

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

CARLO GAVAZZI



- Zero switching AC Solid State Relay
- Direct copper bonding (DCB) technology in 25 A and 40 A types
- LED indication
- Clip-on IP 20 protection cover
- Self-lifting terminals
- Housing free of moulding mass
- 2 input ranges: 4-32 VDC and 18-36 VAC/VDC
- Operational ratings up to 40 AACrms and 480 VAC
- Blocking voltage: Up to 1200 V<sub>p</sub>
- Opto-isolation: > 4000 VACrms
- Integrated snubber network in 25 A and 40 A types



## Product Description

The zero switching relay with triac (10 A) or thyristor output (25 A, 40 A) offer a solution for resistive load switching. 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 protection cover is securing touch protection to IP 20. Output terminals can handle 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 to 36 VAC/VDC<br>D: 3 to 32 VDC*<br>*4 to 32 VDC for 400 VAC and 480 VAC types |

## Selection Guide

| Rated operational voltage | Blocking voltage    | Control voltage | Rated operational current |            |            |
|---------------------------|---------------------|-----------------|---------------------------|------------|------------|
|                           |                     |                 | 10 A                      | 25 A       | 40 A       |
| 230 VACrms                | 650 V <sub>p</sub>  | 3-32 VDC        | RS1A23D10                 | RS1A23D25  | RS1A23D40  |
|                           |                     | 18-36 VAC/DC    | RS1A23LA10                | RS1A23LA25 | RS1A23LA40 |
| 400 VACrms                | 800 V <sub>p</sub>  | 4-32 VDC        | RS1A40D10                 | RS1A40D25  | RS1A40D40  |
|                           |                     | 18-36 VAC/DC    | RS1A40LA10                | RS1A40LA25 | RS1A40LA40 |
| 480 VACrms                | 1200 V <sub>p</sub> | 4-32 VDC        | RS1A48D10                 | RS1A48D25  | RS1A48D40  |
|                           |                     | 18-36 VAC/DC    | RS1A48LA10                | RS1A48LA25 | RS1A48LA40 |

## General Specifications

|                             | RS1A23...            | RS1A40...            | RS1A48...             |
|-----------------------------|----------------------|----------------------|-----------------------|
| Operational voltage range   | 42 to 265 VACrms     | 42 to 440 VACrms     | 42 to 530 VACrms      |
| Blocking voltage            | ≥ 650 V <sub>p</sub> | ≥ 800 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                   | UR, cUR, CSA, EAC    | UR, cUR, CSA, EAC    | UR, cUR, CSA, EAC     |
| CE-marking                  | Yes                  | Yes                  | Yes                   |
| UKCA-marking                | Yes                  | Yes                  | Yes                   |

## Input Specifications

|                                                           | RS1A..D..                | RS1A..LA...  |
|-----------------------------------------------------------|--------------------------|--------------|
| <b>Control voltage</b><br>RS1A23..,<br>RS1A40.., RS1A48.. | 3-32 VDC<br>4-32 VDC     | 18-36 VAC/DC |
| <b>Pick-up voltage</b><br>RS1A23..,<br>RS1A40.., RS1A48.. | ≤ 2.75 VDC<br>≤ 3.75 VDC | ≤ 18 VAC/DC  |
| <b>Reverse voltage</b>                                    | ≤ 32 VDC                 | -            |
| <b>Drop out voltage</b>                                   | ≥ 1.2 VDC                | ≥ 5 VAC/DC   |
| <b>Input current @ max input voltage</b>                  | ≤ 12 mA                  | ≤ 15 mA      |
| <b>Response time pick-up</b>                              | ≤ 1/2 cycle              | ≤ 1 cycle    |
| <b>Response time drop-out</b>                             | ≤ 1/2 cycle              | ≤ 2 cycles   |

