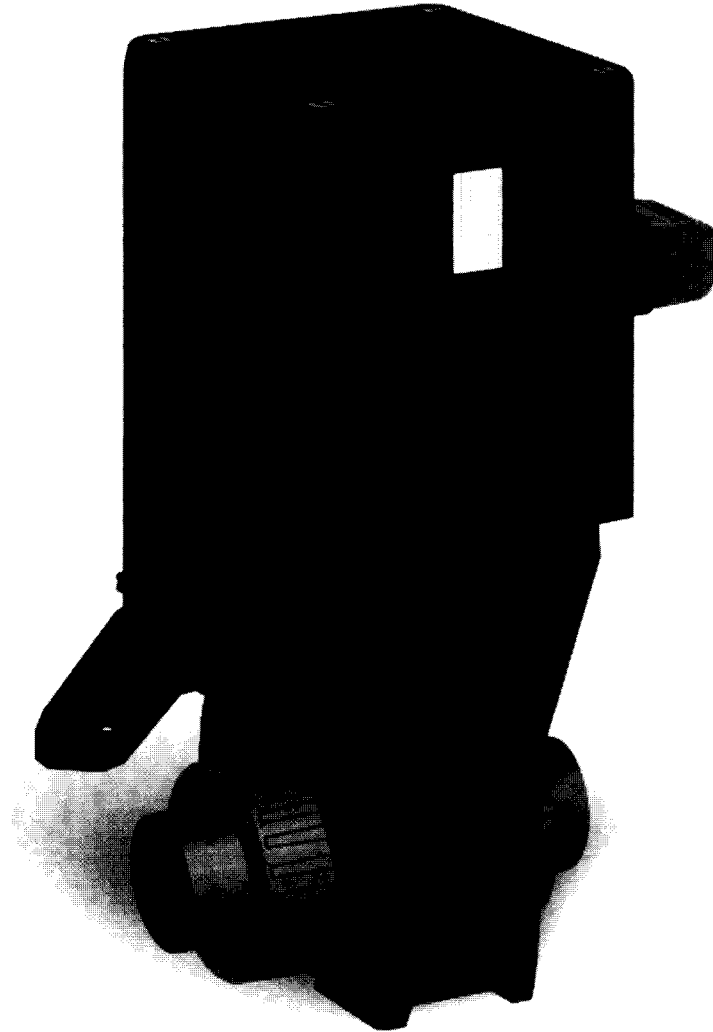


# **SV-800 Series**

## **Ball Valve with Electrical Actuator**



**Operator's Manual**



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Remove the Packing List and verify that you have received all equipment, including the following (quantities in parentheses):

SV-800 Series Ball Valve with Electrical Actuator (1)

Operator's Manual (1)

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When you receive the shipment, inspect the container and equipment for signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

**NOTE**

The carrier will not honor damage claims unless all shipping material is saved for inspection. After examining and removing contents, save packing material and carton in the event reshipment is necessary.

