

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 40 AACrms
- Rated operational voltage: 230 - 600 VACrms
- Input range: 4.5 - 32 VDC
- Blocking voltage: Up to 1200 Vp
- Opto-isolation: 4000 VACrms

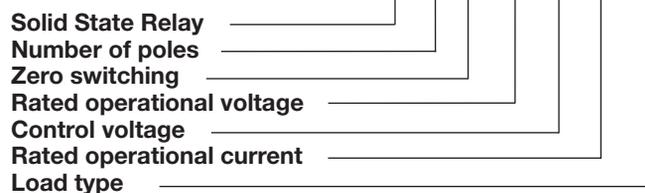


Product Description

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



Type Selection

| Switching mode | Rated operational voltage | Rated operational current | Control voltage | Blocking voltage | Load type |
|-------------------|--|--|-----------------|--|--------------|
| A: Zero switching | 23: 230 VACrms 48: 480 VACrms 60: 600 VACrms | 25: 2 x 25 AACrms 40: 2 x 40 AACrms | D: 4.5 - 32 VDC | 23: 650 V _p 48: 1200 V _p 60: 1200 V _p | M: Inductive |

ZS = Zero Switching

Selection Guide

| Rated operational voltage | Blocking voltage | Control voltage | Rated operational current | |
|---------------------------|---------------------|-----------------|---------------------------|---------------|
| | | | 2 x 25 AACrms | 2 x 40 AACrms |
| 230 VACrms | 650 V _p | 4.5 - 32 VDC | RA2A23D25 | RA2A23D40 |
| | | | RA2A23D25M | RA2A23D40M |
| 480 VACrms | 1200 V _p | 4.5 - 32 VDC | RA2A48D25 | RA2A48D40 |
| | | | RA2A48D25M | RA2A48D40M |
| 600 VACrms | 1200 V _p | 4.5 - 32 VDC | RA2A60D25 | RA2A60D40 |
| | | | RA2A60D25M | RA2A60D40M |

General Specifications

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

Output Specifications

| | RA2A...25 | RA2A...40 | RA2A..D25M | RA2A..D40M |
|---|----------------------|-----------------------|-------------------------------|--------------------------------|
| Rated operational current AC 51 AC 53a | 2 x 25 AACrms - | 2 x 40 AACrms - | 2 x 25 AACrms 2 x 5 AACrms | 2 x 40 AACrms 2 x 15 AACrms |
| Minimum operational current | 150 mA | 250 mA | 150 mA | 250 mA |
| Non-rep. surge current t=10 ms | 325 A _p | 600 A _p | 325 A _p | 600 A _p |
| Off-state leakage current | < 3 mA | < 3 mA | < 3 mA | < 3 mA |
| I ² t for fusing t=10 ms | 525 A ² s | 1800 A ² s | 525 A ² s | 1800 A ² s |
| Critical dV/dt off-state min. | 500 V/μs | 500 V/μs | 500 V/μs | 500 V/μs |
| Zero crossing detection | Yes | Yes | Yes | Yes |

