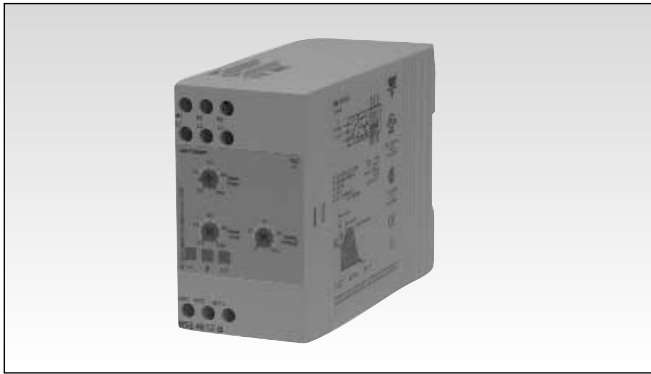


Motor Controllers

AC Semiconductor Motor Controller

Types RSE 22 .. - B, RSE 4. .. - B, RSE 60 .. - B



- Soft starting and stopping of 3-phase squirrel cage motors
- Rated operational voltage: Up to 600 VACrms, 50/60 Hz
- Rated operational current: 3 A or 12 AAC 53 b
- Potential-free control input
- LED-indications for supply and operation
- Transient overvoltage protection built-in
- Integral bypassing of semiconductors

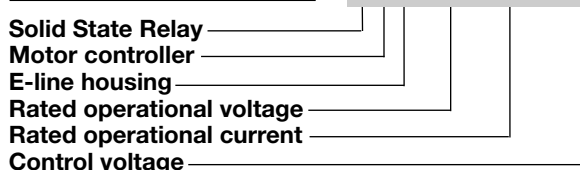
Product Description

Compact easy-to-use AC semiconductor motor controller. With this controller 3-phase motors with nominal load currents up to 12 A can be soft-started and/or soft-

stopped. Starting and stopping time as well as initial torque can be independently adjusted by built-in potentiometers.

Ordering Key

RSE 40 03 - B



Type Selection

| Type | Rated operational voltage U_e | Rated operational current I_e | Control voltage U_c *) |
|--|--|---------------------------------|---------------------------------------|
| RSE: E-series, motor controller | 22: 127/220 VACrms, 50/60 Hz 40: 230/400 VACrms, 50/60 Hz 48: 277/480 VACrms, 50/60 Hz 60: 346/600 VACrms, 50/60 Hz | 03: 3 A 12: 12 A | -B: 24 to 110 VAC/DC & 110 to 480 VAC |

*) The control voltage should never be higher than the rated operational voltage.

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 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) | |
| RSE ..03-B | 3A: AC-53b:3-5:30 |
| RSE ..12-B | 12A: AC-53b:3-5: 180 |
| Min. load current | |
| RSE ..03-B | 100 mAAC rms |
| RSE ..12-B | 200 mAAC rms |



Supply Specifications

| | |
|--|---|
| Power supply | Overvoltage cat. III (IEC 60664) |
| Rated operational volt. (U _e) through terminals L1-L2-L3 | (IEC 60038) |
| 22 | 127/220 VAC rms ±15% 50/60 Hz -5/+5 Hz |
| 40 | 230/400 VAC rms ±15% 50/60 Hz -5/+5 Hz |
| 48 | 277/480 VAC rms ±15% 50/60 Hz -5/+5 Hz |
| 60 | 346/600 VAC rms ±15% 50/60 Hz -5/+5 Hz |
| 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-L3 |

General Specifications

| | |
|------------------------------|--|
| Accuracy | |
| Ramp up | 5.5 - 7.5 s on max. ≤ 0.5 s on min. |
| Ramp down | 6 - 10 s on max. ≤ 0.5 s on min. |
| Initial torque | 70 - 100% on max. 5% on min. |
| EMC | Electromagnetic Compatibility |
| Immunity | acc. to EN 50 082-2 |
| Indication for | |
| Power supply ON | LED, green |
| Ramp up/down 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 |
| Approvals | CSA (<7.5 HP @ 600 VAC), UL, cUL |
| CE-marking | Yes |

Mode of Operation

This motor controller is intended to be used to softstart/softstop 3-phase squirrel cage induction motors and thereby reduce the stress or wear on gear and belt/chain drives and to give smooth operation of machines. Soft starting and/or stopping is achieved by controlling the motor voltage.

The soft-start and soft-stop time can be adjusted from 0.5 to approx. 7s.

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

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

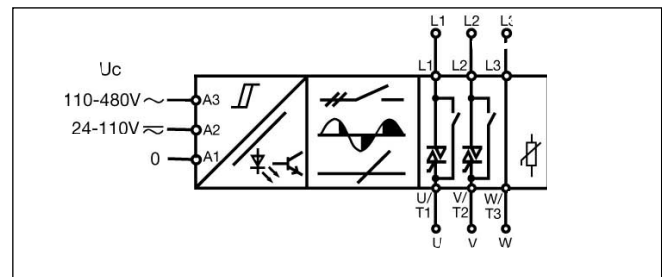
The initial torque can be adjusted from 0 to 85% of the nominal torque.

