

# Motor Controllers

## AC Semiconductor Motor Controller

### Type RSMR



- Soft starting and stopping of 3-phase squirrel cage motors
- Reliable microprocessor control
- 10 pre-programmed ramping profiles
- Rated operational voltage up to 480VAC, 50/60 Hz
- Rated operational current up to 90A AC-53a
- LED status indicator
- Kickstart option for high torque loads
- Auxiliary relays for top of ramp and run
- Phase loss protection at starting
- Over-current "shear-pin" protection

#### Preliminary Datasheet

#### Product Description

The RSMR is a microprocessor based soft starter for 3-phase induction motors. A rotary knob enables selection from 10 pre-programmed ramping profiles. The choice is suggested by a list of popular

applications that corresponds to the positions of the selector. No external supply is necessary as starting and stopping are controlled by closing and opening a contact.

#### Ordering Key

**RSM R 40 90**

M-line Motor Controller

Rotary ramp selector

Rated operational voltage

Rated operational current

#### Selection Guide

Rated operational voltage $U_e$	Rated operational current $I_e$ 72A AC-53a	90A AC-53a
340-506 VAC, 50/60 Hz	RSMR4072	RSMR4090

#### Supply Specification

Rated operational voltage $U_e$ through L1, L2, L3	340-506VAC rms
Rated AC frequency	50/60 Hz $\pm 2$ Hz

#### Input Specifications

Control supply	Internal
Control contacts S0, S1	close to start, open to stop

#### Load Ratings

	RSMR4072	RSMR4090
IEC rated operational current $I_e$ (AC-53a) @ 40/50/60°C	72/57/43 A	90/72/54 A
Assigned motor rating @ 40°C		
400V	37kW/50HP	45kW/60HP
460V	40kW/54HP	45kW/60HP
Overload cycle to IEC/EN 60 947-4-2	72A: AC-53a: 5-4: 99-10	90A: AC-53a: 5-4: 99-10
Power dissipation at rated operational current	119W	144W
Number of starts per hour @ 40°C	10 (starting interval 6 minutes)	
Start duty	5 x FLC for 4 seconds 4 x FLC for 6 seconds 3 x FLC for 12 seconds 2 x FLC for 26 seconds	
Shear-pin cut-off level	currents in excess of 5 x FLC for 500ms	

## General Specifications

Degree of protection	IP20 (IEC 60 529)
Relative humidity max.	85% non-condensing, not exceeding 50% @ 40°C
Rated insulation voltage UI	460V
Pollution degree	3
Ramp up time	1 to 15s
Ramp down time	0 to 15s
Application selection	10 position rotary switch
Status indicator LED	red continuous: active, red intermittent: fault
Auxiliary relay contacts	Run 13,14
Run 13,14	Normally open
End of ramp 23,24	Normally open
Auxiliary relay contact capacity	5A, 250V AC1
Installation altitude	Above 1000m derate linearly by 1% of unit FLC per 100m to a maximum altitude of 2000m

## Conductor Data

Power conductors	
Size	2.5mm <sup>2</sup> to 35mm <sup>2</sup> (AWG 2 to 12)
Tightening torque	≤2.5Nm
Screw driver	Flat, size 7
Auxiliary conductors	
Size	0.5mm <sup>2</sup> to 2.5mm <sup>2</sup> (AWG 20 to 14)
Tightening torque	≤0.5Nm
Screw driver	Flat, size 3
Ground/earth conductor	1.0mm <sup>2</sup> or 5mm earth stud

## Thermal Specifications

Operating temperature	0° to +60°C (32° to +140°F)
Storage temperature	-25° to +60°C (-13° to +140°F)

## Standards

Markings	CE
Norms	IEC/EN 60 947-4-2

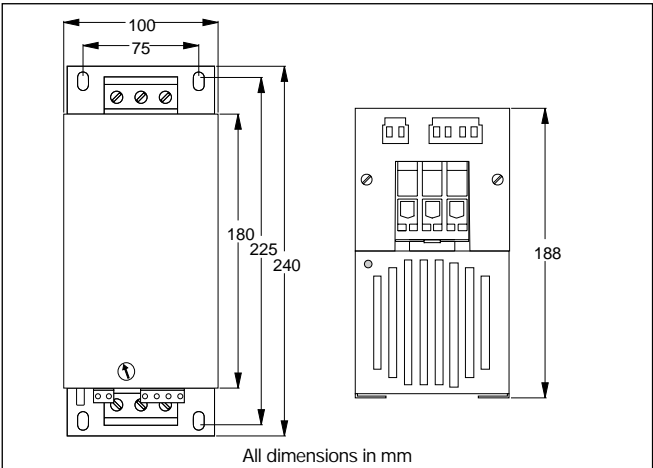
## EMC Emission and Immunity Levels

ESD immunity	IEC 1000-4-2 6kV/contact or 8kV air discharge
R F immunity	IEC 1000-4-6 140dBuV over 0.15-80MHz
R F immunity	IEC 1000-4-3 10V/m over 80/100MHz
Fast transient immunity	IEC 1000-4-4 2kV/5kHz
Surge immunity	IEC 1000-4-5 2kV line to ground 1kV line to line
Conducted RF emissions	EN55011 Class A
Radiated RF emissions	EN55011 Class A