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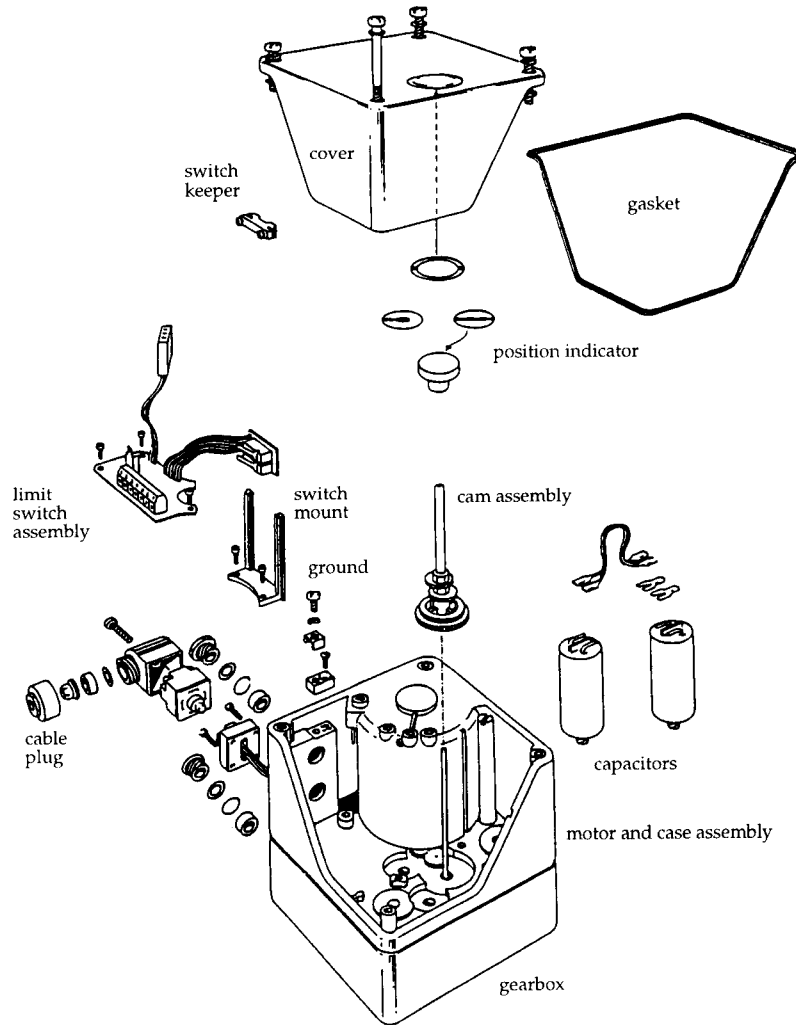
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**Introduction**

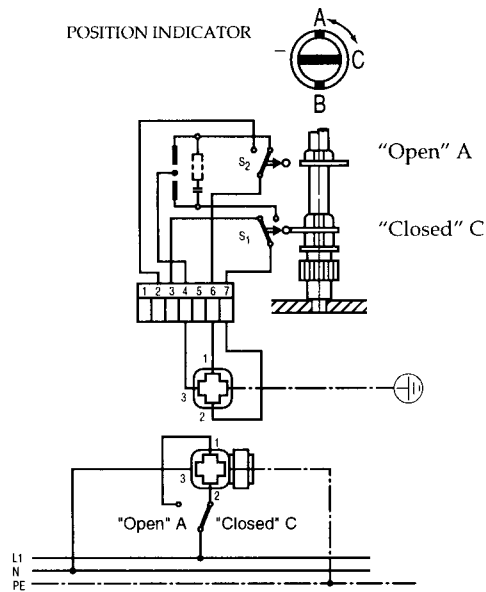
The OMEGA® SV-800 Series Electric Actuator is a fully reversible, heavy duty unit with capacitor start motor. Standard control time is 7 seconds for 90 degree rotation. To calculate actuation time, add 7 seconds for each 90 degree segment. This unit is designed for use with the OMEGA true union ball valves and the multiport series ball valves. The instructions are intended to be a guide for installing the valve and wiring to the various actuators and accessory combinations as well as the installation of the accessory kits into the standard actuator. Exploded drawings have been provided so that the installer can clearly see component part arrangement which will be especially helpful when adding accessory kits to the standard unit. See Figure 1 for component layout in the standard actuator unit.



**Figure 1**

**Available Models**

Part Number	Port Connection (NPT)	C <sub>v</sub>	Pressure Range (PSI)	Orifice Diameter (in)	Weight (kg/lb)
SV-801	1/2 "	12.9	0-140	9/16	4.6/10.1
SV-802	3/4 "	24.0	0-140	3/4	4.7/10.4
SV-803	1 "	49.0	0-140	1	4.9/10.9
SV-804	1-1/4 "	70.0	0-140	1-1/4	5.1/11.2
SV-805	1-1/2 "	112.0	0-140	1-1/2	5.5/12.1



### Function of Limit Switches – 2-Position Actuator

With control switch set to “open”, phase L1 is applied to motor via S2. Motor rotates in direction “open” until it is isolated from L1 by the cam operating limit switch S2. During rotation, S1 has switched over so that the actuator can then be returned to the “closed” position via S1.

