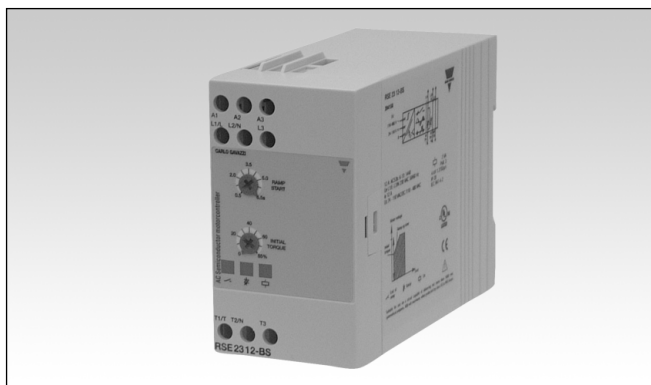


Motor Controllers, Single Phase

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

11: 115 VACrms, 50/60 Hz
23: 230 VACrms, 50/60 Hz
40: 400 VACrms, 50/60 Hz

Control voltage U_c

-B: 24 to 110 VAC/DC
& 110 to 480 VAC

**Rated operational current I_e
12 A**

**RSE 1112-BS
RSE 2312-BS
RSE 4012-BS**

Input Specifications (Control Input)

| | |
|--|---|
| Control voltage U_c A1-A2: | 24 - 110 VAC/DC $\pm 15\%$, 12 mA |
| A1-A3: | 110 - 480 VAC $\pm 15\%$, 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 μ s) |

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 | 25°C | 180 s |
| | 15 | 30°C | 225 s |
| | 11 | 40°C | 315 s |
| Min. load current RSE ..12-BS | 200 mAAC rms | | |



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 supplied from | 2 VA |
| | L1/L- L2/N |

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.

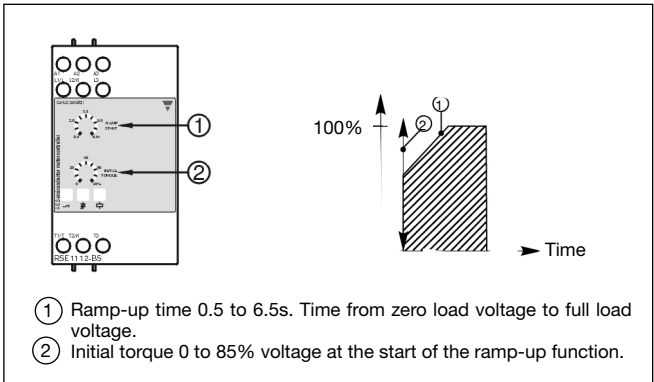
The softstart time can be adjusted from 0.5 to approx. 6.5 s.

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.

Operation Diagram 1



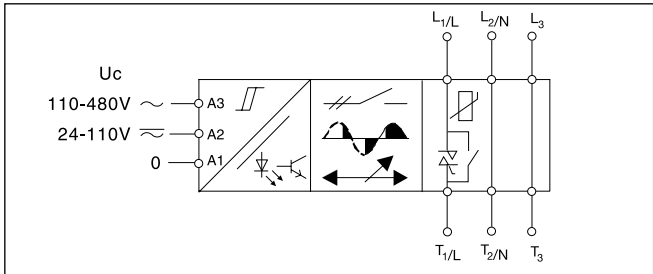
General Specifications

| | |
|-------------------------|--|
| 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 mm ² |
| CE-marking | Yes |
| Approvals | UL, cUL, CSA |

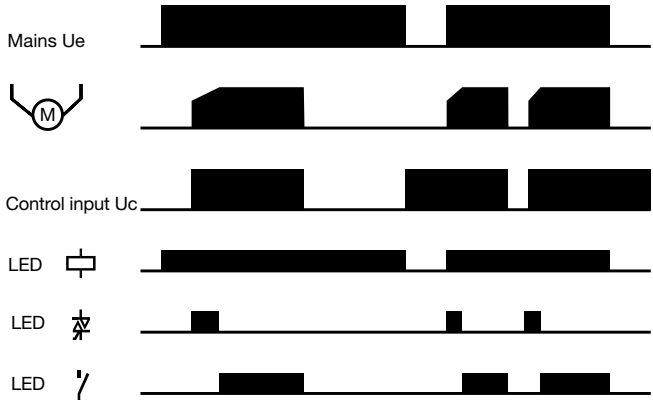
Semiconductor Data

| Rated operational current | I ² t for fusing t = 1 - 10 ms | I _{TSM} | di/dt |
|---------------------------|--|--------------------|---------|
| 12 A | 610 A ² s | 350 A _p | 50 A/µs |

