 1.12 | 0.79 | 0.46 | - |
| 20.0 | 2.50 | 2.10 | 1.70 | 1.31 | 0.91 | 0.28 |
| 16.0 | 3.56 | 3.07 | 2.57 | 2.08 | 1.58 | 0.80 |
| 12.0 | 5.34 | 4.68 | 4.02 | 3.36 | 2.71 | 1.66 |
| 8.0 | 8.36 | 7.37 | 6.38 | 5.39 | 4.40 | 3.39 |
| 4.0 | 16.8 | 14.8 | 12.8 | 10.8 | 8.85 | 6.87 |

Thermal resistance [°C/W] of RS1A..60E

| Load current [A] | Surrounding ambient temperature [°C] | | | | | | |
|------------------|--------------------------------------|------|------|------|------|------|------|
| | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
| 60.0 | 0.71 | 0.51 | 0.32 | 0.13 | - | - | - |
| 54.0 | 1.01 | 0.78 | 0.55 | 0.33 | 0.12 | - | - |
| 48.0 | 1.41 | 1.13 | 0.85 | 0.59 | 0.34 | 0.10 | - |
| 42.0 | 1.97 | 1.61 | 1.27 | 0.94 | 0.63 | 0.33 | 0.05 |
| 36.0 | 2.75 | 2.31 | 1.86 | 1.44 | 1.04 | 0.66 | 0.31 |
| 30.0 | 3.65 | 3.04 | 2.48 | 1.96 | 1.47 | 1.02 | 0.59 |
| 24.0 | 5.17 | 4.26 | 3.45 | 2.70 | 2.03 | 1.41 | 0.83 |
| 18.0 | 8.35 | 6.71 | 5.31 | 4.10 | 3.04 | 2.10 | 1.26 |
| 12.0 | 18.9 | 13.9 | 10.3 | 7.58 | 5.41 | 3.64 | 2.17 |
| 6.0 | nh | nh | nh | nh | 17.3 | 9.99 | 5.41 |

Thermal resistance [°C/W] of RS1A..80E






| Load current [A] | Surrounding ambient temperature [°C] | | | | | | |
|------------------|--------------------------------------|------|------|------|------|------|------|
| | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
| 80.0 | 0.61 | 0.46 | 0.32 | 0.18 | 0.04 | - | - |
| 72.0 | 0.85 | 0.67 | 0.49 | 0.33 | 0.16 | 0.01 | - |
| 64.0 | 1.15 | 0.93 | 0.72 | 0.52 | 0.33 | 0.14 | - |
| 56.0 | 1.57 | 1.29 | 1.03 | 0.79 | 0.55 | 0.32 | 0.11 |
| 48.0 | 2.08 | 1.75 | 1.44 | 1.14 | 0.86 | 0.57 | 0.30 |
| 40.0 | 2.74 | 2.29 | 1.88 | 1.49 | 1.12 | 0.78 | 0.45 |
| 32.0 | 3.86 | 3.19 | 2.59 | 2.04 | 1.54 | 1.07 | 0.63 |
| 24.0 | 6.14 | 4.97 | 3.95 | 3.07 | 2.29 | 1.59 | 0.95 |
| 16.0 | 13.3 | 10.0 | 7.53 | 5.59 | 4.03 | 2.73 | 1.63 |
| 8.0 | nh | nh | nh | nh | 12.3 | 7.31 | 4.03 |

Thermal resistance [°C/W] of RS1A..100E

| Load current [A] | Surrounding ambient temperature [°C] | | | | | | |
|------------------|--------------------------------------|------|------|------|------|------|------|
| | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
| 100.0 | 0.51 | 0.41 | 0.32 | 0.22 | 0.13 | 0.03 | - |
| 90.0 | 0.67 | 0.56 | 0.44 | 0.33 | 0.22 | 0.11 | 0.01 |
| 80.0 | 0.88 | 0.74 | 0.60 | 0.47 | 0.34 | 0.21 | 0.08 |
| 70.0 | 1.12 | 0.95 | 0.79 | 0.63 | 0.47 | 0.32 | 0.18 |
| 60.0 | 1.42 | 1.20 | 0.99 | 0.79 | 0.60 | 0.42 | 0.24 |
| 50.0 | 1.86 | 1.57 | 1.30 | 1.04 | 0.79 | 0.55 | 0.33 |
| 40.0 | 2.60 | 2.18 | 1.80 | 1.43 | 1.09 | 0.77 | 0.46 |
| 30.0 | 4.04 | 3.34 | 2.71 | 2.14 | 1.62 | 1.14 | 0.70 |
| 20.0 | 8.03 | 6.35 | 4.97 | 3.81 | 2.82 | 1.96 | 1.20 |
| 10.0 | nh | nh | 18.8 | 12.0 | 7.89 | 5.02 | 2.90 |

"nh" means no heatsink necessary. The SSR should still be tightened to a surface to ensure optimal thermal dissipation.

