RGx00UC SERIES

USER MANUAL

RG100UC
RG200UC

Dear Valued Consumer:

Congratulations on your purchase of the **RGx00UC Series** drive. This User Manual was created for you to get the most out of your new device and assist with the initial setup. Please visit www.minarikdrives.com to learn more about our other drives.

Thank you for choosing **Minarik Drives**!

Safety First!

SAFETY WARNINGS

Text in gray boxes denote important safety tips or warnings. Please read these instructions carefully before performing any of the procedures contained in this manual.

- 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.
- Reduce the chance of an electrical fire, shock, or explosion by using proper grounding techniques, over-current protection, thermal protection, and enclosure. Follow sound maintenance procedures.

It is possible for a drive to run at full speed as a result of a component failure. Minarik Drives strongly recommends the installation of a master switch in the main power input to stop the drive in an emergency.

Circuit potentials are at 115 VAC or 230 VAC 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 protective equipment and insulated tools if working on this drive with power applied.

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Section 1. Regenerative Drives

Most non-regenerative, variable speed, DC drives control current flow to a motor in one direction. The direction of current flow is the same direction as the motor rotation. Non-regenerative drives operate in Quadrant I, and also in Quadrant III if the drive is reversible (see Figure 1). Motors must stop before reversing direction. Unless dynamic braking is used, non regenerative drives cannot decelerate a load faster than coasting to a lower speed.

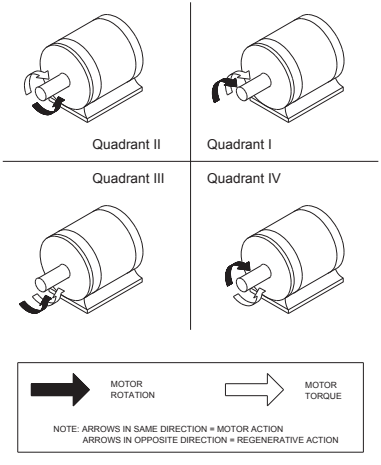


Figure 1. Four Quadrant Operation

Regenerative drives operate in two additional quadrants: Quadrant II and Quadrant IV. In these quadrants, motor torque is in the opposite direction of motor rotation.

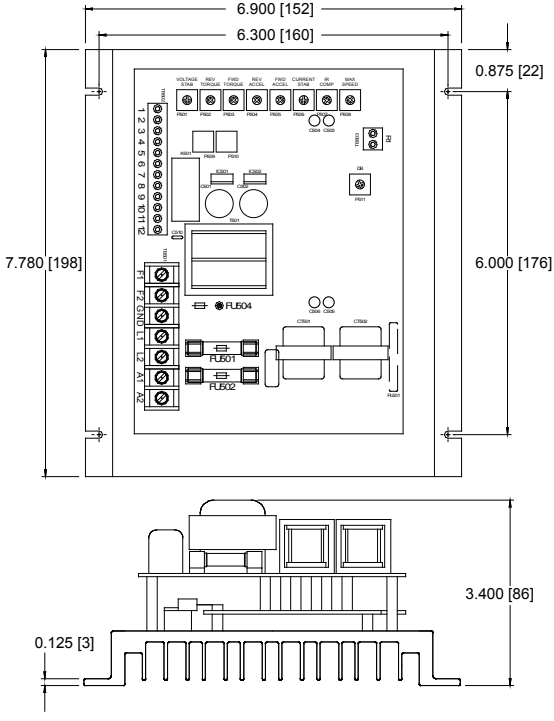
This allows regenerative drives to reverse a motor without contractors or switches, to control an overhauling load, and to decelerate a load faster than it would to coast to a lower speed.

Section 2. Specifications

Model	*Maximum Armature Current (ADC)*	*Armature Voltage Range (VDC)*	*Maximum Armature Current (ADC)*	*HP Range*
RG100UC	*115*	*0 - 90*	*10.0*	*Chassis*
RG200UC	*230*	*0 - 180*	*10.0*	*Chassis*

AC Line Voltage	115 or 230 VAC ± 10%, 50/60 Hz, single phase
Field Voltage	
RG100UC	50 VDC (F1 to L1); 100 VDC (F1 to F2)
RG200UC	100 VDC (F1 to L1); 200 VDC (F1 to F2)
Maximum Field Current	1 ADC
Acceleration Time	0.5 - 5 seconds
Deceleration Time	0.5 - 5 seconds
Analog Input Range (S1 to S2)	-12 to 12 VDC
Input Impedance (S1 to S2)	14.7K ohms
Form Factor	1.37 at base speed
Load Regulation	
with Armature Feedback	2% base speed or better
with Tachogenerator Feedback	0.5% of base speed
Speed Range	
with Armature Feedback	30:1
with Tachogenerator Feedback	50:1
Vibration	0.5G maximum (0 - 50 Hz) 0.1G maximum (> 50 Hz)
Ambient Temperature Range	10° - 50° C

Section 3. Dimensions



ALL DIMENSIONS IN INCHES [MILLIMETERS]

Figure 2. RG100UC and RG200UC Dimensions

Section 4. Installation

Do not install, rewire, or remove this control with input power applied. Failure to heed this warning may result in fire, explosion, or serious injury. Make sure you read and understand the Safety Precautions on page i before attempting to install this product.