**Figure 1A**

### Installation

The following installation instructions are intended only as a guide. Good industry practices must be followed at all times along with normal safety standards. Installation is the responsibility of the purchaser and OMEGA Engineering, Inc. does not assume nor accept any responsibility or warranty associated with installation of these products.

- A. Attach valve to support structure. This may be a support which attaches to the wall mounting bracket or can be attached to the bottom of the PVC valve mounting bracket. In either case, care must be exercised so that firm support for the weight of the valve is provided **without any binding or stress being transmitted to the valve/actuator assembly.**
- B. Connect the media piping to the ball valve utilizing a connection corresponding to the end connection method supplied with the valve. End Connections on the valve are normally solvent cement (socket), FNPT threads, flanged or male spigot. **Note: Do not over-tighten valve union nuts.**
- C. Utilize the manual override handle to open and close the valve several times to insure smooth operation which is free from any binding. **Note: If the manual override handle feels “stiff” or is difficult to move, the union nuts are probably too tight. Otherwise, some other type of binding or stress is being imposed on the valve/actuator unit and it **must** be relieved before proper operation can be achieved. Smooth operation is mandatory.**
- D. Attach electrical wiring to actuator utilizing the appropriate wiring diagram. Each actuator has a wiring diagram attached to the inside of the cover and each accessory kit will have a wiring diagram included. In addition, the most common wiring diagrams are included in this manual.
- E. Apply pressure to the ball valve and inspect for leakage at points of line connection to the valve.

The valve is now ready for automatic operation.

### Cable Plug Instructions

The cable plug is the most common electrical connection for the SV-800 Series actuator.

Other types of connection such as 1/2" conduit will not be discussed in the manual because of the common familiarity throughout the industry, however, the cable plug may be converted to 1/2" conduit by removing the nut and replacing it with a conduit adaptor.



The cable plug consists of the following 8 parts:

- Housing (overall covering)
- Terminal insert (where wires are attached)
- Assembly Screw (holds the terminal insert inside housing)
- Washer
- Grommet (provides weather tight seal around the cable)
- Gripper
- Nut (holds washer, grommet & gripper inside housing)
- Cable Plug Screw (holds cable plug assembly to actuator)

### A. Disassembly (see Figure 2)

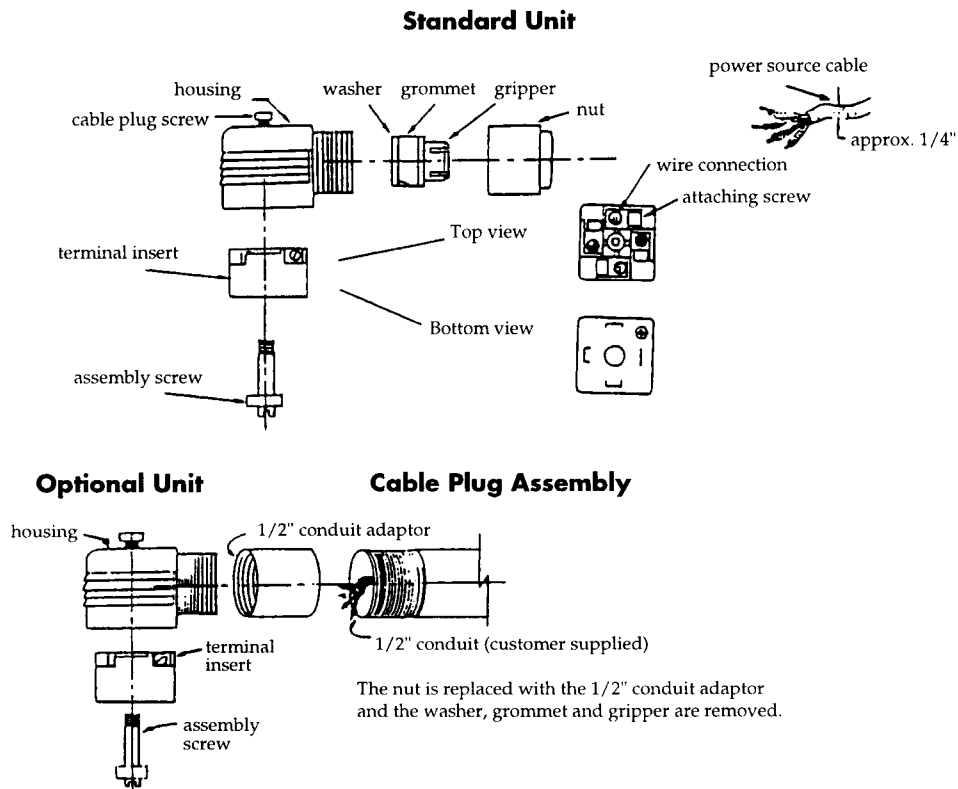
To remove the cable plug assembly from the actuator, remove the cable plug screw and simply unplug the assembly with a firm pull. Turn the assembly upside down and remove the assembly screw. The terminal insert can now be removed from the housing. This will expose the wiring terminals where the wires from the power source will be attached. Next, remove the nut which will allow the washer, grommet and gripper pieces to be removed from the housing.