## Output Specifications

|                                                                            | RS1A...10                                       | RS1A...25                                        | RS1A...40                                          |
|----------------------------------------------------------------------------|-------------------------------------------------|--------------------------------------------------|----------------------------------------------------|
| <b>Rated operational current</b><br>AC51 @ Ta=25°C                         | 10 Arms                                         | 25 Arms                                          | 40 Arms                                            |
| <b>Min. operational current</b><br>RS1A23.., RS1A40..<br>RS1A48..          | 65 mA<br>150 mA                                 | 150 mA<br>150 mA                                 | 250 mA<br>250 mA                                   |
| <b>Rep. overload current t=1 s</b>                                         | < 12 AACrms                                     | < 55 AACrms                                      | < 125 AACrms                                       |
| <b>Non-rep. surge current t=10 ms</b><br>RS1A23.., RS1A40..<br>RS1A48..    | 100 A <sub>p</sub><br>325 A <sub>p</sub>        | 325 A <sub>p</sub><br>325 A <sub>p</sub>         | 600 A <sub>p</sub><br>600 A <sub>p</sub>           |
| <b>Off-state leakage current @ rated voltage and frequency</b>             | < 3 mArms                                       | < 3 mArms                                        | < 3 mArms                                          |
| <b>I<sup>2</sup>t for fusing t=10 ms</b><br>RS1A23.., RS1A40..<br>RS1A48.. | ≤ 50 A <sup>2</sup> s<br>≤ 525 A <sup>2</sup> s | ≤ 525 A <sup>2</sup> s<br>≤ 525 A <sup>2</sup> s | ≤ 1800 A <sup>2</sup> s<br>≤ 1800 A <sup>2</sup> s |
| <b>On-state voltage drop @ rated current</b>                               | ≤ 1.6 Vrms                                      | ≤ 1.6 Vrms                                       | ≤ 1.6 Vrms                                         |
| <b>Critical dV/dt off-state</b>                                            | ≥ 500 V/μs                                      | ≥ 500 V/μs                                       | ≥ 500 V/μs                                         |

## Thermal Specifications

|                              | RS1A...10     | RS1A...25     | RS1A...40     |
|------------------------------|---------------|---------------|---------------|
| <b>Operating temperature</b> | -20° to 70°C  | -20° to 70°C  | -20° to 70°C  |
| <b>Storage temperature</b>   | -40° to 100°C | -40° to 100°C | -40° to 100°C |

## 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             |

## Isolation

|                                                   |               |
|---------------------------------------------------|---------------|
| <b>Rated isolation voltage</b><br>Input to output | ≥ 4000 VACrms |
| <b>Rated isolation voltage</b><br>Output to case  | ≥ 4000 VACrms |

## Electromagnetic Compatibility

|                                                   |                                               |                                                     |                        |
|---------------------------------------------------|-----------------------------------------------|-----------------------------------------------------|------------------------|
| <b>Immunity</b>                                   | EN60947-4-3                                   | <b>Radiated Radio Frequency Immunity</b>            | IEC/EN 61000-4-3       |
| <b>Electrostatic Discharge (ESD)</b>              |                                               | 10V/m, 80 - 1000 MHz                                | Performance Criteria 1 |
| <b>Immunity</b>                                   | IEC/EN 61000-4-2                              | 10V/m, 1.4 - 2.0GHz                                 | Performance Criteria 1 |
| Air discharge, 8kV                                | Performance Criteria 2                        | 3V/m, 2.0 - 2.7GHz                                  | Performance Criteria 1 |
| Contact, 4kV                                      | Performance Criteria 2                        |                                                     |                        |
| <b>Electrical Fast Transient (Burst) Immunity</b> | IEC/EN 61000-4-4                              | <b>Conducted Radio Frequency Immunity</b>           | IEC/EN 61000-4-6       |
| Output: 2kV, 5kHz                                 | Performance Criteria 2                        | 10V/m, 0.15 - 80MHz                                 | Performance Criteria 1 |
| Input: 1kV, 5kHz                                  | Performance Criteria 2                        |                                                     |                        |
| <b>Electrical Surge Immunity</b>                  | IEC/EN 61000-4-5                              | <b>Voltage Dips Immunity</b>                        | IEC/EN 61000-4-11      |
| Output, line to line, 1kV                         | Performance Criteria 2                        | 0% for 0.5, 1 cycle                                 | Performance Criteria 2 |
| Output, line to earth, 1kV                        | Performance Criteria 2                        | 40% for 10 cycles                                   | Performance Criteria 2 |
| Output, line to earth, 2kV                        | Performance Criteria 2                        | 70% for 25 cycles                                   | Performance Criteria 2 |
|                                                   | Performance Criteria 2 with external varistor | 80% for 250 cycles                                  | Performance Criteria 2 |
| Input, line to line, 1kV                          | Performance Criteria 2                        | <b>Voltage Interruptions Immunity</b>               | IEC/EN 61000-4-11      |
| Input, line to earth, 2kV                         | Performance Criteria 2                        | 0% for 5000ms                                       | Performance Criteria 2 |
|                                                   |                                               |                                                     |                        |
| <b>EMC Emission</b>                               | EN60947-4-3                                   | <b>Radio Interference Field Emission (Radiated)</b> | IEC/EN 55011           |
| <b>Radio Interference</b>                         |                                               | <b>30 - 1000MHz</b>                                 | Class B                |
| <b>Voltage Emission (Conducted)</b>               | IEC/EN 55011                                  |                                                     |                        |
| <b>0.15 - 30MHz</b>                               | Class A (industrial) with filters             |                                                     |                        |
|                                                   | IEC/EN 60947-4-3                              |                                                     |                        |
|                                                   | Class A (no filtering needed up to 75AAC)     |                                                     |                        |