Mounting

- Drive components are sensitive to electrostatic discharge. Avoid direct contact with the circuit board. Hold the drive by the heat sink only.
- Protect the drive from dirt, moisture, and accidental contact.
- Provide sufficient room for access to the terminals 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. Four 0.19" (5 mm) wide slots in the heat sink accept #8 pan head screws.

Speed Adjust Potentiometer

WARNING!

Be sure that the potentiometer tabs do not make contact with the potentiometer's body. Grounding the input will cause damage to the drive.

If using a remote potentiometer with a chassis drive, mount the speed adjust potentiometer through a 0.38 in. (10 mm) hole with the hardware provided (Figure 3). Install the circular insulating disk between the panel and the 10K ohm speed adjust potentiometer.

Twist the speed adjust potentiometer wire to avoid picking up unwanted electrical noise. If the speed adjust potentiometer wires are longer than 18 in. (46 cm), use shielded cable. Keep the speed adjust potentiometer wires separate from power leads (L1, L2, A1, A2, F1, F2).

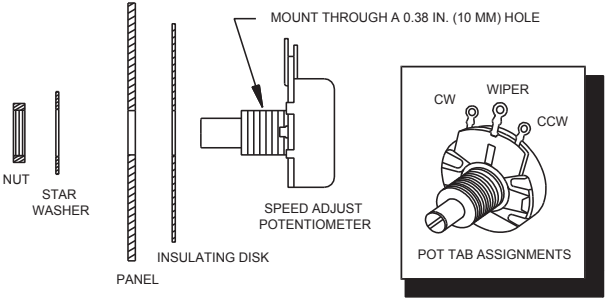


Figure 3. Speed Adjust Potentiometer

Wiring

Do not install, rewire, or remove this control with input power applied. Failure to heed this warning may result in fire, explosion, or serious injury.

Circuit potentials are at 115 or 230 VAC above ground. To prevent the risk of injury or fatality, avoid direct contact with the printed circuit board or with circuit elements.

Do not disconnect any of the motor leads from the drive unless power is removed or the drive is disabled. Opening any one motor lead while the drive is running may destroy the drive.

This product does not have internal solid state motor overload protection. It does not contain speed-sensitive overload protection, thermal memory retention or provisions to receive and act upon signal from remote devices for over temperature protection. If motor over protection is needed in the end-use product, it needs to be provided by additional equipment in accordance with NEC standards.

- Use 18 - 24 AWG wire for logic wiring. Use 14 - 16 AWG wire for AC line and motor wiring.

Shielding Guidelines

Under no circumstances should power and logic level leads be bundled together. Induced voltage can cause unpredictable behavior in any electronic device, including motor controls.

As a general rule, Minarik Drives recommends shielding of all conductors. If it is not practical to shield power conductors, it is recommended to shield all logic-level leads. If shielding of all logic-level leads is not practical, the user should twist all logic leads with themselves to minimize induced noise.

It may be necessary to earth ground the shielded cable. If noise is produced by devices other than the drive, ground the shield at the drive end. If noise is generated by a device on the drive, ground the shield at the end away from the drive. Do not ground both ends of the shield.

If the drive continues to pick up noise after grounding the shield, it may be necessary to add AC line filtering devices, or to mount the drive in a less noisy environment.

Logic wires from other input devices, such as motion controllers and PLL velocity controllers, must be separated from power lines in the same manner as the logic I/O on this drive.

Line Fusing

Model RG100UC is preinstalled with a 20 amp fuse. Model RG200UC is preinstalled with 20 amp fuses.

Preinstalled line fuses are rated for maximum horsepower. If the horsepower rating of the motor being used is less than the maximum horsepower rating of the drive, the line fuse may have to be replaced with a lower rated one. Fuses should be rated for 250 VAC or higher and approximately 150% of the maximum armature current. Refer to Table 1 on page 10 to install a lower rated fuse.

Table 1. Recommended Line Fuse Sizes

90 VDC Motor Horsepower	*180 VDC Motor Horsepower*	*Maximum DC Armature Current (amps)*	*AC Line Fuse Size (amps)*
1/20	*1/10*	*0.5*	*1*
1/15	*1/8*	*0.8*	*1.5*
1/8	*1/4*	*1.5*	*3*
1/6	*1/3*	*1.7*	*3*
1/4	*1/2*	*2.5*	*5*
1/3	*3/4*	*3.5*	*8*
1/2	*1*	*5.0*	*10*
3/4	*1 ½*	*7.5*	*15*
1	*2*	*10*	*15*

Minarik Drives offers fuse kits. See Section 9: Accessories and Replacement Parts for fuse kit part numbers.

Connections

Do not connect this equipment with power applied. Failure to heed this warning may result in fire, explosion, or serious injury.

Minarik Drives strongly recommends the installation of a master power switch in the voltage input line, as shown in Figure 6 (page 16). The switch contacts should be rated at a minimum of 200% of motor nameplate current and 250 volts.

Power Input

Connect the AC line power leads to terminals L1 and L2. Minarik Drives recommends the use of a single-throw, double-pole master power switch. The switch should be rated at a minimum of 250 volts and 200% of motor current. Refer to Figure 6 on page 16.

