



Installation and Operation Manual



EHPS Electrohydraulic Power Servo

Manual 26063 (Revision D)

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.



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www.woodward.com/pubs/current.pdf

The revision level is shown at the bottom of the front cover after the publication number. The latest version of most publications is available at:

www.woodward.com/publications

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*.

Revisions—Text changes are indicated by a black line alongside the text.

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Regulatory Compliance

North American Compliance:

These listings are limited only to those units bearing the UL identification.

UL: UL Listed for Class I, Division 2, Groups A, B, C, & D, T4
at 40 °C Ambient. For use in Canada and the United
States.
UL File E158654.

Wiring must be in accordance with North American Class I, Division 2 wiring
methods as applicable, and in accordance with the authority having jurisdiction.

! WARNING

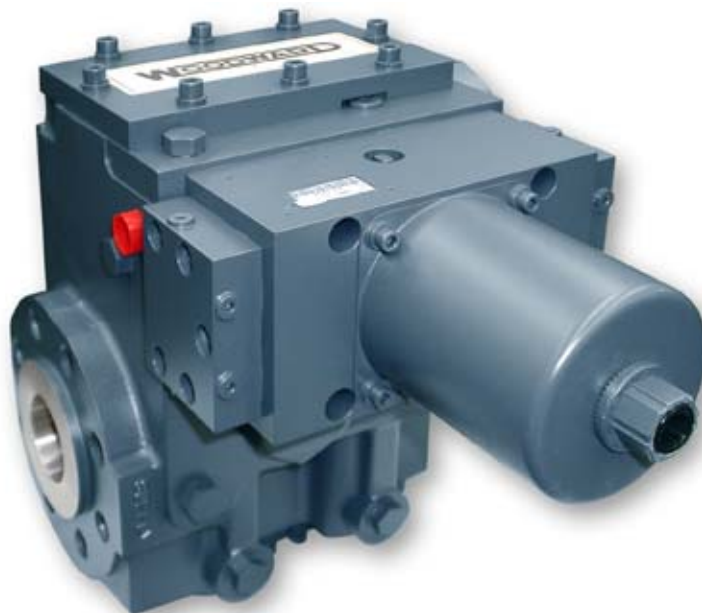
EXPLOSION HAZARD—Do not remove covers or connect/disconnect electrical connectors unless power has been switched off or the area is known to be non-hazardous.

Substitution of components may impair suitability for Class I, Division 2.

! AVERTISSEMENT

RISQUE D'EXPLOSION—Ne pas enlever les couvercles, ni raccorder / débrancher les prises électriques, sans vous en assurer auparavant que le système a bien été mis hors tension, ou que vous vous situez bien dans une zone non explosive.

La substitution de composants peut rendre ce matériel inacceptable pour les emplacements de Classe I, Division 2.



Chapter 1.

General Information

Introduction

This manual provides information on the installation, operation and adjustments, principles of operation, and maintenance of the Electrohydraulic Power Servo (EHPS).

The EHPS is available in four combinations. There is either a single coil or dual coil servo valve along with either “integral” or “separate” hydraulic supply for the 1st and 2nd stages. The integral or separate oil supply is crucial during the design of the installation. The 1st and 2nd stages of the EHPS require 10 µm nominal/ 25 µm absolute hydraulic filtration at 19 L/min (5 US gal/min). The 3rd stage of the EHPS requires up to 757 L/min (200 US gal/min), but is not as susceptible to hydraulic contamination. If this filtration level is not maintained, then the functionality of the EHPS will be compromised. Should the installation provide hydraulic oil at up to 757 L/min (200 US gal/min) with the required level of filtration, then the “integral” supply option is recommended. However, if hydraulic filtration is difficult at the required flow rates, the “separate” supply option is recommended.