Compatibility and conformance

| | |
|-----------------------------|--|
| Approvals |      |
| Standards compliance | LVD: EN 60947-4-3 EMCD: EN 60947-4-3 EE: EN 60947-4-3 EMC: EN 60947-4-3 cURus: UL508 Recognized (E80573), NRNT2, NRNT8 CSA: C22.2 No. 14 (204075) |

* applicable only to RS..25E and RS..40E

| Electromagnetic compatibility (EMC) - Immunity | |
|--|--|
| Electrostatic discharge (ESD) | EN/IEC 61000-4-2 8 kV air discharge, 4 kV contact (PC2) |
| Radiated radio frequency | EN/IEC 61000-4-3 10 V/m, from 80 MHz to 1 GHz (PC1) 10 V/m, from 1.4 to 2 GHz (PC1) 3 V/m, from 2 to 2.7 GHz (PC1) |
| Electrical fast transient (burst) | EN/IEC 61000-4-4 Output: 2 kV, 5 kHz (PC2) Input: 1 kV, 5 kHz (PC2) |
| Conducted radio frequency | EN/IEC 61000-4-6 10 V/m, from 0.15 to 80 MHz (PC1) |
| Electrical surge | EN/IEC 61000-4-5 Output, line to line: 1 kV (PC2) Output, line to earth: 1 kV (PC2) Output, line to earth: 2 kV (PC2)* Input, line to line: 1 kV (PC2) Input, line to earth: 2 kV (PC2) |
| Voltage dips | EN/IEC 61000-4-11 0% for 0.5, 1 cycle (PC2) 40% for 10 cycles (PC2) 70% for 25 cycles (PC2) 80% for 250 cycles (PC2) |
| Voltage interruptions | EN/IEC 61000-4-11 0% for 5000 ms (PC2) |


*with external suppression for RS..25E, RS..40E

| Electromagnetic compatibility (EMC) - Emissions | |
|---|--|
| Radio interference field emission (radiated) | EN/IEC 55011 Class A: from 30 to 1000 MHz |
| Radio interference voltage emissions (conducted) | EN/IEC 55011 Class A: from 0.15 to 30 MHz. External filter may be required. |

Note:

- Control input lines must be installed together to maintain products' susceptibility to Radio Frequency interference.
- The control terminals A1, A2 (RS1A..A.) shall be supplied by a secondary circuit where power is limited by a transformer, rectifier, voltage divider, or similar device that derives power from a primary circuit, and where the short-circuit limit between conductors of the secondary circuit or between conductors and ground is 1500 VA or less. The short-circuit volt ampere limit is the product of the open circuit voltage and the short circuit ampere.
- Performance Criteria 1 (PC1): No degradation of performance or loss of function is allowed when the product is operated as intended.
- Performance Criteria 2 (PC2): During the test, degradation of performance or partial loss of function is allowed. However when the test is complete the product should return operating as intended by itself.
- Performance Criteria 3 (PC3): Temporary loss of function is allowed, provided the function can be restored by manual operation of the controls.

Environmental specifications

| | |
|------------------------------|---|
| Operating temperature | -20°C to +70°C (-4°F to +158°F) max. +60°C (+140°F) for RS..A60/80/100E |
| Storage temperature | -40°C to +100°C (-40°F to +212°F) |
| Relative humidity | < 95% non-condensing |
| Pollution degree | 2 |
| Installation altitude | 0-1000 m. Above 1000 m derate linearly by 1% of FLC per 100 m up to a maximum of 2000 m |
| EU RoHS compliant | Yes |
| China RoHS |  |

The declaration in this section is prepared in compliance with People's Republic of China Electronic Industry Standard SJ/T11364-2014: Marking for the Restricted Use of Hazardous Substances in Electronic and Electrical Products.

| Part Name | Toxic or Hazardous Substances and Elements | | | | | |
|----------------------------|--|--------------|--------------|------------------------------|--------------------------------|---------------------------------------|
| | Lead (Pb) | Mercury (Hg) | Cadmium (Cd) | Hexavalent Chromium (Cr(VI)) | Polybrominated biphenyls (PBB) | Polybrominated diphenyl ethers (PBDE) |
| Power Unit Assembly | x | ○ | ○ | ○ | ○ | ○ |

O: Indicates that said hazardous substance contained in homogeneous materials for this part are below the limit requirement of GB/T 26572.