### Notes:

- Use of AC solid state relays may, according to the application and the load current, cause conducted radio interferences. Use of mains filters may be necessary for cases where the user must meet E.M.C requirements. The capacitor values given inside the filtering specification tables should be taken only as indications, the filter attenuation will depend on the final application.
- 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.

## Heatsink Dimensions (load current versus ambient temperature)

RS1A23..10, RS1A40..10

| Load current [A] | Thermal resistance [°C/W] |      |      |      |      |      | Power dissipation [W] |
|------------------|---------------------------|------|------|------|------|------|-----------------------|
| 10.0             | 3.34                      | 2.58 | 1.81 | 1.04 | 0.27 | -    | 13.0                  |
| 9.0              | 4.25                      | 3.37 | 2.49 | 1.61 | 0.73 | -    | 11.3                  |
| 8.0              | 5.41                      | 4.38 | 3.36 | 2.33 | 1.31 | 0.28 | 9.7                   |
| 7.0              | 6.92                      | 5.70 | 4.49 | 3.27 | 2.06 | 0.84 | 8.2                   |
| 6.0              | 8.96                      | 7.49 | 6.02 | 4.55 | 3.08 | 1.61 | 6.8                   |
| 5.0              | 11.9                      | 10.0 | 8.19 | 6.36 | 4.53 | 2.69 | 5.5                   |
| 4.0              | 16.2                      | 13.9 | 11.5 | 9.10 | 6.72 | 4.34 | 4.2                   |
| 3.0              | 23.7                      | 20.3 | 17.0 | 13.7 | 10.4 | 7.12 | 3.0                   |
| 2.0              | 38.6                      | 33.4 | 28.3 | 23.1 | 17.9 | 12.7 | 1.9                   |
| 1.0              | -                         | -    | -    | -    | -    | -    | 0.9                   |
|                  | 20                        | 30   | 40   | 50   | 60   | 70   | T <sub>A</sub>        |
|                  |                           |      |      |      |      |      | Ambient temp. [°C]    |

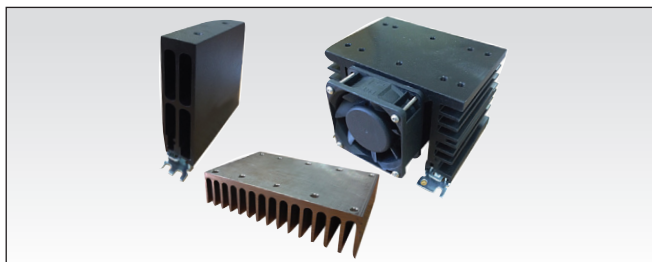
RS1A48..10, RS..25

| Load current [A] | Thermal resistance<br>[°C/W] |       |       |       |       |      |      | Power dissipation [W] |
|------------------|------------------------------|-------|-------|-------|-------|------|------|-----------------------|
| 25.0             | 3.23                         | 2.80  | 2.37  | 1.94  | 1.51  | 1.09 | 0.66 | 23                    |
| 22.5             | 3.70                         | 3.21  | 2.73  | 2.24  | 1.75  | 1.26 | 0.78 | 21                    |
| 20.0             | 4.30                         | 3.74  | 3.17  | 2.61  | 2.05  | 1.49 | 0.92 | 18                    |
| 17.5             | 5.07                         | 4.41  | 3.76  | 3.10  | 2.44  | 1.78 | 1.12 | 15                    |
| 15.0             | 6.12                         | 5.33  | 4.54  | 3.75  | 2.96  | 2.17 | 1.38 | 13                    |
| 12.5             | 7.58                         | 6.61  | 5.64  | 4.66  | 3.69  | 2.72 | 1.75 | 10                    |
| 10.0             | 9.80                         | 8.55  | 7.30  | 6.05  | 4.80  | 3.55 | 2.30 | 8                     |
| 7.5              | 13.5                         | 11.80 | 10.09 | 8.37  | 6.66  | 4.94 | 3.23 | 6                     |
| 5.0              | -                            | 18.3  | 15.7  | 13.04 | 10.39 | 7.74 | 5.09 | 4                     |
| 2.5              | -                            | -     | -     | -     | -     | 16.2 | 10.7 | 2                     |
|                  | 20                           | 30    | 40    | 50    | 60    | 70   | 80   | T <sub>A</sub>        |
|                  |                              |       |       |       |       |      |      | Ambient temp.<br>[°C] |

