

# Motor Controllers

## AC Semiconductor Motor Controller

### Type RSMR



- Soft starting and stopping of 3-phase squirrel cage motors
- 2 Phase controlled (without bypass relay)
- 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

## 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
Soft Stop Control	no more than 3m from enclosure

## 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 60529)
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	Normally open
Top 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
Form Designation	Form 1
Rated Short Circuit Current (Iq)	20kA
Short Circuit Co-ordination	Type 1

## Thermal Specifications

Operating temperature*	0° to +40°C (32° to +140°F)
Storage temperature	-25° to +60°C (-13° to +140°F)

\* Above 40°C derate linearly by 1% of unit FLC per 100m to a max. of 40% at 60°C.

## Standards

Markings	CE
Norms	IEC/EN 60947-4-2

## Recommended Protection

	<b>RSMR..72</b>		<b>RSMR..90</b>
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

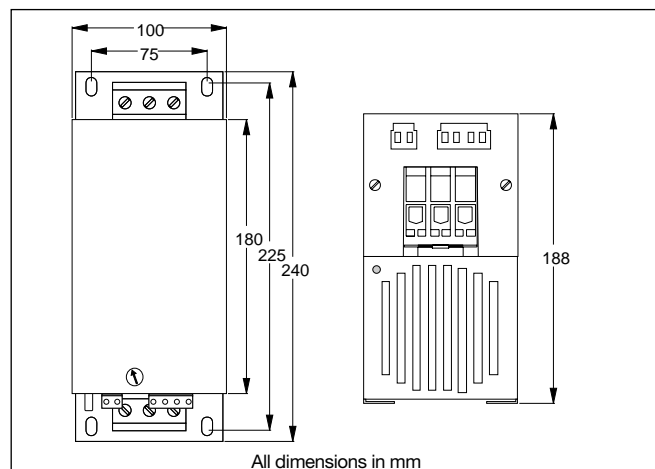
## Conductor Data

Power conductors	
Size	16mm <sup>2</sup> to 35mm <sup>2</sup> (AWG 6 to 2)
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

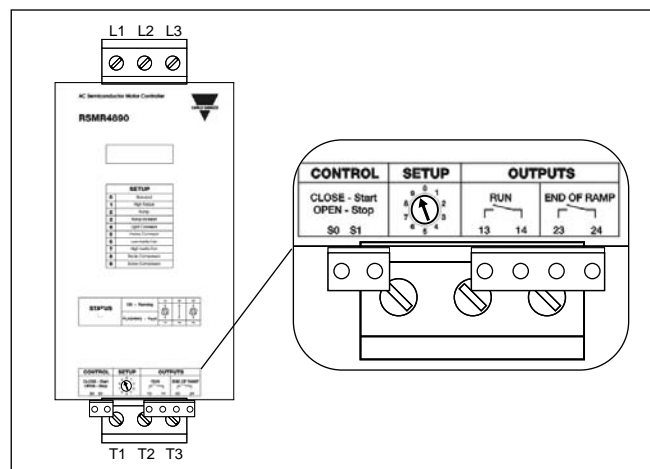
## EMC Emission and Immunity Levels

ESD immunity	IEC 61000-4-2 6kV/contact or 8kV air discharge
R F immunity	IEC 61000-4-6 140dBuV over 0.15-80MHz
R F immunity	IEC 61000-4-3 10V/m over 80/1000MHz
Fast transient immunity	IEC 61000-4-4 2kV/5kHz
Surge immunity	IEC 61000-4-5 2kV line to ground 1kV line to line
Conducted RF emissions	EN55011 Class A
Radiated RF emissions	EN55011 Class A