The cable plug is now completely disassembled.

### B. Assembly (see Figure 2)

Slide nut, gripper, grommet and washer on connecting cable. Feed cable through the threaded end of the housing and attach appropriate wires to terminals on the terminal insert. Gently pull the excess wire back through the threaded end of the housing until the terminal insert is fully back inside the housing. Note: The terminal insert may be rotated to any one of four positions (90 degrees apart) inside housing for the most convenient positioning of the connecting cable.

Install the assembly screw which holds the terminal insert in the housing. Gently slide the washer, grommet and gripper down the connecting cable until it is inside the housing at the threaded end. Screw the nut and plug to the assembly back on the actuator. Install the cable plug screw.



**Figure 2**

## Cam Adjustment

The cams in the SV-800 Series electric actuator are held in place by friction. Since there is very little force applied to the cam by the limit switch trip levers, we have found no instances where cam adjustment is altered by normal operating friction. Test in excess of 500,000 cycles have been performed to verify that precise cam adjustment is maintained.

Refer to Figure 3 for typical cam configuration and arrangement in the standard actuator.

The only tool needed to adjust the cams is an 11mm open end wrench (metric). If an 11mm wrench is not available, a 7/16" U.S. open end wrench will also work. In the event neither of these wrenches is available, a pair of needle nose pliers may be used but it is not normally suggested because the pliers may cause the rounding of the corners of the cams unless they are used very carefully.

### 1. Standard configuration, 90° rotation

Actuators that are shipped from the factory mounted on valves are adjusted for precise 90° rotation open and closed valve positions. Actuators which are installed after valves have been placed in a line may require minor cam adjustment for precise 90° rotation. The top switch controls the open position and the bottom switch controls the closed position.

#### A. Minor Adjustment:

Cycle the actuator through a few open/close movements and observe the direction of rotation of each of the cams. Also observe the position (if possible) of the ball inside the valve at the end of each cycle to determine if more or less rotation is required. It may be desirable to remove one end connection to observe the ball. If it is not possible to remove one of the end connectors (union nuts) due to system considerations you may observe the position of the manual override handle to determine if the valve has undershoot or overshoot problems.

Once you have determined rotation of the cams and whether more or less rotation is required, it is a simple matter to adjust the cam. Moving the lobe toward the limit switch in the same direction as rotation will cause the switch to be tripped sooner while moving it away from the switch opposite the direction of rotation will cause the motor to run longer. This allows you to adjust travel at either end of the stroke to obtain precise positioning at the end of a cycle.

**Caution:** Small incremental cam adjustments are strongly advised to avoid over travel with the manual override handle which could damage other components in the bracket assembly.

