

Instructions for Installation and Operation

Type WPM Enclosed Speed Control for Permanent Magnet DC Motors



Model 0792, 7/16 HP, without Direction Control

Model 0796, 3/4 HP, with Direction Control

Model 0797, 3/4 HP, without Direction Control

BODINE[®]
ELECTRIC
COMPANY
CHICAGO 60618, U.S.A.

QUALITY
IN
MOTION[®]

P/N 074 01042 E (FZ)

IMPORTANT SAFETY PRECAUTIONS

This manual contains the basic information needed to install and operate Bodine DC Motor Speed Control models 0792, 0796, and 0797. This manual does not profess to cover all details or variations in equipment, or to provide for every possible contingency associated with installation, operation, or maintenance. No warranty of fitness for purpose is expressed or implied. Should further information be desired or should particular problems arise which are not covered sufficiently for the user's purpose, the matter should be referred to the Bodine Electric Company.

IMPORTANT

Read this manual completely and carefully. Pay special attention to all warnings, cautions, and safety rules. Failure to follow the instructions could produce safety hazards that could injure personnel or damage the control, motor, or other equipment.

Models 0792, 0796, and 0797 have been evaluated by Underwriters Laboratories for conformance to UL standard 508 and CSA standard C22.2 No. 14 and bear the UL Recognized Component mark.

The DC control is a power electronic device. For safety reasons, please read through this operations manual in detail and observe those paragraphs with the safety alert symbol, such as the following one.



WARNING

- Do not touch printed circuit board (PCB) right after turning off power. Wait until green LED turns off.
- Do not attempt to wire circuitry while power is on.
- Do not attempt to examine components and signals on the PCB while the control is operating.
- Do not attempt to disassemble or modify internal circuitry, wiring, or components of the control.
- Enclosure must be properly grounded.

SPECIFICATIONS

ABOUT THIS PRODUCT - Bodine Models 0792, 0796, and 0797 are designed to provide variable speed control of standard Permanent Magnet DC motors. Adjustable acceleration and deceleration are provided, making the drive suitable for soft start applications. The full-featured drive is easy to install and operate. Simple trim pot adjustments eliminate the computer-like programming required on other drives. However, for most applications, no adjustments are necessary.

TABLE 1 – Control Specifications

Model Number:	0792	0796	0797
Input Voltage:	115 VAC +/-10%, 50/60 Hz, Single Phase		
Drive Type:	PWM		
Output Voltage:	Adjustable, 0 to 130 VDC		
Motor Type:	Permanent Magnet Brush DC		
Max. Input Current, Continuous:	5.7 Amps RMS	8.0 Amps RMS	
Max. Output Current, Continuous:	3.2 Amps DC	5.0 Amps DC	
Max. Output Current, Peak:	5.0 Amps DC	7.5 Amps DC	
Max. Motor HP Rating, Motors rated 1725 RPM @ 90 VDC:	1/3 HP (.23 kW)	1/2 HP (.37 kW)	
Max. Motor HP Rating, Motors rated 2500 RPM @ 130 VDC:	7/16 HP (.33 kW)	3/4 HP (.50 kW)	
Operating Temperature:	0°C to +40°C (32°F to 122°F)		
Speed Regulation Adjustment:	1% of rated speed obtainable with most DC motors		
Diagnostics:	green power LED, red current limit LED		
Direction Control:	NO	YES	NO

INSTALLATION

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.



CAUTION

Do not connect the control to the power supply if there is any sign of shipping damage. Notify the carrier and your distributor immediately.

Step 1: Mounting the Control

The control may be mounted using any two or all four mounting holes. The mounting holes will accommodate either 1/4-20 or M6 screws. See Figures 1 and 2 for distances between the mounting holes.

Although the control is designed for industrial applications, avoiding certain installation sites can prolong the lifespan of the control.

- Avoid areas where surrounding air temperature exceeds 40°C (direct sunlight or near heating equipment or inside a panel without a cooling fan).
- Avoid locations where the front panel dial and switch may be bumped and accidentally turned on/off or damaged.
- Avoid environments with corrosive gas.
- Avoid locations near radioactive matter or flammable material.
- Avoid locations near equipment that generate electromagnetic interference (soldering or power machinery).
- Avoid mounting the control to a surface that vibrates.

