

Motor Controllers

AC Semiconductor Motor Controller

Type RSHR



- Soft starting and stopping of 3-phase squirrel cage motors
- Low inrush and reduced vibration during starting
- Integral bypassing of semiconductors
- Rated operational voltage: up to 600 VAC, 50/60 Hz
- Rated operational current up to 45A AC-53b
- LED status indicators
- Motor PTC protection
- Device over-temperature protection
- DIN rail or panel mounting

Product Description

Compact easy-to-use AC semiconductor motor controller. With this controller 3-phase motors with nominal load currents up to 45 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

RSH R 60 45 C V20

H-line Motor Controller
 Rotary Ramp selector
 Rated operational voltage
 Rated operational current
 Control voltage
 Options

Selection Guide

| Rated operational voltage U_e | Rated operational current I_e | | | Options |
|---------------------------------|---------------------------------|--------------|--------------|---|
| | 25A AC-53b | 38A AC-53b | 45A AC-53b | |
| 220VACrms | RSHR2225CV20 | RSHR2238CV20 | RSHR2245CV20 | CV20: Basic CV21: 2 auxiliary relays |
| 400VACrms | RSHR4025CV20 | RSHR4038CV20 | RSHR4045CV20 | |
| 480VACrms | RSHR4825CV20 | RSHR4838CV20 | RSHR4845CV20 | |
| 600VACrms | RSHR6025DV20 | RSHR6038DV20 | RSHR6045DV20 | |

Supply Specification

| | | | |
|--|--|-----------------------|-----------------------|
| Rated operational voltage U_e through L1, L2, L3 | | RSHR22.. | 127/220 VAC \pm 15% |
| | | RSHR40.. | 230/400 VAC \pm 15% |
| | | RSHR48.. | 277/480 VAC \pm 15% |
| | | RSHR60.. | 346/600 VAC \pm 15% |
| Rated AC frequency | | 50/60 Hz \pm 10% | |
| Dielectric strength | | | |
| Dielectric voltage | | 2 kV (rms) | |
| Rated impulse withstand volt. | | 4 kV (1.2/50 μ s) | |

Input Specifications

| | |
|--|--------------------------------------|
| Rated control input voltage U_c , A1-A2: | C: 24-550 VAC/DC D: 24-660 VAC/DC |
| Rated control input current | <1.5 mA |
| Rated AC frequency | 50/60 Hz±10% |
| Dielectric strength | |
| Dielectric voltage | 2kVAC (rms) |
| Rated impulse withstand volt. | 4kV (1.2/50 μs) |

Load Ratings

| | RSHR..25CV21 | RSHR..38CV21 | RSHR..45CV21 |
|---|-------------------|---------------------|-----------------------|
| IEC rated operational current I_e (AC-53b) @ 40°C | 25 A | 38A | 45 A |
| Assigned motor rating @ 40°C/ UL rating @ 60°C | | | |
| RSHR22.. | 5.5kW / 10HP | 11kW / 10HP | 11kW / 15HP |
| RSHR40.. | 11kW / 15HP | 18.5kW / 20HP | 22kW / 25HP |
| RSHR48.. | 15kW / 20HP | 22kW / 25HP | 30kW / 30HP |
| RSHR60.. | 18.5kW / 25HP | 22kW / 30HP | 30kW / 40HP |
| Overload cycle according to IEC/EN 60 947-4-2 | 25A:AC-53b:4-5:65 | 38A: AC-53b: 4-5:85 | 45A: AC-53b: 4-5: 115 |
| Number of starts per hour @ 40°C | 50 | 40 | 30 |
| Minimum load current | 500mA | 500mA | 500mA |

Conductor Data

| | |
|--|------------------------------|
| Line conductors: L1, L2, L3/T1, T2, T3 according to IEC 60 947 | 0.75...16mm ² |
| maximum size | |
| solid | 1.5...16mm ² |
| finely stranded with end sleeve | 1.5...16mm ² |
| stranded | 1.5...25mm ² |
| UL/CSA rated data | AWG 14...4 |
| Terminal screws | 6xM5 (cage clamp) |
| Tightening torque | 1.5...2.5 Nm /13...22 lb.in |
| Stripping length | 10 mm |
| Secondary conductors: A1, A2, 11, 21, 22, P1, P2 according to IEC 60 947 | 0.75...2.5mm ² |
| maximum size | 0.5...2.5mm ² |
| UL/CSA rated data | AWG 22...14 |
| Terminal screws | 7xM3 (cage clamp) |
| Tightening torque | 0.3...0.5 Nm/2.7...4.5 lb.in |
| Stripping length | 6 mm |

