

Solid State Relays

Industrial, 1-Phase ZS (IO) w. LED and Built-in Varistor

Types RM 23, RM 40, RM 48, RM 60



- Zero switching (RM1A) or instant-on switching (RM1B) AC Solid State Relay
- Direct copper bonding (DCB) technology
- LED indication
- Built-in varistor 230, 400, 480, 600V
- Clip-on IP 20 protection cover
- Self-lifting terminals
- Housing free of moulding mass
- 2 input ranges: 3-32* VDC and 20-280VAC/22-48VDC
- Operational ratings: Up to 100AACrms and 600VACrms
- Blocking voltage: Up to 1400V_p
- Opto-isolation: > 4000VACrms

Product Description

The industrial, 1-phase relay with antiparallel thyristor output is the most widely used industrial SSR due to its multiple application possibilities. The relay can be used for resistive, inductive and capacitive loads. The zero switching relay switches ON when the sinusoidal curve crosses zero and switches OFF when the current crosses zero. The instant-on relay

with DC control input can be used for phase control. The built-in varistor secures transient protection for the heavy industrial applications, and the LED indicates the status of the control input. The clip-on cover is securing touch protection to IP 20. Protected output terminals can handle cables up to 16mm².

Ordering Key

RM 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 | Control voltage | Rated operational current |
|--|--|---|--|
| A: Zero Switching B: Instant-on switching (DC Control only) | 23: 230VACrms 40: 400VACrms 48: 480VACrms 60: 600VACrms | A: 20-280VAC/22-48VDC D: 3-32VDC* *4 to 32VDC for 400, 480 and 600VAC types *4 to 32VDC for RM1B types | 25: 25AACrms 50: 50AACrms 75: 75AACrms 100: 100AACrms |

Selection Guide

| Rated operational voltage | Blocking voltage | Control voltage | Rated operational current | | | |
|---------------------------|--------------------|------------------------------|---------------------------|-----------|-----------|------------|
| | | | 25A | 50A | 75A | 100A |
| 230VACrms | 650V _p | 3 - 32VDC | RM1A23D25 | RM1A23D50 | RM1A23D75 | RM1A23D100 |
| | | 20 to 280VAC 22 to 48VDC | RM1A23A25 | RM1A23A50 | RM1A23A75 | RM1A23A100 |
| 400VACrms | 850V _p | 4 - 32VDC | RM1A40D25 | RM1A40D50 | RM1A40D75 | RM1A40D100 |
| | | 20 to 280VAC 22 to 48VDC | RM1A40A25 | RM1A40A50 | RM1A40A75 | RM1A40A100 |
| 480VACrms | 1200V _p | 4 - 32VDC | RM1A48D25 | RM1A48D50 | RM1A48D75 | RM1A48D100 |
| | | 20 to 280 VAC 22 to 48VDC | RM1A48A25 | RM1A48A50 | RM1A48A75 | RM1A48A100 |
| 600VACrms | 1400V _p | 4 - 32VDC | RM1A60D25 | RM1A60D50 | RM1A60D75 | RM1A60D100 |
| | | 20 to 280VAC 22 to 48VDC | RM1A60A25 | RM1A60A50 | RM1A60A75 | RM1A60A100 |

General Specifications

| | RM1.23... | RM1.40... | RM1.48... | RM1.60... |
|------------------------------------|---------------------|---------------------|----------------------|----------------------|
| Operational voltage range | | | | |
| RM1A... | 24 to 265VACrms | 42 to 440VACrms | 42 to 530VACrms | 42 to 660VACrms |
| RM1B... | 42 to 265VACrms | 42 to 440VACrms | 42 to 530VACrms | 42 to 660VACrms |
| Blocking voltage | ≥ 650V _p | ≥ 850V _p | ≥ 1200V _p | ≥ 1400V _p |
| Zero voltage turn-on | ≤ 10V | ≤ 10V | ≤ 10V | ≤ 10V |
| Operational frequency range | 45 to 65Hz | 45 to 65Hz | 45 to 65Hz | 45 to 65Hz |
| Power factor | > 0.5 @ 230VACrms | > 0.5 @ 400VACrms | > 0.5 @ 480VACrms | > 0.5 @ 600VACrms |
| Approvals | UL, cUL, CSA | UL, cUL, CSA | UL, cUL, CSA | UL, cUL, CSA |
| CE-marking | Yes | Yes | Yes | Yes * |