Motor

Drives supply motor armature voltage from A1 and A2 terminals. It is assumed throughout this manual that, when A1 is positive with respect to A2, the motor will rotate clockwise (CW) while looking at the output shaft protruding from the front of the motor. If the motor does not spin in the desired direction, remove power and reverse the A1 and A2 connections.

Connect a DC motor to terminals A1 and A2 as shown in Figure 6 on page 16. Ensure that the motor voltage rating is consistent with the drive's output voltage.

Field Output Connections

The field output is for shunt wound motors only. Do not make any connections to F1 and F2 when using a permanent magnet motor.

See Table 2 for field output connections. Use 14 - 16 AWG wire to connect the field output to a field / shunt wound motor.

Table 2. Field Output Connections

Line Voltage (VAC)	*Approximate Field Voltage (VDC)*	*Connect Motor Field To*
115	*50*	*F1 and L1*
115	*100*	*F1 and F2*
230	*100*	*F1 and L1*
230	*200*	*F1 and F2*

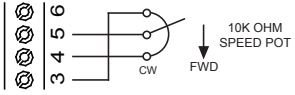
Speed Adjust Potentiometer

Use a 10K ohm, 1/4 W potentiometer for speed control. The motor can operate in one direction (unidirectional) or two directions (bidirectional) depending on how the speed adjust potentiometer is connected to the drive.

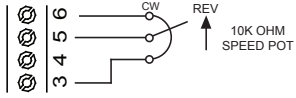
For unidirectional operation in the foward direction, connect the speed adjust potentiometer as shown in Figure 4(a).

For unidirectional operation in the reverse direction, connect the speed adjust potentiometer as shown in Figure 4(b).

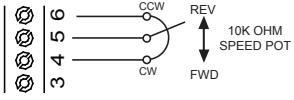
For bidirectional operation, connect the speed adjust potentiometer as shown in Figure 4(c). The motor does not operate when the potentiometer is in the center position. Turning the potentiometer clockwise (CW) from the center position causes the motor to rotate in the forward direction, while turning the potentiometer counterclockwise (CCW) causes rotation in the reverse direction.



(a) Unidirectional Forward



(b) Unidirectional Reverse



(c) Bidirectional

Figure 4. Speed Adjust Potentiometer Connections

Analog Input Signal

Instead of using a speed adjust potentiometer, the drive may be wired to follow an analog input voltage signal that is isolated from earth ground (Figure 5). Connect the signal common (–) to terminal 3. Connect the signal reference (+) to terminal 5. A potentiometer can be used to scale the analog input voltage. An interface device, such as Minarik Drives model PCM4, may be used to scale and isolate an analog input voltage.

An analog input voltage range of -12 to 12 VDC is required to produce an armature voltage range of 0–90 VDC with 115 VAC line voltage or 0–180 VDC with 230 VAC line voltage.

Figure 5. Analog Input Signal Connections

Start/Stop Switches

Switch operation requires a momentary normally open START switch be wired to terminals 10 and 11 and a momentary normally closed STOP switch be wired to terminals 11 and 12. These switches must be used together and are not included with the drive. The 10, 11, and 12 terminals are on terminal block TB502.

If the START/STOP switches are not used, wire a jumper between terminals 10 and 12 to bypass the latching circuit. The drive will then operate in a start on power-up mode. See Figure 6 on page 16 for these switch connections.

Motor Over-Temperature Switch

If the O/T switch is used, the Start-Stop switches must be connected to terminals 11, 12, and 13 to prevent automatic restart of the motor. See Figure 6 on page 16 for switch connections.

Some motors are available with an internal thermostat which functions as an over-temperature switch. If not used, connect a jumper between terminals 9 and 10.

Run/Brake Switch

See “Regenerative Decel to Zero Speed” in the “Starting and Stopping Methods” on pages 18 and 19 for a detailed description of the Run/Brake Switch and other braking methods.

Tachogenerator Feedback

Tachogenerator feedback is optional. Without tachogenerator feedback, load regulation is approximately 2% of base speed with a speed range of 30:1. This is quite acceptable for most applications which do not involve sizable load changes. With tachogenerator feedback, load regulation is better than 0.5% of base speed with a speed range of 50:1.

Calculating the Feedback Resistor Value

The following steps are required to convert the control to operate in a closed-loop, tachogenerator mode.

1. The control is factory set for a tachogenerator rated at 50 volts per 1000 RPM, with a maximum motor speed of 1800 RPM. If the tachogenerator output is other than 50 volts per 1000 RPM, or the maximum speed is greater than 1800 RPM, calculate the value of the feedback resistor (R1) using the following equation:

$$R1 = \frac{(V/rpm * RPMmax) - 5}{2.3} \text{ k}\Omega$$

Connect R1 to terminal TB503.

Example: Using a tachogenerator rated at 50 volts per 1000 RPM with a maximum speed of 1800 RPM.

V/rpm = 50V ÷ 1000 RPM = .05

RPMmax = 1800

Plugging the values into the equation:

$$R1 = \frac{(.05 * 1800) - 5}{2.3} = 36.9 \text{ k}\Omega$$

2. Set the IR COMP trim pot fully CCW.
3. Connect the tachogenerator leads to terminals 1 (negative) and 2 (positive) on terminal board TB502. Tachogenerator polarity is that produced with motor running in FORWARD direction.

