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Contact us

Motor Controllers, Single Phase
3-Phase Torque Reduction
Types RSE 1112-BS, RSE 2312-BS, RSE 4012-BS

CARLO GAVAZZI
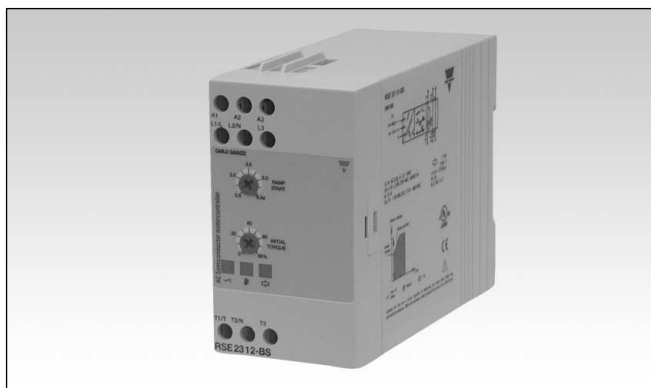
- Rated operational current: 12 AAC 53 b
- Soft starting of most single phase motors
- Torque reduction by use on 3-phase motors
- Rated operational voltage: Up to 400 VAC, 50/60 Hz
- LED-indications for supply and operation
- Transient overvoltage protection built-in
- Integral bypassing of semiconductor

Product Description

Compact easy-to-use AC semiconductor motor controller. With this controller single phase capacitor run induction motors with nominal load currents up to 12 A can be soft-started. Starting time as well as initial torque can be independently adjusted by built-in potentiometers.

Torque reduction by ramping of a single phase in 3-phase applications is also possible with this module.

Ordering Key

RSE 23 12 - BS

Solid State Relay
Motor controller
E-line housing
Rated operational voltage
Rated operational current
Control voltage
Single Phase Control

Type Selection

Rated operational voltage U_e	Control voltage U_c	Rated operational current I_e 12 A
11: 115 VACrms, 50/60 Hz	-B: 24 to 110 VAC/DC & 110 to 480 VAC	**RSE 1112-BS**
23: 230 VACrms, 50/60 Hz		**RSE 2312-BS**
40: 400 VACrms, 50/60 Hz		**RSE 4012-BS**

Input Specifications (Control Input)

Control voltage U_c A1-A2:	24 - 110 VAC/DC ±15%, 12 mA
A1-A3:	110 - 480 VAC ±15%, 5 mA
Rated insulation voltage	630 V rms Overvoltage cat. III (IEC 60664)
Dielectric strength Dielectric voltage Rated impulse withstand volt.	2.5 kVAC (rms) 4 kV (1.2/50 µs)

Output Specifications

Utilization category	AC-53b Integral bypassing of semiconductors		
Overload current profile (overload relay trip class)	12A: AC-53b: 3-5: 180		
Max. number of soft startings per hour (at max. current for 5 s)	Startings	T_A	Inactive
	19	25ºC	180 s
	15	30ºC	225 s
	11	40ºC	315 s
Min. load current RSE ..12-BS	200 mAAC rms		

RSE 1112-BS, RSE 2312-BS, RSE 4012-BS

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Supply Specifications

Power supply	Overvoltage cat. III (IEC 60664)
Rated operational volt. (U$_e$)	
through terminals L1/L-L2/N	(IEC 60038)
11	115 VAC rms ±15%
23	230 VAC rms ±15%
40	400 VAC rms ±15%
Voltage interruption	≤ 40 ms
Dielectric voltage	None
Rated impulse withstand volt.	4 kV (1.2/50 µs)
Rated operational power	2 VA
supplied from	L1/L- L2/N

General Specifications

Accuracy	
Ramp up	5.5 - 7.5 s on max.
	≤ 0.5 s on min.
Initial torque	70 - 100% on max.
	5% on min.
EMC	Electromagnetic Compatibility
Immunity	acc. to EN 61000-6-2
Indication for	
Power supply ON	LED, green
Ramp up bypassing relay	LED, yellow
Environment	
Degree of protection	IP 20
Pollution degree	3
Operating temperature	-20° to +50°C (-4° to +122°F)
Storage temperature	-50° to +85°C (-58° to +185°F)
Screw terminals	
Tightening torque	Max. 0.5 Nm acc. to IEC 60947
Terminal capacity	2 x 2.5 mm²
CE-marking	Yes
Approvals	UL, cUL, CSA

Mode of Operation

This motor controller is intended to be used to softstart single phase run capacitor induction motors and thereby reduce the stress or wear on gear and belt/chain drives and to give smooth operation of machines. Soft starting is achieved by controlling the motor voltage. During running operation the semiconductor is bypassed by an internal electromechanical relay.