The controller is switching 2 lines. The 3rd line is continuously connected to the load.

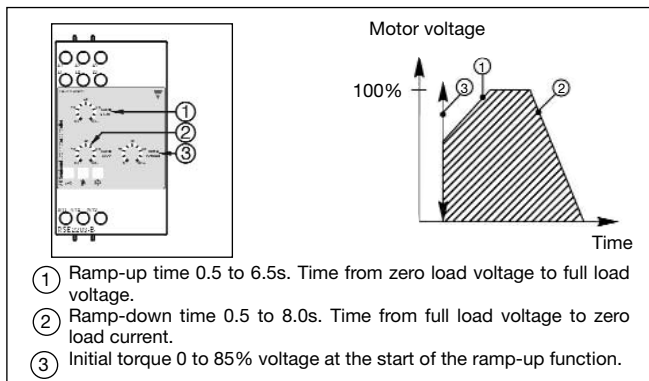
Semiconductor Data

| Rated operational current | I ² t for fusing t = 1 - 10 ms | I _{TSM} | di/dt |
|---------------------------|--|--------------------|---------|
| 3 A | 72 A ² s | 120 A _p | 50 A/μs |
| 12 A | 610 A ² s | 350 A _p | 50 A/μs |

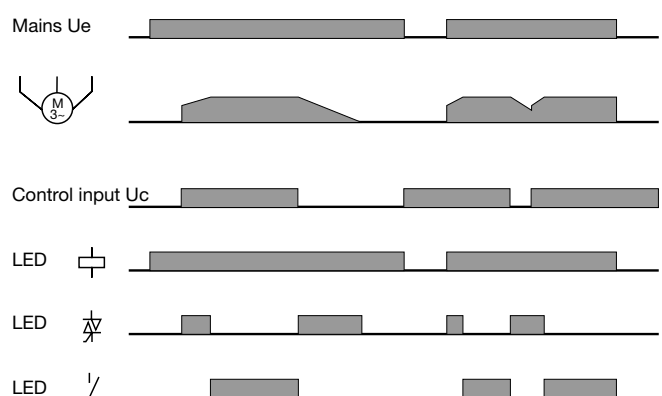
Functional Diagram



Operation Diagram 1

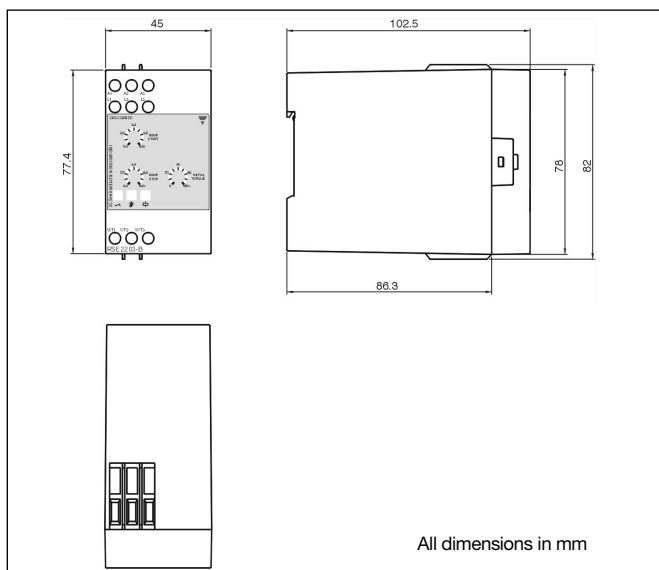


Operation Diagram 2





Dimensions



Housing Specifications

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

Applications

Changing from Direct ON Line start to soft start (Line controlled soft-start) (Fig. 1 & Fig. 2)

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 two of the incoming lines. Set initial torque to minimum and ramp up and down 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.

