

Instructions for Installation and Operation

Type UPM Unfiltered SCR Speed Controls for Permanent Magnet DC Brush Motors
• Model 0865 with quick connect tabs • Model 0866 with plug-in terminal block

SPECIFICATIONS

Input Voltage	115/230 VAC +/- 10%, 50/60 Hz, single phase
Max. Input Current	8.2 Amps RMS at current limit with largest motor
Output Voltage (115 VAC Input)	0-90 VDC
Output Voltage (230 VAC Input)	0-90 VDC or 0-180 VDC
Ambient Temperature	0-50°C (32-122°F)
Max. Output Current, Continuous	2.1 Amps DC
Max. Output Current, Peak	5.1 Amps DC
Speed Regulation	1% of rated speed obtainable with most motors
Acceleration Time	(0-90 VDC) Adjustable, 0.2-10 seconds
Acceleration Time	(0-180 VDC) Adjustable, 0.2-20 seconds
Deceleration Time	(90-0 VDC) Adjustable, 0.2-10 seconds
Deceleration Time	(180-0 VDC) Adjustable, 0.2-20 seconds
Means for Speed Adjustment	10K ohm pot or isolated 0-5 VDC signal
Means for Drive Inhibit	switch closure
Diagnostics	green power LED, red current limit LED

FIGURE 1—Control mounting dimensions

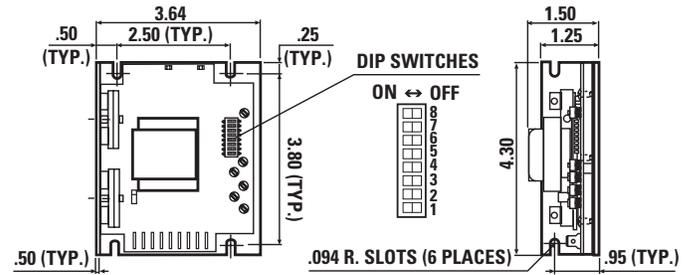


FIGURE 2—Setup of DIP Switches

INSTALLATION

WARNING: This control should only be installed by a qualified person familiar with its operation and associated hazards. The National Electrical Code (NEC), local electrical and safety codes, and when applicable, the Occupational Safety and Health Act (OSHA) should be observed to reduce hazards to personnel and property.

NOTE: The control does not provide motor over temperature protection. The user is responsible for providing this protection in the equipment where this control is used (Remarque: La détection de la surchauffe du moteur n'est pas assurée par cette control).

Step 1: Mounting the Control

The control may be mounted with the plane of the circuit board either horizontal or vertical. The four mounting slots will accommodate #8 screws.

CAUTION—Exposed circuit boards must be protected from electrostatic discharge during handling to prevent component damage.

CAUTION—Mount the control chassis in an enclosure suitable for the application environment.

Step 2: Preliminary Setup

INPUT VOLTAGE JUMPER—Figure 3 shows the location of JP1, a 3-pin header. A jumper is factory-installed for 115 VAC. If operating from 230 VAC, remove the jumper and reinstall it in the "230" position.

HORSEPOWER & OUTPUT VOLTAGE SELECTOR SWITCHES—Figure 1 shows a bank of 8 DIP switches. Set switches 1 thru 7 to match the type, voltage, and speed ratings on the Bodine motor nameplate per Figure 2 (consult Bodine on settings for non-Bodine motors). Set switch 8 "off" for 0-90 VDC output and "on" for 0-180 VDC output.

Step 3: Electrical Connections

WARNING—All parts of the circuit operate at voltages capable of causing serious injury or death.

WARNING—AC power should be the very last connection.

INHIBIT SWITCH (OPTIONAL)—A mechanical switch or relay with contacts rated for low voltage may be connected to terminals "H1" and "H2". With the switch open, the motor will run. With the switch closed, the motor will coast to a stop.

WARNING—The inhibit switch should not be used to disable motor or control when servicing these or driven equipment. Disconnect the AC power instead.