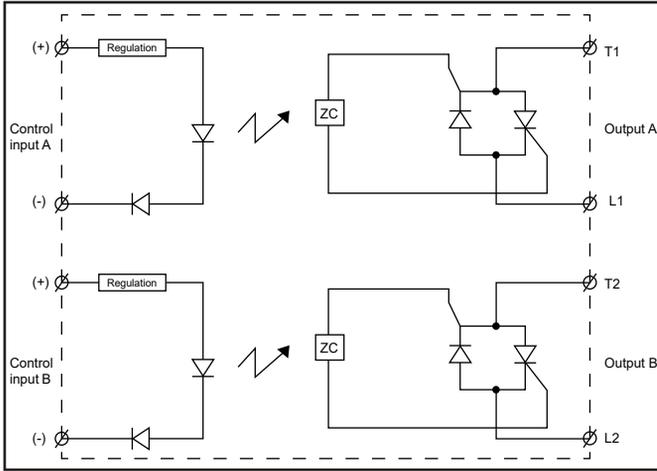
Input Specifications

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

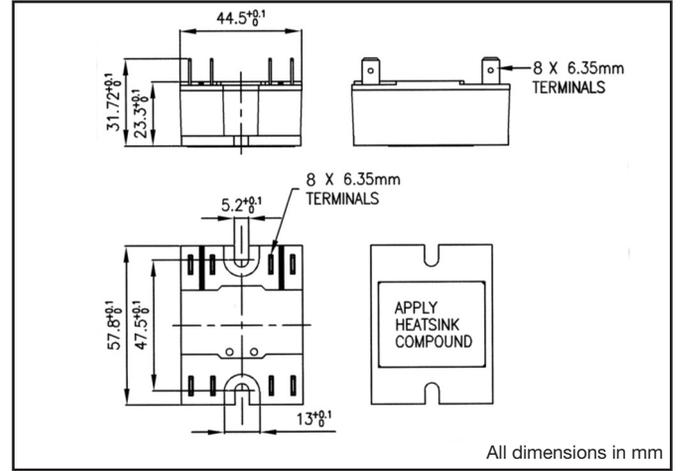
Housing Specifications

| | |
|---|---|
| Weight | Approx. 85 g |
| Housing material | Noryl GFN 1, black |
| Base plate 25, 40 A 40 A (M type) | Aluminium, nickel-plated Copper, nickel-plated |
| FASTON Terminal size | 6.35 x 0.8 mm |
| Relay Mounting screws Mounting torque | M5 1.5 - 2.0 Nm |

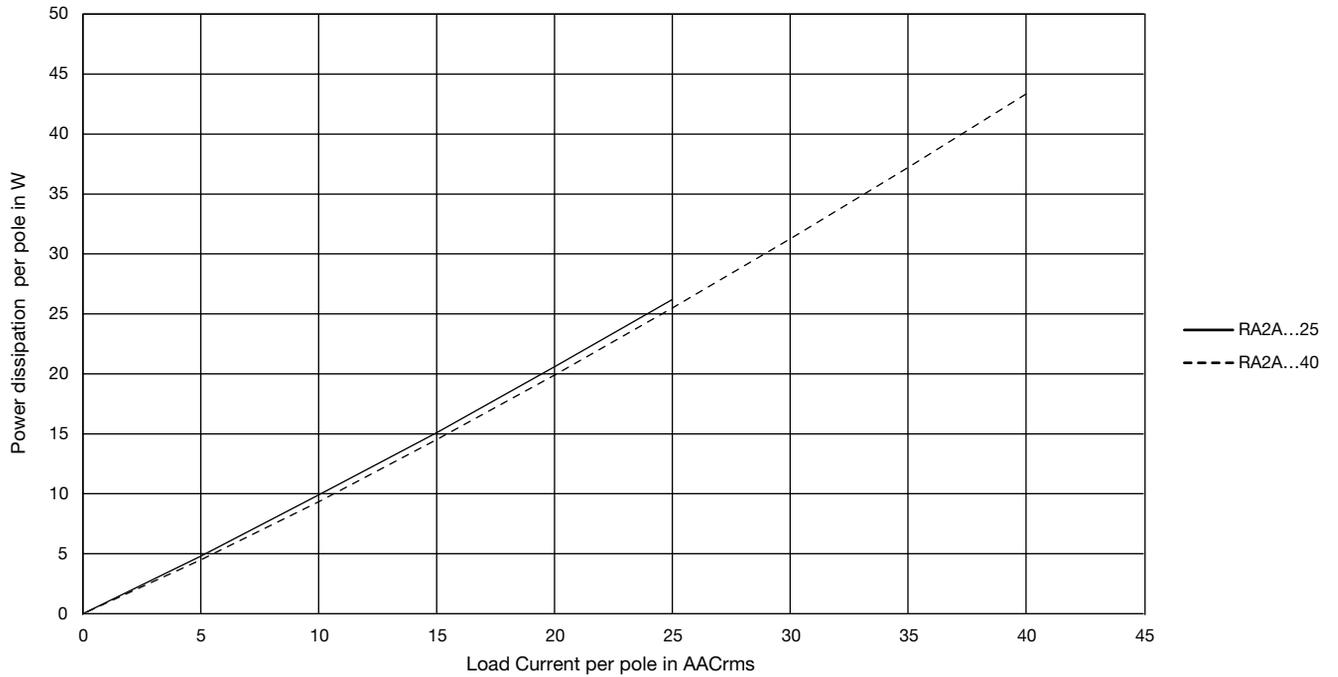
Functional Diagram



Dimensions



Output Power Dissipation



Heatsink Dimensions (load current versus ambient temperature)

