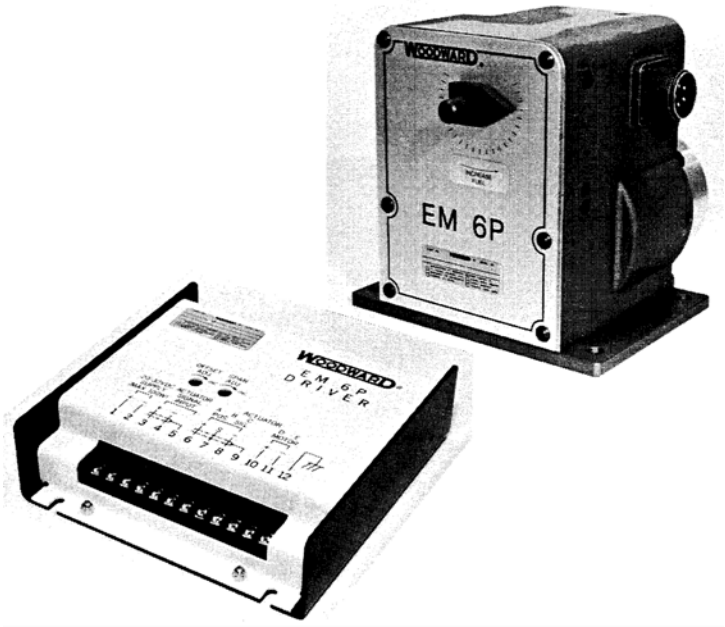
WOODWARD

Product Manual 04110
(Revision NEW)
Original Instructions



EM-6P Actuator

All Electric Actuator with Electronic Driver Box

Installation and Operation Manual

IMPORTANT

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DEFINITIONS

- **DANGER**—Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING**—Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION**—Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **NOTICE**—Indicates a hazard that could result in property damage only (including damage to the control).
- **IMPORTANT**—Designates an operating tip or maintenance suggestion.

WARNING

The engine, turbine, or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage.

The overspeed shutdown device must be totally independent of the prime mover control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment. Practice all plant and safety instructions and precautions. Failure to follow instructions can cause personal injury and/or property damage.

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, be sure to check the *publications page* on the Woodward website:

www.woodward.com/publications

The current revision and distribution restriction of all publications are shown in manual *26311*.

The latest version of most publications is available on the *publications page*. If your publication is not there, please contact your customer service representative to get the latest copy.

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

NOTICE

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

NOTICE

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual *82715*, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Contents

Illustrations and Tables

Electrostatic Discharge Awareness

All electronic equipment is static-sensitive, some components more than others. To protect these components from static damage, you must take special precautions to minimize or eliminate electrostatic discharges.

Follow these precautions when working with or near the control.

1. Before doing maintenance on the electronic control, discharge the static electricity on your body to ground by touching and holding a grounded metal object (pipes, cabinets, equipment, etc.).

2. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.

3. Keep plastic, vinyl, and Styrofoam materials (such as plastic or Styrofoam cups, cup holders, cigarette packages, cellophane wrappers, vinyl books or folders, plastic bottles, and plastic ash trays) away from the control, the modules, and the work area as much as possible.

4. Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:

    - Do not touch any part of the PCB except the edges.

    - Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.

    - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.

NOTICE

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual 82715, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Chapter 1.
General Information

Description

The EM-6P is an all electric actuator which requires no rotational drive or pressure supply from the controlled engine. In the actuator, segment gears convert the rotational output of the drive motor to the desired position of the serrated output shaft.

An electronic actuator driver box, separate from the actuator, converts the 20 to 160 mA control signal from a 2301A or similar electronic control into a proportional position of the actuator output shaft. The actuator driver box provides current to the drive motor, which rotates the output shaft until the position feedback indicates the position is equal to the proportional signal from the electronic control.

EM-6P Actuator Output Ratings

Time Constant at Rated Load	0.080 seconds
Slew Rate, full stroke at rated load	0.140 seconds
Minimum Position Control Signal	20 mA dc
Maximum Position Control Signal	160 mA dc
Maximum Output Torque, both directions	15.7 N·m (11.6 lb-ft)
Maximum Continuous Output Torque	7.9 N·m (5.8 lb-ft)

Installation Requirements

The actuator can be mounted in any position. It requires no drive power except a 24 V, 100 W power supply. The actuator may be installed to make most efficient use of the control features of the prime mover.

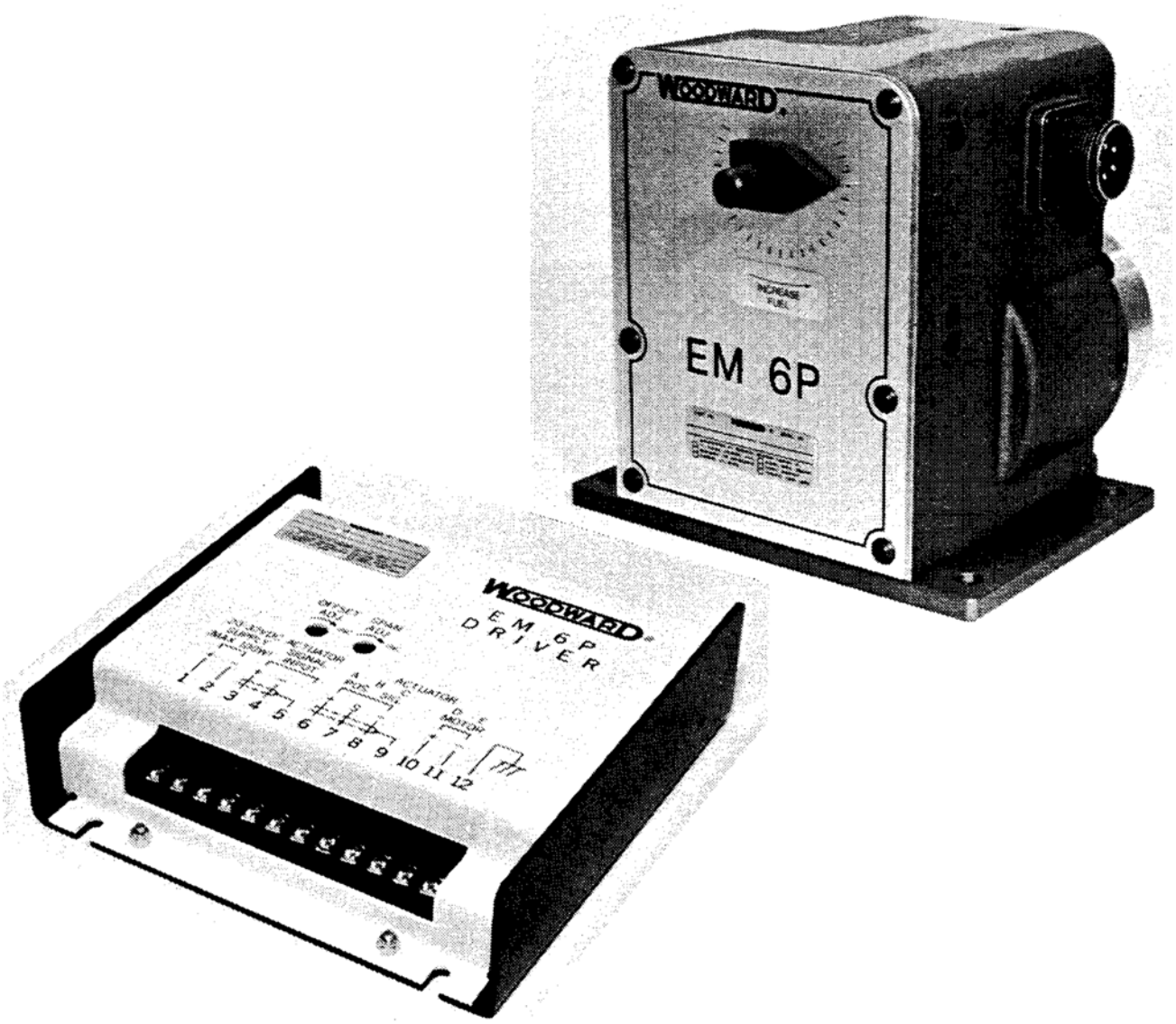


Figure 1-1. EM-6P Actuator and Driver Box

Chapter 2.
Installation

Introduction

⚠WARNING

Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

Use care while handling and installing the actuator. Be particularly careful to avoid striking the output shaft. Abuse can damage critical surfaces and factory adjustments.