The initial torque can be adjusted from 0 to 85% of the nominal torque.

The softstart time can be adjusted from 0.5 to approx. 6.5 s.

A green LED indicates supply. Two yellow LEDs indicate Ramp up and Running mode.

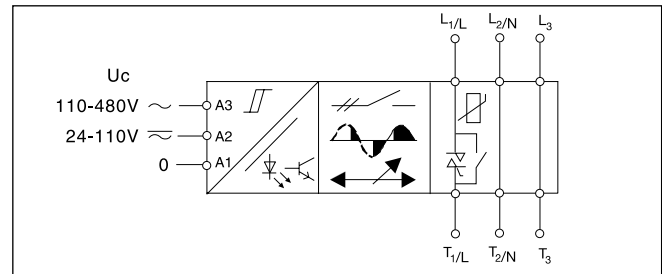Overload protection is not provided in this motor controller and must therefore be installed separately.

The controller is only switching L1 line. The L2/N and L3 are continuously connected to the load.

Semiconductor Data

Rated operational current	I²t for fusing t = 1 - 10 ms	I$_{TSM}$	dI/dt
12 A	610 A²s	350 A$_p$	50 A/µs

Functional Diagram

Operation Diagram 1

① Ramp-up time 0.5 to 6.5s. Time from zero load voltage to full load voltage.
② Initial torque 0 to 85% voltage at the start of the ramp-up function.

Operation Diagram 2

Specifications are subject to change without notice (30.03.2007)

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Dimensions

All dimensions in mm
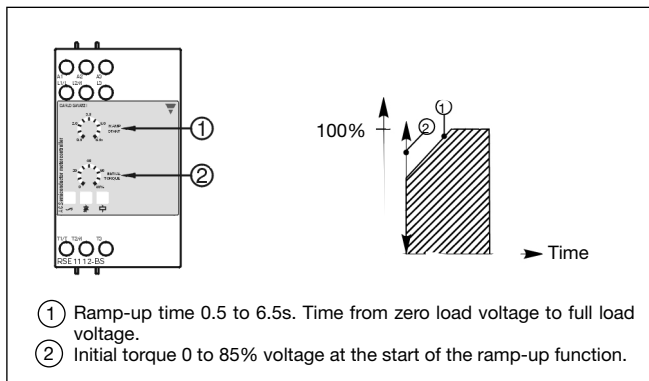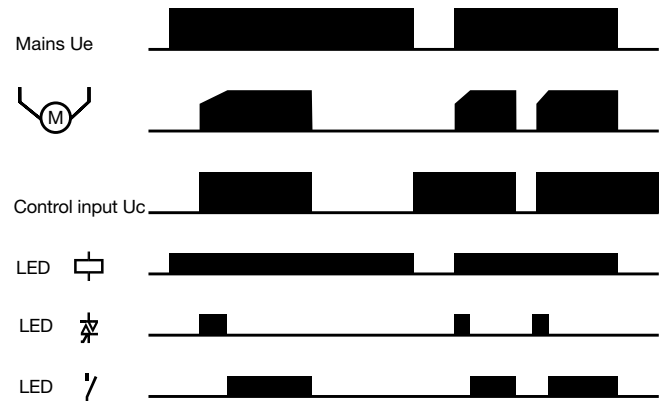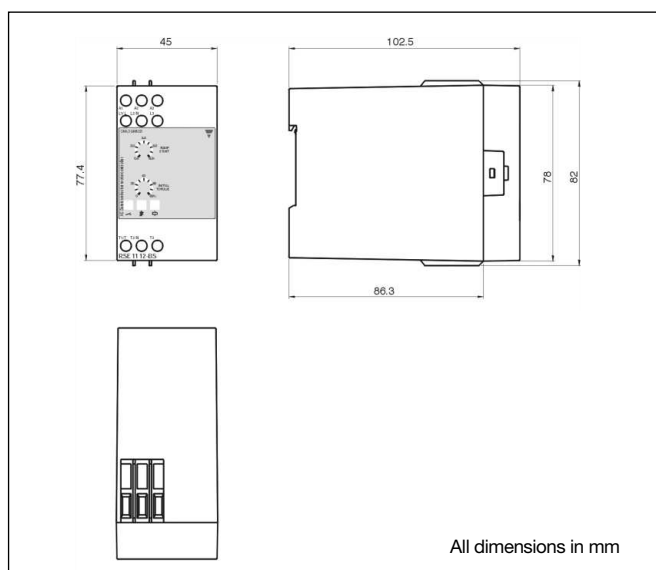
Housing Specifications