X: Indicates that said hazardous substance contained in one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.

这份申明根据中华人民共和国电子工业标准
SJ/T11364-2014：标注在电子电气产品中限定使用的有害物质

| 零件名称 | 有毒或有害物质与元素 | | | | | |
|------|------------|--------|--------|--------------|------------|--------------|
| | 铅 (Pb) | 汞 (Hg) | 镉 (Cd) | 六价铬 (Cr(VI)) | 多溴联苯 (PBB) | 多溴联苯醚 (PBDE) |
| 功率单元 | x | ○ | ○ | ○ | ○ | ○ |

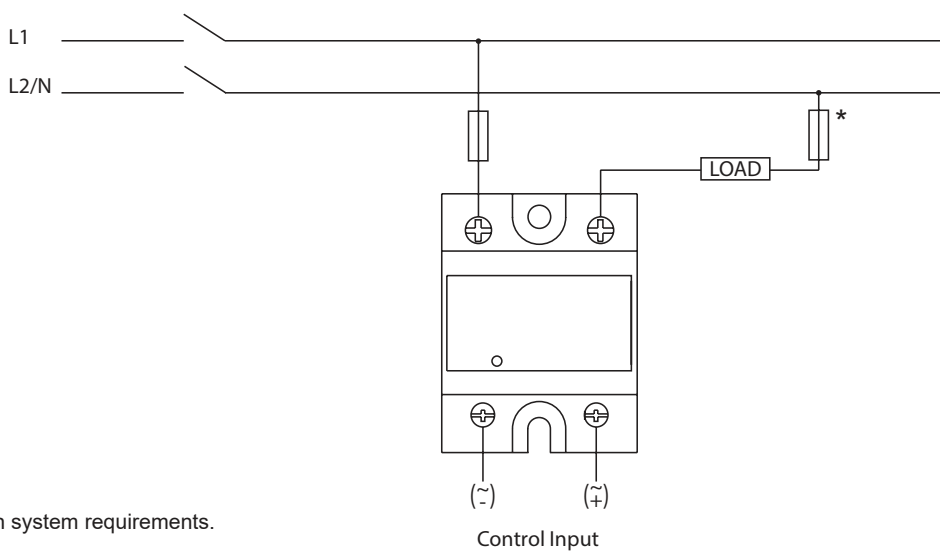
O: 此零件所有材料中含有的该有害物低于GB/T 26572的限定。

X: 此零件某种材料中含有的该有害物高于GB/T 26572的限定。

▶ Short circuit protection, co-ordination type 2

| Part No. | Prospective short circuit current [kArms] | Ferraz Shawmut (Mersen) | | Max. voltage [VAC] |
|------------|---|-------------------------|------------------------------|--------------------|
| | | Max fuse size [A] | Part number | |
| RS1A..25E | - | - | | - |
| RS1A..40E | | | | |
| RS1A..60E | 5 | 40 | 5014006.40 VC22-40A700VAC | 528 |
| RS1A..80E | | 63 | 5014006.63 VC22-63A700VAC | 528 |
| RS1A..100E | | 80 | 5014006.80 VC22-80A700VAC | 528 |

▶ Connection diagram

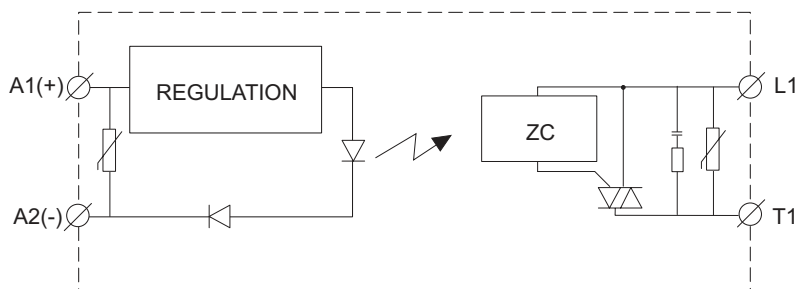


* Depends on system requirements.