If any doubt exists concerning the tachogenerator polarity, start the motor very slowly. A miswired tachogenerator will cause the motor to accelerate to full speed. If this occurs, disconnect the control from AC power immediately. Interchange the connections at terminals 1 and 2. Reconnect AC power to the control.

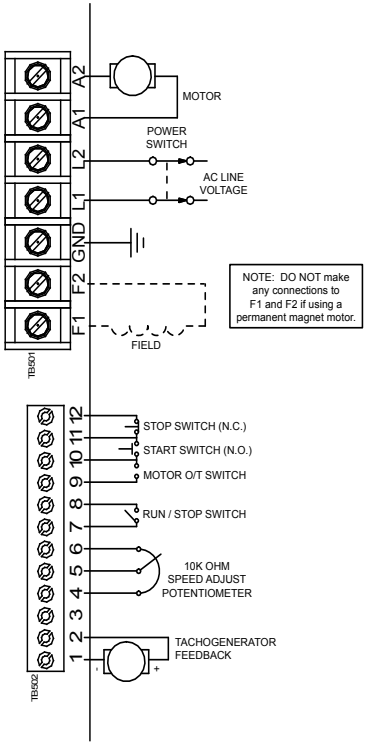


Figure 6. RG100UC and RG200UC Drive Connections

Section 5. Operation

Change voltage switch settings only when the drive is disconnected from AC line voltage. Make sure both switches are set to their correct position. If the switches are improperly set to a lower voltage position, the motor will not run at full voltage and may cause damage to the transformer. If the switches are improperly set to a higher voltage position, the motor will overspeed, which may cause motor damage, or result in bodily injury or loss of life.

Dangerous voltages exist on the drive when it is powered. BE ALERT. High voltages can cause serious or fatal injury. For your safety, use personal protective equipment (PPE) when operating this drive.

If the motor or drive does not perform as described, disconnect the AC line voltage immediately. Refer to the Troubleshooting section, page 39, for further assistance.

Before Applying Power

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

Startup

1. Turn the speed adjust potentiometer or input voltage signal to minimum speed.
2. Apply AC line voltage.
3. Slowly advance the speed adjust potentiometer clockwise (CW) or increase the input voltage signal. The motor slowly accelerates as the potentiometer is turned CW or as the input voltage signal is increased. Continue until the desired speed is reached.
4. Remove AC line voltage from the drive to coast the motor to a stop.

Starting and Stopping Methods

Regenerative braking, coasting to a stop, or decelerating to minimum speed is recommended for frequent starts and stops. Do not use any of these methods for emergency stopping. They may not stop a drive that is malfunctioning. Removing AC line power (both lines) is the only acceptable method for emergency stopping.

For this reason, Minarik Drives strongly recommends installing an emergency stop switch on both AC line inputs (see Figure 6 on page 16).

Frequent starting and stopping can produce high torque. This may cause damage to motors, especially gearmotors that are not properly sized for the application.

Automatic Restart Upon Power Restoration

All drives automatically run to set speed when power is applied, the Start/Stop circuitry is closed, and the Run/Brake switch is opened.

Line Starting and Stopping

Line starting and stopping (applying and removing AC line voltage) is recommended for infrequent starting and stopping of a drive only. When AC line voltage is applied to the drive, the motor accelerates to the speed set by the speed adjust potentiometer or analog signal. When AC line voltage is removed, the motor coasts to a stop.

Regenerative Decel to Zero Speed

Short the RB1 and RB2 terminals to regeneratively brake the motor to zero speed. See Figure 6 on page 16. The RB1 and RB2 circuit follows the deceleration rate set by the FWD ACCEL and REV ACCEL trim pots. Open the RB1 and RB2 terminals to accelerate the motor to set speed.

Coast to Zero Speed

If using START and STOP switches (see page 13 and Figure 6 on page 16), opening the STOP switch will coast the motor to a stop. If START and STOP switches are not used, removing the jumper from terminals 10 and 12 will coast the motor to a stop.

Section 6. Calibration

Dangerous voltages exist on the drive when it is powered. When possible, disconnect the voltage input from the drive before adjusting the trim pots. If the trim pots must be adjusted with power applied, use insulated tools and the appropriate personal protection equipment. **BE ALERT.** High voltages can cause serious or fatal injury.

RGx00UC series drives have user-adjustable trim pots. Each drive is factory calibrated to its maximum current rating. Readjust the calibration trim pot settings to accommodate lower current rated motors.

All adjustments increase with CW rotation, and decrease with CCW rotation. Use a non-metallic screwdriver for calibration. Each trim pot is identified on the printed circuit board.

Maximum Speed (MAX SPEED)

The MAX SPEED setting determines the maximum motor speed when the speed adjust potentiometer or input voltage signal is set for maximum speed.

To calibrate MAX SPEED:

1. Set the MAX SPEED trim pot full CCW.
2. Set the speed adjust potentiometer or input voltage signal for maximum speed.
3. Adjust MAX SPEED until the desired maximum speed is reached.

Forward Acceleration (FWD ACCEL)

The FWD ACCEL setting determines the time the motor takes to ramp to a higher speed in the forward direction or to a lower speed in the reverse direction. See Specifications on page 1 for approximate acceleration times. FWD ACCEL is factory set for the shortest acceleration time (full CCW).

