

Solid State Relays

Low Voltage AC/DC Control: 5 to 24 V

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

CARLO GAVAZZI



- Zero switching AC Solid State Relay
- Low voltage AC/DC control: 5 to 24 V
- Direct copper bonding (DCB) technology
- LED indication
- Built-in varistor
- Clip-on IP 20 protection cover
- Self-lifting terminals
- Housing free of moulding mass
- Operational ratings up to 100 AACrms and 600 VAC
- Opto-insulation: > 4000 VACrms

Product Description

The industrial, 1-phase relay with antiparallel thyristor output is the most widely used SSR due to its multiple application possibilities. This relay has been designed to interface low voltage AC or DC control systems with high voltage 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 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 safety to IP 20. Protected output terminals can take cables up to 16 mm².

Ordering Key

RM 1 A 23 M 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	23: 230 VACrms 40: 400 VACrms 48: 480 VACrms 60: 600 VACrms	M: 5 to 24 VDC/AC	25: 25 AACrms 50: 50 AACrms 75: 75 AACrms 100: 100 AACrms

Selection Guide

Rated operational voltage	Non-rep. voltage	Control voltage	Rated operational current			
			25 AACrms	50 AACrms	75 AACrms	100 AACrms
230 VACrms	650 V _p	5 to 24 VDC/AC	RM1A23M25	RM1A23M50	RM1A23M75	RM1A23M100
400 VACrms	850 V _p	5 to 24 VDC/AC	RM1A40M25	RM1A40M50	RM1A40M75	RM1A40M100
480 VACrms	1200 V _p	5 to 24 VDC/AC	RM1A48M25	RM1A48M50	RM1A48M75	RM1A48M100
600 VACrms	1400 V _p	5 to 24 VDC/AC	RM1A60M25	RM1A60M50	RM1A60M75	RM1A60M100

General Specifications

	RM1A23M	RM1A40M	RM1A48M	RM1A60M
Operational voltage range	24 to 265 VACrms	42 to 440 VACrms	42 to 530 VACrms	42 to 660 VACrms
Non-rep. peak voltage	$\geq 650 V_p$	$\geq 850 V_p$	$\geq 1200 V_p$	$\geq 1400 V_p$
Zero voltage turn-on	$\leq 15 V$	$\leq 15 V$	$\leq 15 V$	$\leq 15 V$
Operational frequency range	45 to 65 Hz	45 to 65 Hz	45 to 65 Hz	45 to 65 Hz
Power factor	$> 0.5 @ 230 VACrms$	$> 0.5 @ 400 VACrms$	$> 0.5 @ 480 VACrms$	$> 0.5 @ 600 VACrms$
Approvals	UL, CSA	UL, CSA	UL, CSA	UL, CSA
CE-marking	Yes	Yes	Yes	Yes **

** Heatsink must be connected to ground

Input Specifications

Control voltage range	4.25-36 VDC 4.25-27 VAC
Absolute max. input voltage	37 VDC 28 VAC
Pick-up voltage	4.0 VDC 4.0 VAC
Drop out voltage	2.0 VDC 2.0 VAC
Input current	
@ 5 VAC	10 mA
@ 24 VAC	18 mA
@ 5 VDC	9 mA
@ 24 VDC	12 mA
Response time pick-up max.	≤ 1 cycle
Response time drop-out max.	≤ 2.5 cycle

Insulation

Rated insulation voltage Input to output	$\geq 4000 VACrms$
Rated insulation voltage Output to case	$\geq 4000 VACrms$

Housing Specifications

Weight	25 A, 50 A 75 A, 100 A	Approx. 60 g Approx. 100 g
Housing material		Noryl GFN 1, black
Baseplate	25 A, 50 A 75 A, 100 A	Aluminium Copper, nickel-plated
Potting compound		None
Relay	Mounting screws Mounting torque	M5 1.5-2.0 Nm
Control terminal	Mounting screws Mounting torque	M3 x 9 0.5 Nm
Power terminal	Mounting screws Mounting torque	M5 x 9 2.4 Nm