Bodine Motor Type	Rated Volts (DC)	Armature Speed (RPM) ¹	Rated Current (Amps) ²	Motor Power (HP)	DIP Switches ON	Typical Current Range of TORQ Pot. (DC Amps) ³	Typical Input Current at Max. TORQ Setting (RMS Amps) ⁴
24A4	90	2500	0.58	1/20	4	0-.98	1.3
24A4	90 130	1700 2500	.56 .81	1/23 1/11	4	0-0.92	1.3
24A4 ⁵	115	11500	1.1	1/7	3,5	0-1.5	8.2
33A3 ⁵	90 130	1700 2500	.78 1.0	1/16 1/8	3,5	0-2.4	2.6
33A5	90	2500	1.6	1/7	2,4,5	0-3.0	3.8
33A5 ⁵	90 130	1700 2500	1.4 1.8	1/8 1/4	3,4,5	0-2.2	2.5
33A5 ⁵	90 130	1700 2500	1.3 1.7	1/8 1/4	3,4,5	0-2.2	2.5
33A7	90	2500	2.3	1/4	1,3,4	0-4.6	5.5
10.02	130	2000	1.4	1/6	3	0-1.38	1.8
33A7 ⁵	90 130	1700 2500	1.8 2.4	1/6 1/3	2,4,5	0-3.0	3.8
42A4 ⁵	130	2000	1.3	1/6	2,5,7	0-2.7	4.3
42A5	90	2500	2.2 ⁷	1/4	2,3,4,5	0-4.0	5.4
42A5 ⁵	90 130	1700 2500	1.9 1.8	3/16 1/4	1,3,4	0-4.3	6.9
42A5 ⁵	90 130	1700 2500	2.1 2.8	3/16 3/8	1,3,4	0-4.3	6.9
24A2	180	1725	0.13	1/19	4,6,7,8	0-0.2	0.30
24A4	180	2500	0.30	1/19	4,6,7,8	0-0.5	0.8
24A4	180	1725	0.18	1/32	4,6,7,8	0-0.3	0.40
33A3	180	1725	0.33	1/23	4,6,7,8	0-0.6	0.80
33A3	180	1725	0.31	1/23	4,6,7,8	0-0.6	0.90
33A5	180	1725	0.41	1/14	3,4,5,6,7,8	0-0.8	1.3
33A5	180	1725	0.62	1/11	3,5,6,7,8	0-1.1	1.5
33A5	180	2500	0.80	1/7	1,2,3,6,8	0-2.1	2.2
33A5	180	3000	0.89	1/6	1,2,3,6,8	0-1.2	1.9
33A7	180	2500	1.1	1/5	2,5,8	0-2.3	3.1
33A7 ⁵	180	3000	1.3	1/4	2,5,8	0-2.6	3.5
33A7	180	1725	0.88	1/6	3,5,8	0-1.7	2.0
42A5	180	1725	0.85	1/6	3,5,8	0-1.3	2.1
42A5	180	1725	0.85	1/5	3,5,8	0-1.71	2.1
42A5	180	2500	1.2	1/4	2,5,8	0-2.7	8.5
42A5 ⁵	180	3000	1.17	1/5	2,5,8	0-2.5	4.1
42A5	180	1725	0.85	1/6	3,5,8	0-1.7	2.1
42A7	180	1725	1.0	1/5	2,5,8	0-2.0	3.2
42A7 ⁵	180	3000	1.5	1/4	2,3,8	0-3.3	6.9

1. Armature speeds are based on 130VDC (or 180VDC). For armature speed of a geared motor, multiply the output speed at the driveshaft by the gear ratio. Note that "PWM rated" motors, or motors rated at 130 VDC, will run about 69% slower with an unfiltered control because of the 90VDC max output voltage.
2. If the user desires to install their own armature fuse on the control output to protect the motor from continuous overloads, base fuse ratings on the motor current rating in this column. The fuse should be sized at 1.2 times the current rating in this column.
3. Peak current available with TORQ pot in fully CW position. This current may exceed the continuous rating of the motor, in which case it is intended for intermittent overload conditions only. It is the user's responsibility to make sure the application does not exceed continuous rating of the motor or gearing.
4. Use this column for sizing a line fuse on the control input. The fuse should be sized at 1.2 times the current rating in this column.
5. These motors are capable of exceeding the continuous output rating of the control. The loading on these motors must be limited to keep their continuous current draw at 2.1A or less.
6. The REG potentiometer must be turned fully CCW (off) for high-speed type 24A4BEP motor.
7. The load/current of our 42A5 "SCR Rated", 90V, 2500 rpm gearmotors may not exceed 2.1 amps (max) rating of control.