#### B. Major Adjustment: (Read Minor Adjustment First!)

If you find that the cam positions have been disturbed to the point that you cannot determine rotation of the unit or it will not cycle at all, major adjustment will be necessary. Note: As you look down at the actuator from the top, rotation will be clockwise to close and counter-clockwise to open. The top cam/switch controls counter-clockwise rotation, the bottom cam/switch controls clockwise rotation.

Make sure that power to the actuator is off. Rotate each of the cams until they are positioned so that both switches are tripped (levers depressed) which cuts off all power flow to the actuator motor. Note the position of the manual override handle to determine which way you want the actuator to turn – then follow one of the 2 sets of directions below:

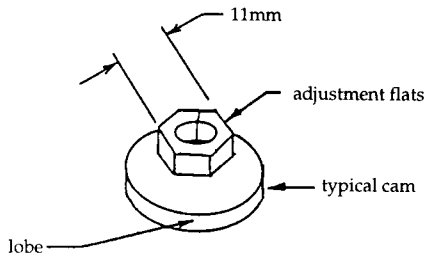
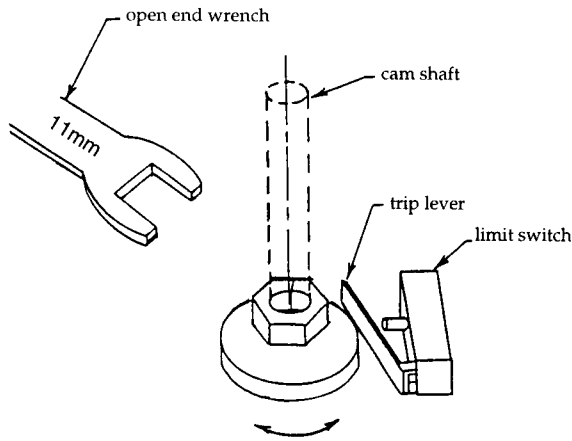
1-Valve sitting open (handle in line with pipe) – want to turn towards the closed position (clockwise rotation).

- Turn bottom cam counter-clockwise until the lobe is approximately 70° to 80° from tripping the bottom limit switch lever. You can hear an audible click when the switch is tripped off or on so use this clicking sound as a starting point for turning the bottom cam 70° to 80° counter-clockwise.
- Apply power to terminal 2 of the cable plug and valve will rotate towards the closed position. It won't travel a full 90° to the full closed position but will travel towards closed.
- Now apply power to terminal 1 of the cable plug and valve will rotate counter-clockwise toward the open position. The valve should now be adjusted about right for the open cycle and final adjustments can be made (in small increments) to the closed cycle as you cycle the unit back and forth.

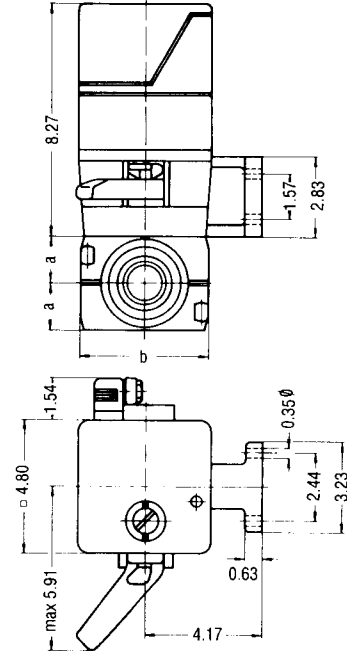
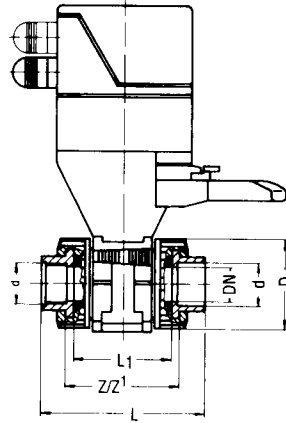
2-Valve sitting closed (handle at right angle to pipe) – want to turn towards the open position (counter-clockwise rotation).