To set the forward acceleration time:

1. Set the speed adjust potentiometer or input voltage signal for minimum speed. The motor should run at minimum speed.
2. Set the speed adjust potentiometer or input voltage signal for maximum forward speed. Measure the time it takes the motor to go from minimum to maximum speed.
3. If the time measured in step 2 is not the desired acceleration time, turn the FWD ACCEL trim pot CW for a longer acceleration time or CCW for a shorter acceleration time. Repeat steps 1 through 2 until the acceleration time is correct.

Reverse Acceleration (REV ACCEL)

The REV ACCEL setting determines the time the motor takes to ramp to a higher speed in the reverse direction or to a lower speed in the forward direction. See Specifications on page 1 for approximate acceleration times. REV ACCEL is factory set for the shortest acceleration time (full CCW).

To set the forward acceleration time:

1. Set the speed adjust potentiometer or input voltage signal for minimum speed. The motor should run at minimum speed.
2. Set the speed adjust potentiometer or input voltage signal for maximum reverse speed. Measure the time it takes the motor to go from minimum to maximum speed.
3. If the time measured in step 2 is not the desired acceleration time, turn the REV ACCEL trim pot CW for a longer acceleration time or CCW for a shorter acceleration time. Repeat steps 1 through 2 until the acceleration time is correct.

Forward Torque (FWD TORQUE)

FWD TORQUE should be set to 150% of motor nameplate current rating. Continuous operation beyond this rating may damage the motor. If you intend to operate beyond the rating, contact your Minarik Drives representative for assistance.

The FWD TORQUE setting determines the maximum torque for accelerating and driving the motor in the forward direction. To calibrate FWD TORQUE, refer to the recommended FWD TORQUE settings in Figure 7 on page 26 or use the following procedure:

1. With the power disconnected from the drive, connect a DC ammeter in series with the armature.
2. Set the FWD TORQUE trim pot to minimum (full CCW).
3. Set the speed adjust potentiometer full CW or input voltage signal to maximum speed.
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 TORQUE trim pot CW until the armature current is 150% of motor rated armature current.
7. Turn the speed adjust potentiometer CCW or decrease the input voltage signal.
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.

Reverse Torque (REV TORQUE)

REV TORQUE should be set to 150% of motor nameplate current rating. Continuous operation beyond this rating may damage the motor. If you intend to operate beyond the rating, contact your Minarik Drives representative for assistance.

The REV TORQUE setting determines the maximum torque for accelerating and driving the motor in the reverse direction. To calibrate REV TORQUE, refer to the recommended REV TORQUE settings in Figure 7 on page 26 or use the following procedure:

1. With the power disconnected from the drive, connect a DC ammeter in series with the armature.
2. Set the REV TORQUE trim pot to minimum (full CCW).
3. Set the speed adjust potentiometer full CW or input voltage signal to maximum speed.
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 REV TORQUE trim pot CW until the armature current is 150% of motor rated armature current.
7. Turn the speed adjust potentiometer CCW or decrease the input voltage signal.
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.

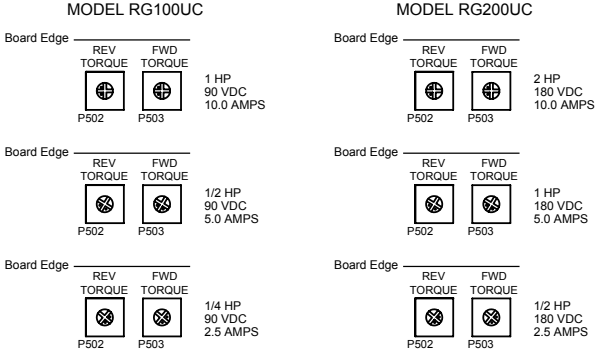


Figure 7. Recommended FWD TORQUE and REV TORQUE Settings (actual settings may vary with each application)

Deadband (DB)

The DB setting determines the time that will elapse between the application of current in one direction before current is applied in the opposite direction.

The DB affects the resistance that a motor has to changes in the shaft position at zero speed. It does this by applying an AC voltage to the motor armature.

The deadband is factory calibrated to approximately 3/4 of a turn position for 60 Hz AC line operation. Recalibrate the trim pot to approximately the 1/4 of a turn position for 50 Hz AC line operation. If you hear motor noise (humming), the deadband might be set too high. Turn the DB trim pot CCW until the motor noise ceases.

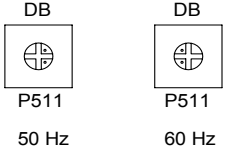


Figure 8. Deadband Settings

IR Compensation (IR COMP)

The IR COMP setting determines the degree to which motor speed is held constant as the motor load changes.

Use the following procedure to recalibrate the IR COMP setting:

1. Set the IR COMP trim pot to minimum (full CCW).
2. Increase the speed adjust potentiometer or input voltage signal until the motor runs at midspeed without load (for example, 900 RPM for an 1800 RPM motor). 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.

Current Stability (CURRENT STAB)

The effect of this adjustment is most apparent in the DC tachogenerator feedback operating mode. CURRENT STAB is factory set to midrange and should not require adjustment unless the tachogenerator signal has considerable ripple. Then, you should turn the CURRENT STAB trim pot clockwise until the motor stabilizes.