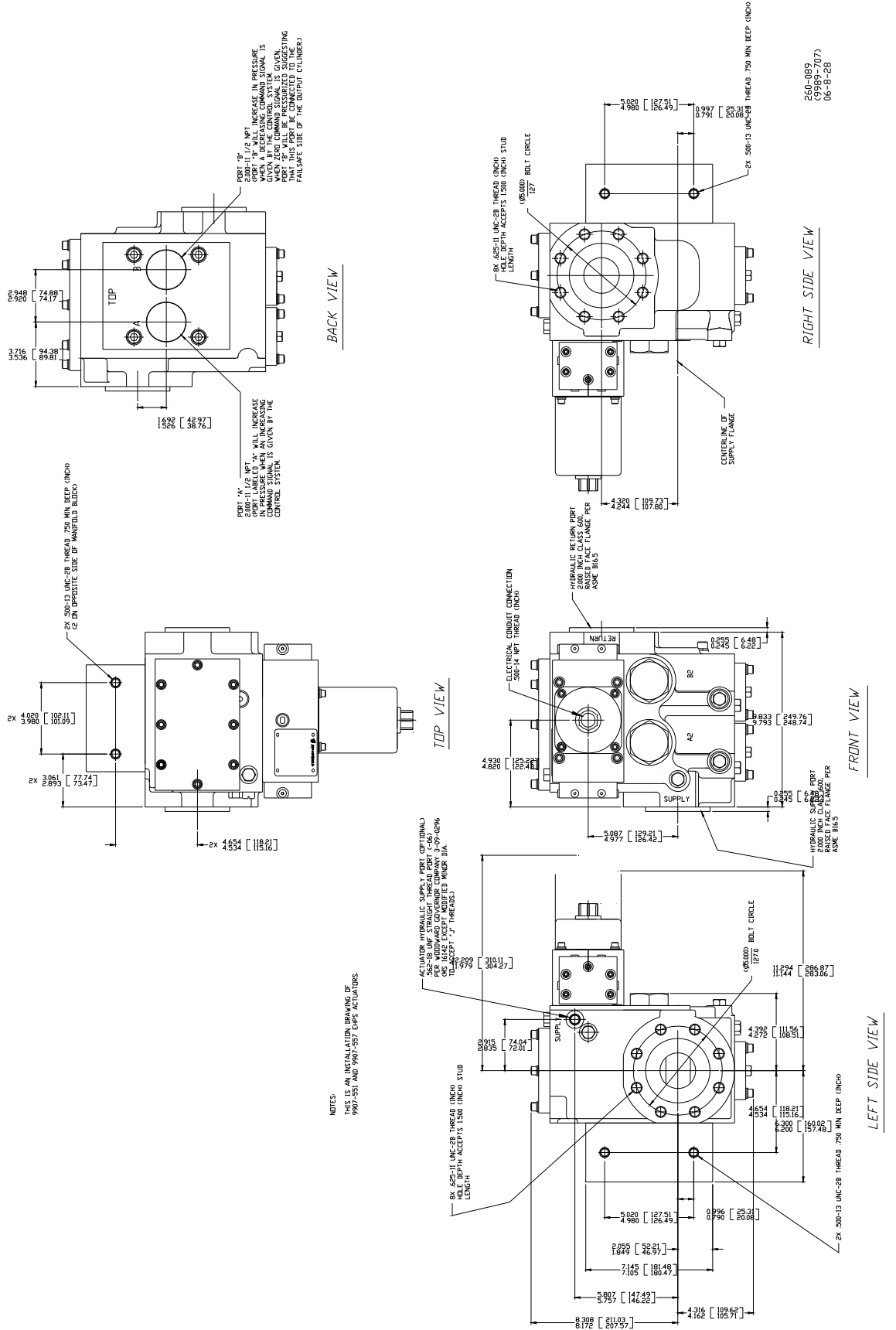
Woodward Part Numbers

9907-551	Single Coil Servo Valve with Separate Hydraulic Supply
9907-555	Dual Coil Servo Valve with Separate Hydraulic Supply
9907-556	Dual Coil Servo Valve with Integral Hydraulic Supply
9907-557	Single Coil Servo Valve with Integral Hydraulic Supply

Description

The Electrohydraulic Power Servo (Figures 1-1 & 1-2) is a three-stage servo valve used in conjunction with a customer-supplied power cylinder with integral position feedback. The EHPS is a modular staged design that can provide several output stages, all within the same envelope size. The stages are as follows:

- Stage 1—a torque-motor servo valve
- Stage 2—a 19.05 mm (0.750 inch) diameter spool stage with feedback to the first stage
- Stage 3—a spool stage driven by the second-stage flow valve with feedback to the second-stage spool bushing
- Stage 4—a commercial hydraulic servo with an integral electrical position transducer installed to provide a position feedback signal to the electronic control to allow closed loop control (customer supplied)



NOTES:
 THIS IS AN INSTALLATION DRAWING OF 9907-255 AND 9907-257 EHPS ACTUATORS.
 ACTUATOR HYDRAULIC SUPPLY PORT (OPTIONAL) 5/8-18 UNF STRAIGHT THREAID PORT (4-60) IS AVAILABLE AS AN ADDITIONAL PORT. THIS PORT ACCEPTS "J" THREAID (3/8 THREAID).