* Heatsink must be connected to ground

Input Specifications

| | RM1...D.. | RM1...A.. |
|--|------------|-------------------------|
| Control voltage range | | |
| RM1A23... | 3 - 32VDC | 20 - 280VAC, 22 - 48VDC |
| RM1A40... RM1A48... RM1A60... | 4 - 32VDC | 20 - 280VAC, 22 - 48VDC |
| RM1B... | 4 - 32VDC | - |
| Pick-up voltage @ Ta = 25°C | | |
| RM1A23... | 2.5VDC | 18VAC/DC |
| RM1A40... RM1A48... RM1A60... | 3.5VDC | 18VAC/DC |
| RM1B ... | 3.5VDC | - |
| Reverse voltage | 32VDC | - |
| Drop out voltage | 1.2VDC | 6VAC/DC |
| Input current @ max input voltage | | |
| RM1A | ≤12 mA | ≤ 20mA |
| RM1B | ≤15 mA | - |
| Response time pick-up | | |
| RM1A | ≤1/2 cycle | ≤ 12ms |
| RM1B | ≤0.1ms | - |
| Response time drop-out | ≤1/2 cycle | ≤ 40ms |

Output Specifications

| | RM1....25 | RM....50 | RM1....75 | RM1....100 |
|--|-----------------------|------------------------|------------------------|-------------------------|
| Rated operational current | | | | |
| AC51 @ Ta=25°C | 25Arms | 50Arms | 75Arms | 100Arms |
| AC53a @ Ta=25°C | 5Arms | 15Arms | 20Arms | 30Arms |
| Min. operational current | 150mA | 250mA | 400mA | 500mA |
| Rep. overload current t=1 s | < 55AACrms | < 125AACrms | < 150AACrms | < 200AACrms |
| Non-rep. surge current t=10 ms | 325A _p | 600A _p | 1150A _p | 1900A _p |
| Off-state leakage current @ rated voltage and frequency | < 3mArms | < 3mArms | < 3mArms | < 3mArms |
| I²t for fusing t=10 ms | < 525A ² s | < 1800A ² s | < 6600A ² s | < 18000A ² s |
| On-state voltage drop @ rated current | 1.6Vrms | 1.6Vrms | 1.6Vrms | 1.6Vrms |
| Critical dV/dt off-state min. | 1000V/μs | 1000V/μs | 1000V/μs | 1000V/μs |

Thermal Specifications

| | RM1....25 | RM1....50 | RM1.60.50 | RM1....75 | RM1....100 |
|-------------------------------------|---------------|---------------|---------------|---------------|---------------|
| Operating temperature range | -20° to 70°C | -20° to 70°C | -20° to 70°C | -20° to 70°C | -20° to 70°C |
| Storage temperature range | -40° to 100°C | -40° to 100°C | -40° to 100°C | -40° to 100°C | -40° to 100°C |
| Junction temperature | ≤ 125°C | ≤ 125°C | ≤ 125°C | ≤ 125°C | ≤ 125°C |
| R _{th} junction to case | ≤ 0.80K/W | ≤ 0.50K/W | ≤ 0.72K/W | ≤ 0.35K/W | ≤ 0.30K/W |
| R _{th} junction to ambient | ≤ 20.0K/W | ≤ 20.0K/W | ≤ 20.0K/W | ≤ 20.0K/W | ≤ 20.0K/W |

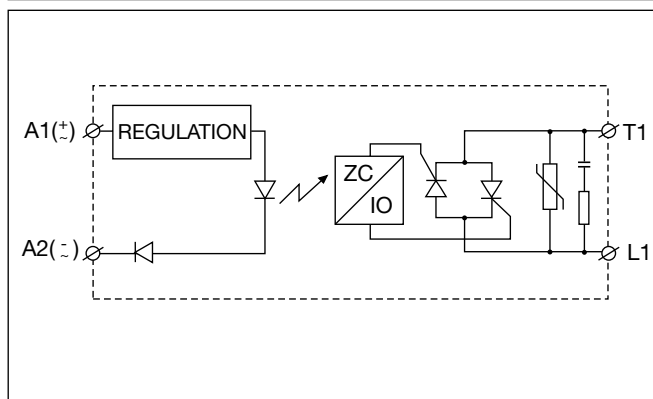
Housing Specifications

| | |
|---|------------------------------------|
| Weight 25A, 50A 75A, 100A | Approx. 60g Approx. 100g |
| Housing material | Noryl GFN 1, black |
| Baseplate 25A, 50A 75A, 100A | Aluminium Copper, nickel-plated |
| Potting compound | None |

