

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 100AACrms and 600VACrms
- Opto-isolation: > 4000VACrms

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

Selection Guide

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

General Specifications

	RM1A23M	RM1A40M	RM1A48M	RM1A60M
Operational voltage range	24 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	≤ 15V	≤ 15V	≤ 15V	≤ 15V
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, CSA	UL, CSA	UL, CSA	UL, CSA
CE-marking	Yes	Yes	Yes	Yes *

* Heatsink must be connected to ground.

Input Specifications

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

Isolation

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

Housing Specifications

Weight 25 A, 50 A 75 A, 100 A	Approx. 60g Approx. 100g
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 1.5-2.0Nm
Control terminal Mounting screws Mounting torque	M3 x 9 0.5Nm
Power terminal Mounting screws Mounting torque	M5 x 9 2.4Nm

Thermal Specifications

	RM1...M25	RM1...M50	RM1.60M50	RM1...M75	RM1...M100
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

Output Specifications

	RM1A..M25	RM1A..M50	RM1A..M75	RM1A..M100
Rated operational current AC51 @ Ta=25°C AC53a @ Ta=25°C	25Arms 5Arms	50Arms 15Arms	75Arms 20Arms	100Arms 30Arms
Min. operational current	150mA	250mA	400mA	500mA
Rep. overload current t=1 s	< 55AACrms	< 125AACrms	< 150AACrms	< 200AACrms
Non-rep. surge current t=10ms	325Ap	600Ap	1150Ap	1900Ap
Off-state leakage current @ rated voltage and frequency	< 3mArms	< 3mArms	< 3mArms	< 3mArms
I²t for fusing t=10ms	< 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.	500V/μs	500V/μs	500V/μs	500V/μs
Zero crossing detection	Yes	Yes	Yes	Yes

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]

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}	< 0.80	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]

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 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.d

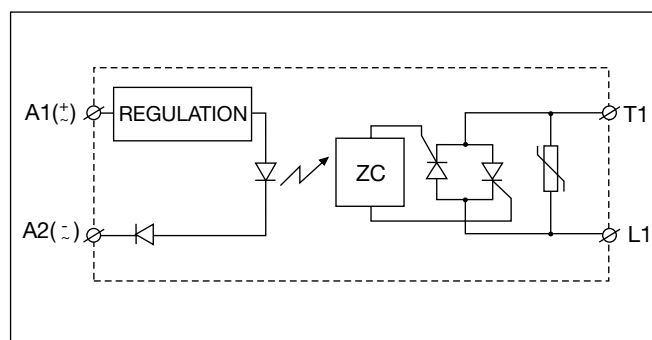
RM1...M100

Load current [A]	Thermal resistance [K/W]						Power dissipation [W]
	20	30	40	50	60	70	T _A
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

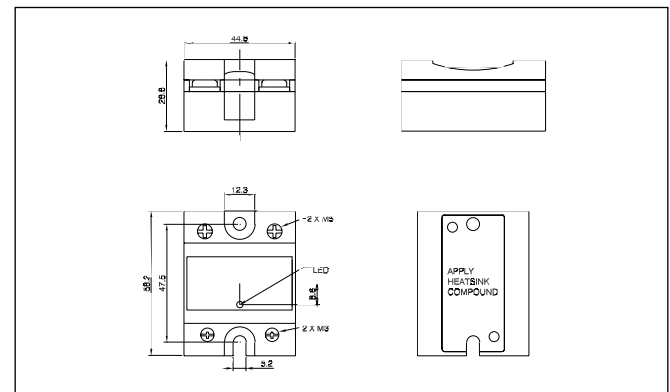
Functional Diagram



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 45C	2.70 K/W	> 60 W
RHS 45B	2.00 K/W	> 60 W
RHS 90A	1.35 K/W	> 60 W
RHS 45C plus fan	1.25 K/W	> 0 W
RHS 45B plus fan	1.20 K/W	> 0 W
RHS 112A	1.10 K/W	> 100 W
RHS 301	0.80 K/W	> 70 W
RHS 90A plus fan	0.45 K/W	> 0 W
RHS 112A 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

Dimensions



All dimensions in mm.



Faston terminals



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

Ordering Key

Screw mounted
Faston terminals

RM1A48M25 F 4*

RS, RM Solid State Relay
Faston terminals
Tab orientation

Input Tab width: 4.8mm
Output Tab width: 6.3mm

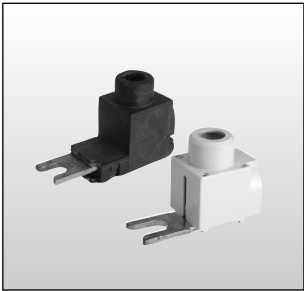
Faston terminals
in packs of 20

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



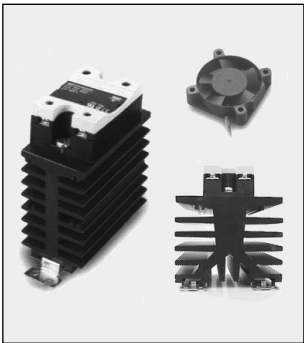
- Terminal adaptors for 35mm² cable
- Type RM635FK
- Pack size: 20 pieces

Ordering Key

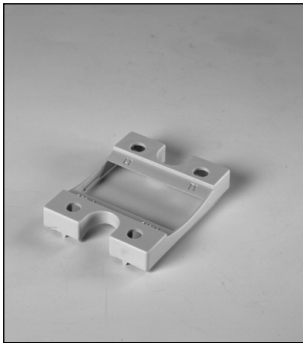
RM635FK P

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.