

# 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<sub>p</sub>
- Opto-isolation: > 4000VACrms



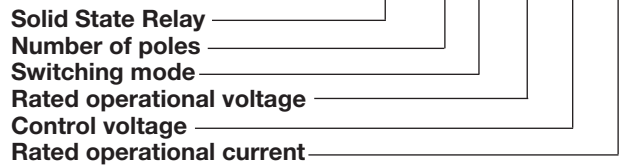
### Product Description

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<sup>2</sup>.

### Ordering Key

**RM 1 A 23 D 25**



### Type Selection

Switching mode	Rated operational voltage	Control voltage	Rated operational current
A: Zero Switching (ZC)	23: 230VACrms	A: 20-280VAC / 22-48VDC	25: 25AACrms
B: Instant-on switching (IO) (DC Control only)	40: 400VACrms 48: 480VACrms 60: 600VACrms	D: 3-32VDC* *4 to 32VDC for 400, 480 and 600VAC types *4 to 32VDC for RM1B types	50: 50AACrms 75: 75AACrms 100: 100AACrms

### Selection Guide

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

## General Specifications

	RM1.23...	RM1.40...	RM1.48...	RM1.60...
<b>Operational voltage range</b>				
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
<b>Blocking voltage</b>	650V <sub>p</sub>	850V <sub>p</sub>	1200V <sub>p</sub>	1400V <sub>p</sub>
<b>Zero voltage turn-on</b>	≤ 10V	≤ 10V	≤ 10V	≤ 10V
<b>Operational frequency range</b>	45 to 65Hz	45 to 65Hz	45 to 65Hz	45 to 65Hz
<b>Power factor</b>	> 0.5 @ 230VACrms	> 0.5 @ 400VACrms	> 0.5 @ 480VACrms	> 0.5 @ 600VACrms
<b>Approvals</b>	UR, cUR, CSA, CCC, EAC	UR, cUR, CSA, CCC, EAC	UR, cUR, CSA, CCC, EAC	UR, cUR, CSA, CCC, EAC
<b>CE-marking</b>	Yes	Yes	Yes	Yes *
<b>Isolation</b>				
<b>Input to Output</b>	4000 Vrms	4000 Vrms	4000 Vrms	4000 Vrms
<b>input and Output to case</b>	4000 Vrms	4000 Vrms	4000 Vrms	4000 Vrms

\* Heatsink must be connected to ground

## Input Specifications

	RM1...D..	RM1...A..
<b>Control voltage range</b>		
RM1A23...	3 - 32VDC	20 - 280VAC, 22 - 48VDC
RM1A40... RM1A48... RM1A60...	4 - 32VDC	20 - 280VAC, 22 - 48VDC
RM1B...	4 - 32VDC	-
<b>Pick-up voltage @ Ta = 25°C</b>		
RM1A23...	2.5VDC	18VAC/DC
RM1A40... RM1A48... RM1A60...	3.5VDC	18VAC/DC
RM1B ...	3.5VDC	-
<b>Reverse voltage</b>	32VDC	-
<b>Drop out voltage</b>	1.2VDC	6VAC/DC
<b>Input current @ max input voltage</b>		
RM1A	≤12 mA	≤ 20mA
RM1B	≤15 mA	-
<b>Response time pick-up</b>		
RM1A	≤1/2 cycle	≤ 12ms
RM1B	≤0.1ms	-
<b>Response time drop-out</b>	≤1/2 cycle	≤ 40ms

