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**
- **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**
- **Blocking voltage: Up to 1400V_p**
- **Opto-isolation: > 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 16mm^2.

Ordering Key

RM 1 A 23 D 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 (DC Control only)	23: 230VACrms 40: 400VACrms 48: 480VACrms 60: 600VACrms	A: 20-280VAC/22-48VDC D: 3-32VDC* *4 to 32VDC for 400, 480 and 600VAC types *4 to 32VDC for RM1B types	25: 25AACrms 50: 50AACrms 75: 75AACrms 100: 100AACrms

Selection Guide

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

General Specifications

	RM1.23...	RM1.40...	RM1.48...	RM1.60...
Operational voltage range				
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
Blocking voltage	≥ 650V_p	≥ 850V_p	≥ 1200V_p	≥ 1400V_p
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
Approvals	UR, cUR, CSA	UR, cUR, CSA	UR, cUR, CSA	UR, cUR, CSA
CE-marking	Yes	Yes	Yes	Yes *

* 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

Output Specifications

	RM1....25	RM....50	RM1....75	RM1....100
Rated operational current				
AC51 @ Ta=25°C	25Arms	50Arms	75Arms	100Arms
AC53a @ Ta=25°C	5Arms	15Arms	20Arms	30Arms
Min. operational current	150mA	250mA	400mA	500mA
Rep. overload current t=1 s	< 55AACrms	< 125AACrms	< 150AACrms	< 200AACrms
Non-rep. surge current t=10 ms	$325A_p$	$600A_p$	$1150A_p$	$1900A_p$
Off-state leakage current @ rated voltage and frequency	< 3mArms	< 3mArms	< 3mArms	< 3mArms
I^2t for fusing t=10 ms	< $525A^2s$	< $1800A^2s$	< $6600A^2s$	< $18000A^2s$
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

Electromagnetic Compatibility

EMC Immunity	IEC/EN 61000-6-2
Electrostatic Discharge (ESD) Immunity	IEC/EN 61000-4-2
Air discharge, 8kV	Performance Criteria 2
Contact, 4kV	Performance Criteria 2
Electrical Fast Transient (Burst) Immunity	IEC/EN 61000-4-4
Output: 2kV, 5kHz	Performance Criteria 1
Input: 1kV, 5kHz	Performance Criteria 1
Electrical Surge Immunity	IEC/EN 61000-4-5
Output, line to line, 1kV	Performance Criteria 2
Output, line to earth, 2kV	Performance Criteria 2
Input, line to line, 1kV (RM1..D..)	Performance Criteria 2
Input, line to earth, 2kV (RM1..D..)	Performance Criteria 2
Input, line to line, 500V[1] (RM1..A..)	Performance Criteria 2
Input, line to earth, 500V[1](RM1..A..)	Performance Criteria 2

Radiated Radio Frequency Immunity	IEC/EN 61000-4-3
10V/m, 80 - 1000 MHz	Performance Criteria 1
10V/m, 1.4 - 2.0GHz	Performance Criteria 1
3 V/m, 2.0 - 2.7GHz	Performance Criteria 1
Conducted Radio Frequency Immunity	IEC/EN 61000-4-6
10V/m, 0.15 - 80 MHz	Performance Criteria 1
Voltage Dips Immunity	IEC/EN 61000-4-11
0% for 10ms	Performance Criteria 2
70% for 500ms	Performance Criteria 2
Voltage Interruptions Immunity	IEC/EN 61000-4-11
0% for 5000ms	Performance Criteria 2

EMC Emission	IEC/EN 61000-6-4
Radio Interference Voltage Emission (Conducted)	IEC/EN 55011
0.15 - 30MHz	Class A (industrial) with filters IEC/EN 60947-4-3 Class A (no filtering needed up to 75AAC)

Radio Interference Field Emission (Radiated)	IEC/EN 55011
30 - 1000MHz	Class B

* For higher surge voltage levels a varistor should be connected across the control terminals.

Thermal Specifications

	RM1....25	RM1....50	RM1.60.50	RM1....75	RM1....100
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

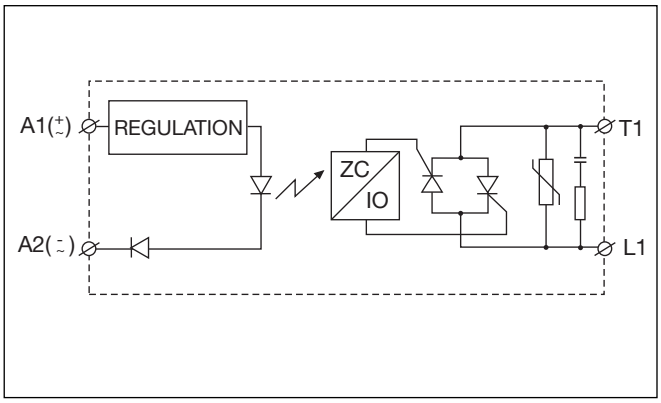
Housing Specifications

Weight	
25A, 50A	Approx. 60g
75A, 100A	Approx. 100g
Baseplate	
25A, 50A	Aluminium
75A, 100A	Copper, nickel-plated
Potting compound	None