Voltage Stability (VOLTAGE STAB)

The effect of this trim pot is most obvious when tachogenerator feedback is used. If the trim pot is set too low, stepping will occur during acceleration and deceleration (Figure 9, Chart A). When optimum adjustment of voltage stabilization is achieved, the speed profile through time should be smooth (Figure 9, Chart B). If the trim pot is set too high, there will be oscillation at set speed (Figure 9, Chart C).

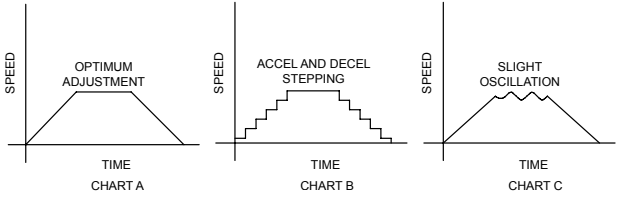


Figure 9. Voltage Stabilization Outputs

Section 7.Application Notes

Direction Switch

For a Forward/Reverse switch, use a single-pole, two-position switch with a single speed adjust potentiometer to regeneratively reverse the motor (Figure 10). If a Forward/Stop/Reverse switch is desired, use a single-pole, three-position switch (Figure 11). The MIN SPD setting is in effect for either direction.

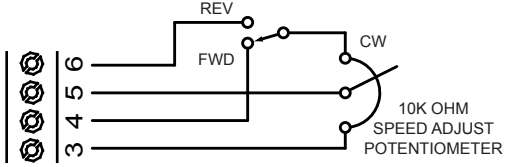


Figure 10. Forward-Reverse Switch

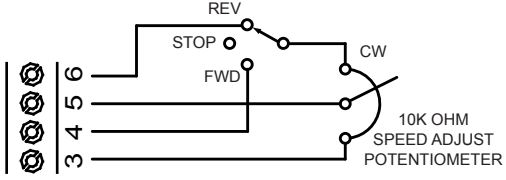


Figure 11. Forward-Stop-Reverse Switch

Multiple Fixed Speeds

Replace the speed adjust potentiometer with a series of resistors with a total series resistance of 10K ohms (Figure 12). Add a single pole, multi-position switch with the correct number of positions for the desired number of fixed speeds.

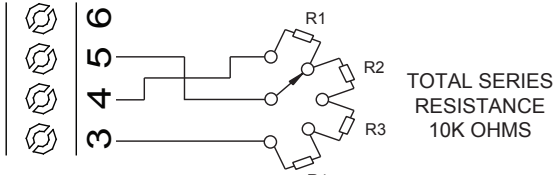


Figure 12. Multiple Fixed Speeds

Adjustable Speeds Using Potentiometers In Series

Replace the speed adjust potentiometer with a series of resistors with a total series resistance of 10K ohms (Figure 13). Add a single pole, multi-position switch with the correct number of positions for the desired number of fixed speeds.

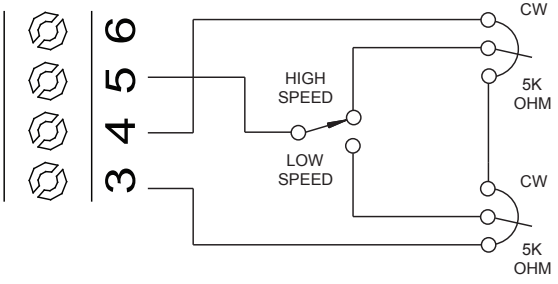


Figure 13. Adjustable Speeds Using Potentiometers In Series

Independent Adjustable Speeds

Replace the speed adjust potentiometer with a single pole, multi-position switch, and two or more potentiometers in parallel, with a total parallel resistance of 10K ohms. Figure 14 shows the connection of two independent speed adjust potentiometers that can be mounted at two separate operating stations.

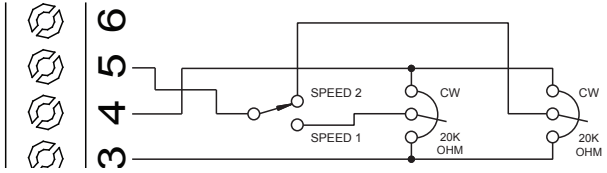


Figure 14. Independent Adjustable Speeds

Independent Adjustable Forward and Reverse Speeds

Replace the speed adjust potentiometer with a single pole, multi-position switch, and two or more potentiometers in parallel, with a total parallel resistance of 10K ohms. Figures 15 and 16 show the connection of two independent forward and reverse speed adjust potentiometers that can be mounted at two separate operating stations.

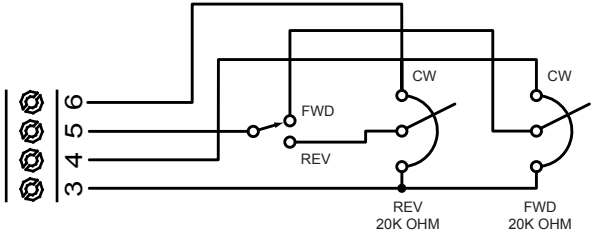


Figure 15. Independent Adjustable Forward and Reverse Speeds

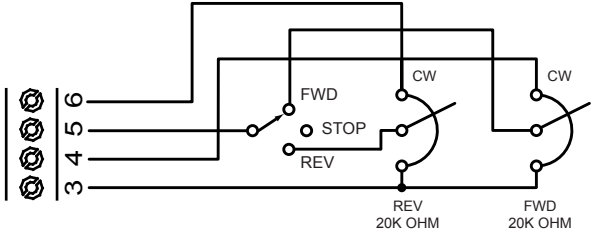


Figure 16. Independent Adjustable Forward and Reverse Speeds with Stop

RUN/JOG Switch - Run/Brake Connection

Use a single pole, two position switch for the RUN/JOG switch, and a single pole, normally closed, momentary operated pushbutton for the JOG pushbutton.

