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
- Non-repetitive voltage: Up to 1400V_P
- Opto-insulation: > 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 23D 50

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

Selection Guide

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

Output Specifications

	RM1....25	RM....50	RM1....75	RM1....100
Rated operational current				
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
Non-rep. peak voltage	⩾ 650Vp	⩾ 850Vp	⩾ 1200Vp	⩾ 1400Vp
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

* 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

Operational voltage range

	RM1...25	RM1...50	RM1...75	RM..100.
Rated operational current				
AC51@ Ta=25□C	25Arms	50Arms	75Arms	100Arms
AC53a @ Ta=25□C	5Arms	15Arms	20Arms	30Arms
Min. operational current	150mA	150mA	150mA	150mA
Rep. overload current t=1 s	< 55AACrms	< 125AACrms	< 150AACrms	< 200AACrms
Non-rep. surge current t=10 ms	300Ap	580Ap	1150Ap	1900Ap
Off-state leakage current @ rated voltage and frequency	< 3mArms	< 3mArms	< 3mArms	< 3mArms
I^2t for fusing t=1-10 ms	< 450 A^2s	< 1680 A^2s	< 6600 A^2s	< 18000 A^2s
Critical dI/dt	⩾ 50A/μs	⩾50A/μs	⩾ 100A/μs	⩾ 100A/μs
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....75	RM1....100
Operating temperature	-20° to 70℃	-20° to 70℃	-20° to 70℃	-20° to 70℃
Storage temperature	-40° to 100℃	-40° to 100℃	-40° to 100℃	-40° to 100℃
Junction temperature	⩽ 125° C	⩽ 125° C	⩽ 125° C	⩽ 125° C
Rth junction to case	⩽ 0.80K/W	⩽ 0.50K/W	⩽ 0.35K/W	⩽0.30K/W
Rth junction to ambient	⩽20K/W	⩽20K/W	⩽20K/W	⩽ 20K/W

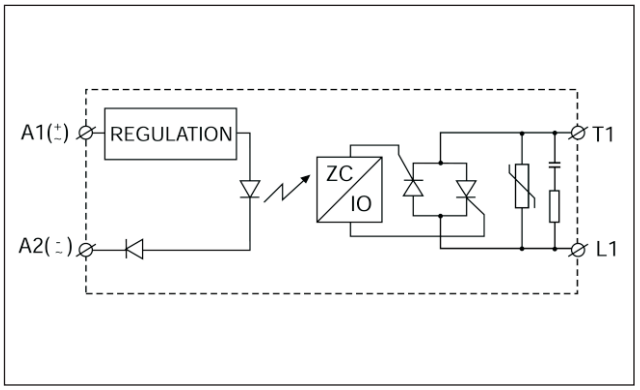
Housing Specifications

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

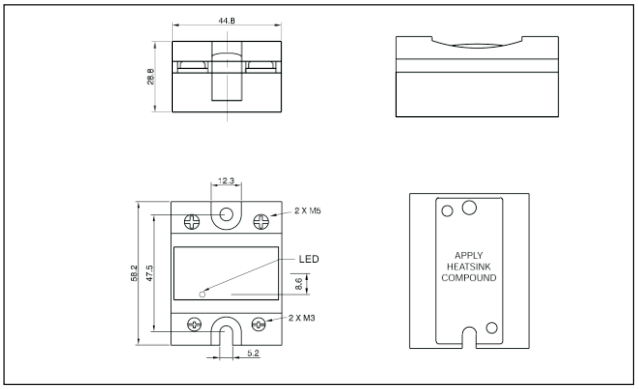
Housing Specifications (Cont.)

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

Functional Diagram



Dimensions



All dimensions in mm

Heatsink Selection

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 45A 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

Insulation

Rated insulation voltage Input to output	⩾ 4000 VACrms
Rated insulation voltage Output to case	⩾ 4000 VACrms

Heatsink Dimensions (load current versus ambient temperature)

RM25.

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

Ambient temp. [° C]

Junction to ambient thermal resistance, Rthj-a	< 20.0	K/W
Junction to case thermal resistance, Rthj-c	<0.80	K/W
Case to heatsink thermal resistance, Rthc-s	< 0.20	K/W
Maximum allowable case temperature	100	deg.C
Maximum allowable junction temperature	125	deg.C

RM50.

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

Ambient temp. [° C]

Junction to ambient thermal resistance, Rthj-a	< 20.0	K/W
Junction to case thermal resistance, Rthj-c	< 0.50	K/W
Case to heatsink thermal resistance, Rthc-s	< 0.20	K/W
Maximum allowable case temperature	100	deg.C
Maximum allowable junction temperature	125	deg.C

RM75.

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

Ambient temp. [° C]

Junction to ambient thermal resistance, Rthj-a	< 20.0	K/W
Junction to case thermal resistance, Rthj-c	<0.35	K/W
Case to heatsink thermal resistance, Rthc-s	< 0.10	K/W
Maximum allowable case temperature	100	deg.C
Maximum allowable junction temperature	125	deg.C

RM100.

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

Ambient temp. [° C]

Junction to ambient thermal resistance, Rthj-a	< 20.0	K/W
Junction to case thermal resistance, Rthj-c	< 0.30	K/W
Case to heatsink thermal resistance, Rthc-s	< 0.10	K/W
Maximum allowable case temperature	100	deg.C
Maximum allowable junction temperature	125	deg.C