Receiving

The EM actuator is calibrated at the factory. It is shipped in a cardboard container filled with urethane foam. Additional cleaning or calibration is not necessary before installation or operation.

Storage

The EM actuator may be stored as received from the factory. The unit should be protected from moisture or corrosive atmospheres while in storage.

IMPORTANT

The actuator and driver box are calibrated and matched during factory calibration. They function as a combined unit and must be installed in pairs as provided by the factory.

Actuator Location

The actuator is designed to withstand vibration and temperatures associated with most engine installations. However, for best actuator life install on a surface with minimum vibration and adequate air circulation to minimize extreme temperature. Avoid installation in locations which will subject the actuator to excessive heat, dirt, or vibration.

Driver Box Location

Consider the following requirements when selecting the location for the driver box:

- Adequate ventilation to prevent temperature damage to the electronics.
- Space for servicing.
- Protection from direct exposure to water or to a condensation-prone environment.
- Avoidance of vibration.
- Protection from high-voltage or high-current devices, or devices which produce electro-magnetic interference.

- A location that will provide an operating temperature range of –20 to +60 °C (–4 to +140 °F).

The Driver Box is usually installed in the control cabinet for convenient access to other plant controls and the various inputs which will be needed. Do not install the Driver Box on the engine. See Figure 5-1 for Driver Box installation dimensions.

Installation of Actuator

See the outline drawing, Figure 2-3, for overall dimensions, installation hole locations, output shaft dimensions, and electrical connections. Install the actuator directly to a flat surface with four 10 mm bolts. Horizontal mounting is not recommended.

Linkage

Linkage between the actuator output and the engine must not collapse at maximum stress.

It is important that the linkage between the actuator output and the fuel system be of correct relationship for proper operation. The relationship between the rotation of the actuator and the power of the engine should be as linear as possible. Adjust the relative length of the output lever attached to the actuator to achieve the proportional relationship. Gas engines and certain types of diesel engines have nonlinear fuel systems. In these cases it may be necessary to install nonlinear linkage in order to maintain the proportional relationship between engine output and actuator rotation.

Use as much of the 40 degrees of actuator travel as possible between minimum and maximum fuel. Normally, no less that 30 degrees of actuator travel should be used. The prime mover should provide the minimum and maximum fuel stops about 5 degrees before the actuator stops.

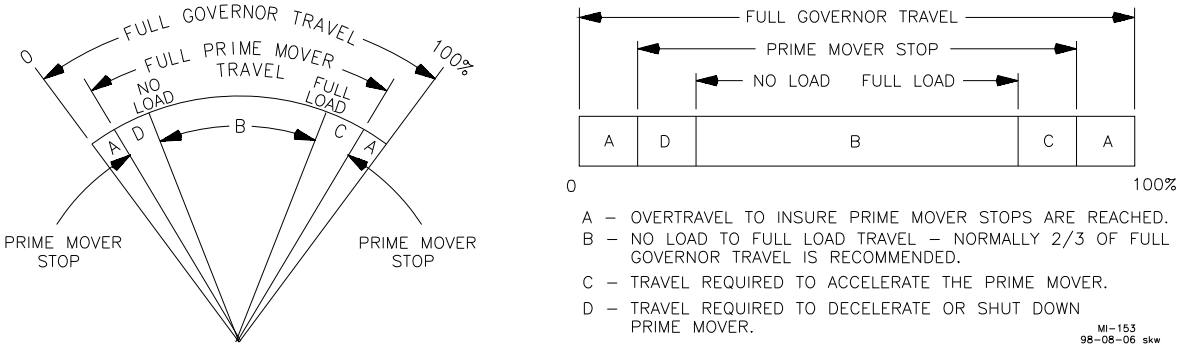


Figure 2-1. Distribution of Actuator Travel

With a 20 mA signal for minimum fuel from the electronic control, the actuator will take a position of about 2.5 degrees. With a 160 mA maximum fuel signal from the electronic control, the actuator will take a position of about 38 degrees toward maximum fuel. The actuator will go to 0 degrees on complete absence of a control signal.

Electrical Connections

Make all electrical connections that are required, using applicable Woodward control manuals. See the plant wiring diagram, Figure 2-4, for connection of the Driver box to the actuator, the control and the power supply.

IMPORTANT

The actuator will draw 3 A when calling for minimum fuel at shutdown. It is important to provide a switch between the battery and actuator to protect the battery and the actuator from prolonged minimum fuel positioning after engine shutdown.

It is not necessary to remove the covers on either side of the actuator during installation or during normal operation or maintenance of the actuator. Should it be necessary to service the inside of the actuator the unit must be removed from the installation. All electrical connections are made to the five-pin receptacle on the side of the actuator.

Use 3 mm² (12 AWG) wire in the harness to the five-pin receptacle. The wiring from the battery to the driver box, from the driver box to the actuator and from the speed control to the driver box should be as short as possible. Do not exceed 50 m (160 ft) from the battery to the driver box. The electronic control wiring must not exceed the length specified for the control. Keep all wiring distances as short as possible. The fuse and switch or circuit breaker must be in the non-grounded battery lead. Use a fuse as specified. The connections to the driver box must be directly from the battery terminal, not through distribution points (see Figure 2-2).

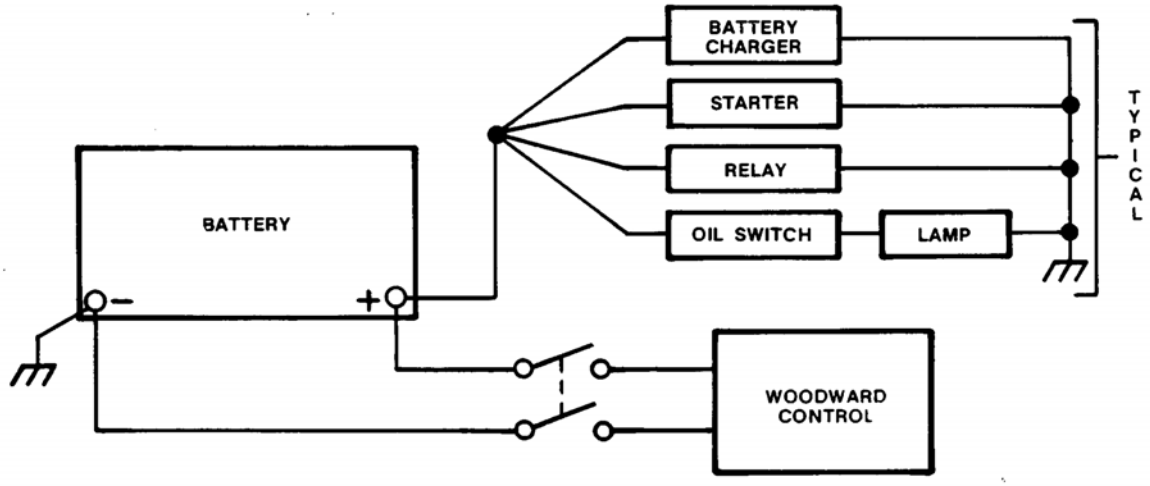


Figure 2-2. Correct Wiring to the Battery

The wires from the driver box to the actuator must be shielded. The wires carrying the feedback signal from the actuator to the driver box must also be shielded. Terminate the shields between the actuator and the driver box at the driver box. Terminate shields between the electronic control and the driver box at the electronic control end. Use twisted pair wires with braided or foil shields.

Make all electrical connections for the electronic control according to the plant wiring diagram for the control.