RS....40

| Load current [A]   |       | Thermal resistance [°C/W] |      |       |       |      |      | Power dissipation [W] |                |
|--------------------|-------|---------------------------|------|-------|-------|------|------|-----------------------|----------------|
| 40                 | 1.73  | 1.49                      | 1.25 | 1.01  | 0.77  | 0.52 | 0.28 | 41                    |                |
| 36                 | 2.00  | 1.73                      | 1.45 | 1.18  | 0.90  | 0.63 | 0.35 | 36                    |                |
| 32                 | 2.35  | 2.03                      | 1.71 | 1.39  | 1.08  | 0.76 | 0.44 | 31                    |                |
| 28                 | 2.80  | 2.43                      | 2.05 | 1.68  | 1.30  | 0.93 | 0.55 | 27                    |                |
| 24                 | 3.41  | 2.96                      | 2.51 | 2.05  | 1.60  | 1.15 | 0.70 | 22                    |                |
| 20                 | 4.26  | 3.71                      | 3.15 | 2.59  | 2.03  | 1.47 | 0.92 | 18                    |                |
| 16                 | 5.56  | 4.84                      | 4.12 | 3.40  | 2.68  | 1.96 | 1.24 | 14                    |                |
| 12                 | 7.74  | 6.74                      | 5.75 | 4.76  | 3.77  | 2.78 | 1.78 | 10                    |                |
| 8                  | 12.12 | 10.58                     | 9.04 | 7.50  | 5.96  | 4.42 | 2.88 | 6                     |                |
| 4                  | -     | -                         | -    | 15.74 | 12.56 | 9.37 | 6.18 | 3                     |                |
|                    |       | 20                        | 30   | 40    | 50    | 60   | 70   | 80                    | T <sub>A</sub> |
| Ambient temp. [°C] |       |                           |      |       |       |      |      |                       |                |

## Heatsink Selection



Heatsink Range Overview:

[https://gavazziautomation.com/images/PIM/DATASHEET/ENG/SSR\\_Accessories.pdf](https://gavazziautomation.com/images/PIM/DATASHEET/ENG/SSR_Accessories.pdf)

Heatsink Selector Tool:

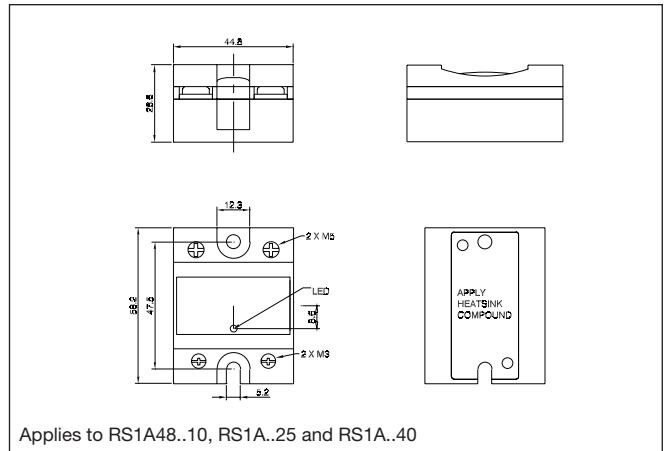
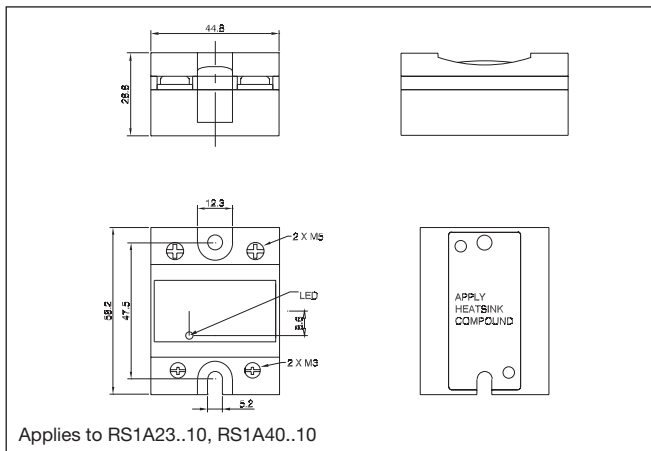
[https://gavazziautomation.com/nsc/HQ/EN/solid\\_state\\_relays](https://gavazziautomation.com/nsc/HQ/EN/solid_state_relays)