- Turn top cam clockwise approximately 70° to 80° from tripping to top limit switch lever. You can hear an audible click when the switch is tripped off or on so use this clicking sound as a starting point for turning the bottom cam 70° to 80° clockwise.
- Apply power to terminal 1 of the cable plug and valve will turn towards the open position (counter-clockwise).
- Now apply power to terminal 2 of the cable plug and the valve will turn towards the closed position. The adjustment should be about correct for the closed cycle and final minor adjustments can be made to both cycles in accordance with the "minor adjustment" instructions above.





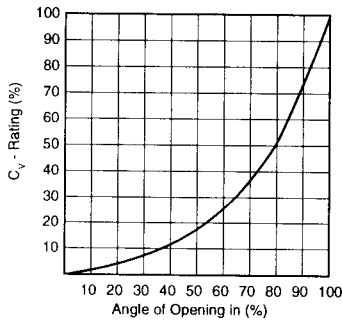
**Figure 3**



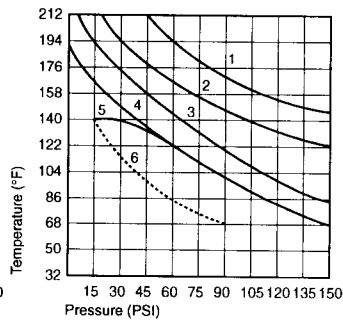
Orifice Size	a	b	d	L	L1	Z	Z1	D	Weight (lbs)
3/8	0.94	4.65	NPT 3/8	3.90	2.48	2.80	2.80	1.81	10.1
9/16	0.94	4.65	NPT 1/2	4.02	2.48	2.76	2.87	1.81	10.1
3/4	1.10	4.65	NPT 3/4	4.72	2.95	3.23	3.35	2.20	10.4
1	1.33	4.65	NPT 1	5.16	3.11	3.43	3.58	2.64	10.9
1-1/4	1.67	4.65	NPT 1-1/4	5.91	3.50	3.86	4.09	3.23	11.2
1-1/2	1.97	4.65	NPT 1-1/2	6.42	3.74	3.98	4.61	3.86	12.1
2	2.40	5.11	NPT 2	7.76	4.53	4.76	5.63	4.72	13.9

Note: All dimensions in inches, unless otherwise noted.

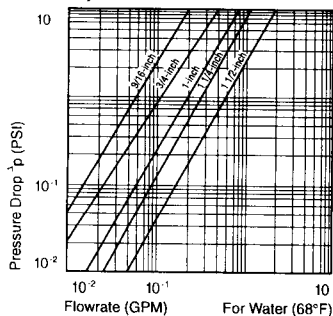
Flowrate Characteristic



Pressure-temperature Characteristics



Pressure Drop Characteristic  
2-way ball valve



Curve No.	Material	Service Life (Years)
1	PP	2
2	PP	5
3	PP	10
4	PP	20
5	PVC	50
6	PVC	50

Non-hazardous (5) and hazardous (6) through-flow media as defined in DIN 2403.

## Specifications

**Body Material:**

Polyvinylchloride PVC (PV), polypropylene (PP) optional As required

**Installation:**

**Actuator Material:**

Epoxy resin body with epoxy resin encapsulated motor; good heat dissipation

**Actuation Rate:**

7 sec/90°

**Voltage:**

110 V/60 Hz

**Power Consumption:**

45 W

**Electrical Connection:**

Cable plug as per DIN 43 650 (Code F) or PG fitting as per DIN 43 320 (Code A)

**Classification:**

IP65 as per DIN 40 050

**Service Life:**

200,000 cycles at

**Standard Fittings:**

maintenance-free operation  
Motor brake for precise end position cutoff (overrun less than 1°) and reactionless drive; emergency manual operation (37 revolutions/90°); motor protection by means of thermal cutout



# Troubleshooting Guide

## Troubleshooting

The actuators leave the factory in a fully checked and tested condition. Some problems which arise can be attributed to causes other than the actuator itself and may concern the application details or result from a conversion. The following troubleshooting procedure should assist you in determining potential sources of problems.