Figure 1-1. Outline Drawing of Electrohydraulic Power Servo (Single Coil)

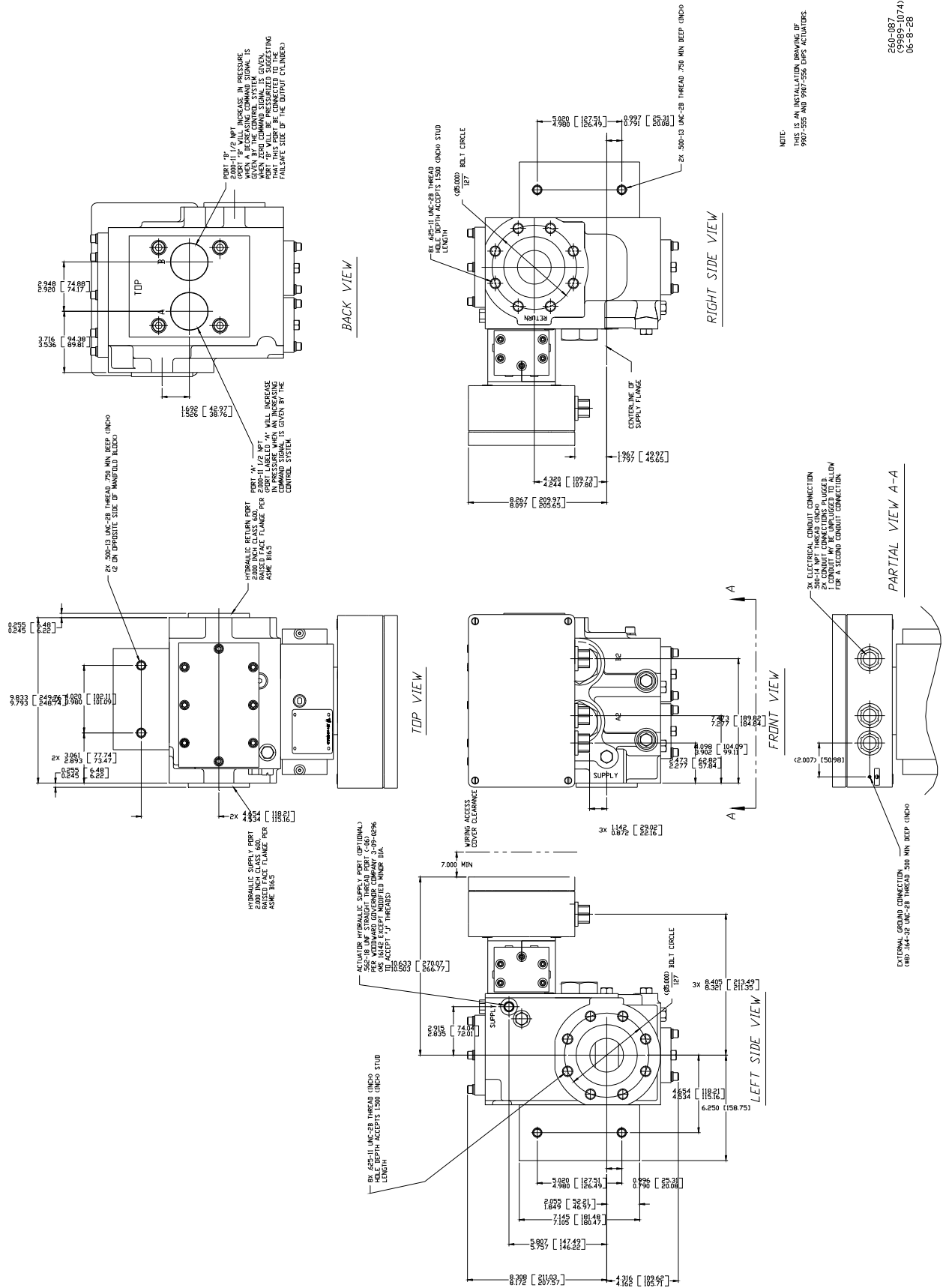


Figure 1-2. Outline Drawing of Electrohydraulic Power Servo (Dual Coil)

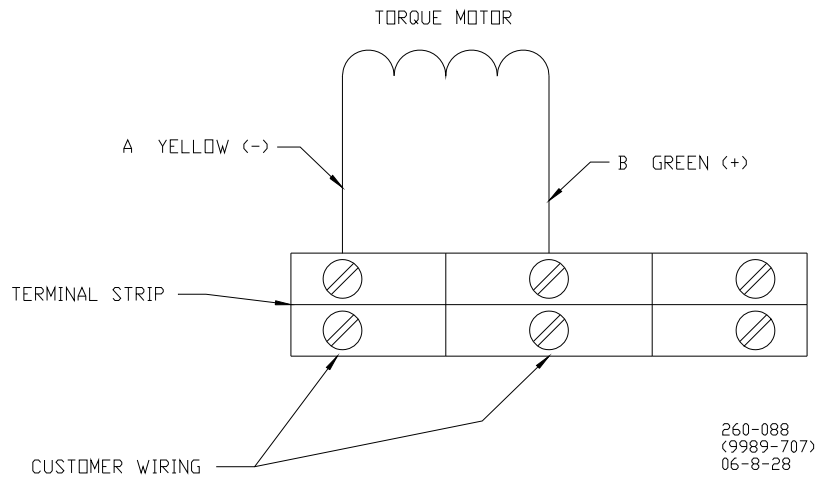


Figure 1-3. Wiring Diagram (Single Coil EHPS)