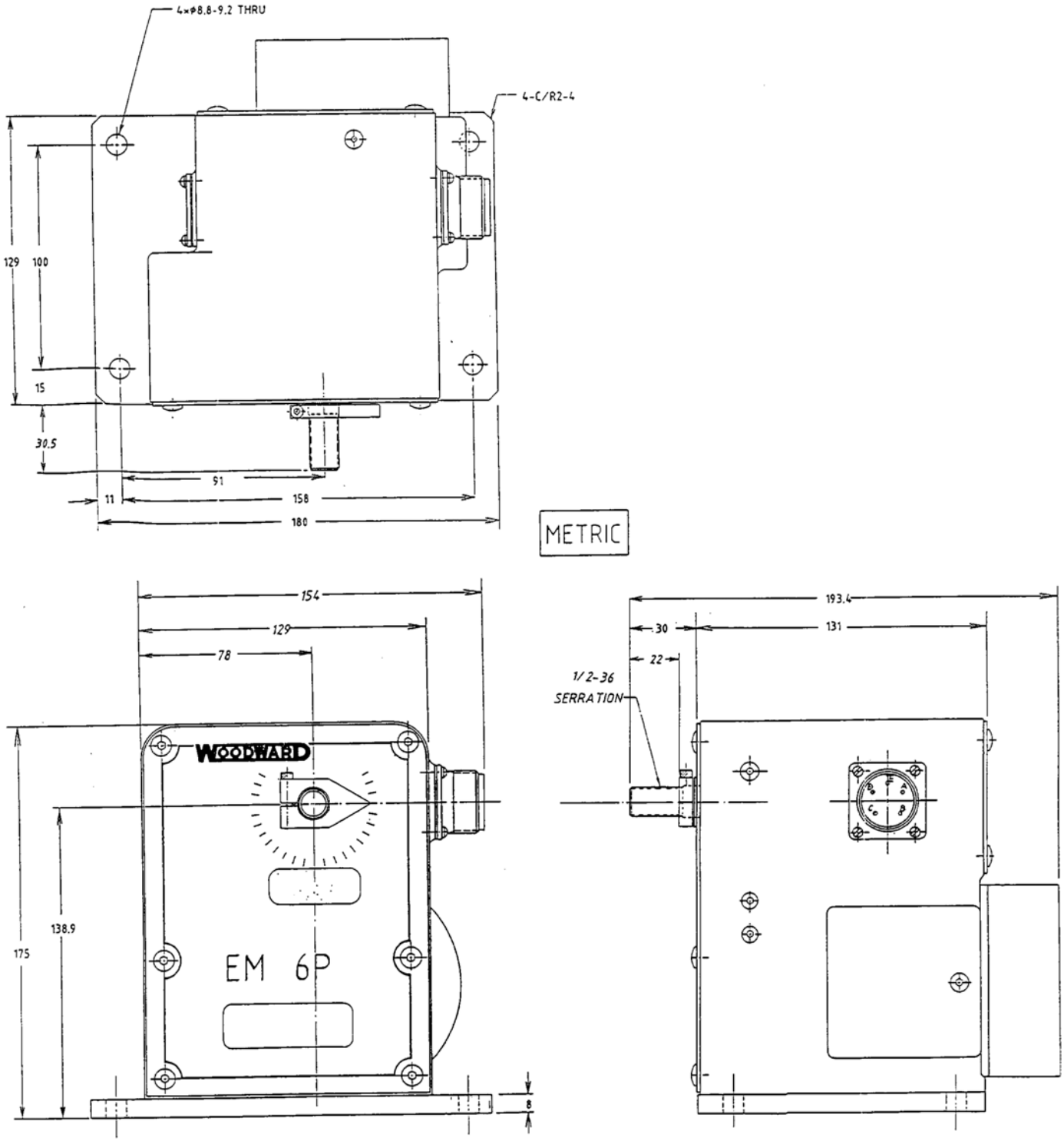
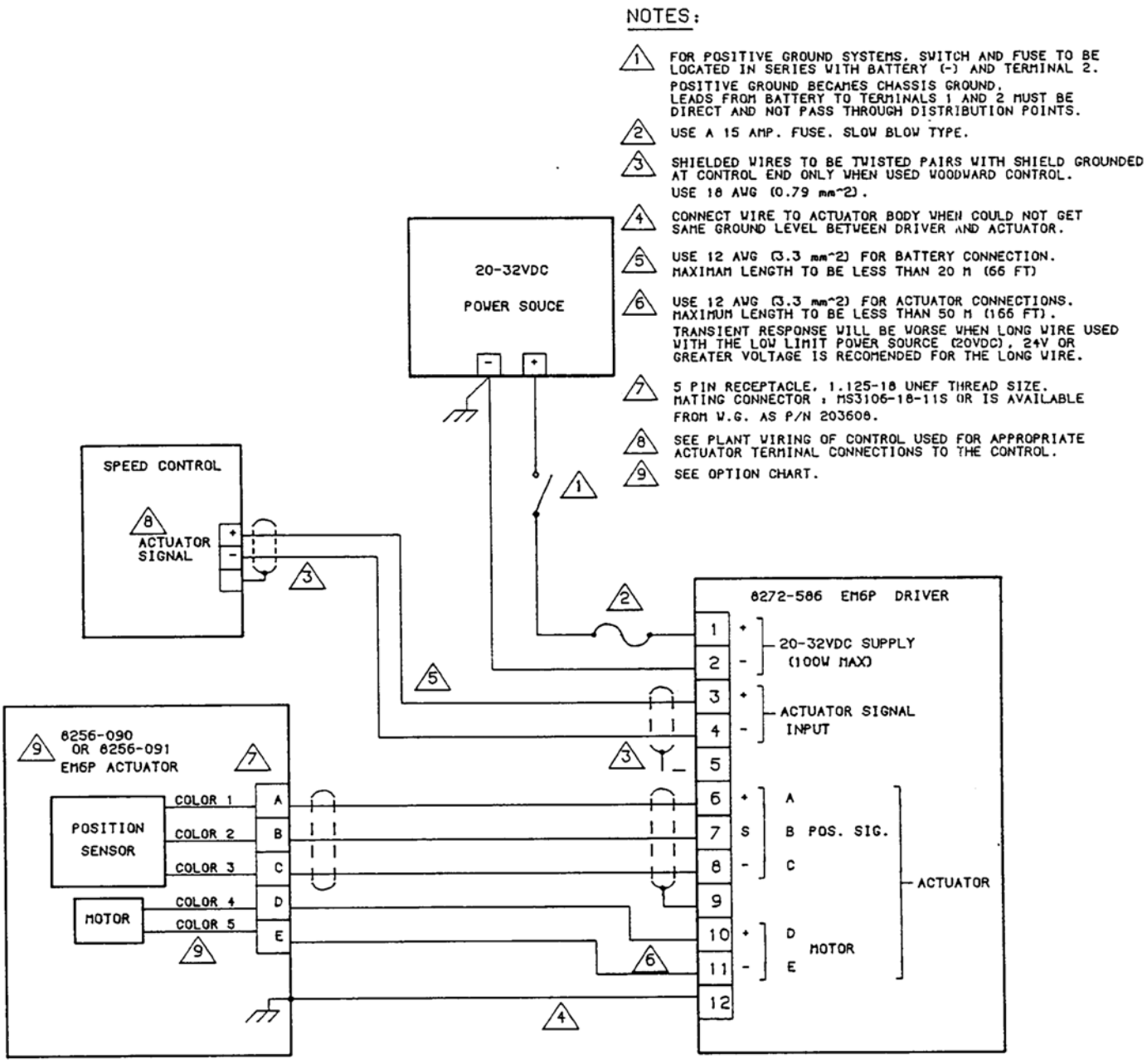


Figure 2-3. Outline Drawing of EM-6P Actuator



Fuel Increase Direction	Actuator Assembly	Driver Assembly	System Assembly	Color 1	Color 2	Color 3	Color 4	Color 5
CCW	8256-091	8272-586	8256-094	Black	Red	Blue	Black	Red
CW	8256-090	8272-586	8256-093	Blue	Red	Black	Red	Black

Figure 2-4. Plant Wiring Diagram

Chapter 3.
Operation and Adjustment

Initial Operation

Before initial operation of the actuator, make sure that all previous installation and hookup steps are successfully accomplished.