RA 2....25/25M

| Load current [A] | Thermal resistance [°C/W] | | | | | |
|------------------|---------------------------|------|------|------|------|------|
| | 20 | 30 | 40 | 50 | 60 | 70 |
| 50 | 1.11 | 0.94 | 0.78 | 0.62 | 0.46 | 0.29 |
| 45 | 1.36 | 1.17 | 0.99 | 0.80 | 0.61 | 0.43 |
| 40 | 1.68 | 1.47 | 1.25 | 1.03 | 0.81 | 0.60 |
| 35 | 2.06 | 1.80 | 1.54 | 1.29 | 1.03 | 0.77 |
| 30 | 2.5 | 2.2 | 1.87 | 1.56 | 1.25 | 0.94 |
| 25 | 3.1 | 2.7 | 2.3 | 1.9 | 1.6 | 1.17 |
| 20 | 4.0 | 3.5 | 3.0 | 2.5 | 2.0 | 1.52 |
| 15 | 6 | 5 | 4 | 3.5 | 2.8 | 2.1 |
| 10 | 9 | 8 | 7 | 6 | 4 | 3.3 |
| 5 | 18 | 16 | 14 | 12 | 9 | 7 |

T_A
Ambient temp. [°C]

RA 2....40

| Load current [A] | Thermal resistance [°C/W] | | | | | |
|------------------|---------------------------|------|------|------|------|------|
| | 20 | 30 | 40 | 50 | 60 | 70 |
| 80 | 0.68 | 0.56 | 0.44 | 0.32 | 0.19 | 0.07 |
| 72 | 0.87 | 0.73 | 0.59 | 0.45 | 0.31 | 0.17 |
| 64 | 1.10 | 0.94 | 0.78 | 0.62 | 0.45 | 0.29 |
| 56 | 1.41 | 1.22 | 1.03 | 0.83 | 0.64 | 0.45 |
| 48 | 1.8 | 1.6 | 1.36 | 1.13 | 0.90 | 0.67 |
| 40 | 2.3 | 2.0 | 1.7 | 1.4 | 1.1 | 0.86 |
| 32 | 3.0 | 2.6 | 2.2 | 1.9 | 1.5 | 1.11 |
| 24 | 4 | 4 | 3 | 2.6 | 2.0 | 1.5 |
| 16 | 6 | 6 | 5 | 4 | 3 | 2.4 |
| 8 | 13 | 12 | 10 | 8 | 7 | 5 |

T_A
Ambient temp. [°C]

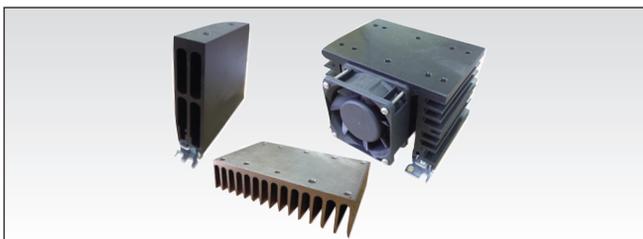
RA 2....40M

| Load current [A] | Thermal resistance [K/W] | | | | | |
|------------------|--------------------------|------|------|------|------|------|
| | 20 | 30 | 40 | 50 | 60 | 70 |
| 100 | 0.41 | 0.32 | 0.23 | 0.13 | 0.04 | - |
| 90 | 0.55 | 0.44 | 0.34 | 0.23 | 0.13 | 0.02 |
| 80 | 0.72 | 0.60 | 0.48 | 0.35 | 0.23 | 0.11 |
| 70 | 0.95 | 0.80 | 0.66 | 0.52 | 0.37 | 0.23 |
| 60 | 1.25 | 1.08 | 0.90 | 0.73 | 0.56 | 0.39 |
| 50 | 1.7 | 1.5 | 1.25 | 1.04 | 0.83 | 0.61 |
| 40 | 2.2 | 1.9 | 1.6 | 1.4 | 1.1 | 0.82 |
| 30 | 3 | 2.7 | 2.3 | 1.9 | 1.5 | 1.14 |
| 20 | 5 | 4 | 4 | 2.9 | 2.3 | 1.8 |
| 10 | 10 | 9 | 7 | 6 | 5 | 3.6 |
| 5 | 20 | 17 | 15 | 12 | 10 | 7 |

T_A
Ambient temp. [°C]

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.