Thermal Specifications

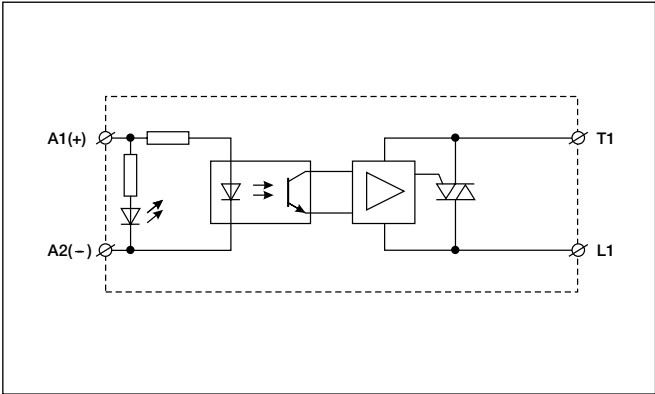
	RM1...M25	RM1...M50	RM1...M75	RM1...M100
Operating temperature range	-20° to 70°C	-20° to 70°C	-20° to 70°C	-20° to 70°C
Storage temperature range	-40° to 100°C	-40° to 100°C	-40° to 100°C	-40° to 100°C
Junction temperature	$\leq 125^\circ C$	$\leq 125^\circ C$	$\leq 125^\circ C$	$\leq 125^\circ C$
R _{th} junction to case	$\leq 0.80 K/W$	$\leq 0.50 K/W$	$\leq 0.35 K/W$	$\leq 0.30 K/W$
R _{th} junction to ambient	$\leq 20.0 K/W$	$\leq 20.0 K/W$	$\leq 20.0 K/W$	$\leq 15.0 K/W$



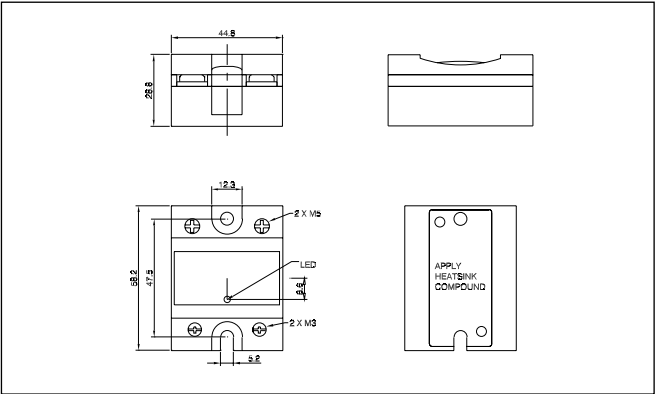
Output Specifications

	RM1A..M25	RM1A..M50	RM1A..M75	RM1A..M100
Rated operational current AC51 @ Ta=25°C AC53a @ Ta=25°C	25 Arms 5 Arms	50 Arms 15 Arms	75 Arms 20 Arms	100 Arms 30 Arms
Min. operational current	150 mA	150 mA	150 mA	150 mA
Rep. overload current t=1 s	< 55 AACrms	< 125 AACrms	< 150 AACrms	< 200 AACrms
Non-rep. surge current t=10 ms	250 Ap	600 Ap	1000 Ap	1500 Ap
Off-state leakage current @ rated voltage and frequency	< 3 mArms	< 3 mArms	< 3 mArms	< 3 mArms
I²t for fusing t=1-10 ms	< 310 A²s	< 1800 A²s	< 6600 A²s	< 18000 A²s
Critical di/dt	≥ 100 A/µs	≥ 100 A/µs	≥ 100 A/µs	≥ 100 A/µs
On-state voltage drop @ rated current	1.6 Vrms	1.6 Vrms	1.6 Vrms	1.6 Vrms
Critical dV/dt commutating	500 V/µs	500 V/µs	500 V/µs	500 V/µs
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

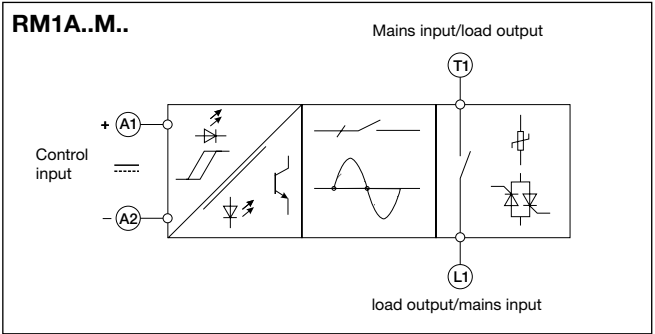
Wiring Diagram



Dimensions



Functional Diagram



Heatsink Dimensions (load current versus ambient temperature)

RM1...M25

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]

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

RM1...M50

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}	< 0.50	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...M75

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 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

RM1...M100.

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

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}	< 0.30	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



Heatsink Selection

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

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 with: 6.3mm
- Tab dimensions according to DIN 46342 part 1
- Pure tin-plated brass

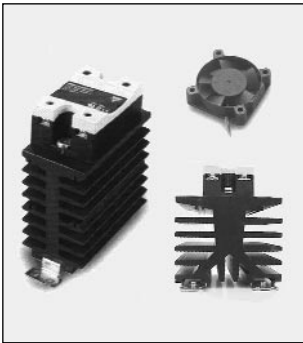
Ordering Key

RM1A48M25 F 4*

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.