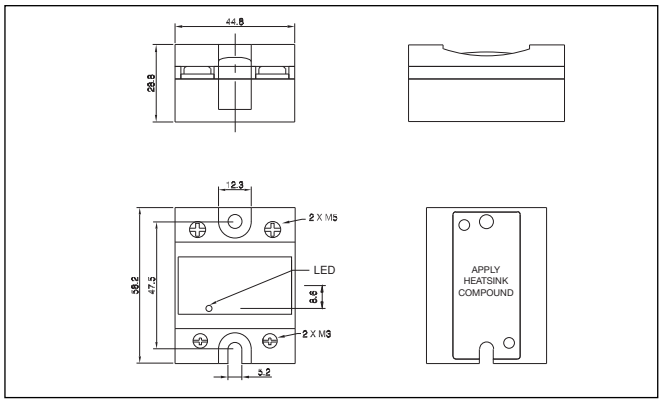
Housing Specifications (Cont.)

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

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

Isolation

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

CARLO GAVAZZI

Heatsink Dimensions (load current versus ambient temperature)

RM....25

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	T_A Ambient temp. [°C]

Junction to ambient thermal resistance, $R_{th\ j\text{-}a}$	< 20.0	K/W
Junction to case thermal resistance, $R_{th\ j\text{-}c}$	< 0.80	K/W
Case to heatsink thermal resistance, $R_{th\ c\text{-}s}$	< 0.20	K/W
Maximum allowable case temperature	100	deg.C
Maximum allowable junction temperature	125	deg.C

RM....50

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	T_A Ambient temp. [°C]

Junction to ambient thermal resistance, $R_{th\ j\text{-}a}$	< 20.0	K/W
Junction to case thermal resistance, $R_{th\ j\text{-}c}$	< 0.50	K/W
Case to heatsink thermal resistance, $R_{th\ c\text{-}s}$	< 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]
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
	20	30	40	50	60	70	T_A Ambient temp. [°C]

Junction to ambient thermal resistance, $R_{th\ j\text{-}a}$	< 20.0	K/W
Junction to baseplate case thermal resistance, $R_{th\ j\text{-}c}$	< 0.72	K/W
Case to heatsink thermal resistance, $R_{th\ c\text{-}s}$	< 0.20	K/W
Maximum allowable heatsink temperature	100	deg.C
Maximum allowable junction temperature	125	deg.C

RM....75

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	T_A Ambient temp. [°C]

Junction to ambient thermal resistance, $R_{th\ j\text{-}a}$	< 20.0	K/W
Junction to case thermal resistance, $R_{th\ j\text{-}c}$	< 0.35	K/W
Case to heatsink thermal resistance, $R_{th\ c\text{-}s}$	< 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.

RM....100

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	T_A

Ambient temp. [°C]

Junction to ambient thermal resistance, $R_{th\ j\text{-}a}$	< 20.0	K/W
Junction to case thermal resistance, $R_{th\ j\text{-}c}$	< 0.30	K/W
Case to heatsink thermal resistance, $R_{th\ c\text{-}s}$	< 0.10	K/W
Maximum allowable heatsink temperature	100	deg.C
Maximum allowable junction temperature	125	deg.C

FASTON terminals

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

Ordering Key

Screw mounted Faston terminals — **RM1A48D25 | 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***

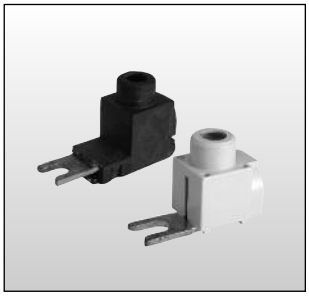
- **RS, RM Solid State Relay**
- **Tab orientation**

*** 0: Flat (0°)**
4: Angled (45°)

**** 48: 4.8mm faston for input**
63: 6.3mm faston for output

Specifications are subject to change without notice (07.02.2014)

Fork Terminals



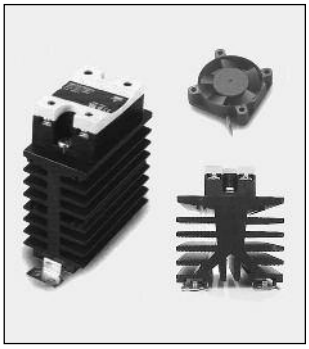
- Terminal adaptors for 35mm² cable
- Type RM635FK
- Pack size: 20 pieces

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 futher information refer to Accessories datasheets.