⚠WARNING

Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

Adjustments

All operating adjustments are made to the EM-6 actuator and matching driver box during factory calibration. Additional adjustment should not be required. There are no electrical adjustments available inside the actuator.

IMPORTANT

Calibration of the combined actuator and driver box is made at the factory. If the serial number on the actuator name plate is different than the serial number on the driver box name plate the units are not matched and may not provide satisfactory operation.

Shutdown

When the engine is shut down, always disconnect power to the driver box and actuator. Three amps is drawn when the actuator is against the minimum stop and the battery will be rapidly discharged. The actuator will not be damaged should the power not be disconnected.

Chapter 4.
Principles of Operation

The EM-6 system consists of four basic parts:

- Reversible DC motor
- Reduction gear transmission
- Actuator output position sensor
- Electronic driver

The EM actuator is driven by a precision dc servo motor. The output of this motor is transferred to the terminal shaft through a reduction gear transmission.

The transmission increases the torque of the motor by a 20:1 ratio. Terminal shaft rotation is limited to 40 degrees by an internal stop.

Terminal-shaft position is determined by a position sensor. This provides a specific feedback voltage for each terminal-shaft position.

The driver receives 20 to 160 mA dc signals from the electronic control. The current signal levels correspond to specific terminal-shaft position. The driver compares the input signal to the signal from the position feedback sensor. The driver then supplies current to the motor to adjust the terminal-shaft position at a speed proportional to the magnitude of the error signal. The current is decreased as the actuator approaches the desired position.

The driver box, separate from the actuator, converts the 24 Vdc drive power to the power need to respond to the electronic signal from the controller and sets the polarity as needed. A negative signal cause the drive motor to rotate toward minimum fuel and a positive signal causes the motor to rotate toward maximum fuel. The drive signal is reduced to 0 V when the desired position is reached.

The printed-circuit board which provides the electronic drive is sealed in potting material and repairs are not possible.

Span and Offset adjustments are available though the cover of the driver box. Span and Offset are used to match the actuator position to the total control signal. Always adjust the Span for the greatest position, then the Offset for the lowest position. Repeat adjustments until additional adjustment is not necessary.

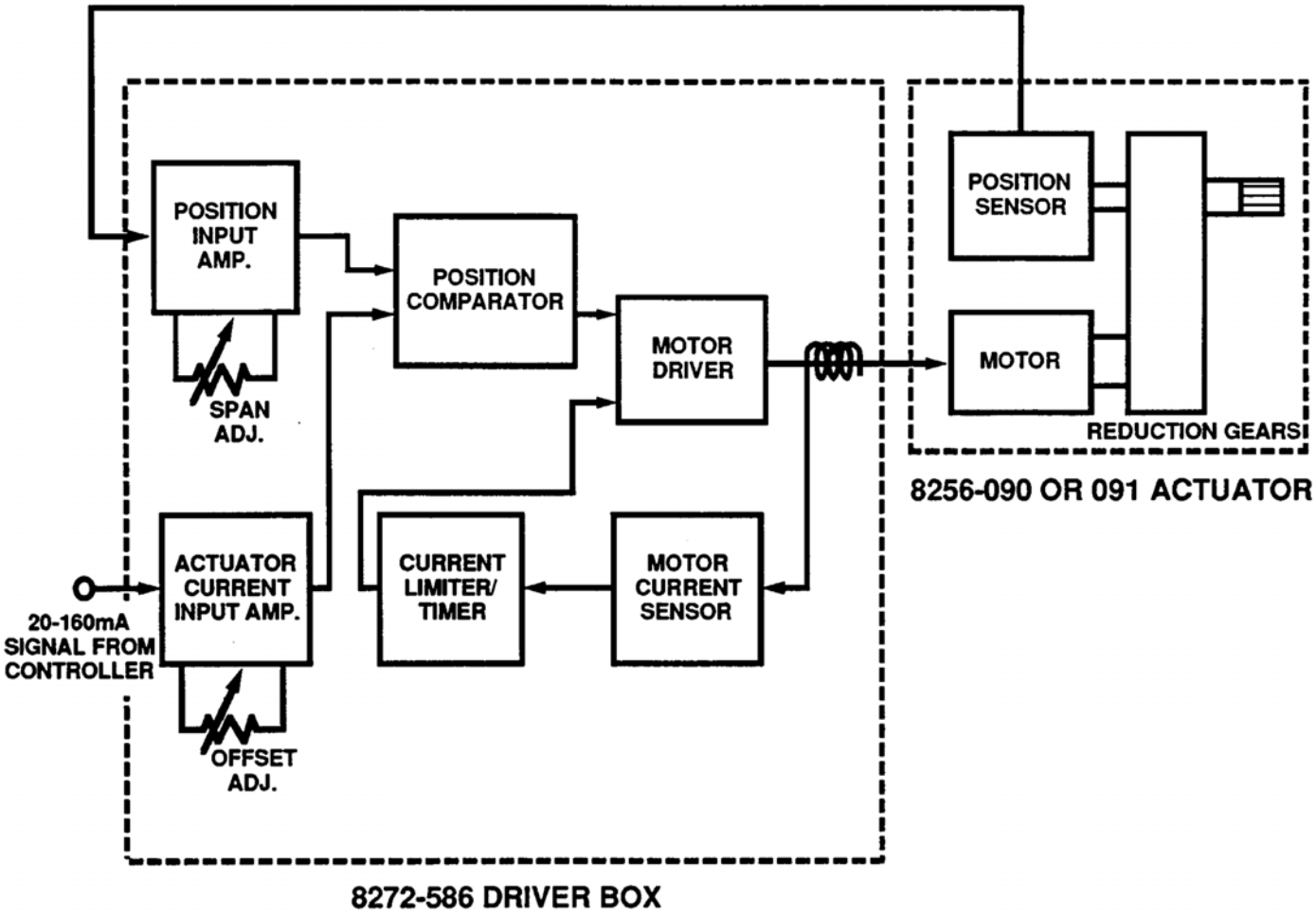


Figure 4-1. EM-6P Actuator System

Chapter 5. Troubleshooting

Troubleshooting

IMPORTANT

The actuator and driver box are calibrated and matched during factory calibration. They function as a combined unit and cannot be individually replaced. If factory service is required, both the actuator and the driver box must be returned.

IMPORTANT

Linkage design determines the relationship between actuator position and engine power. Carefully review the linkage between the actuator and the fuel control before determining that the EM-6 should be adjusted. The actuator rotation should be proportional with the increase in power output of the engine.

Faults in the governing system are usually revealed as speed variations of the prime mover, but it does not necessarily follow that such speed variations indicate governing system faults.

Therefore, when improper speed variations appear, check all components, including the engine or turbine, for proper operation. Refer to applicable Woodward electronic control manuals for assistance in isolating the trouble. The following steps provide a guide for troubleshooting the actuator.

1. Linkage between the actuator and fuel supply should be checked. A common source of trouble is binding or lost motion in the linkage.

2. Improper shielding of wires from the electronic control to the actuator can cause inaccuracy of actuator position. Always check the complete wiring harness when control problems occur.

   Shielding protects the EM-6 system from electro-magnetic interference. Shields must be continuous as shown on the plant wiring diagram and must be grounded as shown. EM-6 wiring should be kept as far away as possible from circuits which are carrying high voltage. In some cases double shielding or conduit of control circuits is necessary.

   Electromagnetic interference can be of an occasional nature, making it hard to troubleshoot and identify. Suspect this form of trouble when a system that has been operating acceptably becomes erratic.

3. If, during the starting sequence the actuator does not respond to electronic control input, check the actuator electrical connection, fuses, and the 24 V supply to the driver box.