Thermal Specifications

| | |
|-----------------------|--------------------------------|
| Operating temperature | -20° to +60°C (-4° to +140°F) |
| Storage temperature | -50° to +85°C (-58° to +185°F) |

Standards

| | |
|----------------------|----------------------|
| Approvals* (pending) | UL, cUL, CSA pending |
| Markings | CE |
| Norms | IEC/EN 60 947-4-2 |

General Specifications

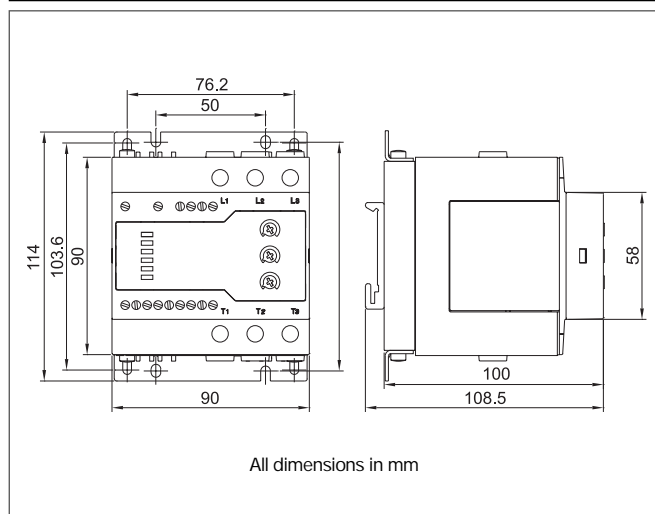
| | |
|--|---|
| Pollution degree | 3 |
| Weight | 800g (approx.) |
| Degree of protection | IP20 (IEC 60 529) |
| Relative humidity | <95% non-condensing |
| Ramp up time | 1...10s |
| Ramp down time | 1...30s |
| Initial torque | 0...70% |
| Status indicator LEDs | |
| Power supply ON | LED, green (continuous) |
| Ramping | LED, yellow (intermittent) |
| Bypass relay ON | LED, yellow (continuous) |
| Over-temperature alarm | |
| Device alarm | LED, red (intermittent) |
| Motor PTC alarm | LED, red (continuous) |
| Wrong phase sequence* | LED, red (intermittent) |
| Phase loss* | LED, red (intermittent) |
| Motor PTC alarm input P1, P2 | Acc. to DIN 44081 and DIN 44082-1 |
| Form designation | Form 1 |
| Auxiliary relays: (V21 option) | |
| Bypass relay activation | Normally open (21,22) |
| Over-temperature, phase sequence, phase loss alarm | Normally closed (11, 22) |
| Auxiliary relay contact capacity | 3 A, 250 VAC 3 A, 30 VDC |
| Installation altitude | Above 1000m derate linearly by 1% of unit FLC per 100m to a maximum altitude of 2000m |

* detection of these alarm conditions is made during power-up of the device

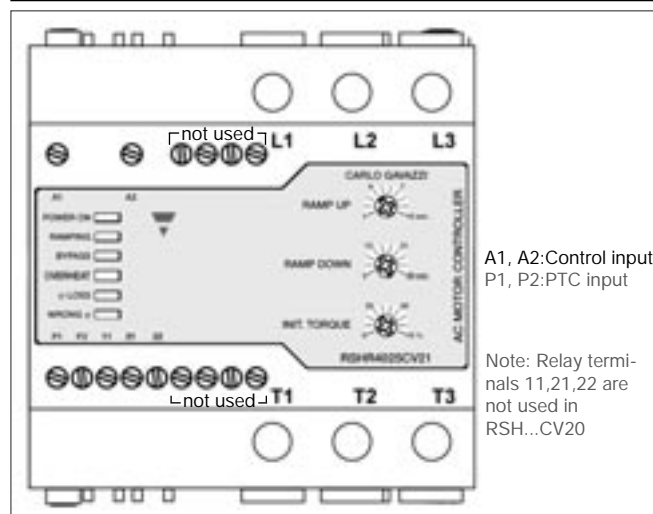
Recommended Protection according to IEC/EN 60 947-4-2

| | RSHR..25CV21 | RSHR ..38CV21 | RSHR..45CV21 |
|---|--|---|--|
| Type of coordination: 2 Semiconductor fuse | Ferraz Shawmut 63A A, Class URQ, Art.No. 6.621 CP URQ27x60/63 | Ferraz Shawmut 80A A, Class URQ, Art.No. 6.621 CP URQ27x60/80 | Ferraz Shawmut 100 A, Class URQ, Art.No. 6.621 CP URQ27x60/100 |
| Type of coordination: 1 Motor protection circuit breaker | Telemecanique: GV3-ME63 ABB: MS325 -25 Sprecher+Schuh: KTA3-25-25A | Telemecanique: GV3-ME40 ABB: MS450 -40 Sprecher+Schuh: KTA3-100-40A | Telemecanique: GV2-M22 ABB: MS450 -45 Sprecher+Schuh: KTA3-100-63A |
| RK5 fuse | TRS45R 45A | TRS70R 70A | TRS90R 90A |