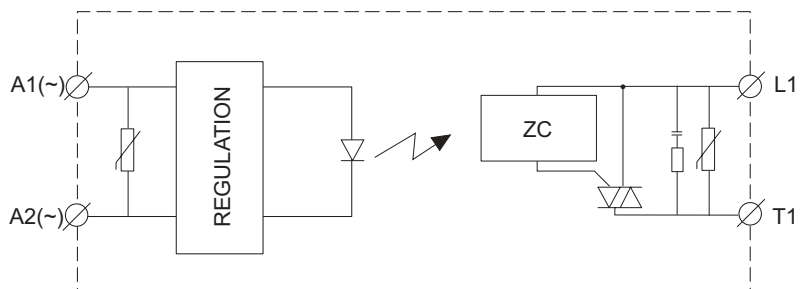
Functional diagram

RS1A..25, 40, 60, 80E

DC control

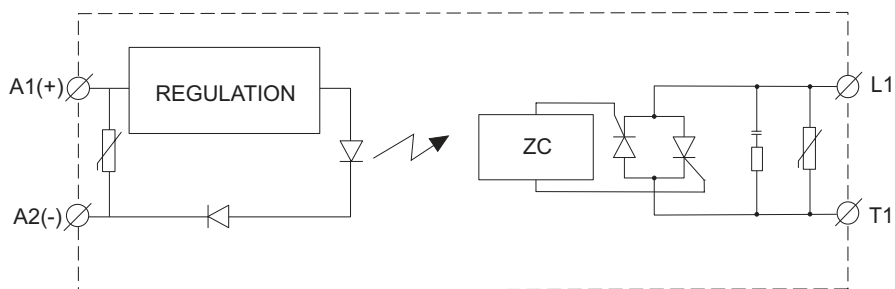


AC control

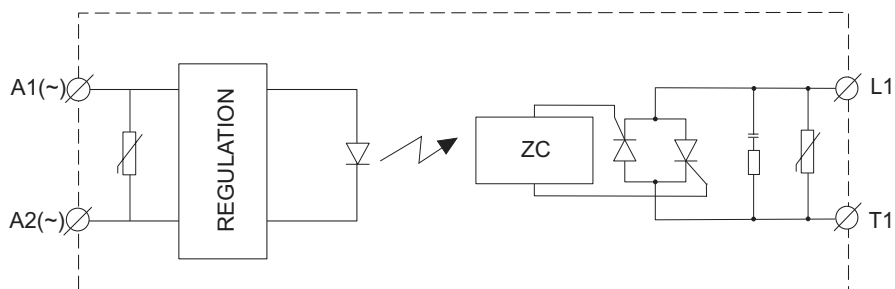


RS1A..100E

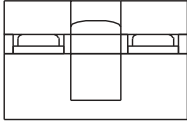
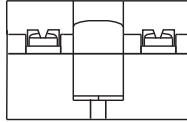
DC control



AC control



Connection Specifications

| | 1/L2, 2/T1 | | A1+, A2- | |
|---|--|--|---|--|
| |  | |  | |
| Mounting screws (SSR to heatsink) | M5, not provided with SSR (refer to SRWKITM5X10MM in the Compatible components section) | | | |
| Mounting torque (SSR to heatsink) | 1.5 - 2.0 Nm (13.3 - 17.7 lb-in) | | | |
| Connection type | M5 screw with captivated washer | | M3 screw with captivated washer | |
| Stripping length | 12 mm | | 8 mm | |
| Rigid (solid & stranded) UR/cUR rated data | 1 x 2.5 – 6.0 mm ² 1 x 14 – 10 AWG | 2x 2.5 – 6.0 mm ² 2x 14 – 10 AWG | 1x 0.5 – 2.5 mm ² 1x 18 – 12 AWG | 2x 0.5 - 2.5 mm ² 2x 18 - 12 AWG |
| Flexible with end sleeve | 1 x 1.0 – 4.0 mm ² 1 x 18 – 12 AWG | 2x 1.0 – 2.5 mm ² 2x 2.5 – 4.0 mm ² 2x 18 – 14 AWG 2x 14 – 12 AWG | 1x 0.5 – 2.5 mm ² 1x 18 – 12 AWG | 2x 0.5 - 2.5 mm ² 2x 18 - 12 AWG |
| Flexible without end sleeve | 2x 1.0 – 6.0 mm ² 2x 18 – 10 AWG | 2x 1.0 – 2.5 mm ² 2x 2.5 – 6.0 mm ² 2x 18 – 14 AWG 2x 14 – 10 AWG | 1x 1.0 – 6.0mm ² 1x 18 –10 AWG | |
| Torque specifications | Posidrive bit 2 2.4 Nm (21.2 lb-in) | | Posidrive bit 1 0.5 Nm (4.4 lb-in) | |
| Aperture for termination lug (fork or ring) | 12 mm | | 7.5 mm | |



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