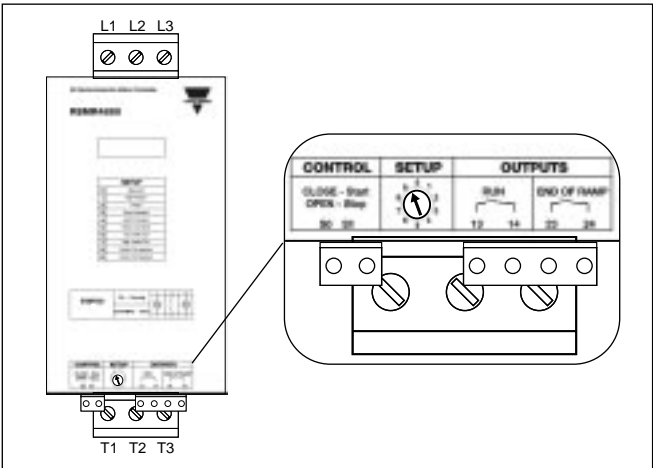
## Recommended Protection

	RSMR..72		RSMR..90
Semiconductor fuse	Ferraz Shawmut, type PSC 250 A, body size 31, Art.No. 6,6URD31D11A0250 or 6,6URD31EF0250 Bussmann, type Zilox, 250 A, body size 1, Art.No. 170M3116	Semiconductor fuse	Ferraz Shawmut, type PSC 250 A, body size 31, Art.No. 6,6URD31D11A0250 or 6,6URD31EF0250 Bussmann, type Zilox, 250 A, body size 1, Art.No. 170M3116
Motor Protection circuit breaker	Telemecanique : GV7-RS80 ABB: MS495-75 Sprecher+Schuh: KTA3-100-16A	Motor Protection circuit breaker	Telemecanique : GV7-RS100 ABB: MS495-90 Sprecher+Schuh: KTA3-100-16A