INSTALLATION, continued

CAUTION—The control board signal common is not at ground potential. Any external signal or equipment connected to the control must be electrically isolated from ground.

SPEED POTENTIOMETER—Connect a 10K Ohm potentiometer (included with control) to terminals “S1”, “S2”, and “S3” as shown in **Figure 3**. Alternatively, an isolated 0-5 VDC signal may be connected to “S2” using “S1” as common.

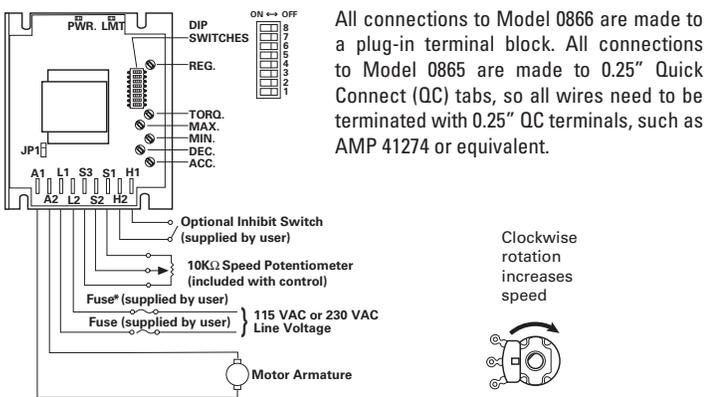
Wiring the Speed Pot—Turn the wiper to the full CW position and measure the resistance between the center terminal and the end terminals. Connect the end terminal that measures 0 Ohms to “S3” (+). Connect the other end terminal to “S1”. Motor speed will increase with CW pot rotation.

MOTOR—For clockwise armature rotation, connect the “+” motor wire (white on Bodine motors) to terminal “A2” and the “-” motor wire (black on Bodine motors) to terminal “A1”. To reverse rotation, reverse the motor connection.

LINE FUSE—Connect a fuse (not included with control) between “L1” and the “hot” side of the AC line. Use information in **Figure 2**, along with applicable safety standards and the assistance of a fuse supplier, to select a proper fuse value. An additional fuse of the same value must be connected to “L2” only when the connection made to “L2” is not “neutral” and has a potential with respect to ground (such as with 230 VAC lines in the U.S.A.)

AC POWER—Connect the AC line to “L2” and the fuse connected to “L1”.

FIGURE 3—Electrical connections and internal adjustments



All connections to Model 0866 are made to a plug-in terminal block. All connections to Model 0865 are made to 0.25" Quick Connect (QC) tabs, so all wires need to be terminated with 0.25" QC terminals, such as AMP 41274 or equivalent.

Clockwise rotation increases speed



OPERATION

Step 4: Preliminary Checks Before Starting

1. Recheck all fuses, connections, and adjustments.
2. Check that the gearmotor is securely mounted.
3. Test the motor unloaded first (follow instructions in Step 5). If the motor operates properly unloaded, then proceed with testing it loaded.
4. Check all rotating members. Be sure keys, pulleys, etc. are securely fastened and safety guards are in place.
5. Check for proper mounting and alignment of products, and verify safe loading on shafts and gears.

Step 5: Operating the Control

1. With AC input power OFF, set the speed pot to ZERO (fully counterclockwise). If an inhibit switch is used, close the switch.
2. Turn on the AC input power to the control.
3. Open the inhibit switch, if used.
4. Turn the speed pot until motor rotates at desired speed.
5. If the motor does not start promptly and run smoothly, disconnect the AC power and refer to “TROUBLESHOOTING,” below.

Step 6: Internal Adjustments

To fine tune the control, use the five trim pots, shown in **Figure 3**.

WARNING—Circuit components are at high potential and accidental short-circuiting and shock hazard may occur with conductive tools. Use a non-metallic or insulated adjustment tool for trim pot adjustments.