Weight	270 g
Housing material	PC/ABS Blend
Colour	Light grey
Terminal block	PBTP
Colour	Light grey
Bottom clip	POM
Colour	Black
Diode cover	PC
Colour	Grey Transparent
Front knob	PA
Colour	Grey

Applications for Single Phase Motors

Changing from Direct ON Line start to soft start (Line controlled soft-start)

(*Fig. 1*)

Changing a Direct On Line start into a soft start is very simple with the RSE soft-starting relay:

1) Cut the cable to the motor and insert the RSE relay.

2) Connect control input to the two mains lines. Set initial torque to minimum and ramp up potentiometer to maximum.

3) Power up again - adjust the start torque so the motor starts turning immediately after power is applied, and adjust ramp time to the appropriate value.

When C1 is operated, the motor controller will perform soft-start of the motor. When C1 is switched off, the motor will stop, the motor controller will reset and after 0.5 s a new soft-start can be performed.

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

Soft-start

(*Fig. 2*)

When S1 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.
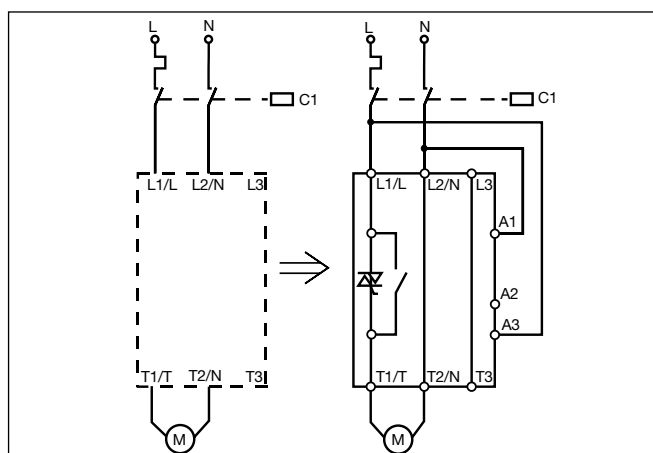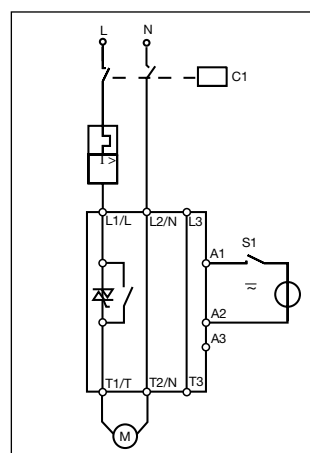

Fig. 1

Fig. 2

Applications for Single Phase Motors (cont.)

Time between rampings
To prevent the semiconductors from overheating, a certain time between ramping should be allowed. The time between rampings depends on the motor current during ramping and ramp time (see tables below).

Note:
Table is valid for ambient temperature 25°C. For higher ambient temperature add 5%/°C to values in the tables. The shaded areas in the tables are for blocked rotor. Do not repeat rampings with blocked rotor.

Fusing Considerations
The motor controller provides by-passing of the semiconductor during running operation. Therefore the semiconductor can only be damaged by short-circuit currents during ramp-up and ramp-down function.

A single-phase run capacitor 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, e.g. 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 single-pole thermal-magnetic overload relay.

If the risk of short circuit of the motor cable, the controller or the load exists, then the controller must be protected by ultrafast fuses, e.g. Ferraz 6.9 gRB 10-25. Fuseholder type CMS10 1P.

RSE .. 12 -BS
Time between rampings

I ramp (A) \ Ramp time (sec.)	1	2	5	10
72	2.5 min	5 min	40 min	N/A
60	1.5 min	3 min	13 min	17 min
48	50 sec	1.5 min	5 min	10 min
36	30 sec	1 min	3 min	7 min
24	15 sec	40 sec	1.5 min	2.5 min
12	10 sec	20 sec	50 sec	70 sec
6	5 sec	9 sec	20 sec	40 sec

Applications for Three Phase Motors

3-phase torque reduction
When C1 is closed, a torque reduced start of the 3-phase motor will be performed according to the setting of the ramp-up potentiometer, and the setting of the initial torque potentiometer.

Warning:
When the motor is stopped C1 must be open to remove all 3 phases from the motor. This is necessary to avoid 2-phase running of the motor.

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