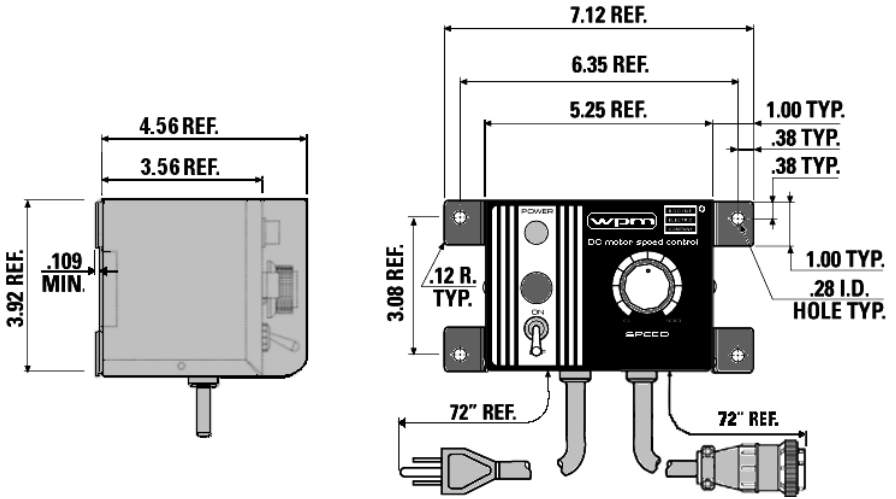


FIGURE 1 - Control mounting dimensions for Model 0792

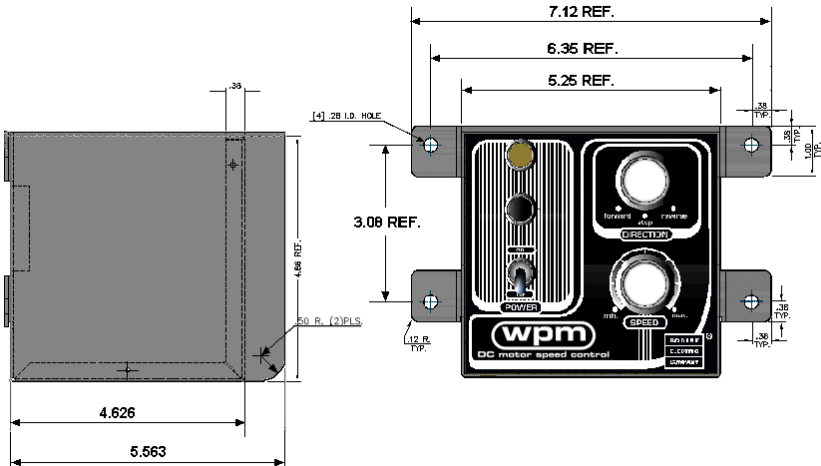


FIGURE 2 - Control mounting dimensions for Models 0796 and 0797. Cords not shown, but they are the same as on Model 0792 (see Figure 1).

Step 2: Preliminary Setup



CAUTION

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

MOTOR SIZE SELECTOR SWITCHES - Control Models 0792, 0796, and 0797 are packaged with the enclosure cover in place, but not attached. Remove the cover to set the motor size selector switches. Fig. 4 shows the location of a bank of 8 dip switches. Set switches 1 through 6 to match the type, speed, and current ratings on the motor nameplate per Table 2.

TABLE 2 - Setup of Dip Switches 1 through 6

MOTOR RATINGS					CONTROL SETUP		
Motor Mfr.	Motor Type	Armature RPM / Volts ¹	Rated Amps ²	HP	Dip Switches ON	Peak Output Amps ³	Cont. Input Amps
Control Model 0792							
Bodine	24A4...	2500 / 130	0.45	1/17	none	1.0	1.1
	33A3... 32A3...	2500 / 130	0.71	1/12	1	1.2	1.4
	32A4...	2000 / 130	0.62	1/12	1	1.0	1.4
	33A5... 32A5...	2500 / 130	1.00	1/8	3	2.1	1.9
	42A3...	2500 / 130	1.00	1/8	1, 3	2.0	2.0
	42A4...	2000 / 130	1.20	1/6	2, 3	2.0	2.5
	42A5...	2500 / 130	1.80	1/4	3, 5	4.1	3.6
	42A7...	2500 / 130	2.30	1/3	2, 3, 5	4.9	4.0
Other	PM	2500 / 130	2.2	1/4	1, 2, 3, 5	5.3	4.0
Control Models 0796 and 0797							
Other	PM	2500 / 90	5.0	1/2	1,2,3,4,5,6	7.5	8.0

Notes:

1. To calculate the armature speed of a geared motor, multiply the output speed at the driveshaft by the gear ratio.
2. If the user desires to install their own armature fuse on the control output to protect motor from continuous overloads, then the rating of that fuse should be based on the motor rating in this column.
3. Peak current available with TORQ pot in fully CW position (factory setting). This current, which exceeds the continuous rating of the motor, is intended for intermittent overload conditions only, such as infrequent starting of inertial loads.