MINIMUM SPEED LIMIT—Turn MIN pot clockwise (CW) to make motor run faster than 0 rpm when speed pot is set at “0”. With MIN pot fully CW and speed pot set at “0”, control output will be 50 VDC. Increasing the min. speed will also increase the max. speed, so the MAX pot may need to be adjusted.

MAXIMUM SPEED LIMIT—Turn MAX pot counterclockwise (CCW) to make motor run slower than full speed when speed pot is set for full speed (5V at “S2”). With MAX pot fully CCW and speed pot set for full speed, motor will run at 60% of full speed.

TORQUE LIMIT—Turn TORQ pot counterclockwise (CCW) to reduce peak torque capability of the motor. Most Bodine motors produce about 200% of their rated torque with the DIP switches set per **Figure 2** and with the TORQ pot turned fully CW. Turn the TORQ pot fully CCW to produce 0% torque (stall).

ACCELERATION TIME—Turn the ACCEL pot to change the acceleration time. The minimum setting (fully counterclockwise) produces a voltage ramp time of approximately 0.2 seconds. The maximum setting (fully clockwise) produces a voltage ramp time of approximately 10 seconds with a 0-90 VDC output and 20 seconds with a 0-180 VDC output. Certain loading conditions may prevent the motor from actually accelerating as quickly as the output voltage ramps up.

DECELERATION TIME—Turn the DECEL pot to change the deceleration time. The minimum setting (fully counterclockwise) produces a voltage ramp time of approximately 0.2 seconds. The maximum setting (fully clockwise) produces a voltage ramp time of approximately 10 seconds for a 90-0 VDC output and 20 seconds for a 180-0 VDC output. Certain loading conditions may prevent the motor from actually decelerating as quickly as the output voltage ramps down.

SPEED REGULATION—The REG pot sets the gain of the IR compensation. It is factory-set so that the speed of most Bodine motors varies no more than 2% from no load to full speed when the DIP switches are set per **Figure 2**. The REG pot normally requires no adjustment by the user unless better speed regulation is needed or no speed regulation is wanted. Turn REG pot CW to increase IR compensation. Turning too much will make the system unstable. If that happens, turn the REG pot CCW. When using a high speed 24A4BEPM motor, turn the REG pot fully CCW (off).

TROUBLESHOOTING

WARNING—Disconnect the control from the AC power source and wait 7 minutes before servicing.

If the motor does not operate, disconnect the AC power and double-check all connections and fuses. Make sure the TORQ pot is not turned fully counterclockwise. If a fuse is blown and the motor is not locked (stalled) or overloaded, do not replace the fuse. The control may be damaged. If the motor is overloaded, reduce the load and replace the blown fuses with new ones of the proper type and rating. If the problem persists, contact your source of purchase or a Bodine Authorized Service Center and describe the problem in detail. Include all nameplate data for both motor and control.

BODINE LIMITED WARRANTY

The Bodine Electric Company warrants all products it manufactures to be free of defects in workmanship and materials when applied in accordance with nameplate specifications. Bodine motors and gearmotors purchased with and used only with appropriately applied Bodine controls are covered by this warranty for a period of 24 months from the date of purchase or 30 months from date of manufacture, whichever comes first. Bodine motors and gearmotors used with non-Bodine controls and Bodine controls used with non-Bodine motors and gearmotors are covered by a 12 month warranty period. The Bodine Electric Company will repair, replace, or refund at its option, any of its products which has been found to be defective and within the warranty period, provided that the product is shipped freight prepaid, with previous authorization, to Bodine or to a Bodine Authorized Service Center. Bodine is not responsible for removal, installation, or any other incidental expenses incurred in shipping the products to or from Bodine. This warranty is in lieu of any other expressed or implied warranty—including, but not limited to, any implied warranties of merchantability and/or fitness for a particular use. Bodine’s liability under this warranty shall be limited to repair or replacement of the Bodine product and Bodine shall not be liable, under any circumstances, for any consequential, incidental or indirect damages or expenses associated with the warranted products. Proof of purchase of motor or gearmotor and matching control as a system must be provided with any claim.

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