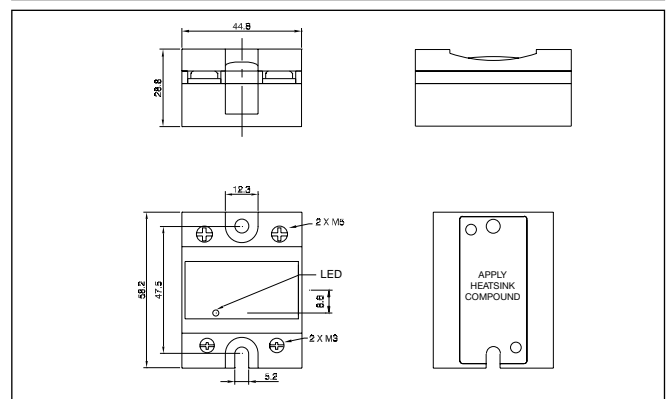
Housing Specifications (Cont.)

| | |
|---|-----------------|
| Relay Mounting screws Mounting torque | M5 1.5-2.0Nm |
| Control terminal Mounting screws Mounting torque | M3 x 9 0.5Nm |
| Power terminal Mounting screws Mounting torque | M5 x 9 2.4Nm |

Functional Diagram



Dimensions



All dimensions in mm

Heatsink Selection

| Carlo Gavazzi Heatsink (see Accessories) | Thermal resistance... | ...for power dissipation |
|---|-----------------------|--------------------------|
| No heatsink required | --- | N/A |
| RHS 300 | 5.00K/W | > 0W |
| RHS 100 | 3.00K/W | > 25W |
| RHS 45C | 2.70K/W | > 60W |
| RHS 45B | 2.00K/W | > 60W |
| RHS 90A | 1.35K/W | > 60W |
| RHS 45C plus fan | 1.25K/W | > 0W |
| RHS 45B plus fan | 1.20K/W | > 0W |
| RHS 112A | 1.10K/W | > 100W |
| RHS 301 | 0.80K/W | > 70W |
| RHS 90A plus fan | 0.45K/W | > 0W |
| RHS 112A plus fan | 0.40K/W | > 0W |
| RHS 301 plus fan | 0.25K/W | > 0W |
| Consult your distribution | > 0.25K/W | N/A |
| Infinite heatsink - No solution | --- | N/A |

Isolation

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

Heatsink Dimensions (load current versus ambient temperature)

RM....25

| Load current [A] | Thermal resistance [K/W] | | | | | | Power dissipation [W] |
|------------------|--------------------------|------|------|------|------|------|-----------------------|
| | 20 | 30 | 40 | 50 | 60 | 70 | |
| 25.0 | 2.70 | 2.34 | 1.98 | 1.61 | 1.25 | 0.89 | 28 |
| 22.5 | 3.10 | 2.69 | 2.28 | 1.86 | 1.45 | 1.04 | 24 |
| 20.0 | 3.61 | 3.13 | 2.65 | 2.18 | 1.70 | 1.23 | 21 |
| 17.5 | 4.26 | 3.70 | 3.14 | 2.59 | 2.03 | 1.47 | 18 |
| 15.0 | 5.14 | 4.47 | 3.80 | 3.14 | 2.47 | 1.80 | 15 |
| 12.5 | 6.38 | 5.56 | 4.73 | 3.91 | 3.09 | 2.27 | 12 |
| 10.0 | 8.25 | 7.19 | 6.14 | 5.08 | 4.02 | 2.97 | 9 |
| 7.5 | 11.4 | 9.94 | 8.49 | 7.04 | 5.59 | 4.14 | 7 |
| 5.0 | 17.7 | 15.4 | 13.2 | 11.0 | 8.74 | 6.51 | 4 |
| 2.5 | - | - | - | - | 18.2 | 13.6 | 2 |

T_A
Ambient temp. [°C]

