RCD 201R 24V MOTOR CONTROL PCB MODULE
WITH BRAKING & REVERSAL OPTION
USER INFORMATION SHEET

A. CONNECTION DETAILS

Connections are made using the 15 pin terminal block on the PCB. The pin out of terminals on the PCB is as follows (Refer to diagram for pin numbering):

        PIN 1 :   24V AC
        PIN 2 :   24V AC
        PIN 3 :   18V AC
        PIN 4:   18V AC
        PIN 5:   24V DC OUTPUT
        PIN 6:   GROUND
        PIN 7:   MOTOR +
        PIN 8:   MOTOR -
        PIN 9:   POT HIGH SIDE (15V DC OUT)
        PIN 10:   POT WIPER
        PIN 11:   POT LOW SIDE
        PIN 12:   TACHO+
        PIN 13:   GROUND
        PIN 14:   VPLC1
        PIN 15:   VPLC2

PIN 1,2 : AC voltage for motor supply. Recommended voltage : 24V AC. Current : 5 Amps max.

PIN 3,4 : AC voltage for negative supply. Recommended voltage : 18V AC. Current : 250 mA max.
        (Not needed if speed is controlled from inbuilt potentiometer)

PIN 5,6 : 24V DC Output. (Rated 2 Amps)

PIN 7,8: Motor Terminals.

PIN 9,10,11: Potentiometer Terminals.

PIN 12 : TACHO: Tachogenerator +ve.

PIN 13: GND: Tachogenerator −ve.

PIN 14,15: VPLC1,2: Short these terminals in case speed is controlled externally.

The speed pot is already wired to pins 9,10,11 on the PCB. If desired, the pot may be removed and mounted at any other convenient location. In such a case, keep the wire lengths to a minimum and avoid running the wires alongside any power cables. The use of a shielded cable is recommended, especially in electrically noisy environments. Connect the cable shield to the system earth.

Pins 7 and 8 are used to connect the motor. Keep connecting wires as short as possible to minimize voltage drop on the conductors. Keep connecting wires away from any sensitive circuits, as they carry switching currents. Twisting the wires together will minimize pickup problems. Connect an external slow blow fuse of 1.3 times the motor rating in series for protection of the motor.

SIGNAL CONNECTIONS : (8 Pin Relimate Connector)

PIN 1 : External speed signal input (0 – 10V). (If Speed potentiometer is not used)

PIN 2 : Ground.

PIN 3 : N.C.

PIN 4 : +15V DC Output.

PIN 5 : -15V DC output.

PIN 6 : REVERSE.

PIN 7 : ENABLE.

PIN 8 : N.C.

B. MAKING ADJUSTMENTS

Adjustments for optimum operation can be made by setting the four presets mounted on the PCB. Refer to the diagram for preset locations.

MIN : This is for setting the minimum speed. Set the speed control pot to minimum speed, and then adjust the MIN preset till the desired minimum speed is obtained. In case a minimum speed or zero is desired, adjust the preset till the motor just starts moving, and the reduce the setting till the motor just stops. In case if the speed is to be controlled from external speed signal keep this preset at the minimum.

MAX : This is for setting the maximum speed. Set the speed control pot to maximum speed, and then adjust the MAX preset till the desired maximum speed is obtained.

CL : This is for setting the current limit. Connect an ammeter in series with the motor, and set the speed control pot midway. Apply friction braking till the motor stalls, and adjust the CL preset till the ammeter reads the motor's rated current.

IR COMP : Disconnect load from the motor and set the speed control midway. Measure the motor speed with a tacho. Now connect the load to the motor, and adjust the IR preset till the tacho indicates the original no-load speed. If the above cannot be carried out, then with the load connected increase IR COMP till the motor begins to hunt, and then back off until the hunting stops.

C. APPLICATION NOTES

VOLTAGE FOLLOWER / SPEED CONTROL THROUGH PLC : Disconnect the speed control pot from the PCB. The voltage to be tracked can be fed between EXT. SPEED REF (Pin 1 on the Signal connector), and GROUND (Pin 2 on the Signal connector). The voltage can be derived from a tacho, D/A converter, etc. and a level of 10V corresponds to full speed.

TACH FEEDBACK : Refer to the diagram and shift the jumper from 2 & 3 to 1 & 2 position of the 3 Pin Header JP3. Connect the tacho between pin 12 of the terminal block and GROUND. The value of R102 may be changed, if required, to match the full speed requirements of the motor-tacho combination.

REVERSING : A switch or relay contact may be connected between pin 2 (GROUND) and pin 6 (REVERSE) of the 8 pin relimate connector to control the motor direction FWD / REV. The motor will run in one direction when the contact is open, and reversed when the contact is closed.

BRAKING : A switch or relay contact may be connected between pin 2 (GROUND) and pin 7 (ENABLE) of the 8 pin relimate connector to control the motor STOP / RUN. The motor will run when the contact is open and stop when the contact is closed.