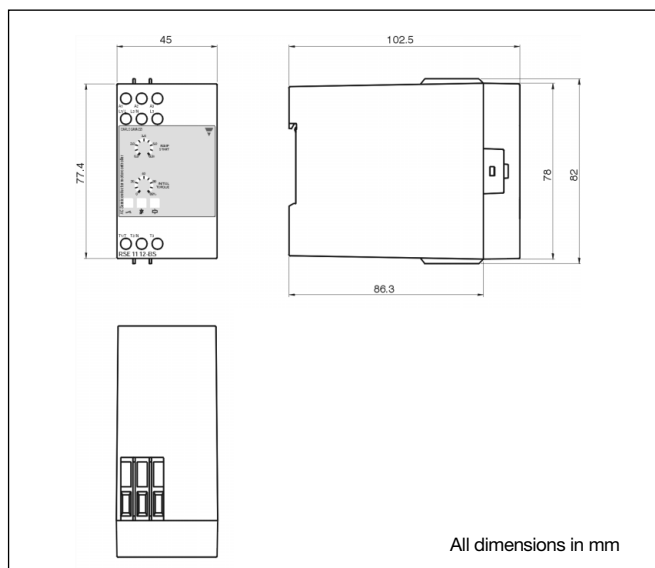
Functional Diagram



Operation Diagram 2



Dimensions



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.

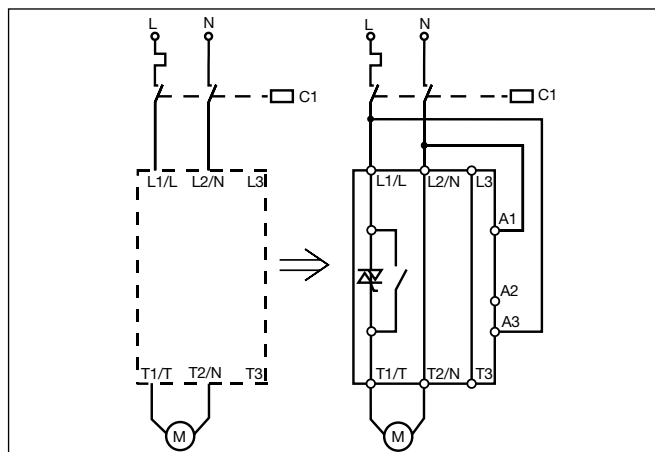


Fig. 1

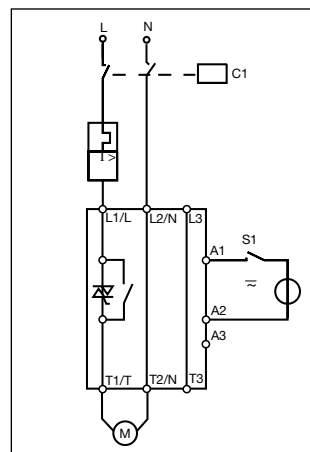


Fig. 2

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.

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.

RSE .. 12 -BS

Time between rampings

| Ramp time (sec.) I ramp (A) | 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 |

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

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.

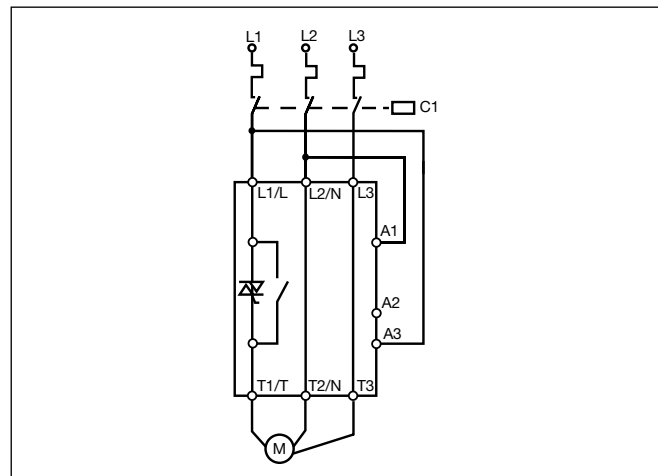
Applications for Three Phase Motors

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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