RM....50

| Load current [A] | Thermal resistance [K/W] | | | | | | Power dissipation [W] |
|------------------|--------------------------|------|------|------|------|------|-----------------------|
| | 20 | 30 | 40 | 50 | 60 | 70 | |
| 50.0 | 1.03 | 0.86 | 0.70 | 0.53 | 0.37 | 0.20 | 61 |
| 45.0 | 1.27 | 1.09 | 0.90 | 0.71 | 0.52 | 0.33 | 53 |
| 40.0 | 1.54 | 1.32 | 1.10 | 0.89 | 0.67 | 0.45 | 46 |
| 35.0 | 1.85 | 1.59 | 1.34 | 1.08 | 0.82 | 0.57 | 39 |
| 30.0 | 2.26 | 1.95 | 1.65 | 1.34 | 1.03 | 0.72 | 33 |
| 25.0 | 2.85 | 2.47 | 2.08 | 1.70 | 1.32 | 0.94 | 26 |
| 20.0 | 3.73 | 3.24 | 2.75 | 2.26 | 1.77 | 1.27 | 20 |
| 15.0 | 5.22 | 4.54 | 3.86 | 3.19 | 2.51 | 1.83 | 15 |
| 10.0 | 8.21 | 7.16 | 6.11 | 5.05 | 4.00 | 2.95 | 10 |
| 5.0 | 17.2 | 15.0 | 12.9 | 10.7 | 8.51 | 6.33 | 5 |

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} | < 0.80 | 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 |

| | | |
|---|--------|-------|
| Junction to ambient thermal resistance, R _{th j-a} | < 20.0 | K/W |
| Junction to case thermal resistance, R _{th j-c} | < 0.50 | 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 |

RM1.60..50

| Load current [A] | Thermal resistance [K/W] | | | | | | Power dissipation [W] |
|------------------|--------------------------|------|-------|-------|-------|------|-----------------------|
| | 20 | 30 | 40 | 50 | 60 | 70 | |
| 50.0 | 0.99 | 0.81 | 0.63 | 0.44 | 0.26 | 0.08 | 55 |
| 45.0 | 1.28 | 1.07 | 0.86 | 0.65 | 0.44 | 0.23 | 48 |
| 40.0 | 1.64 | 1.40 | 1.15 | 0.91 | 0.67 | 0.42 | 41 |
| 35.0 | 2.11 | 1.82 | 1.54 | 1.25 | 0.96 | 0.67 | 35 |
| 30.0 | 2.60 | 2.25 | 1.90 | 1.55 | 1.20 | 0.85 | 29 |
| 25.0 | 3.30 | 2.86 | 2.43 | 1.99 | 1.55 | 1.11 | 23 |
| 20.0 | 4.36 | 3.79 | 3.22 | 2.65 | 2.08 | 1.51 | 18 |
| 15.0 | 6.1 | 5.4 | 4.6 | 3.77 | 2.97 | 2.18 | 13 |
| 10.0 | 9.76 | 8.52 | 7.3 | 6.0 | 4.8 | 3.54 | 8 |
| 5.0 | -- | -- | 15.47 | 12.85 | 10.24 | 7.6 | 4 |

T_A
Ambient temp. [°C]

RM....75

| Load current [A] | Thermal resistance [K/W] | | | | | | Power dissipation [W] |
|------------------|--------------------------|-------|-------|------|------|------|-----------------------|
| | 20 | 30 | 40 | 50 | 60 | 70 | |
| 75.0 | 0.91 | 0.78 | 0.65 | 0.52 | 0.39 | 0.26 | 77 |
| 67.5 | 1.10 | 0.96 | 0.81 | 0.66 | 0.51 | 0.36 | 68 |
| 60.0 | 1.34 | 1.17 | 1.00 | 0.83 | 0.66 | 0.49 | 59 |
| 52.5 | 1.60 | 1.40 | 1.20 | 1.00 | 0.80 | 0.60 | 50 |
| 45.0 | 1.93 | 1.68 | 1.44 | 1.20 | 0.96 | 0.72 | 42 |
| 37.5 | 2.38 | 2.08 | 1.78 | 1.49 | 1.19 | 0.89 | 34 |
| 30.0 | 3.06 | 2.68 | 2.30 | 1.91 | 1.53 | 1.15 | 26 |
| 22.5 | 4.21 | 3.68 | 3.16 | 2.63 | 2.10 | 1.58 | 19 |
| 15.0 | 6.51 | 5.70 | 4.88 | 4.07 | 3.26 | 2.44 | 12 |
| 7.5 | 13.5 | 11.77 | 10.09 | 8.41 | 6.73 | 5.04 | 6 |