Heatsink Selection



Heatsink Range Overview:
http://www.productselection.net/PDF/UK/ssr_accessories.pdf

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

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

Applications

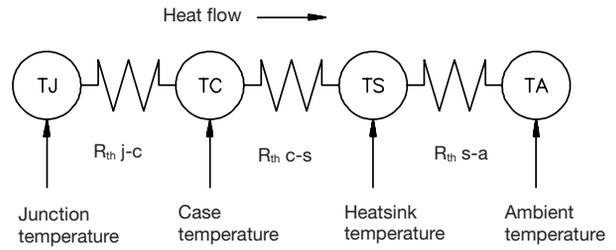
Care must be taken to ensure proper heatsinking when the relay is to be used at high sustained currents. Adequate electrical connection between relay terminals and cable must be ensured.

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

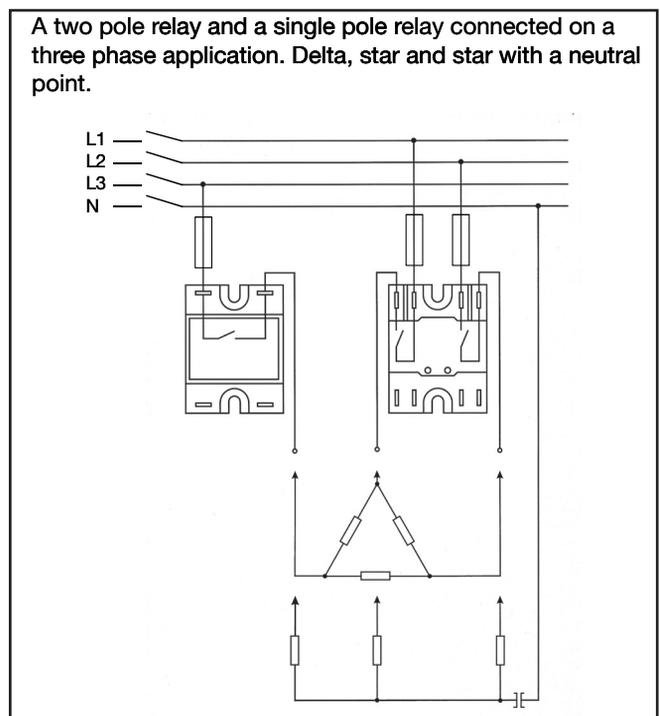
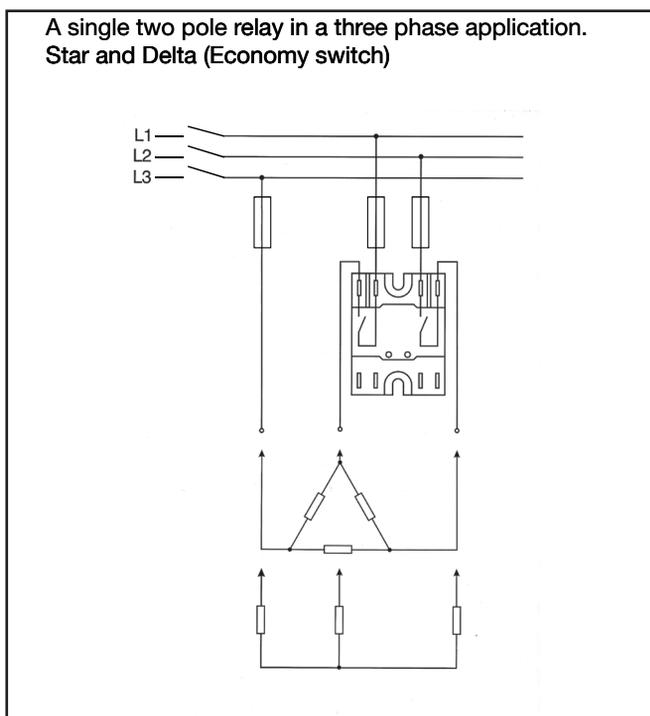
Thermal Specifications

| | 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 | 1°C/W | 1°C/W | 0.92°C/W |
| 2 pole | 0.5°C/W | 0.5°C/W | 0.46°C/W |
| R_{th} junction to ambient | ≤ 20°C/W | ≤ 20°C/W | ≤ 20°C/W |

Environmental Specifications

| | |
|----------------------|---|
| Pollution degree | 2 (non-conductive pollution with possibilities of condensation) |
| EU RoHS compliant | Yes |
| China RoHS compliant | Refer to Environmental Information (Page 8) |