Test Procedure

The following procedure is provided if an incorrect relation between the 20–160 mA control signal and the output position of the actuator occurs.

Recommended Test Equipment

- 24 Vdc, 10 A power supply
- 20 to 160 mA adjustable current source (0–7 Vdc, or 0–200 mA)
- Fluke 8060A or equivalent ammeter
- Protractor

Procedure

1. Connect the Driver Box to the actuator according to the calibration setup illustrated in Figure 5-1. If testing at an existing installation the wiring between the driver and the actuator should be carefully inspected for condition, shielding, and correct installation. Remove all linkage from the actuator output shaft.

2. Set the adjustable current source for 0 mA output. Connect the positive (+) lead from the adjustable current source in series through the meter to terminal 3 of the driver box. Connect the negative (–) lead from the adjustable current source to terminal 4 of the driver box. (If present, disconnect the leads from the speed control.)

3. Connect the positive (+) lead from the 24 Vdc power supply to terminal 1 of the driver box. Connect the negative (–) lead from the 24 Vdc power supply to terminal 2 of the driver box.

4. Turn the output shaft until it touches the minimum stop. (Turn CCW for P/N 8256-090, CW for P/N 8256-091.)

5. Attach the protractor to the actuator case so that a pointer attached to the output shaft will indicate degrees of rotation. (P/N 8256-090 will turn CW toward maximum and P/N 8256-091 will turn CCW toward maximum.) Set the pointer for 0 degrees rotation.

NOTICE

Discharge body static before making calibration changes at the driver box. (Contact a grounded surface and maintain this contact while making the calibration change.) Components in the driver box are static sensitive and can be damaged by static charges.

6. Set the adjustable current source for 20 ±0.1 mA. The output should move to 2.5° ±0.2° from the minimum stop. If necessary adjust the OFFSET ADJ. pot on the driver box.

7. Set the actuator current at 160 ±0.1 mA. The output should go to 37.5° ±0.2°. If the output is not at 37.5° adjust the SPAN ADJ potentiometer on the front of the Control Box.

8. Repeat steps 6 and 7 as necessary.

9. Verify that:
   160 ±0.1 mA equals 37.5° ±0.5°
   90 ±0.1 mA equals 20.0° ±0.5°
   20 ±0.1 mA equals 2.5° ±0.5°

10. Turn off the 24 Vdc power supply and the adjustable current source.

IMPORTANT **If the entire rotation of the actuator cannot be used, set the Span and Offset to provide the desired outputs at 20 and 160 mA signals.**