T_A
Ambient temp. [°C]

| | | |
|--|--------|-------|
| Junction to ambient thermal resistance, R _{th j-a} | < 20.0 | K/W |
| Junction to baseplate case thermal resistance, R _{th j-c} | < 0.72 | K/W |
| Case to heatsink thermal resistance, R _{th c-s} | < 0.20 | K/W |
| Maximum allowable heatsink temperature | 100 | deg.C |
| Maximum allowable junction temperature | 125 | deg.C |

| | | |
|---|--------|-------|
| Junction to ambient thermal resistance, R _{th j-a} | < 20.0 | K/W |
| Junction to case thermal resistance, R _{th j-c} | < 0.35 | K/W |
| Case to heatsink thermal resistance, R _{th c-s} | < 0.10 | K/W |
| Maximum allowable heatsink temperature | 100 | deg.C |
| Maximum allowable junction temperature | 125 | deg.C |

Heatsink Dimensions (load current versus ambient temperature) cont.

RM....100

| Load current [A] | Thermal resistance [K/W] | | | | | | Power dissipation [W] |
|------------------|--------------------------|------|------|------|------|------|-----------------------|
| | 20 | 30 | 40 | 50 | 60 | 70 | |
| 100.0 | 0.54 | 0.45 | 0.36 | 0.27 | 0.18 | 0.09 | 111 |
| 90.0 | 0.68 | 0.58 | 0.47 | 0.37 | 0.27 | 0.17 | 97 |
| 80.0 | 0.86 | 0.74 | 0.62 | 0.50 | 0.38 | 0.26 | 84 |
| 70.0 | 1.08 | 0.94 | 0.80 | 0.66 | 0.52 | 0.38 | 71 |
| 60.0 | 1.37 | 1.20 | 1.03 | 0.85 | 0.68 | 0.51 | 59 |
| 50.0 | 1.70 | 1.49 | 1.28 | 1.06 | 0.85 | 0.64 | 47 |
| 40.0 | 2.21 | 1.93 | 1.66 | 1.38 | 1.10 | 0.83 | 36 |
| 30.0 | 3.06 | 2.68 | 2.30 | 1.91 | 1.53 | 1.15 | 26 |
| 20.0 | 4.78 | 4.18 | 3.59 | 2.99 | 2.39 | 1.79 | 17 |
| 10.0 | 9.98 | 8.73 | 7.49 | 6.24 | 4.99 | 3.74 | 8 |

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} | < 0.30 | K/W |
| Case to heatsink thermal resistance, R_{th-c-s} | < 0.10 | K/W |
| Maximum allowable heatsink temperature | 100 | deg.C |
| Maximum allowable junction temperature | 125 | deg.C |

FASTON terminals



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

Ordering Key

Screw mounted Faston terminals

RM1A48D25 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 F4***

RS, RM Solid State Relay

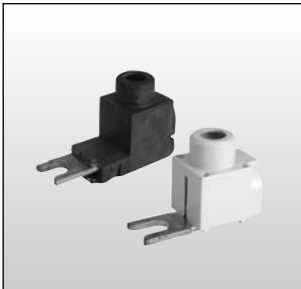
Tab orientation

* 0: Flat (0°)

4: Angled (45°)

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

Fork Terminals



- Terminal adaptors for 35mm² cable
- Type RM635FK
- Pack size: 20 pieces

Ordering Key

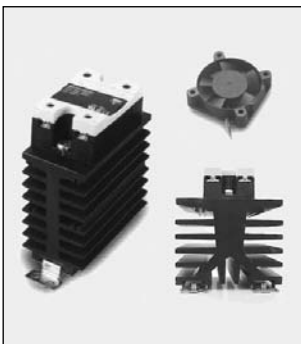
RM635FK

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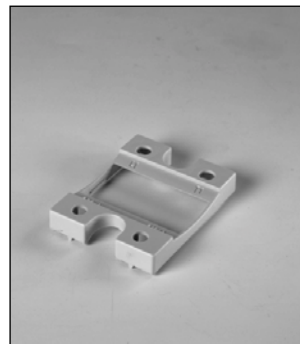
RM terminal adaptor

Touch protected (optional)

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.