AMERICAN CONTROL ELECTRONICS

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RGH100 / RGH200

4Q Half-Wave SCR Chassis
Adjustable Speed Drive for PMDC Brush Motors

Specifications

Model	Line Voltage (VAC)	Armature Voltage Range (VDC)	Continuous Armature Current (Amps)	Armature Horsepower Range
RGH100-5	115	0 - 75	5.0	1/8 - 1/2
RGH200-5	230	0 - 150	5.0	1/4 - 1

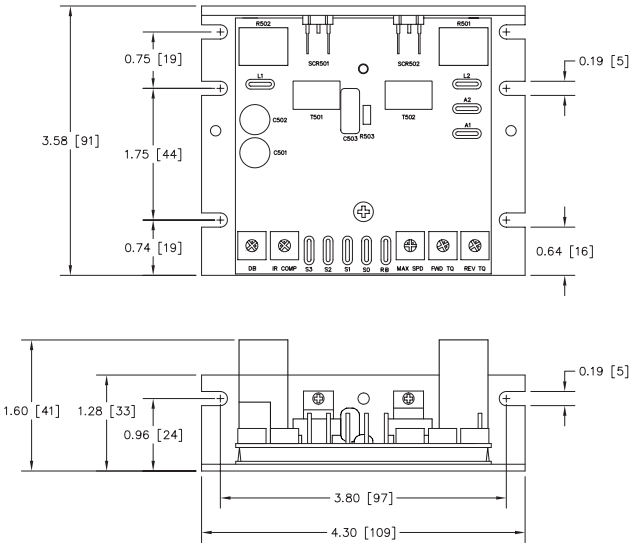
AC Line Voltage *RGH100-5*.....115 VAC ± 10%, 50/60 Hz, single phase
RGH200-5.....230 VAC ± 10%, 50/60 Hz, single phase
Form Factor.....1.77 at base speed
Acceleration Time Range.....1 second
Deceleration Time Range.....1 second
Analog Input Voltage Range (Signal must be isolated).....0 to ± 10 VDC
Input Impedance (S0 to S2).....200K ohms
Load Regulation.....3% base speed
Speed Range.....50:1
Vibration *(0 - 50 Hz)*.....0.5G maximum
(>50 Hz).....0.1G maximum
Ambient Temperature Range.....10°C - 55°C
Weight.....0.5 lbs

Safety Warnings

READ ALL SAFETY WARNINGS BEFORE INSTALLING THIS EQUIPMENT

- **DO NOT INSTALL, REMOVE, OR REWIRE THIS EQUIPMENT WITH POWER APPLIED.** Have a qualified electrical technician install, adjust and service this equipment. Follow the National Electrical Code and all other applicable electrical and safety codes, including the provisions of the Occupational Safety and Health Act (OSHA), when installing equipment.
- **Circuit potentials are at 115 above earth ground**. Avoid direct contact with the printed circuit board or with circuit elements to prevent the risk of serious injury or fatality. Use a non-metallic screwdriver for adjusting the calibration trim pots. Use approved personal protection equipment and insulated tools if working on this drive with power applied.
- Reduce the chance of an electrical fire, shock, or explosion by using proper grounding, over-current protection, thermal protection, and enclosure. Follow sound maintenance procedures.
- **ACE strongly recommends the installation of a master power switch in the line voltage input.** The switch contacts should be rated for 250 VAC and 200% of motor nameplate current.
- **Removing AC line power is the only acceptable method for emergency stopping.** Do not use regenerative braking, decelerating to minimum speed, or coasting to a stop for emergency stopping. They may not stop a drive that is malfunctioning. Removing AC line power is the only acceptable method for emergency stopping.
- Line starting and stopping (applying and removing AC line voltage) is recommended for infrequent starting and stopping of a drive only. Regenerative braking, decelerating to minimum speed, or coasting to a stop is recommended for frequent starts and stops. Frequent starting and stopping can produce high torque. This may cause damage to motors.
- **Do not disconnect any of the motor leads from the drive** unless power is removed or the drive is disabled. Opening any one lead while the drive is running may destroy the drive.
- Under no circumstances should power and logic level wires be bundled together.
- Be sure potentiometer tabs do no make contact with the potentiometer's body. Grounding the input will cause damage to the drive.