## Output Specifications

	RM1....25	RM....50	RM1....75	RM1....100
<b>Rated operational current</b>				
AC51 @ Ta=25°C	25Arms	50Arms	75Arms	100Arms
AC53a @ Ta=25°C	5Arms	15Arms	20Arms	30Arms
<b>Min. operational current</b>	150mA	250mA	400mA	500mA
<b>Rep. overload current t=1 s</b>	< 55AACrms	< 125AACrms	< 150AACrms	< 200AACrms
<b>Non-rep. surge current t=10 ms</b>	325A <sub>p</sub>	600A <sub>p</sub>	1150A <sub>p</sub>	1900A <sub>p</sub>
<b>Off-state leakage current @ rated voltage and frequency</b>	< 3mArms	< 3mArms	< 3mArms	< 3mArms
<b>I<sup>2</sup>t for fusing t=10 ms</b>	< 525A <sup>2</sup> s	< 1800A <sup>2</sup> s	< 6600A <sup>2</sup> s	<18000A <sup>2</sup> s
<b>Critical dV/dt off-state min.</b>	1000V/μs	1000V/μs	1000V/μs	1000V/μs
<b>Endurance testing acc. to UL508</b>	100,000 cycles	100,000 cycles	100,000 cycles	6,000 cycles

Note: UL requirement for General Use Endurance testing is 6,000 cycles



## Motor Ratings\*: HP (UL508)

	230VAC	400VAC	480VAC	600VAC
RM1..25	1.5HP	3HP	3HP	5HP
RM1..50	3HP	5HP	7.5HP	10HP
RM1..75	5HP	10HP	10HP	15HP
RM1..100	7.5HP	15HP	20HP	25HP

\* with suitable heatsink

## Electromagnetic Compatibility

<b>EMC Immunity</b>	EN60947-4-3	<b>Radiated Radio Frequency Immunity</b>	IEC/EN 61000-4-3
<b>Electrostatic Discharge (ESD) Immunity</b>	IEC/EN 61000-4-2	10V/m, 80 - 1000 MHz	Performance Criteria 1
Air discharge, 8kV	Performance Criteria 2	10V/m, 1.4 - 2.0GHz	Performance Criteria 1
Contact, 4kV	Performance Criteria 2	3 V/m, 2.0 - 2.7GHz	Performance Criteria 1
<b>Electrical Fast Transient (Burst) Immunity</b>	IEC/EN 61000-4-4	<b>Conducted Radio Frequency Immunity</b>	IEC/EN 61000-4-6
Output: 2kV, 5kHz	Performance Criteria 1	10V/m, 0.15 - 80 MHz	Performance Criteria 1
Input: 1kV, 5kHz	Performance Criteria 1	<b>Voltage Dips Immunity</b>	IEC/EN 61000-4-11
<b>Electrical Surge Immunity</b>	IEC/EN 61000-4-5	0% for 0.5, 1 cycle	Performance Criteria 2
Output, line to line, 1kV	Performance Criteria 2	40% for 10 cycles	Performance Criteria 2
Output, line to earth, 2kV	Performance Criteria 2	70% for 25 cycles	Performance Criteria 2
Input, line to line, 1kV	Performance Criteria 2	80% for 250 cycles	Performance Criteria 2
Input, line to earth, 2kV	Performance Criteria 2	<b>Voltage Interruptions Immunity</b>	IEC/EN 61000-4-11
		0% for 5000ms	Performance Criteria 2
<b>EMC Emission</b>	EN60947-4-3	<b>Radio Interference Field Emission (Radiated)</b>	IEC/EN 55011
<b>Radio Interference Voltage Emission (Conducted)</b>	IEC/EN 55011	30 - 1000MHz	Class B
0.15 - 30MHz	Class A (industrial) with filters		
	IEC/EN 60947-4-3		
	Class A (no filtering needed up to 75AAC)		

Notes:

- Control input lines must be installed together to maintain products' susceptibility to Radio Frequency interference.
- Performance Criteria 1: No degradation of performance or loss of function is allowed when the product is operated as intended.
- Performance Criteria 2: During the test, degradation of performance or partial loss of function is allowed. However, when the test is complete the product should return operating as intended by itself.
- Performance Criteria 3: Temporary loss of function is allowed, provided the function can be restored by manual operation of the controls.