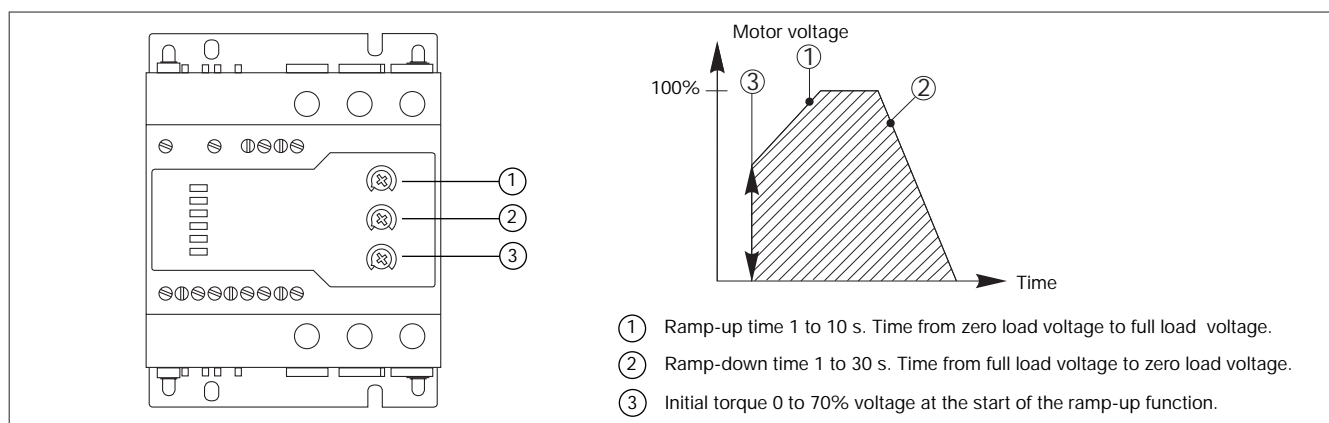
Dimensions



Terminal Diagram



Operation Diagram 1



Operation Diagrams for RSHR

Diagram 1: normal operation

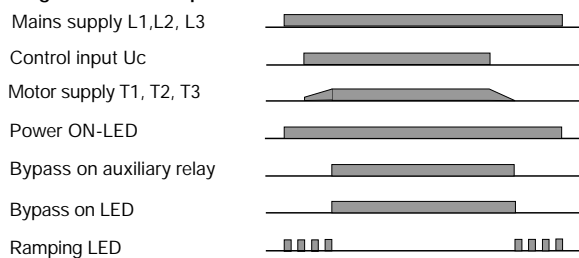


Diagram 2a: device Over-temperature alarm

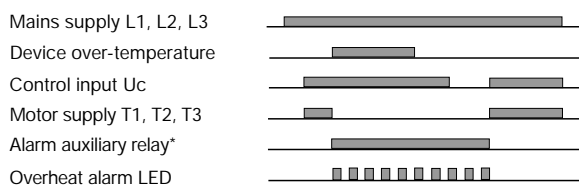


Diagram 2b: Motor PTC Alarm

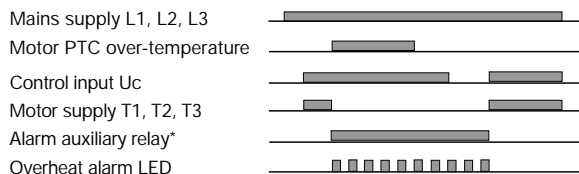


Diagram 2c: Phase Loss Alarm

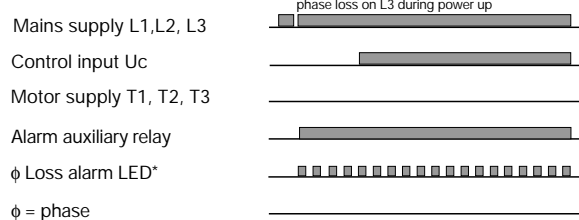
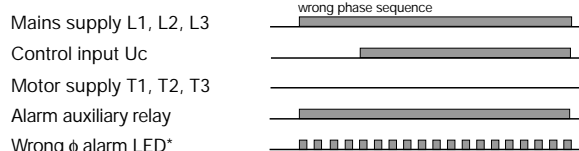