ACCEL/DECEL SELECTOR SWITCHES – Fig. 3 shows the location of a bank of 8 DIP switches. Set switches 7 and 8 to select the acceleration and deceleration time range per Table 3.

TABLE 3 – Setup of DIP switches 7 and 8.

Switch Number		Acceleration/Deceleration Time Range (seconds) ¹	
7	8	ACC pot fully CCW (factory setting)	ACC pot fully CW
OFF	OFF	0.1	0.3
OFF	ON	0.5	2.0
ON	OFF	3.5	12.0
ON	ON	4.0	15.0

1. The time for voltage across A1 and A2 to ramp up from 0 to 130 VDC when voltage across S1 & S2 switches instantly from 0 to 5 VDC; or the time to ramp down from 130 to 0 VDC when voltage across S1 & S2 switches from 5 to 0 VDC.

Step 3: Electrical Connections

⚠ WARNING

Do not attempt to wire circuitry while power is on.

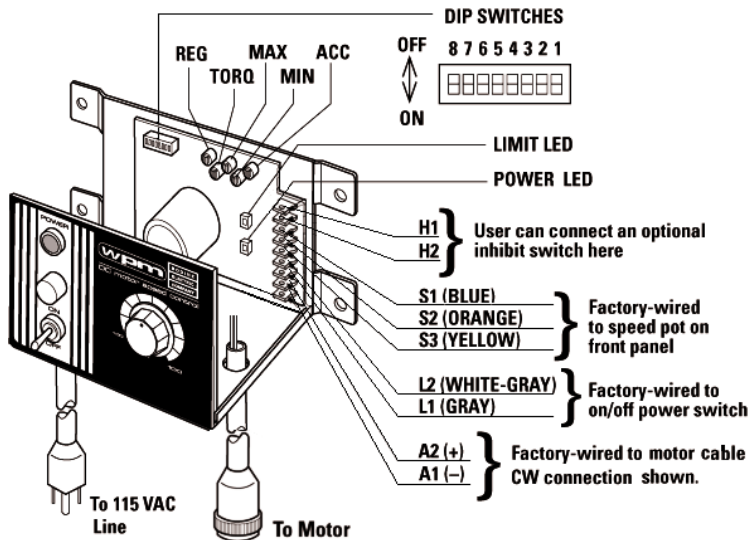


FIGURE 3 – Control shown with cover removed to identify locations of electrical connections, DIP switches, trim pots, and diagnostic lights (LEDs). Model number 0792 is shown. Models 0796 and 0797 use the same printed circuit board.



WARNING

The AC power line to the control should be the very last connection made.

INHIBIT SWITCH (OPTIONAL) - A mechanical switch or relay with low voltage contacts may be connected to 0.25" spade terminals "H1" and "H2". The motor will run with the switch open. Closing the switch will stop the motor.



WARNING

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



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.

MOTOR CONNECTIONS - Models 0792, 0796, and 0797 have a six foot long cable with a plug-in connector at the end. A mating connector, AMP #206429-1 or equivalent, must be installed on the motor cable. To reverse motor direction, remove the control enclosure cover and transpose the wire connections at "A1" and "A2". The factory connection of the cable has the white wire in the cable connected to pin 1 of the AMP connector and to "A2" in the control. The black wire is connected to pin 2 of the AMP connector and to "A1" in the control. The green & yellow wire is connected to pin 3 of the AMP connector and to the ground screw in the control. See Fig. 3 for location of tabs.

LINE FUSE - Models 0792, 0796, and 0797 have a fuseholder on the front panel of the enclosure. Model 0792 uses an 8 amp fuse and Models 0796 and 0797 use a 15 amp fuse.

AC POWER CONNECTIONS - Models 0792, 0796, and 0797 have a six foot long cable with a standard connector for a 115 VAC outlet. When all other connections are made, plug it in.

