

# Solid State Relays Industrial, 1-Phase Analog Switching Type RM1E

CARLO GAVAZZI



- AC Solid State Relay
- Analog switching (phase-angle control) for resistive and slightly inductive load applications
- 4 to 20 mA control current
- Rated operational current: 25, 50 and 100 AACrms
- Rated operational voltage: Up to 600 VACrms
- Variable intensity LED-indication according to input current
- Integral snubber network

## Product Description

The analog switching relay works in accordance with the phase angle control principle, i.e. the output switching point in the AC sine wave depends on the control current. 4 mA corresponds to no switching and 20 mA corresponds

to full sine wave (near linear power response). The relay switches off every time the output current crosses zero, and switches ON in accordance with the applied control current.

## Ordering Key

**RM 1E 60 AA 50**

Solid State Relay  
Number of Poles  
Switching mode  
Rated operational voltage  
4 to 20 mA control current  
Rated operational current

## Type Selection

Switching mode	Rated operational voltage	Rated operational current	Control current	Non-rep. peak voltage
E: Analog switching	230 VAC* 400 VAC 480 VAC 600 VAC**	25: 25 A 50: 50 A 100: 100 A	AA: 4 - 20 mA	23 : 600 V <sub>p</sub> 40 : 850 V <sub>p</sub> 48 : 1200 V <sub>p</sub> 60 : 1400 V <sub>p</sub>

\* Also suitable for 110 VAC

\*\* Also suitable for 480 VAC

## Selection Guide

Rated operational voltage	Non-rep. voltage	Control current	Rated operational current		
			25 A	50 A	100 A
230 VAC	600 V <sub>p</sub>	4 - 20 mA	<b>RM1E23AA25</b>	<b>RM1E23AA50</b>	<b>RM1E23AA100</b>
400 VAC	850 V <sub>p</sub>	4 - 20 mA	<b>RM1E40AA25</b>	<b>RM1E40AA50</b>	<b>RM1E40AA100</b>
480 VAC	1200 V <sub>p</sub>	4 - 20 mA	<b>RM1E48AA25</b>	<b>RM1E48AA50</b>	<b>RM1E48AA100</b>
600 VAC	1400 V <sub>p</sub>	4 - 20 mA	<b>RM1E60AA25</b>	<b>RM1E60AA50</b>	<b>RM1E60AA100</b>

## General Specifications

	RM 1E 23 AA ..	RM 1E 40 AA ..	RM 1E 48 AA ..	RM 1E 60 AA ..
Operational voltage range	90 to 280 VAC	340 to 460 VAC	90 to 550 VAC	410 to 660 VAC
Non-rep. peak voltage	600 V <sub>p</sub>	850 V <sub>p</sub>	1200 V <sub>p</sub>	1400 V <sub>p</sub>
Operational frequency range	45 to 65 Hz	45 to 65 Hz	45 to 65 Hz	45 to 65 Hz
Power factor	> 0.75	> 0.75	> 0.75	> 0.75
Approvals	UL, cUL, CSA	UL, cUL, CSA	UL, cUL, CSA	UL, cUL, CSA
CE-marking	Yes	Yes	Yes	Yes

## Output Specifications

	RM1E..AA25	RM1E..AA50	RM1E..AA100
Rated operational current AC51 Ta=25 °C AC53a Ta=25 °C	25 A 5 A	50 A 15 A	100 A 20 A
Minimum operational current	150 mA	150 mA	150 mA
Rep. overload current t=1s	55 A <sub>p</sub>	125 A <sub>p</sub>	150 A <sub>p</sub>
Non-rep. surge current t=10ms	300 A <sub>p</sub>	600 A <sub>p</sub>	1150 A <sub>p</sub>
Off-state leakage current	< 3 mA	< 3 mA	< 3 mA
I <sup>2</sup> t for fusing t= 1-10 ms	450 A <sup>2</sup> s	1680 A <sup>2</sup> s	6600 A <sup>2</sup> s
Critical di/dt @ 50hz	≥ 100 A/μs	≥ 100 A/μs	≥ 100 A/μs
Critical dV/dt off-state min.	1000 V/μs	1000 V/μs	1000 V/μs

## Input Specifications

Control current range	4-20 mA
Pick up current	4.2 mA
Drop out current	4.1 mA
Response time (input to output)	15ms
Voltage drop	<10 VDC @ 20 mA
Dynamic impedance	≥ 330 Ω
Allowable input current (max.)	≤ 50 mA
Reverse polarity protected	Yes

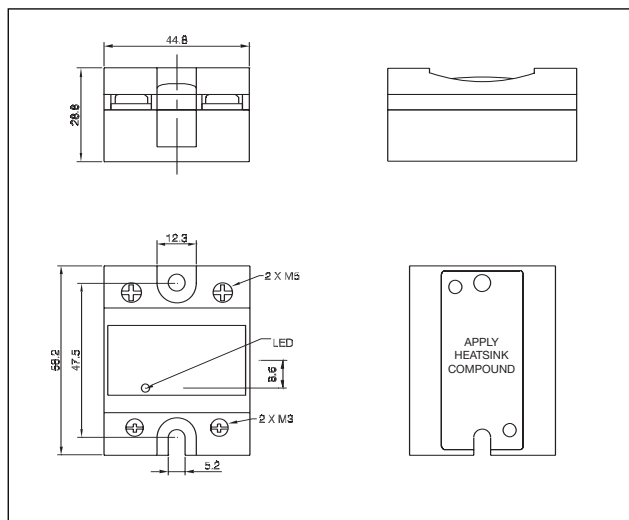
## Thermal Specifications

Operating temperature	-20° to +70°C	(-18° to +158 °F)
Storage temperature	-20° to +100°C	(-4° to +212 °F)
Junction temperature	125°C	(257 °F)