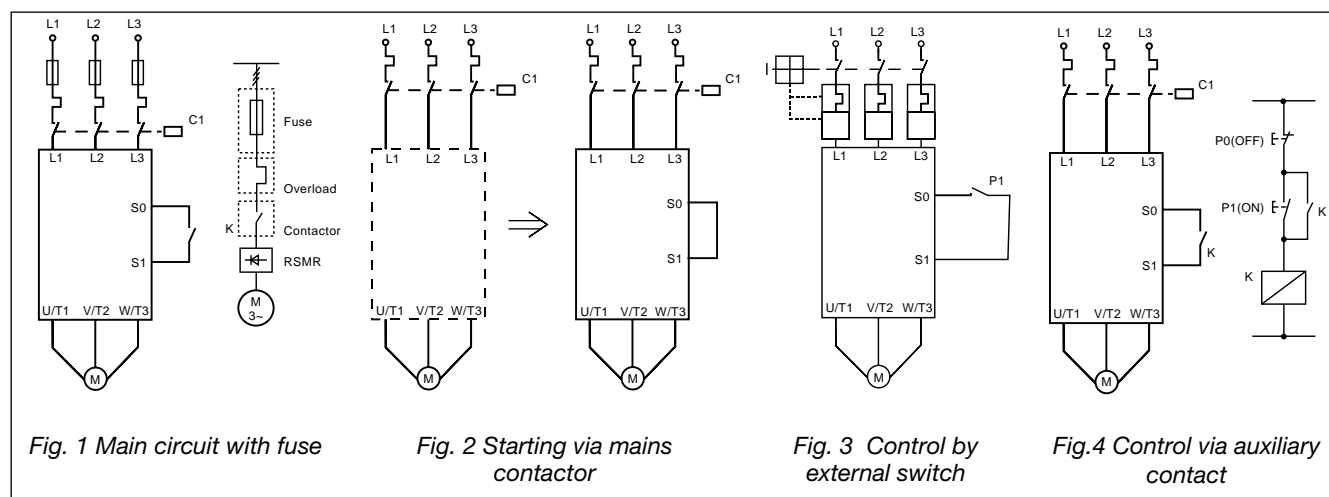
## Dimensions



## Terminal Diagram



## Control Diagrams and Applications



### Fusing Considerations (Fig. 1)

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.

### Changing from Direct ON Line start to soft start (Line controlled soft-start) (Fig. 2)

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.

### Soft-start and stop with 2 position switch (Fig. 3)

When P1 is closed, soft-start of the motor will be performed according to the setting of the rotary setup knob. When P1 is opened, soft-

stop will be performed according to the setting of the rotary setup knob.

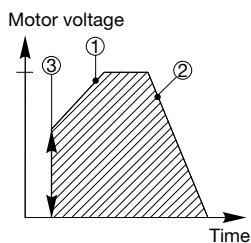
### Soft-start and stop with push-to-make and push-to-break switches (Fig. 4)

Pushing P1 soft-starts the RSMR. Pushing P0 soft-stops the RSMR. K is the auxiliary contact of an external mains contactor.

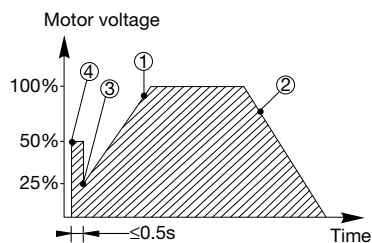
## Operation Diagram

Multi ramp starting strategies suitable for all applications are designed into the RSMR

**Excluding setup position [3]**



**Setup position [3]**



- ① Ramp-up time: time from zero load voltage to full load voltage.
- ② Ramp-down time: time from full load voltage to zero load voltage.
- ③ Initial voltage: voltage at the start of the ramp-up function.
- ④ Kickstart: constant initial voltage delay before ramp-up.

Setup position	Selection switch	Ramp-up time s	Initial voltage	Ramp-down time s
0	Standard	05	30%	10
1	High Torque	05	60%	05
2	Pump	05	40%	15
3	Pump kick-start	05	50%	15
4	Light conveyor	02	40%	10
5	Heavy conveyor	15	60%	10
6	Low inertia fan	10	30%	00
7	High inertia fan	15	50%	00
8	Recip. compressor	01	50%	00
9	Screw compressor	10	40%	00