D. IMPORTANT NOTE ON MOTOR SPEED REGULATION

The terminal voltage of a motor under load can be expressed as $Vt = Vnl + Im . Rm$, where
Vt = terminal voltage, Vnl = no-load voltage, Im = motor current, Rm = motor resistance.
Thus, the terminal voltage is seen to increase with load for a fixed rpm of the motor. The RCD 201 drive controls motor speed by increasing the terminal voltage in response to increasing loads. With a 24V AC supply, the drive can generate a maximum terminal voltage of 24V DC. In order to achieve proper regulation, the motor and running rpm must therefore be chosen so that the terminal voltage requirement **on load** does not exceed 24V DC.
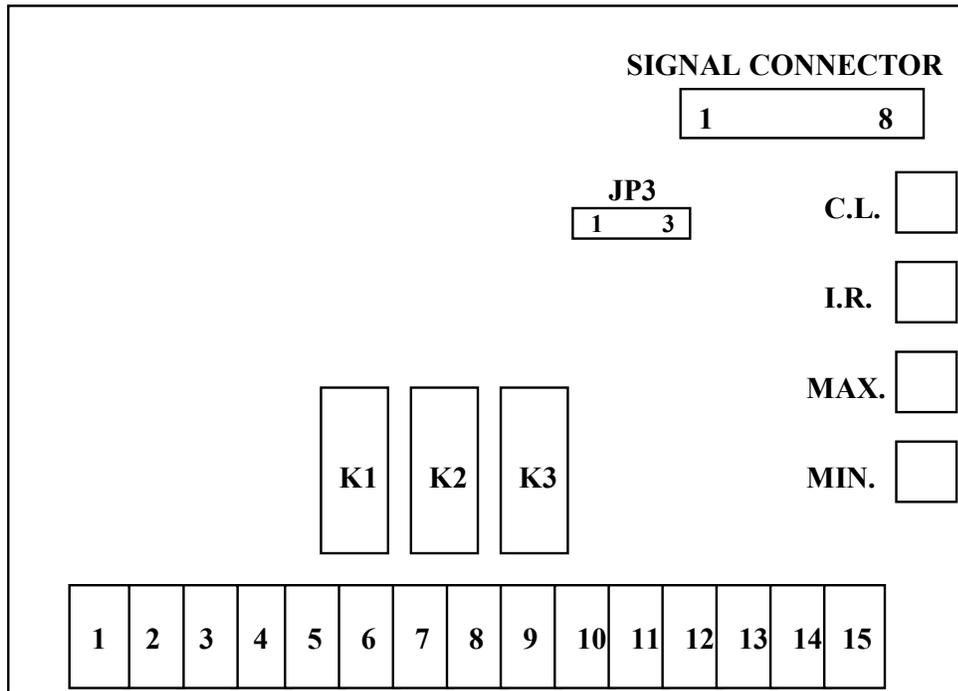
Example 1 : Assume motor resistance = 1 ohm, motor current on load = 4 amps.
         IR drop = 1 x 4 = 4 volts.
         Max. no load voltage = 24 – 4 = 20 volts.

Example 2 : Assume motor resistance = 5 ohms, motor current on load = 2 amps.
         IR drop = 5 x 2 = 10 volts.
         Max. no load voltage = 24 – 10 = 14 volts.

Using no load voltages above these computed values can result in poor speed regulation. In general, higher load currents and motor resistance will result in lower no-load voltage limits.

Rm can be determined from the motor's data sheet, or by checking the terminal resistance of the motor with an ohmmeter. The load current can be measured while running the motor under loaded conditions.

The IR compensation circuit on the drive is designed to cater to motor resistance upto 6 ohms. If motors of higher resistance are used, poor regulation will again result. For use with higher resistance motors, the setting can be changed to accommodate motors of upto 12 or 24 ohms. Contact factory for details.

DIAGRAM OF PCB MODULE

SIGNAL CONNECTOR

1							8

JP3

1		3

C.L.

I.R.

MAX.

MIN.

K1	K2	K3

TERMINAL BLOCK

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

TERMINAL BLOCK DETAILS

PIN 1	:	24V AC
PIN 2	:	24V AC
PIN 3	:	18V AC
PIN 4	:	18V AC
PIN 5	:	24V DC OUT
PIN 6	:	GROUND
PIN 7	:	MOTOR+
PIN 8	:	MOTOR-
PIN 9	:	POT HIGH / 15V
PIN 10	:	POT WIPER
PIN 11	:	POT LOW
PIN 12	:	TACHO
PIN 13	:	GROUND
PIN 14	:	VPLC1
PIN 15	:	VPLC2

SIGNAL CONNECTOR DETAILS

PIN 1 :	EXT. SPEED REF.
PIN 2 :	GROUND
PIN 3 :	N.C.
PIN 4 :	+15V DC OUT
PIN 5 :	-15V DC OUT
PIN 6 :	REVERSE
PIN 7 :	ENABLE
PIN 8 :	N.C.

JP3 DETAILS

PIN 1-2: TACHO FEEDBACK
PIN 2-3: ARMATURE FEEDBACK