## 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

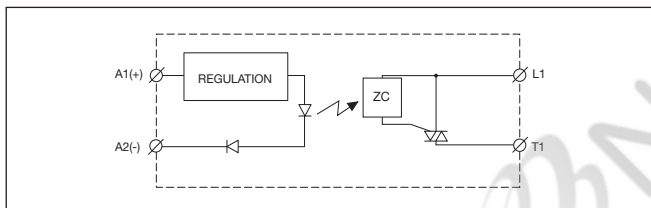
## Dimensions



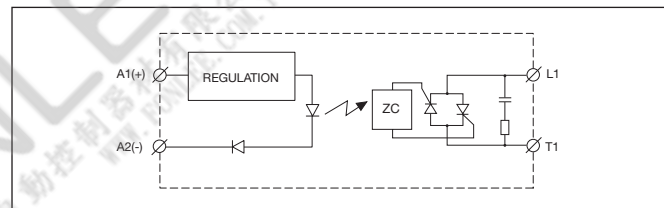
All dimensions in mm.

## Functional Diagram

### DC Control Voltage

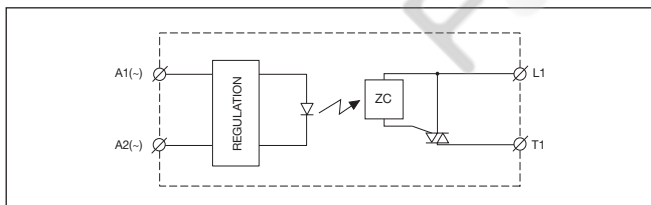


Note: Applies only to RS1A23D10, RS1A40D10

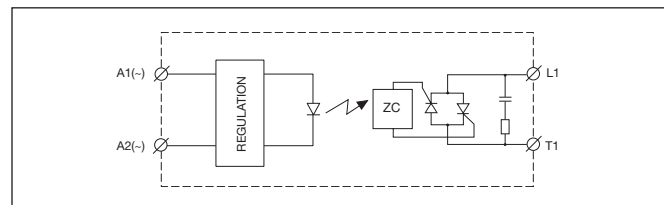


Note: Applies only to RS1A48D10, RS1A..D25, RS1A..D40

### AC Control Voltage



Note: Applies only to RS1A23LA10, RS1A40LA10



Note: Applies only to RS1A48LA10, RS1A..LA25, RS1A..LA40

## 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            | O            | O                            | O                              | O                                     |
| 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. |                                            |              |              |                              |                                |                                       |

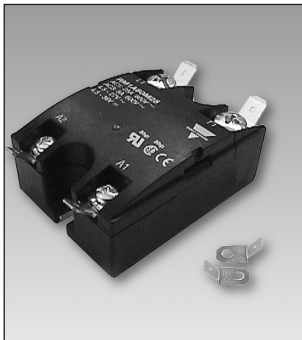
## 环境特性

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      | O      | O            | O           | O            |
| 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。 |            |        |        |              |             |              |



## Faston terminals



- Fast-on tabs
- Tab dimensions according to DIN 46342 part 1
- Pure tin-plated brass

## Ordering Key

### Screw mounted Faston terminals

**RS1A48D25 F 4**

RS, RM Solid State Relay

Faston terminals

Tab orientation

Input Tab width: 4.8mm

Output Tab width: 6.3mm

### Faston terminals in packs of 20

**RM48\*\* F 4**

RS, RM Solid State Relay

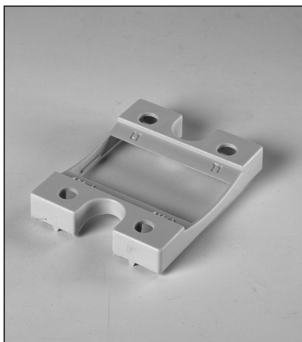
Tab orientation

\* 0: Flat (0°)

4: Angled (45°)

 \*\* 48: 4.8mm faston for input  
63: 6.3mm faston for output

## Other Accessories



- 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, varistors and spacers. For further information refer to Accessories datasheets.