Dimensions



ALL DIMENSIONS IN INCHES [MILLIMETERS]

Installation

Mounting

- Drive components are sensitive to electrostatic discharge. Avoid direct contact with the circuit board. Hold the drive by the chassis only.
- Protect the drive from dirt, moisture, and accidental contact.
- Provide sufficient room for access to the terminal block and calibration trim pots.
- Mount the drive away from heat sources. Operate the drive within the specified ambient operating temperature range.
- Prevent loose connections by avoiding excessive vibration of the drive.
- Mount the drive with its board in either a horizontal or vertical plane. Six 0.19" (5 mm) wide slots in the chassis accept #8 pan head screws. Fasten either the large base or the narrow flange of the chassis to the subplate.
- The chassis should be earth grounded. Use a star washer beneath the head of at least one of the mounting screws to penetrate the anodized chassis surface and to reach bare metal.

Wiring

Use 18 - 24 AWG wire for logic wiring.
Use 14 - 16 AWG wire for AC line (L1, L2) and motor (A1, A2) wiring.

Shielding Guidelines

As a general rule, ACE recommends shielding of all conductors. If it is not practical to shield power conductors, ACE recommends shielding all logic-level leads. If shielding of logic-level leads is not practical, the user should twist all logic leads with themselves to minimize induced noise. Refer to the user's manual for details on earth grounding shielded wires and filtering.

Fusing

ACE drives require an external line fuse for protection. Use fast acting fuses rated for 250 VAC or higher and 150% of the maximum armature current. Fuse the HOT leg of the AC line when using 115 VAC and both lines when using 230 VAC.

Connections

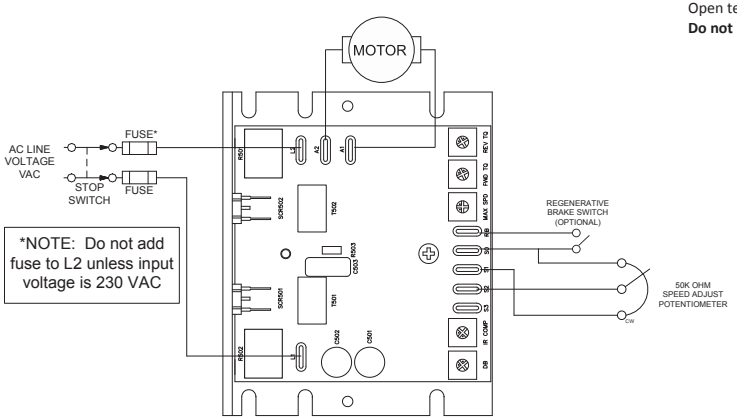
POWER (BOTTOM BOARD)

Line Input

Connect the AC line power leads to terminals L1 and L2. ACE recommends the use of a double-pole, single throw master power switch. The switch should be rated at a minimum of 250 VAC and 200% of motor current.

Motor

Connect the DC armature leads to terminals A1 and A2. If the motor does not spin in the desired direction, power down the drive and reverse these connections.



LOGIC (TOP BOARD)

Speed Potentiometer

Use a 50K ohm, 1/4 W potentiometer for speed control. Connect the counter-clockwise end of the potentiometer to S0, wiper to S2, and the clockwise end to S1. If the potentiometer works inversely of desired functionality, (i.e. to increase motor speed, you must turn the potentiometer counterclockwire), power off the drive and swap the S0 and S1 connections. See the Operation section for alternative wiring setups.