## Insulation

Rated insulation voltage	
Input to output	≥ 4000 Vrms
Output to case	≥ 4000 Vrms

## Dimensions

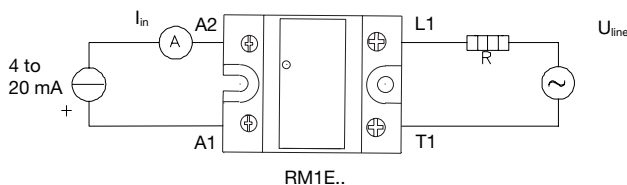


## Housing Specifications

Weight	
25 A, 50 A	Approx. 60 g
100 A	Approx. 100 g
Housing material	Noryl, black
Baseplate	
25 A, 50 A	Aluminium
100 A	Copper, nickel-plated
Relay	
Mounting screws	M5
Mounting torque	1.5-2.0 Nm
Control terminal	
Mounting screws	M3 x 9mm
Mounting torque	0.5 Nm
Power terminal	
Mounting screws	M5 x 9mm
Mounting torque	2.4 Nm

## Applications

This relay is suitable for control of heaters, lighting and slightly inductive loads such as small fans. The relay can also be used for soft turn-on of high-power incandescent lamps.



## Transfer Characteristics

Output power as a function of control input (4 to 20mA)

I in [mA]	P out [%]
4	0
6	13
8	25
10	38
12	50
14	63
16	75
18	88
20	99

## Heatsink Dimensions (load current versus ambient temperature)

With the output fully ON (360° conduction angle)

### RM1E..25

Load current [A]	Thermal resistance [K/W]						Power dissipation [W]
	20	30	40	50	60	70	
25.0	3.23	2.80	2.37	1.94	1.51	1.09	23
22.5	3.70	3.21	2.73	2.24	1.75	1.26	21
20.0	4.30	3.74	3.17	2.61	2.05	1.49	18
17.5	5.07	4.41	3.76	3.10	2.44	1.78	15
15.0	6.12	5.33	4.54	3.75	2.96	2.17	13
12.5	7.58	6.61	5.64	4.66	3.69	2.72	10
10.0	9.80	8.55	7.30	6.05	4.80	3.55	8
7.5	13.5	11.80	10.09	8.37	6.66	4.94	6
5.0	-	18.3	15.7	13.04	10.39	7.74	4
2.5	-	-	-	-	-	7	2

T<sub>A</sub>  
Ambient temp. [°C]

### RM1E..50

Load current [A]	Thermal resistance [K/W]						Power dissipation [W]
	20	30	40	50	60	70	
50.0	1.25	1.07	0.88	0.70	0.52	0.34	55
45.0	1.46	1.25	1.04	0.84	0.63	0.42	48
40.0	1.73	1.49	1.25	1.01	0.77	0.52	41
35.0	2.08	1.80	1.51	1.23	0.94	0.66	35
30.0	2.56	2.22	1.87	1.53	1.18	0.84	29
25.0	3.24	2.81	2.38	1.95	1.52	1.09	23
20.0	4.26	3.71	3.15	2.59	2.03	1.47	18
15.0	5.99	5.22	4.45	3.67	2.90	2.12	13
10.0	9.49	8.27	7.06	5.85	4.64	3.43	8
5.0	-	17.5	15.0	12.4	9.91	7.39	4

T<sub>A</sub>  
Ambient temp. [°C]

### RM1E..100

Load current [A]	Thermal resistance [K/W]						Power dissipation [W]
	20	30	40	50	60	70	
100.0	0.60	0.52	0.43	0.34	0.26	0.17	117
90.0	0.74	0.64	0.54	0.44	0.34	0.24	101
80.0	0.91	0.79	0.68	0.56	0.45	0.33	87
70.0	1.09	0.96	0.82	0.68	0.55	0.41	73
60.0	1.33	1.16	1.00	0.83	0.66	0.50	60
50.0	1.66	1.45	1.24	1.04	0.83	0.62	48
40.0	2.16	1.89	1.62	1.35	1.08	0.81	37
30.0	3.01	2.64	2.26	1.88	1.51	1.13	27
20.0	4.73	4.14	3.55	2.96	2.37	1.78	17
10.0	9.94	8.70	7.45	6.21	4.97	3.73	8

T<sub>A</sub>  
Ambient temp. [°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	> 55 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	> 80 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 distributor	< 0.25 K/W	N/A
Infinite heatsink	----	N/A
- No solution	----	N/A

Note: For power dissipation values smaller than those shown above, please refer to the corresponding heatsink curve in the SSR Accessories Section is referred to.

## Functional Diagram

