

# Solid State Relays

## Industrial, 1-Phase Analog Switching

### Type RM1E



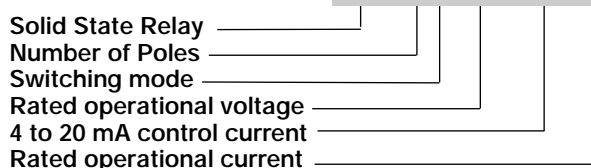
- AC Solid State Relay
- Analog switching (phase-angle control) for resistive and slightly inductive load applications
- 4 to 20 mA control current
- Rated operational current: 25, 50 and 100 AACrms
- Rated operational voltage: Up to 600 VACrms
- Variable intensity LED-indication according to input current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



### Type Selection

Switching mode	Rated operational voltage	Rated operational current	Control current
E: Analog switching	23: 230 VACrms* 40: 400 VACrms 48: 480 VACrms 60: 600 VACrms	25: 25 AACrms 50: 50 AACrms 100: 100 AACrms	AA: 4 - 20 mADC

\* For 110VACrms operational voltage, the RM1E23AA.. should be used.

### Selection Guide

Rated operational voltage	Non-rep. voltage	Control current	Rated operational current		
			25 A	50 A	100 A
230 VAC	650 V <sub>p</sub>	4 - 20 mA	RM1E23AA25	RM1E23AA50	RM1E23AA100
400 VAC	850 V <sub>p</sub>	4 - 20 mA	RM1E40AA25	RM1E40AA50	RM1E40AA100
480 VAC	1200 V <sub>p</sub>	4 - 20 mA	RM1E48AA25	RM1E48AA50	RM1E48AA100
600 VAC	1400 V <sub>p</sub>	4 - 20 mA	RM1E60AA25	RM1E60AA50	RM1E60AA100

### 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	650 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*

\* Heatsink must be connected to ground for 600V types

## Output Specifications

	RM1E..AA25	RM1E..AA50	RM1E..AA100
Rated operational current AC51 Ta=25 °C AC53a Ta=25 °C	25 AACrms 5 AACrms	50 AACrms 15 AACrms	100 AACrms 20 AACrms
Minimum operational current	150 mA	150 mA	150 mA
Rep. overload current t=1s	55 AACrms	125 AACrms	150 AACrms
Non-rep. surge current t=10ms	300 A <sub>p</sub>	580 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	≥ 50 A/μs	≥ 50 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 mADC
Pick up current	4.2 mADC
Drop out current	4.1 mADC
Response time (input to output)	20ms
Voltage drop	< 10 VDC @ 20 mA
Dynamic impedance	≥ 330 Ω
Max. allowable input current	50 mA
Reverse polarity protected	Yes

The use of twisted pair cable for the control input is recommended

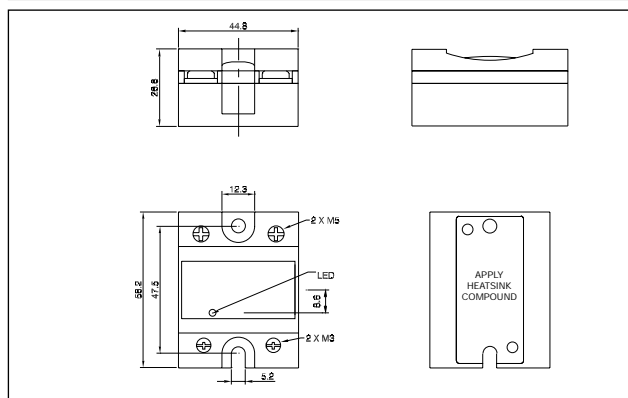
## Thermal Specifications

Operating temperature	-20° to +70°C	(4° 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



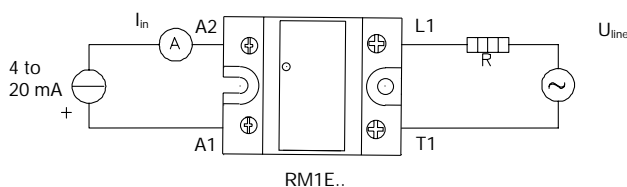
All dimensions in mm

## 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

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

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

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 45C	2.70 K/W	> 55 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	> 80 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 distributor	< 0.25 K/W	N/A
Infinite heatsink	----	N/A
- No solution		

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