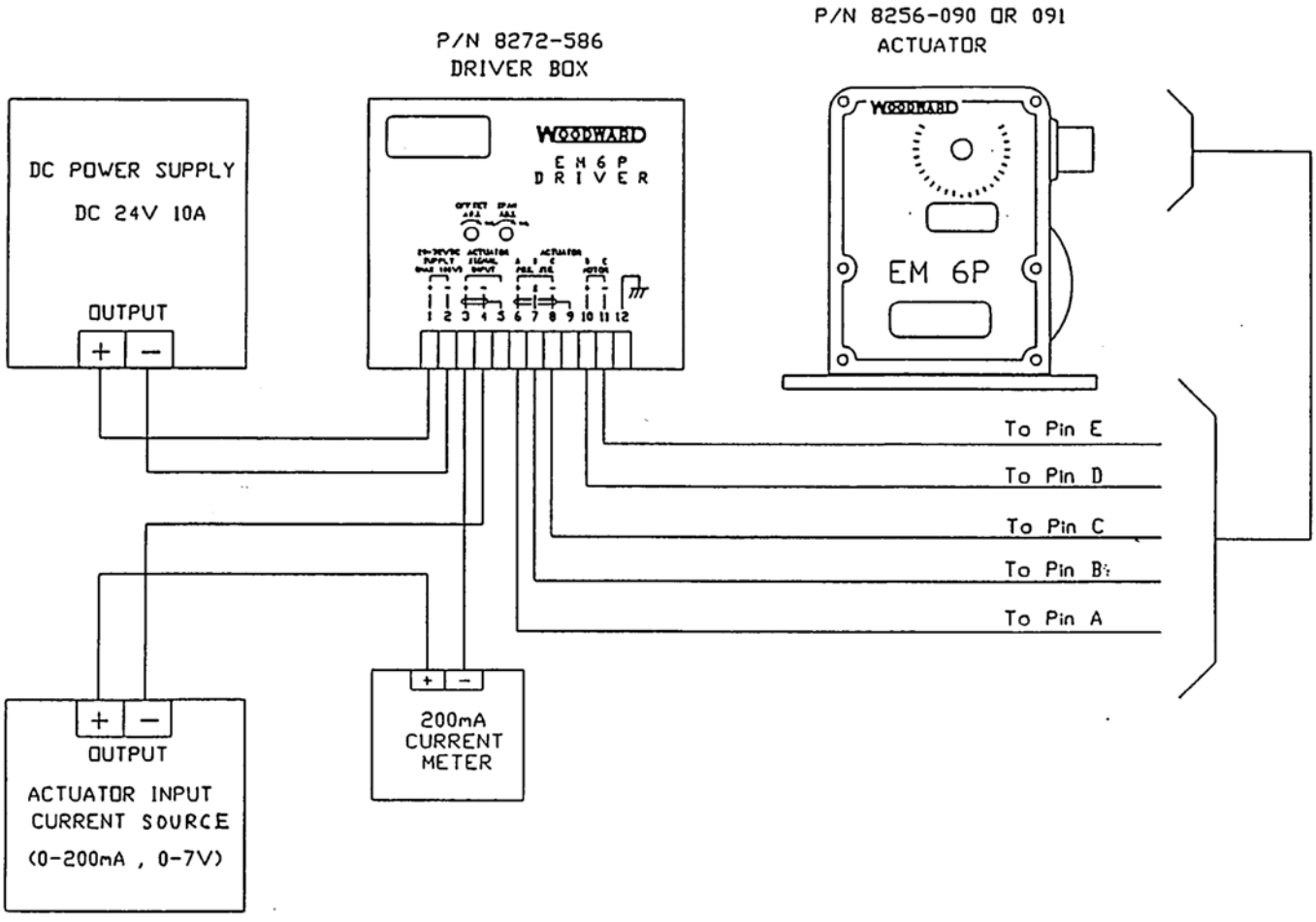


Figure 5-1. EM-6P Test and Calibration Wiring

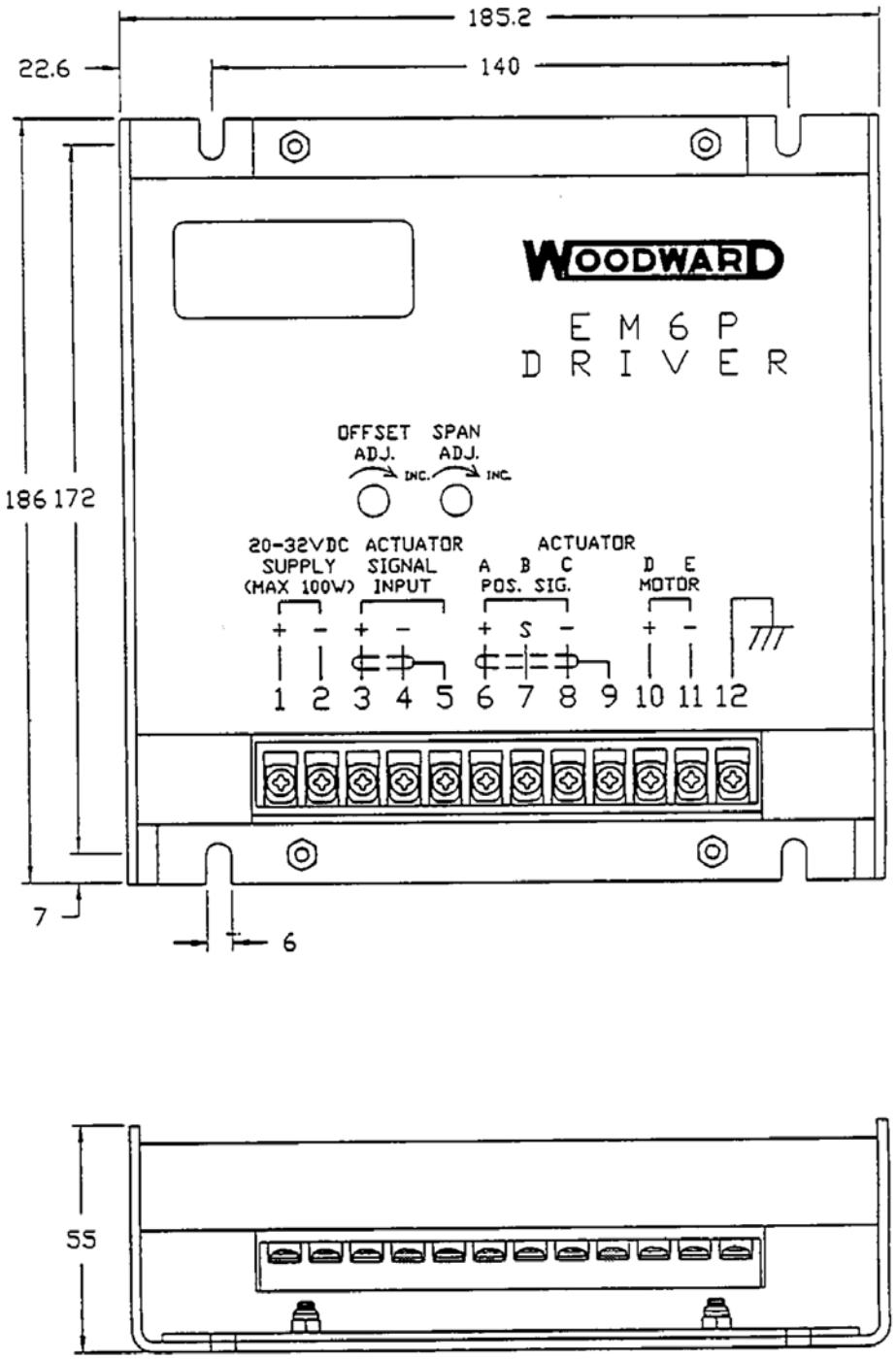


Figure 5-2. Outline Drawing of Driver Box

Chapter 6.
Replacement Parts Information

Exploded views and a parts list are supplied only for the EM-6P actuator and feedback device. Electronics in the driver box are potted at the factory and are not considered field repairable. Should a new electronic driver box be required, it is necessary to send both the actuator to the factory to have the new box properly calibrated before the electronics are potted.

When ordering replacement parts, it is essential to include the following information:

- Actuator serial number and part number, shown on the nameplate. A manual reference number alone does not identify the exact part required for a specific unit.
- The manual number (this is manual 04110).
- The part reference number in the parts list, and the name or description of the part.

Ref. No.	Part Name	Quan.	Part No.	Ref. No.	Part Name	Quan.	Part No.
04110-1	Case	1	4037-547	04110-29a	Panel	1	3082-461
04110-2	Screw	4	1029-939	04110-30	Ring	2	1023-460
04110-3	Nut	4	1029-659	04110-31	Spring	1	1013-215
04110-4	Stopper	2	4956-015	04110-32	Gear	2	3024-731
04110-5	Pin	1	1023-101	04110-33	Spacer	2	3233-053
04110-6	Spring	1	3014-015	04110-34	Spacer	1	4946-029
04110-7	Gear	1	3024-726	04110-35	Bushing	1	3249-085
04110-8	Base	1	3723-041	04110-36	Ring	1	1023-461
04110-9	Screw	6	1029-938	04110-37	Preformed Packing	2	1355-101
04110-10	Lever	1	3870-113	04110-38	Set Screw	2	1029-714
04110-11	Bearing	1	1411-317	04110-39	Cover, EM-6	1	3810-045
04110-12	Spring	2	1013-217	04110-40	Plug, Hex Socket	2	187034
04110-13	Ring	1	1023-409	04110-41	Potentiometer	1	1657-981
04110-14	Ring	1	3410-087	04110-42	Guide	1	3264-085
04110-15	Key	3	3690-053	04110-43	Shim, Washer	1	1023-207
04110-16	Bushing	1	3249-081	04110-44	Decal	1	3060-105
04110-17	Shaft	1	3577-065	04110-45	Motor	1	1764-313
04110-18	Spacer	1	3211-075	04110-46	Set Screw	4	1029-713
04110-19	Gear	1	3024-729	04110-47	Screw	4	1037-659
04110-20	Spacer	1	3211-077	04110-48	Cable Tie	2	1609-463
04110-21	Gear	1	3024-731	04110-49	Screw	2	1029-903
04110-22	Screw	1	1029-243	04110-50	Gasket	2	3054-061
04110-23	Bushing	1	3249-083	04110-51	Screw	11	1029-934
04110-24	Screw	1	1029-352	04110-52	Receptacle	1	1630-225
04110-25	Shaft	1	3387-343	04110-53	Screw	4	1029-936
04110-26	Pointer	1	3080-479	04110-54	Screw	11	1029-934
04110-27	Case	1	4037-547	04110-55	Plate	1	3810-047
04110-28	Screw	10	1029-932	04110-56	Grommet	1	4946-027
04110-29	Panel	1	3082-459				