Connection Diagram





Electromagnetic Compatibility

| | | | |
|--|-----------------------------------|---|------------------------|
| Immunity | EN 61000-6-2 | Radiated Radio Frequency Immunity | IEC/EN 61000-4-3 |
| Electrostatic Discharge (ESD) | | 10 V/m, 80 - 1000 MHz | Performance Criteria 1 |
| Immunity | IEC/EN 61000-4-2 | 10 V/m, 1.4 - 2.0 GHz | Performance Criteria 1 |
| Air discharge, 8 kV | Performance Criteria 2 | 3 V/m, 2.0 - 2.7 GHz | Performance Criteria 1 |
| Contact, 4 kV | Performance Criteria 2 | Conducted Radio Frequency Immunity | IEC/EN 61000-4-6 |
| Electrical Fast Transient (Burst) Immunity | IEC/EN 61000-4-4 | 10 V/m, 0.15 - 80 MHz | Performance Criteria 1 |
| Output: 2 kV, 5 kHz | Performance Criteria 2 | Voltage Dips Immunity | IEC/EN 61000-4-11 |
| Input: 1 kV, 5 kHz | Performance Criteria 1 | 0% for 0.5 , 1 cycle | Performance Criteria 2 |
| Electrical Surge Immunity | IEC/EN 61000-4-5 | 40% for 10 cycles | Performance Criteria 2 |
| Output, line to line, 1 kV | Performance Criteria 2 | 70% for 25 cycles | Performance Criteria 2 |
| Output, line to earth, 1 kV | Performance Criteria 2 | 80% for 250 cycles | Performance Criteria 2 |
| Output, line to earth, 2 kV | Performance Criteria 2 | Voltage Interruptions Immunity | IEC/EN 61000-4-11 |
| Input, line to line, 1 kV | Performance Criteria 2 | 0% for 5000 ms | Performance Criteria 2 |
| Input, line to earth, 2 kV | Performance Criteria 2 | | |
| EMC Emission | EN 61000-6-4 | Radio Interference Field Emission (Radiated) | IEC/EN 55011 |
| Radio Interference Voltage Emission (Conducted) | IEC/EN 55011 | 30 - 1000 MHz | Class B |
| 0.15 - 30 MHz | Class A (industrial) with filters | | |

Notes:

- Control input lines must be installed together to maintain products' susceptibility to Radio Frequency interference.
- Performance Criteria 1: No degradation of performance or loss of function is allowed when the product is operated as intended.
- Performance Criteria 2: 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: Temporary loss of function is allowed, provided the function can be restored by manual operation of the controls.

Short Circuit Protection

Protection Co-ordination, Type 1 vs. Type 2:

Type 1 protection implies that after a short circuit, the device under test will no longer be in a functioning state. In type 2 co-ordination the device under test will still be functional after the short circuit. In both cases, however, the short circuit has to be interrupted. The fuse between enclosure and supply shall not open. The door or cover of the enclosure shall not be blown open. There shall be no damage to conductors of terminals and the conductors shall not separate from terminals. There shall be no breakage or cracking of insulating bases to the extent that the integrity of the mounting of live parts is impaired. Discharge of parts or any risk of fire shall not occur.

The product variants listed in the table hereunder are suitable for use on a circuit capable of delivering not more than 65,000A rms Symmetrical Amperes, 600Volts maximum when protected by fuses. Tests at 65,000A were performed with Class J, fast acting: please refer to the table below for maximum allowed ampere rating of the fuse. Use fuses only.

Co-ordination type 1 (UL508)

| Type | Prospective short circuit current [kArms] | Max. fuse size [A] | Class | Voltage [VAC] |
|------------|---|--------------------|-----------------|---------------|
| RA2A..25.. | 65 | 30 | J / CC | 600 |
| RA2A..40.. | 65 | 40 | J | 600 |
| | | 20 | HSJ20 (Mersen*) | 600 |

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

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

*Formerly Ferraz Shawmut

xx= 00 without fuse trip indication

xx = 21 with fuse trip indication

Protection co-ordination Type 2 with Miniature Circuit Breakers (M.C.B.s)

| 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] ¹ |
|-------------------------------------|---|---|---|---|
| RA2A..25 (525 A ² s) | 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 (1800 A ² s) | 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 |
| | 2-pole S202 - Z25 (25A) | S202-B13 (13A) | 2.5 | 19.0 |
| | | | 4.0 | 30.4 |

1: 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.



Environmental Information

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 Harardous 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 fot 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. | | | | | | |

环境特性

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)) | 多溴化联苯 (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。 | | | | | | |



Accessories



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

All accessories can be ordered pre-assembled with Solid State Relays.
Other accessories include DIN rail adaptors and varistors

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