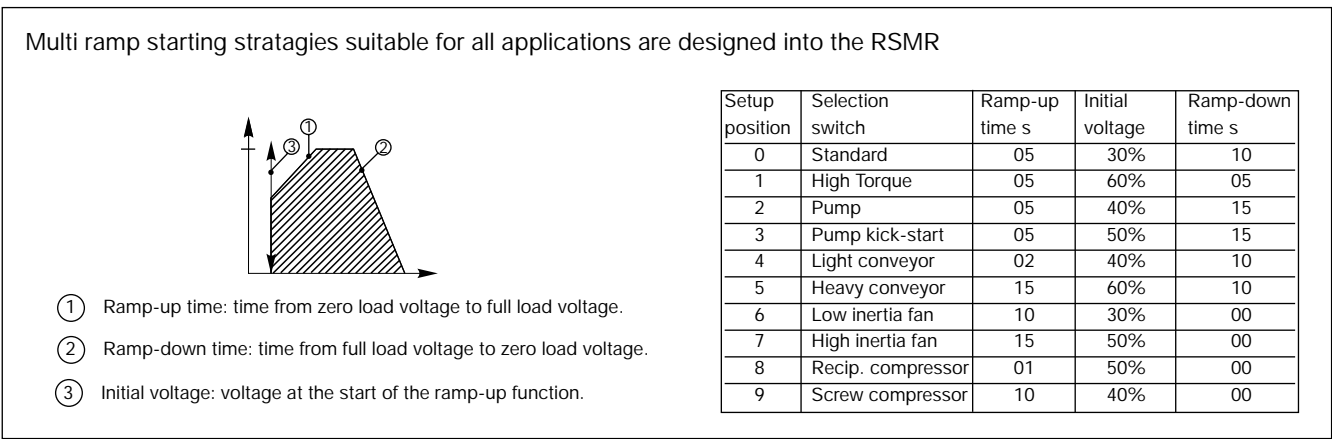
Dimensions



Terminal Diagram



Operation Diagram



Connection Diagrams

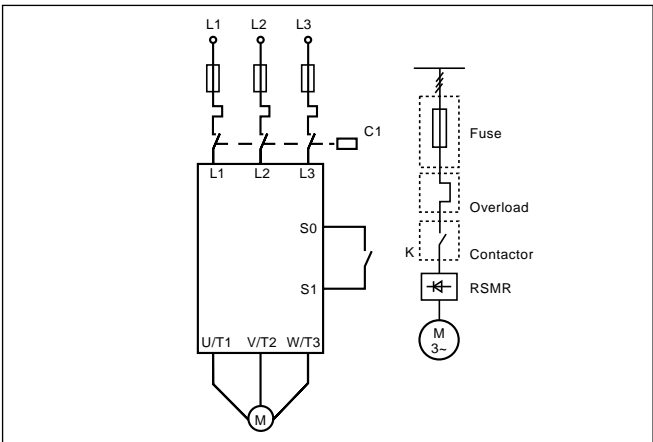


Fig. 1 Main circuit with fuse

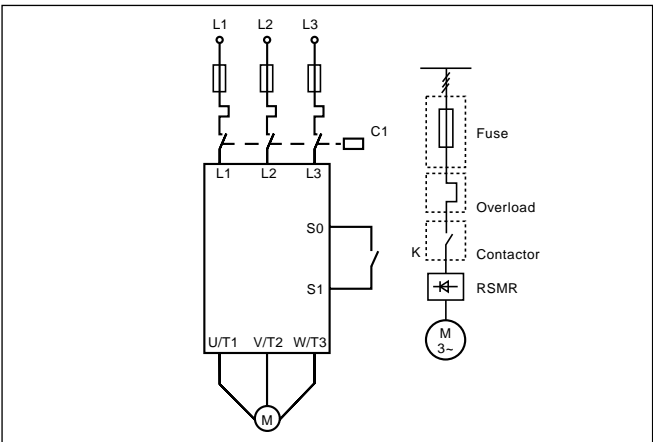


Fig. 2 Main circuit with thermal-magnetic overload relay

## Applications

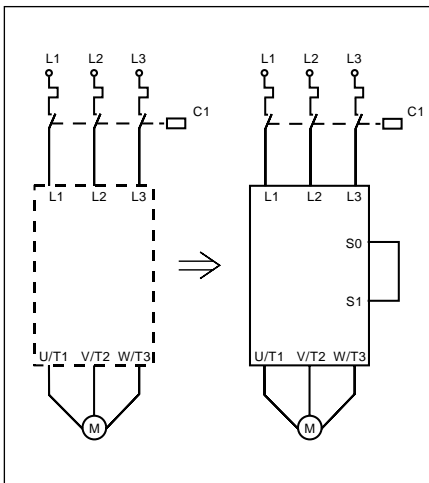


Fig. 3 Starting via mains contactor

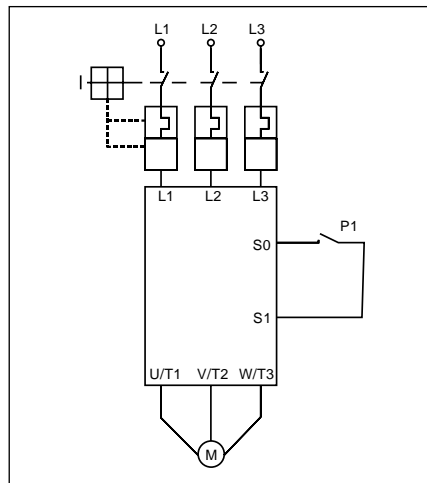


Fig. 4 Control by external switch

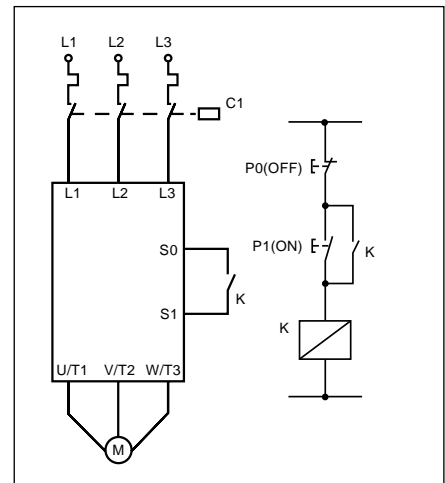


Fig. 5 Control via auxiliary contact

### Fusing Considerations

This motor controller uses semiconductors during running operation. Therefore the semiconductors can be damaged by short-circuit currents. The best protection is with semiconductor fuses. (Fig. 1)

### Other protection methods

A 3-phase induction motor with correctly installed and adjusted overload protection does not short totally between lines or directly to earth as some other types of loads, eg heater bands. In a failing motor there will always be some part of a winding to limit the fault current. If the motor is installed in an environment where the supply to the motor

cannot be damaged, the short circuit protection can be considered to be acceptable if the controller is protected by a 3-pole thermal-magnetic overload relay. For protection with an overload relay. (Fig. 2)

### Changing from Direct ON Line start to soft start (Line controlled soft-start) (Fig. 3)

Changing a Direct On Line start into a soft start is very simple with the RSMR soft starter:

- 1) Cut the cable to the motor and insert the RSMR soft starter.
- 2) Short the control input S0, S1 with the link provided
- 3) Power up again - adjust the start torque so the motor

starts turning immediately after power is applied.

When C1 is operated, the motor controller will perform soft-start of the motor. When C1 is switched off, the motor will stop (no soft-stop), the motor controller will reset and a new soft-start can be performed.

Please note that the controller does not insulate the motor from the mains. A mains contactor C1 is therefore needed as a service switch for the motor.

### Soft-start and stop with 2 position switch (Fig. 4)

When P1 is closed, soft-start of the motor will be performed according to the setting of the ramp-up potentiometer and

the setting of the initial torque potentiometer. When P1 is opened, soft-stop will be performed according to the setting of the ramp-down potentiometer.

### Soft-start and stop with push-to-make and push-to-break switches (Fig. 5)

Pushing P1 soft-starts the RSMR. Pushing P2 soft-stops the RSMR. K is the auxiliary contact of an external mains contactor.