Regenerative Brake

Short terminals S0 and RB to regeneratively brake the motor to zero speed. The time it takes the motor to come a stop is dependent on load inertia, friction, and the FWD TQ and REV TQ trim pot settings. Open terminals S0 and RB to accelerate the motor to set speed.
Do not use the regenerative braking for emergency stopping.

Startup

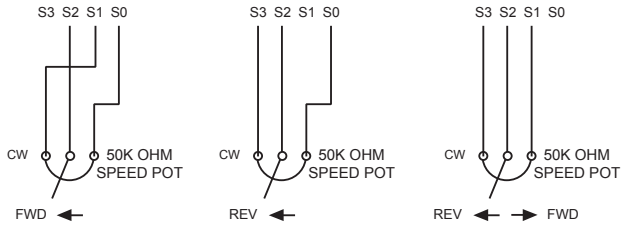
STARTUP

- Verify that no foreign conductive material is present on the printed circuit board.

1. Turn the speed adjust potentiometer full counterclockwise (CCW).
2. Apply AC line voltage.
3. Make sure the drive is enabled.
4. Slowly advance the speed adjust potentiometer clockwise (CW). The motor slowly accelerates as the potentiometer is turned CW. Continue until the desired speed is reached.
5. Remove AC line voltage from the drive to coast the motor to a stop.

Operation

POTENTIOMETER WIRING



Unidirectional Forward **Unidirectional Reverse** **Bidirectional**

Calibration

Maximum Speed (MAX SPD): The MAX SPD setting determines the maximum motor speed when the speed adjust potentiometer is set for maximum speed. To calibrate the MAX SPD:

1. Set the MAX SPD trim pot full CCW.
2. Set the speed adjust potentiometer for maximum speed.
3. Adjust MAX SPD trim pot until the desired maximum speed is reached.

Forward Torque (FWD TQ) and Reverse Torque (REV TQ): The FWD TQ and REV TQ settings determine the maximum torque for accelerating and driving the motor in the forward and reverse direction. To calibrate the FWD TQ:

1. With the power disconnected from the drive, connect a DC ammeter in series with the armature.
2. Set the FWD TQ trim pot to minimum (full CCW).
3. Set the speed adjust potentiometer to maximum forward speed (full CW).
4. Carefully lock the motor armature. Be sure that the motor is firmly mounted.
5. Apply line power. The motor should be stopped.
6. Slowly adjust the FWD TQ trim pot CW until the armature current is 150% of motor rated armature current.
7. Turn the speed adjust potentiometer to minimum speed (full CCW).
8. Remove line power.
9. Remove the stall from the motor.
10. Remove the ammeter in series with the motor armature if it is no longer needed.

To calibrate the REV TQ:

1. Follow the steps for calibrating the foward torque using the REV TQ trim pot and with the motor set to run in the reverse direction.

IR Compensation (IR COMP): The IR COMP setting determines the degree to which motor speed is held constant as the motor load changes. To calibrate the IR COMP:

1. Set the IR COMP trim pot full CCW.
2. Increase the speed adjust potentiometer until the motor runs at midspeed without load. A handheld tachometer may be used to measure motor speed.
3. Load the motor armature to its full load armature current rating. The motor should slow down.
4. While keeping the load on the motor, rotate the IR COMP trim pot until the motor runs at the speed measured in step 2. If the motor oscillates (overcompensation), the IR COMP trim pot may be set too high (CW). Turn the IR COMP trim pot CCW to stabilize the motor.
5. Unload the motor.

Deadband (DB): The deadband trim pot determines the time that will elapse between the application of current in one direction before current is applied in the opposite direction. The deadband trim pot affects the resistance that a motor has to changes in shaft position at zero speed. It does this by applying an AC voltage to the motor armature. Deadband is factory calibrated to approximately the 3 o'clock position for 60 Hz AC line operation. Recalibrate the deadband to the 9 o'clock position for 50 Hz operation. If you hear motor noise (humming), the deadband might be set too high. Turn the deadband trim pot CCW until the motor noise ceases.