Diagram 2d: Wrong Phase Sequence Alarm

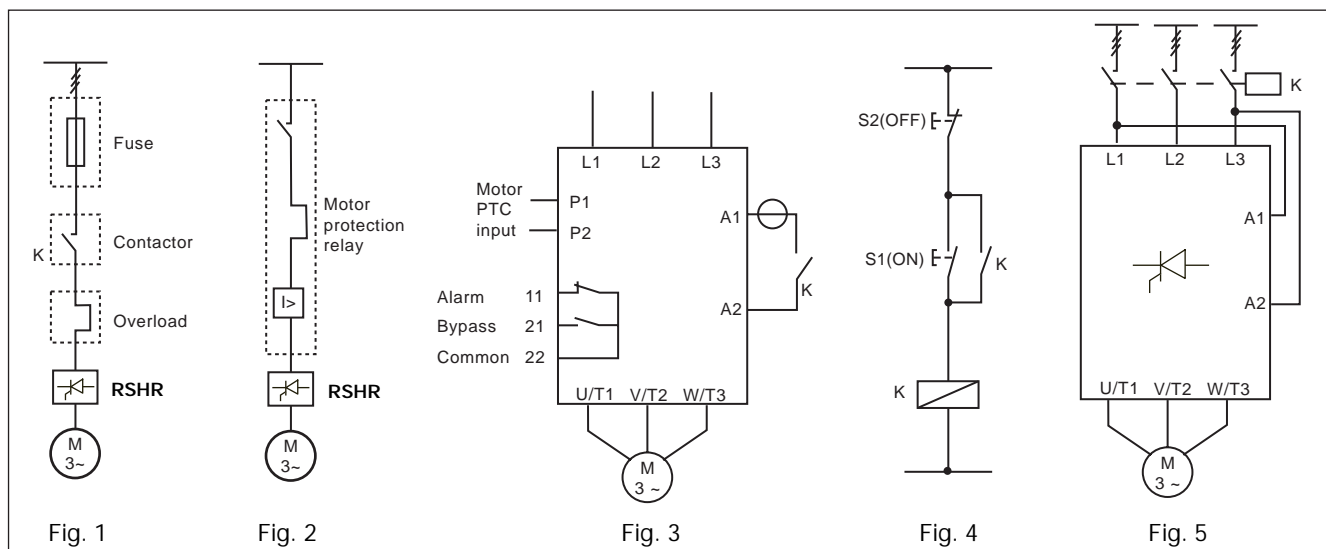


Note 1: Auxiliary relays available only on RSHR...CV21 types

Note 2: A phase loss on L1 or L2 causes the device to reset as these phases provide the internal power supply.

Note 3: Phase sequence and phase loss alarms are only detected if they occur during power up, when L1, L2, L3 are switched ON.

Wiring Diagram



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. Please note that the motor controller does not insulate the motor from the mains.

Figure 1: Protection of the device when using fuses.

Protection with semiconductor fuses is intended to protect the motor feeder and motor controller from damage due to short-circuit.

Figure 2: Protection using a thermal-magnetic motor protection relay.

The motor feeder is protected but damage to the motor controller is possible. When motor failure occurs, if part of the motor winding limits the fault current and the motor feeder is protected, this type of protection can be considered acceptable.

Figure 3: Secondary conductors.

3.1: Control using a 2-position switch.
When K is closed, the control

input is supplied to A1, A2 and soft starting of the motor is performed. When K is opened, soft stopping is performed.

3.2: Motor PTC input

When the motor PTC sensor is connected to P1, P2 the motor controller detects overheating of the motor windings.

3.3: Auxiliary Relays (Available on RSHR...CV21 types only!)
The Alarm relay 11, 21 (NC) can be connected in series with the supply to the coil of a mains contactor. The Bypass relay 21, 22 (NO) can be used in series with the supply to the

coil of an external bypass contactor.

Figure 4: Control using ON and OFF push buttons

Pushing S1 soft starts the RSHR. Pushing S2 soft stops the RSHR. K is an auxiliary contact of the mains contactor.

Figure 5: Control using 2 phases

Connecting input A1, A2 to two of the incoming lines will soft start the motor when C1 is operated. When C1 is switched off, the motor will stop (no soft stop).