Connect the RUN/JOG switch and JOG pushbutton to terminals 7 and 8 as shown in Figure 17. The motor coasts to a stop when the RUN/JOG switch is set to JOG. Press the JOG pushbutton to jog the motor. Return the RUN/JOG switch to RUN for normal operation.

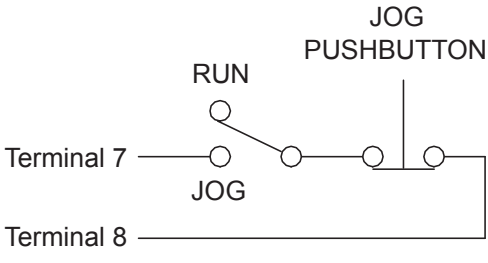


Figure 17. RUN/JOG Switch - Run/Brake Connection

RUN/JOG Switch - Potentiometer Connection

Connect the RUN/JOG switch and the JOG pushbutton as shown in Figure 18. When the RUN/JOG switch is set to JOG, the motor decelerates to zero speed. Press the JOG pushbutton to jog the motor. Return the RUN/JOG switch to RUN for normal operation.

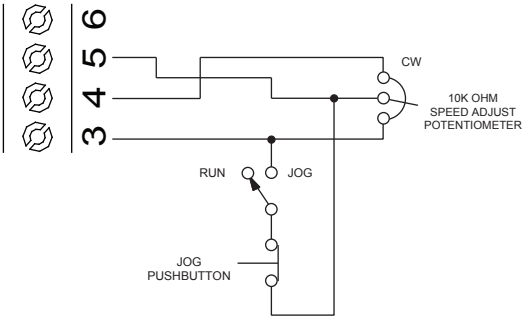


Figure 18. RUN/JOG Switch - Speed Adjust Potentiometer Connection

Leader-Follower Application

In this application, use a PCM4 to monitor the speed of the leader motor (Figure 19). The PCM4 isolates the leader motor from the follower drive, and outputs a voltage proportional to the leader motor armature voltage. The follower drive uses this voltage reference to set the speed of the follower motor. An optional ratio potentiometer may be used to scale the PCM4 output voltage.

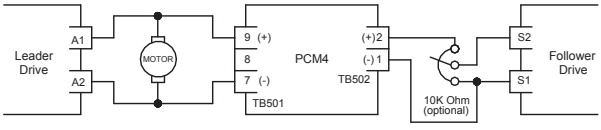


Figure 19. Leader-Follower Application

Single Speed Potentiometer Control Of Multiple Drives

Multiple drives can be controlled with a single speed adjust potentiometer using a USIM-8 at the input of each drive to provide isolation (Figure 20). Optional ratio potentiometers can be used to scale the USIM-8 output voltage, allowing independent control of each drive.

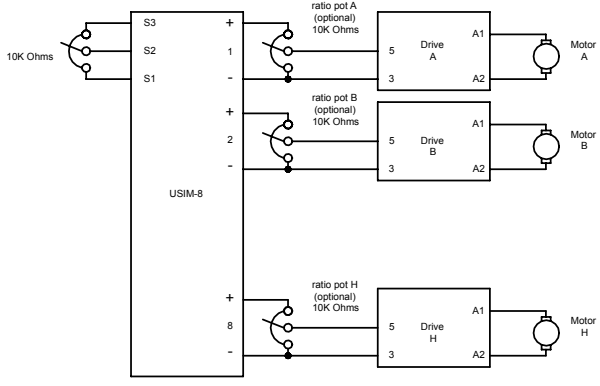


Figure 20. Single Speed Potentiometer Control of Multiple Drives

Section 8. Troubleshooting

Dangerous voltages exist on the drive when it is powered. When possible, disconnect the drive while troubleshooting. High voltages can cause seroius or fatal injury.

Before Troubleshooting

Perform the following steps before starting any procedure in this section:

1. Disconnect AC line voltage from the drive.
2. Check the drive closely for damaged components.
3. Check that no conductive or other foreign material has become lodged on the printed circuit board.
4. Verify that every connection is correct and in good condition.
5. Verify that there are no short circuits or grounded connections.
6. Check that the drive's rated armature is consistent with the motor ratings.