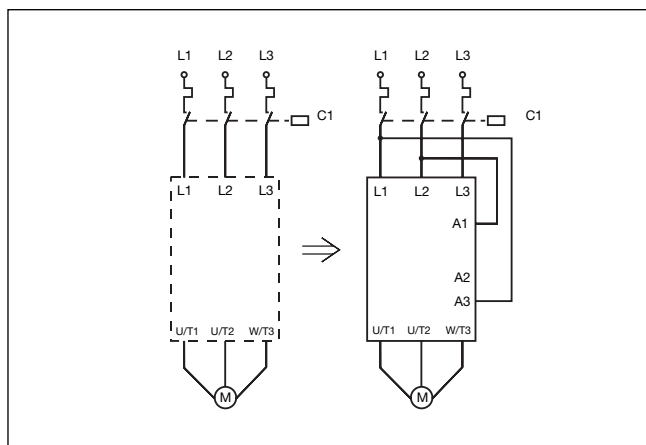


Fig. 1

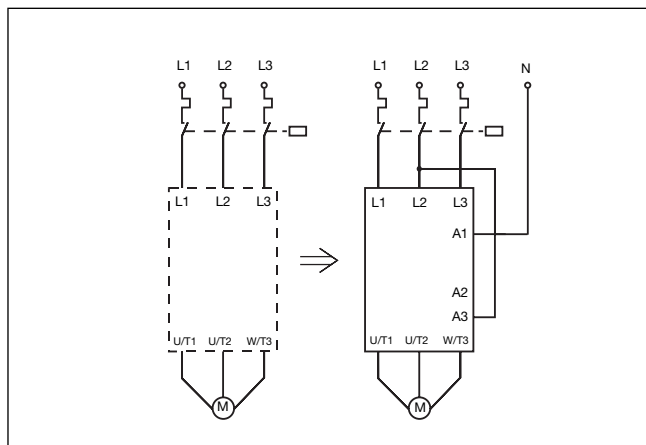


Fig. 2 For voltages higher than 480 VAC

Soft-start and soft-stop (Fig. 3)

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. When S1 is opened, soft-stop will be performed according to the setting of the ramp-down potentiometer.

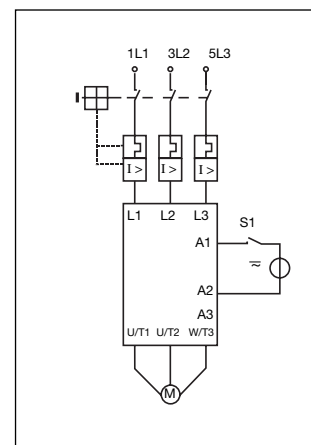


Fig. 3



Applications

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 semiconductors during running operation. Therefore the semiconductors can only be damaged by short-circuit currents during ramp-up and ramp-down function.

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 (see table below).

RSE .. 03 - B

Time between rampings

| Ramp time (sec.) \ I ramp (A) | 1 | 2 | 5 | 10 |
|-------------------------------|--------|--------|---------|---------|
| 18 | 15 sec | 30 sec | 1.5 min | 2.5 min |
| 15 | 12 sec | 20 sec | 60 sec | 1.5 min |
| 12 | 10 sec | 20 sec | 50 sec | 70 sec |
| 9 | 8 sec | 12 sec | 30 sec | 50 sec |
| 6 | 5 sec | 9 sec | 25 sec | 40 sec |
| 3 | 2 sec | 5 sec | 20 sec | 35 sec |
| 1.5 | 1 sec | 2 sec | 5 sec | 5 sec |

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, e.g. heater bands. In a failing motor there will always be some part of a winding to limit

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. for a 3 A type: Ferraz 660 gRB 10-10, for an 12 A type: Ferraz 660 gRB 10-25. Fuseholder type PST 10.

RSE .. 12 - B

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 |

Recommended thermal-magnetic overload relay

Selection Chart

Thermal-magnetic overload relay and motor controller

| | | | | | | | | | | | |
|--|--|-------------|------------|------------|------------|-----------|--|---------|---------|---------|--------|
| Motor full load current (AACrms) | 0.1 - 0.16 | 0.16 - 0.25 | 0.25 - 0.4 | 0.4 - 0.63 | 0.63 - 1.0 | 1.0 - 1.6 | 1.6 - 2.5 | 2.5 - 4 | 4 - 6.3 | 6.3 - 9 | 9 - 12 |
| Overload relay type GV 2- Manufacturer: Telemecanique | M 01 | M 02 | M 03 | M 04 | M 05 | M 06 | M 07 | M 08 | M 10 | M 14 | M 16 |
| Overload relay type MS 325- Manufacturer: ABB | 0.16 | 0.25 | 0.4 | 0.63 | 1 | 1.6 | 2.5 | 4 | 6.3 | 9 | 12.5 |
| Motor protection circuit breaker type KTA 3-25- Manufacturer: Allan-Bradley/Sprecher + Schuh | 0.16 | 0.25 | 0.4 | 0.63 | 1 | 1.6 | 2.5 | 4 | 6.3 | 10 | 16 |
| Motor controller type: 127/220 V mains 230/400 V mains 270/480 V mains 400/690 V mains | RSE 22 03 - B RSE 40 03 - B RSE 48 03 - B RSE 60 03 - B | | | | | | RSE 22 12 - B RSE 40 12 - B RSE 48 12 - B RSE 60 12 - B | | | | |

Example:

Line voltage: 230/400 V
Motor 1.5 HP: 1.1 kW
Full load current: 2.9 A

Step 1:

Select overload relay:
In this example GV 2 - M 08, MS 325 - 4 or KTA 3-25-4A must be used.

Step 2:

Select motor controller:
For line voltage 230/400 V and overload, relay GV 2 - M 08 or MS 325 - 4 with a setting of 2.9 A type RSE 40 03 -B can be selected.

N.B.: For motors with full load current from 12 A to 40 A, see types RSC/RSO.