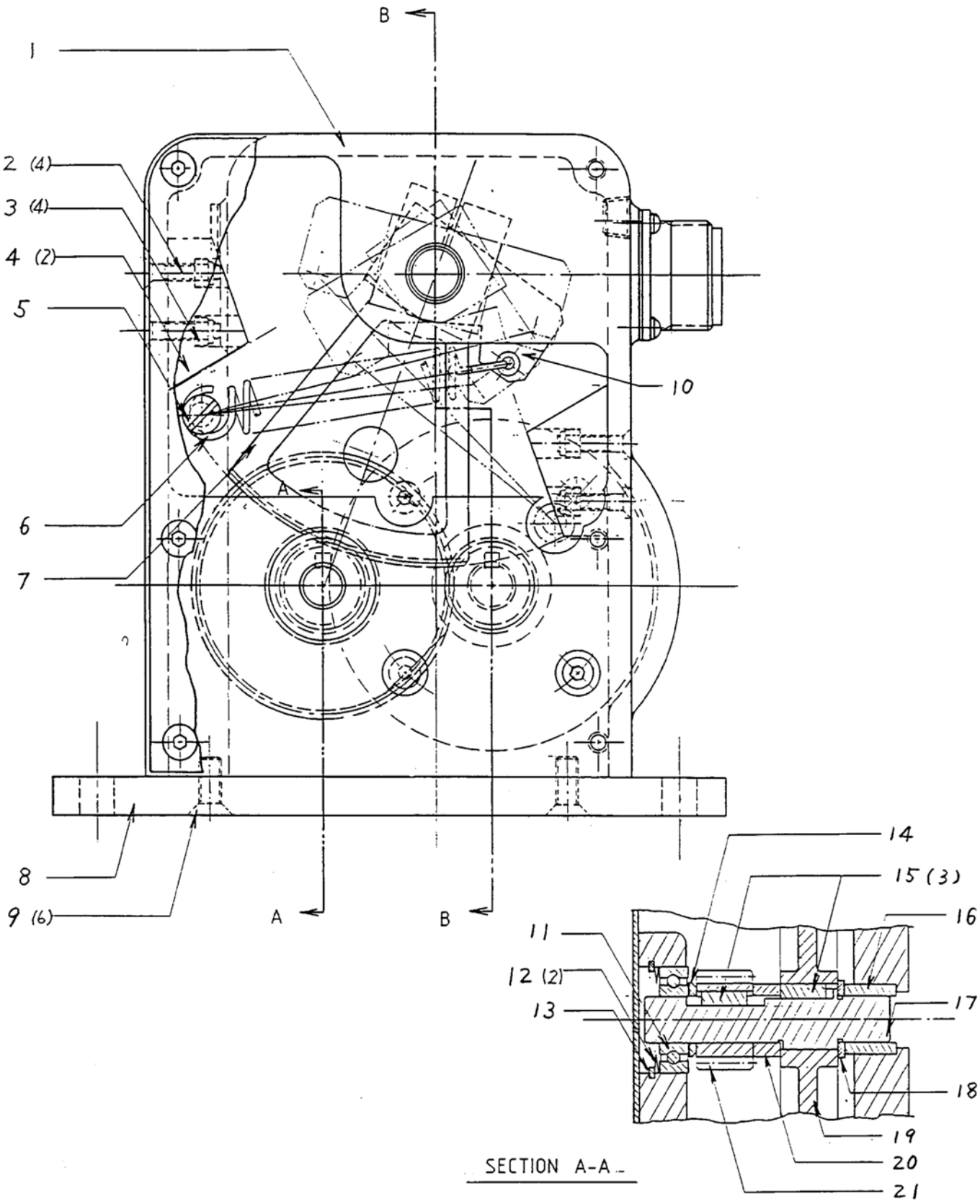


Figure 6-1. EG-6P Actuator Assembly

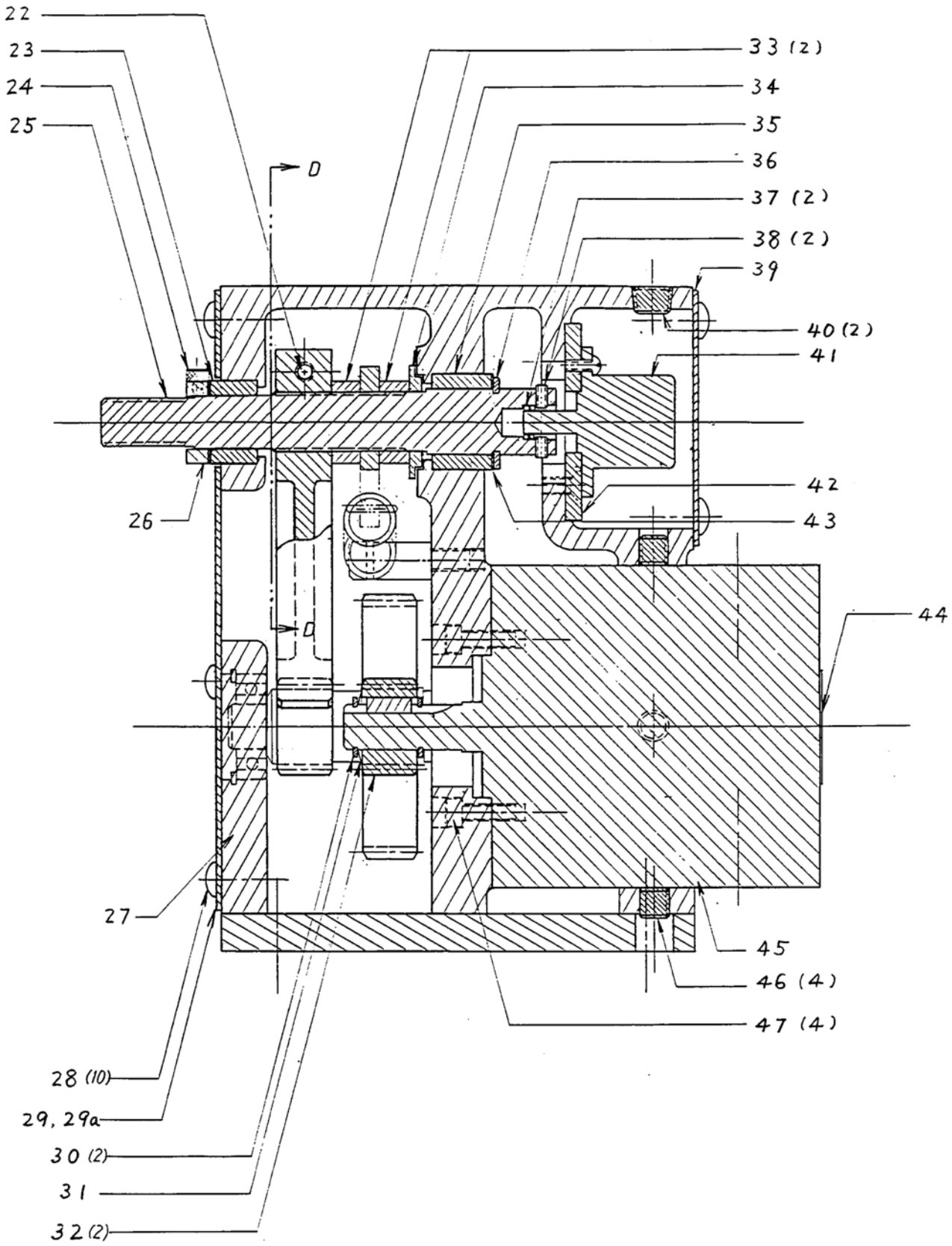


Figure 6-2. Assembly Views of EM-6P Actuator

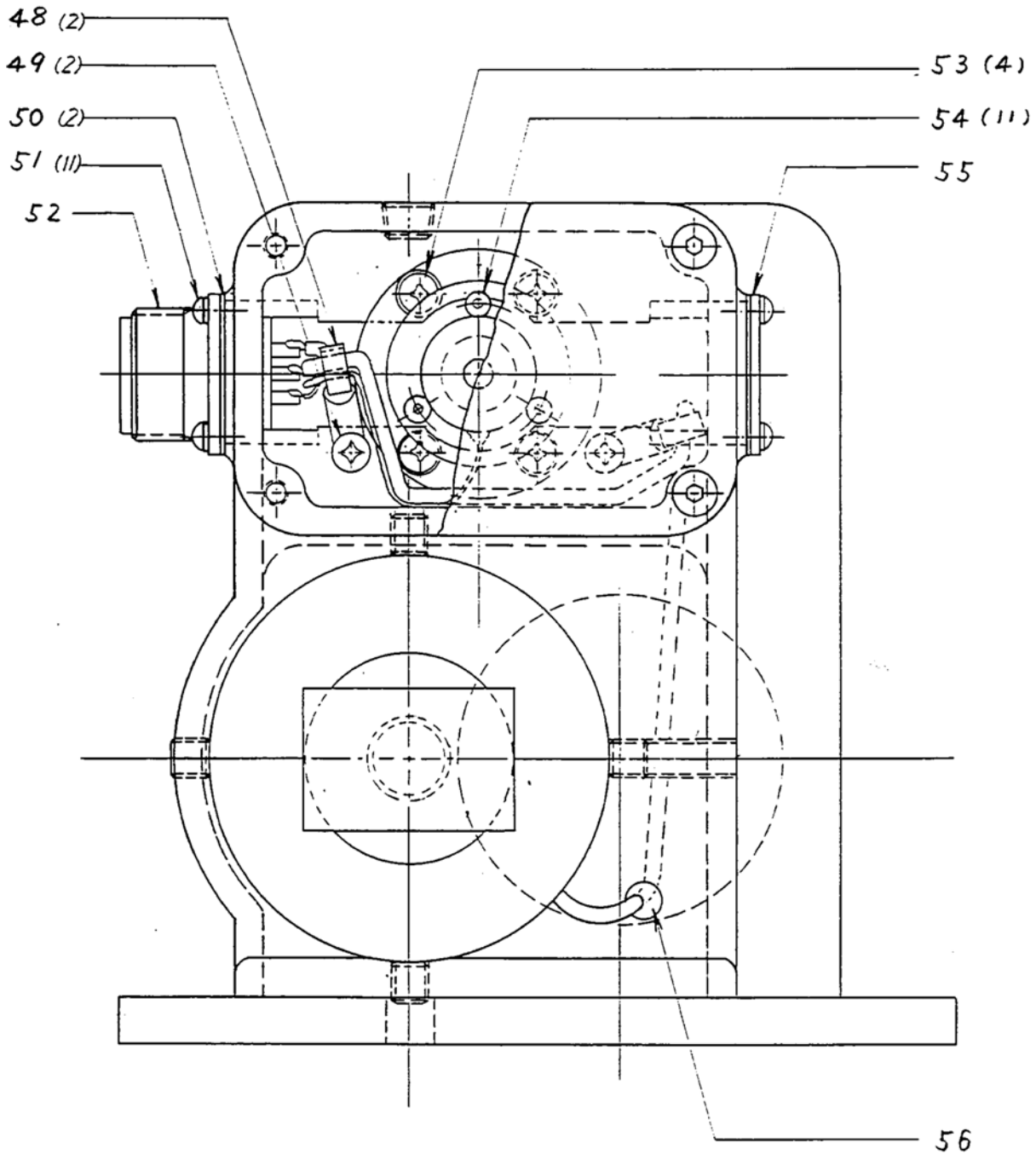


Figure 6-3. Assembly View of EM-6P Actuator

Chapter 7.
Product Support and Service Options

Product Support Options

If you are experiencing problems with the installation, or unsatisfactory performance of a Woodward product, the following options are available:

1. Consult the troubleshooting guide in the manual.
2. Contact the **OE Manufacturer or Packager** of your system.
3. Contact the **Woodward Business Partner** serving your area.
4. Contact Woodward technical assistance via email (**EngineHelpDesk@Woodward.com**) with detailed information on the product, application, and symptoms. Your email will be forwarded to an appropriate expert on the product and application to respond by telephone or return email.
5. If the issue cannot be resolved, you can select a further course of action to pursue based on the available services listed in this chapter.

OEM or Packager Support: Many Woodward controls and control devices are installed into the equipment system and programmed by an Original Equipment Manufacturer (OEM) or Equipment Packager at their factory. In some cases, the programming is password-protected by the OEM or packager, and they are the best source for product service and support. Warranty service for Woodward products shipped with an equipment system should also be handled through the OEM or Packager. Please review your equipment system documentation for details.

Woodward Business Partner Support: Woodward works with and supports a global network of independent business partners whose mission is to serve the users of Woodward controls, as described here:

- A **Full-Service Distributor** has the primary responsibility for sales, service, system integration solutions, technical desk support, and aftermarket marketing of standard Woodward products within a specific geographic area and market segment.
- An **Authorized Independent Service Facility (AISF)** provides authorized service that includes repairs, repair parts, and warranty service on Woodward's behalf. Service (not new unit sales) is an AISF's primary mission.
- A **Recognized Engine Retrofitter (RER)** is an independent company that does retrofits and upgrades on reciprocating gas engines and dual-fuel conversions, and can provide the full line of Woodward systems and components for the retrofits and overhauls, emission compliance upgrades, long term service contracts, emergency repairs, etc.

A current list of Woodward Business Partners is available at **www.woodward.com/directory**.

Product Service Options

Depending on the type of product, the following options for servicing Woodward products may be available through your local Full-Service Distributor or the OEM or Packager of the equipment system.

- Replacement/Exchange (24-hour service)
- Flat Rate Repair
- Flat Rate Remanufacture

Replacement/Exchange: Replacement/Exchange is a premium program designed for the user who is in need of immediate service. It allows you to request and receive a like-new replacement unit in minimum time (usually within 24 hours of the request), providing a suitable unit is available at the time of the request, thereby minimizing costly downtime.

This option allows you to call your Full-Service Distributor in the event of an unexpected outage, or in advance of a scheduled outage, to request a replacement control unit. If the unit is available at the time of the call, it can usually be shipped out within 24 hours. You replace your field control unit with the like-new replacement and return the field unit to the Full-Service Distributor.

Flat Rate Repair: Flat Rate Repair is available for many of the standard mechanical products and some of the electronic products in the field. This program offers you repair service for your products with the advantage of knowing in advance what the cost will be.

Flat Rate Remanufacture: Flat Rate Remanufacture is very similar to the Flat Rate Repair option, with the exception that the unit will be returned to you in "like-new" condition. This option is applicable to mechanical products only.

Returning Equipment for Repair

If a control (or any part of an electronic control) is to be returned for repair, please contact your Full-Service Distributor in advance to obtain Return Authorization and shipping instructions.

When shipping the item(s), attach a tag with the following information:
- return number;
- name and location where the control is installed;
- name and phone number of contact person;
- complete Woodward part number(s) and serial number(s);
- description of the problem;
- instructions describing the desired type of repair.

Packing a Control

Use the following materials when returning a complete control:
- protective caps on any connectors;
- antistatic protective bags on all electronic modules;
- packing materials that will not damage the surface of the unit;
- at least 100 mm (4 inches) of tightly packed, industry-approved packing material;
- a packing carton with double walls;
- a strong tape around the outside of the carton for increased strength.

NOTICE

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual 82715, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Replacement Parts

When ordering replacement parts for controls, include the following information:
- the part number(s) (XXXX-XXXX) that is on the enclosure nameplate;
- the unit serial number, which is also on the nameplate.

Engineering Services

Woodward's Full-Service Distributors offer various Engineering Services for our products. For these services, you can contact the Distributor by telephone or by email.

- Technical Support
- Product Training
- Field Service

Technical Support is available from your equipment system supplier, your local Full-Service Distributor, or from many of Woodward's worldwide locations, depending upon the product and application. This service can assist you with technical questions or problem solving during the normal business hours of the Woodward location you contact.

Product Training is available as standard classes at many Distributor locations. Customized classes are also available, which can be tailored to your needs and held at one of our Distributor locations or at your site. This training, conducted by experienced personnel, will assure that you will be able to maintain system reliability and availability.

Field Service engineering on-site support is available, depending on the product and location, from one of our Full-Service Distributors. The field engineers are experienced both on Woodward products as well as on much of the non-Woodward equipment with which our products interface.

For information on these services, please contact one of the Full-Service Distributors listed at **www.woodward.com/directory**.

Contacting Woodward's Support Organization

For the name of your nearest Woodward Full-Service Distributor or service facility, please consult our worldwide directory published at **www.woodward.com/directory**.

You can also contact the Woodward Customer Service Department at one of the following Woodward facilities to obtain the address and phone number of the nearest facility at which you can obtain information and service.

Products Used In Electrical Power Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
Germany:	
Kempen	+49 (0) 21 52 14 51
Stuttgart	+49 (711) 78954-510
India	+91 (129) 4097100
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
Poland	+48 12 295 13 00
United States	+1 (970) 482-5811

Products Used In Engine Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
Germany	+49 (711) 78954-510
India	+91 (129) 4097100
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
The Netherlands	+31 (23) 5661111
United States	+1 (970) 482-5811

Products Used In Industrial Turbomachinery Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
India	+91 (129) 4097100
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
The Netherlands	+31 (23) 5661111
Poland	+48 12 295 13 00
United States	+1 (970) 482-5811

For the most current product support and contact information, please visit our website directory at **www.woodward.com/directory**.

Technical Assistance

If you need to contact technical assistance, you will need to provide the following information. Please write it down here before contacting the Engine OEM, the Packager, a Woodward Business Partner, or the Woodward factory:

General

Your Name _____

Site Location _____

Phone Number _____

Fax Number

Prime Mover Information

Manufacturer _____

Engine Model Number _____

Number of Cylinders _____

Type of Fuel (gas, gaseous, diesel, dual-fuel, etc.) _____

Power Output Rating _____

Application (power generation, marine, etc.)

Control/Governor Information

Control/Governor #1

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number

Control/Governor #2

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number

Control/Governor #3

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number

Symptoms

Description _____

_____

If you have an electronic or programmable control, please have the adjustment setting positions or the menu settings written down and with you at the time of the call.

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 04110.

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Email and Website—www.woodward.com

**Woodward has company-owned plants, subsidiaries, and branches,
as well as authorized distributors and other authorized service and sales facilities throughout the world.**

Complete address / phone / fax / email information for all locations is available on our website.

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