General Problem	Check	Problem	Solution
Motor does not operate	Has fuse blown? Yes	See below	See below
No humming	Is socket from PCB connected to motor terminal pins? No	No voltage at motor	Connect socket
	Is there power at PCB? No	Power supply faulty	Connect power supply and / or rectify fault
	Is motor overheated? Yes	Thermal switch has cut out, since motor has been overloaded	Wait until motor cools and avoid further overloading (see fuse section below)
	Are cams adjusted as prescribed on page 4? No	Appropriate microswitch is incorrectly set and is switching motor off	Adjust cams as prescribe <sup>4</sup>
	Are several actuators switched in parallel? Yes	Microswitches burnt out. Capacitor damaged erratic operation	Control actuators separately or via relays. Replace capacitor and limit switches
Motor hums	Is there voltage at capacitor? Yes (ac versions only)	Capacitor possibly faulty	Replace capacitor
	Can actuator not be operated manually or is rotation very stiff? Yes	Gearbox or motor jammed	Return actuator to factory for checking
Fuse blows	Is actuator correctly connected? No	Short circuit due to wiring error	Make sure wiring is correct. If necessary replace any defective components
	Motor winding resistance outside tolerance range <sup>1)</sup>	Defective winding	Return actuator to factory
Motor continues running	Are cams operating limit switches? No	Limit switch lever bent	Replace PCB and limit switch assembly
	Is limit switch audibly operating? No	Limit switch mechanically defective.	Replace PCB and limit switch assembly
		Limit switch operating too late	Adjust cams as prescribed
Rotation direction incorrect (3-position actuator)	Are connections as per circuit diagram? No	Connections reversed	Reconnect as per circuit diagram
Potentiometer does not (completely) follow movement	Is potentiometer clutch slipping? Yes	Defective clutch	Replace clutch, if still unsatisfactory, also replace potentiometer
	Does potentiometer spindle rotate freely? No	Potentiometer defective	Replace potentiometer
External control via potentiometer does not function	Does potentiometer voltage follow movement? No See potentiometer section directly above		
	Does potentiometer follow movement? Yes	External control circuitry defective	Rectify circuitry

1) 220 - 240V 184Ω - 202Ω  
110V 35.2Ω - 38.8Ω  
Ω-Measurement at motor terminal pins from central contact.

## WARRANTY/DISCLAIMER

OMEGA warrants this unit to be free of defects in materials and workmanship and to give satisfactory service for a period of **13 months** from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product. If the unit should malfunction, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. However, this WARRANTY is VOID, if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear or which are damaged by misuse are not warranted. These include contact points, fuses, and triacs.

**OMEGA is pleased to offer suggestions on the use of its various products. Nevertheless, OMEGA only warrants that the parts manufactured by it will be as specified and free of defects.**

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Direct all warranty and repair requests/inquiries to the OMEGA ENGINEERING Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. P.O. number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS OR **CALIBRATION**, consult OMEGA for current repair/calibration charges. Have the following information available BEFORE contacting OMEGA:

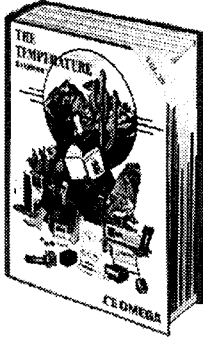
1. P.O. number to cover the COST of the repair/calibration,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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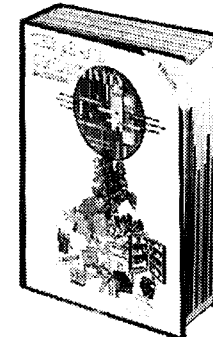


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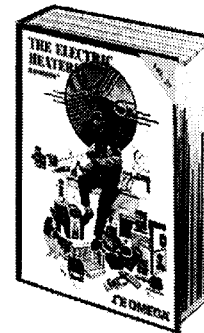


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