For additional assistance, contact your local Minarik Drives distributor or the factory direct:

(800) MINARIK or FAX: (800) 394-6334

PROBLEM	POSSIBLE CAUSE	SUGGESTED SOLUTIONS
Line fuse blows.	1. Line fuse is the wrong size.	1. Check that the line fuse is correct for the motor size.
	2. Motor cable or armature is shorted to ground.	2. Check motor cable and armature for shorts.
	3. Nuisance tripping caused by a combination of ambient conditions and high-current spikes (i.e. reversing).	3. Add a blower to cool the drive components, decrease FWD TORQUE / REV TORQUE settings, resize motor and drive for actual load demand, or check for incorrectly aligned mechanical components or "jams". See pages 24 or 25 for information on adjusting the FWD TORQUE / REV TORQUE trim pot.
Line fuse does not blow, but the motor does not run.	1. Speed adjust potentiometer or input voltage signal is set to zero speed.	1. Increase the speed adjust potentiometer setting or input voltage signal.
	2. Regenerative brake mode is active.	2. Remove the short from the 7 and 8 terminals.
	3. Terminal 5 is shorted to terminal 3.	3. Remove the short.
	4. Drive is in current limit.	4. Verify that the motor is not jammed. Increase FWD TORQUE / REV TORQUE setting if set too low.
	5. Drive is not receiving AC line voltage.	5. Apply AC line voltage.
	6. Motor is not connected.	6. Remove power. Connect the motor to A1 and A2. Reapply power.

PROBLEM	POSSIBLE CAUSE	SUGGESTED SOLUTIONS
Motor does not stop when the speed adjust potentiometer is full CCW.	1. Noise on logic wires.	1. Place a .01 µF capacitor across terminals 3 and 5.
Motor runs in the opposite direction	1. Motor connections to A1 and A2 are reversed.	1. Remove power. Reverse connections to A1 and A2. Reapply power.
Motor runs too fast.	1. MAX SPEED is set too high.	1. Calibrate MAX SPEED.
Motor will not reach the desired speed.	1. MAX SPEED setting is too low.	1. Increase MAX SPEED setting.
	2. IR COMP setting is too low.	2. Increase IR COMP setting.
	3. FWD TORQUE / REV TORQUE setting is too low.	3. Increase FWD TORQUE / REV TORQUE setting.
	4. Motor is overloaded.	4. Check motor load. Resize the motor and drive if necessary.
Motor pulsates or surges under load.	1. IR COMP is set too high.	1. Adjust the IR COMP setting slightly CCW until the motor speed stabilizes.
	2. Motor bouncing in and out of current limit.	2. Make sure motor is not undersized for load; adjust FWD TORQUE / REV TORQUE trim pot CW.

Section 9. Accessories & Replacement Parts

Displays

Closed Loop..... DLC600
Open Loop..... VT-8

Kits

Potentiometer & Connector
Pot Kit..... 202-0003
Fuse
1.5 - 5 Amp Fuse Kit..... 050-0066
1 - 8 Amp Fuse Kit with Pico Fuse..... 050-0068
3 - 8 Amp Fuse Kit with Pico Fuse..... 050-0069
5 - 15 Amp Fuse Kit..... 050-0071

Logic Cards

Current Sensing
5 Amps..... CSC1-5
20 amps..... CSC1-20
Isolation Cards
Unidirectional, 8 outputs..... USIM-8
Bidirectional, 1 output..... PCM4

Notes

Unconditional Warranty

A. Warranty

Minarik Drives warrants that its products will be free from defects in workmanship and material for twelve (12) months or 3000 hours, whichever comes first, from date of manufacture thereof. Within this warranty period, Minarik Drives will repair or replace, at its sole discretion, such products that are returned to Minarik Drives, 14300 De La Tour Drive, South Beloit, Illinois 61080 USA.

This warranty applies only to standard catalog products, and does not apply to specials. Any returns of special controls will be evaluated on a case-by-case basis. Minarik Drives is not responsible for removal, installation, or any other incidental expenses incurred in shipping the product to and from the repair point.

B. Disclaimer

The provisions of Paragraph A are Minarik Drives's sole obligation and exclude all other warranties of merchantability for use, expressed or implied. Minarik Drives further disclaims any responsibility whatsoever to the customer or to any other person for injury to the person or damage or loss of property of value caused by any product that has been subject to misuse, negligence, or accident, or misapplied or modified by unauthorized persons or improperly installed.

C. Limitations of Liability

In the event of any claim for breach of any of Minarik Drives's obligations, whether expressed or implied, and particularly of any other claim or breach of warranty contained in Paragraph A, or of any other warranties, expressed or implied, or claim of liability that might, despite Paragraph B, be decided against Minarik Drives by lawful authority, Minarik Drives shall under no circumstances be liable for any consequential damages, losses, or expenses arising in connection with the use of, or inability to use, Minarik Drives's product for any purpose whatsoever.

An adjustment made under warranty does not void the warranty, nor does it imply an extension of the original 12-month warranty period. Products serviced and/or parts replaced on a no-charge basis during the warranty period carry the unexpired portion of the original warranty only.

If for any reason any of the foregoing provisions shall be ineffective, Minarik Drives's liability for damages arising out of its manufacture or sale of equipment, or use thereof, whether such liability is based on warranty, contract, negligence, strict liability in tort, or otherwise, shall not in any event exceed the full purchase price of such equipment.

Any action against Minarik Drives based upon any liability or obligation arising hereunder or under any law applicable to the sale of equipment or the use thereof, must be commenced within one year after the cause of such action arises.

www.minarikdrives.com
14300 DE LA TOUR DRIVE
SOUTH BELOIT, IL 61080
(800) MINARIK

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