OPERATION

Step 4: Preliminary Checks Before Starting

1. Recheck all fuses, connections, and adjustments.
 2. Check that motor is securely mounted.
 3. Test the motor unloaded first to verify proper connections (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 power switch OFF, set the speed pot to ZERO (fully counterclockwise).
 2. Turn the AC power switch ON. If an optional inhibit switch is being used, open it.
 3. Turn speed pot until motor rotates at desired speed. Note that “SCR rated” motors (motors rated at 90 VDC) will run faster with a filtered control because of the 130 VDC max. output voltage.
 4. If the motor does not start promptly and run smoothly, refer to “TROUBLESHOOTING” below.
-

Step 6: Internal Adjustments

Most users will find the factory settings of the control to be acceptable for their application. For those who want to fine-tune the control, four trim potentiometers on the PC board can be adjusted. First, remove the enclosure cover. Fig. 3 shows the locations of the trim pots.



WARNING

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

MINIMUM SPEED LIMIT - Turn the MIN pot clockwise (CW) to make the motor run faster than 0 rpm when the speed pot is set at “0”. With MIN

pot fully CW and speed pot set at “0”, control output will be about 50 VDC. Increasing the minimum speed will also increase the maximum speed, so the MAX pot may need to be adjusted.

MAXIMUM SPEED LIMIT - Turn the MAX pot counterclockwise to make the motor run slower than full speed when the speed pot is set at “100”. With the MAX pot fully counterclockwise and the speed pot set at “100”, the motor will run at about 60% of its full speed. The factory setting of Model 0792 is for 130V motors. The factory setting of Models 0796 and 0797 is for 90V motors.

TORQUE LIMIT - Turn the TORQ pot counterclockwise to reduce the peak torque capability of the motor. Most Bodine motors will produce about 200% of rated torque with the horsepower switches set per Table 2 and with the TORQ pot turned fully clockwise. The motor must be properly sized for the application so that it only produces this peak torque intermittently. Turning the TORQ pot fully counterclockwise will produce 0% torque (stall).

ACCELERATION & DECELERATION TIME – The ACC pot simultaneously adjusts both the acceleration and deceleration times within the range selected by DIP switches 7 and 8 per Table 3. Turn CW to increase times.

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 load at full speed when the horsepower switches are set per Table 2. The REG pot normally requires no adjustment by the user unless better speed regulation is needed or no speed regulation is needed. Turn the REG pot clockwise to increase IR compensation. Turning it too much will make the system unstable. If that happens, turn the REG pot counterclockwise to reduce IR compensation. When using the WPM control in a closed-loop system with another control device, turn the REG pot fully counterclockwise to eliminate IR compensation.

TROUBLESHOOTING



WARNING

Disconnect the control from the AC power source and wait seven minutes before working on the control, motor, or driven equipment.

If the motor does not operate, first carefully remove the enclosure cover and observe the condition of the two diagnostic LEDs.

1. If the green "PWR" LED is not illuminated, the control is not getting power from the AC line. Turn the ON/OFF switch off and double check all connections and fuses.
2. If both the green "PWR" LED and the red "LMT" LED are illuminated, make sure the TORQ pot is not turned fully counterclockwise. If the motor is overloaded, reduce the load or use a larger motor.
3. If a fuse is blown and the motor is overloaded, reduce the load and replace the fuse with a new one of the same type and rating.
4. If a fuse is blown and the motor is not locked (stalled) or overloaded, do not replace the fuse. The control may be damaged.
5. 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 used under Normal Operating Conditions and when applied in accordance with nameplate specifications.

When Bodine motors and gearmotors have been purchased with and used only with appropriately applied Bodine controls, this warranty shall be in effect for a period of twenty-four months from date of purchase or thirty months from date of manufacture, whichever comes first. Bodine motors and gearmotors used with non-Bodine motors and gearmotors are covered by the standard twelve-month warranty period.

The Bodine Electric Company will repair or replace at its option, any of its products which has been found to be defective and is within the warranty period, provided that the product is shipped freight prepaid, with previous authorization, to Bodine's plant in Chicago, Illinois 60618 U.S.A., or to the nearest Bodine Authorized Service Center. At its option, all return shipments are F.O.B. Bodine's plant or 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 or purpose.

Bodine's liability under this warranty shall be solely limited to repair or replacement of the Bodine product within the warranty period and Bodine shall not be liable, under any circumstances, for any consequential, incidental or indirect damages or expenses associated with the warranted products.

Commutator and/or brush wear and its associated effects are normal occurrences and are not covered by this warranty unless otherwise agreed to by Bodine in writing.

Proof of purchase of motor or gearmotor and matching control as a system must be provided with any claim.



2500 W. Bradley Place
Chicago, IL 60618
Phone: (773) 478-3515, Fax: (773) 478-3232
www.bodine-electric.com



P/N 074 01042 E (FZ)