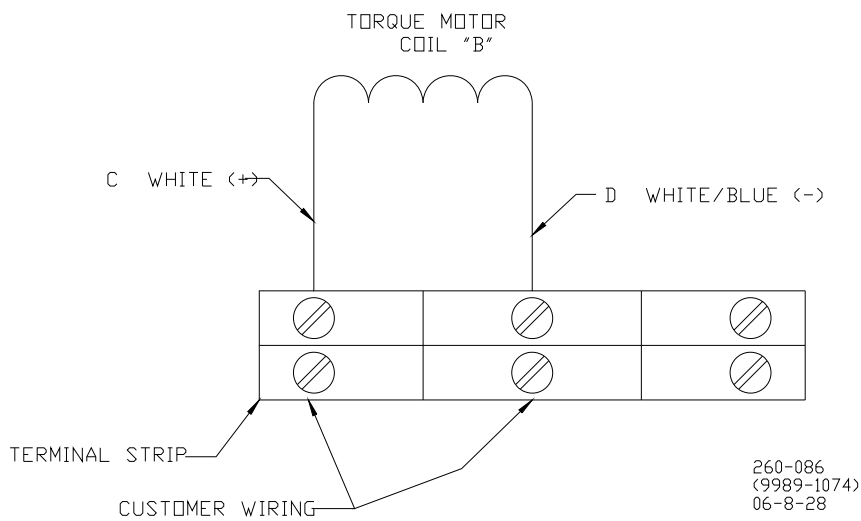
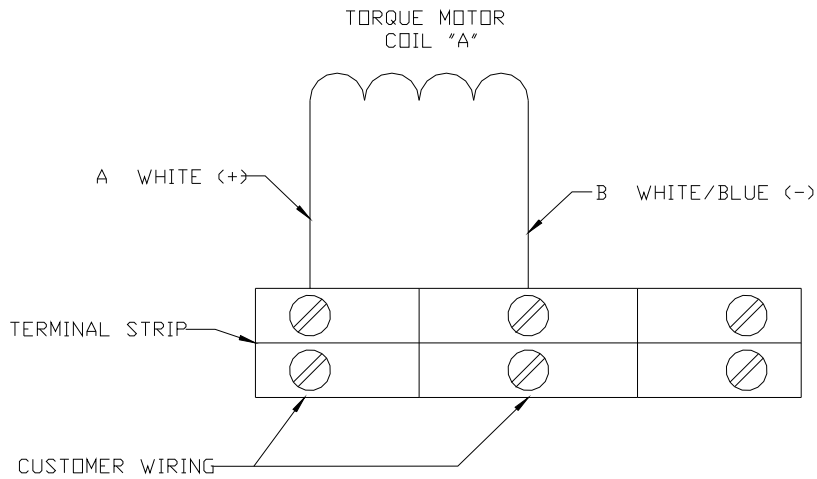


Figure 1-4. Wiring Diagram (Dual Coil EHPS)

Chapter 2. Installation

Mechanical

Weight

The EHPS weighs approximately 68 kg (150 pounds) when sent from the factory. Installation hardware must be adequate to hold this weight and still provide stable support for the EHPS. Do not lift the unit by the torque motor housing or damage may occur.

Receiving

The EHPS is calibrated and then drained of calibrating fluid at the factory. It is then placed in a custom-fabricated wooden packing crate for delivery to the customer. Additional cleaning or calibration is not necessary before installation or operation.

Storage

The EHPS may be stored as received from the factory before installation. If storage time will exceed nine months, please contact Woodward.

Installation

NOTICE

Be careful when installing the EHPS. Abuse of the EHPS can result in damage to seals and installation surfaces, and can alter the calibration of the unit. Protect the hydraulic connections with shipping caps when the servo valve is not connected to the normal piping.

See Outline Drawing, Figure 1-1 or 1-2 for:

- Overall dimensions
- Installation hole locations
- Hydraulic fitting sizes

See Wiring Diagram, Figure 1-3 or 1-4 for:

- Wiring connections

Proper filtration of the hydraulic fluid that is to be supplied to the unit is extremely important. A 10 μm nominal, 25 μm absolute filter must be installed in the supply to the EHPS within 1 m of the supply port. It is necessary to keep the immediate area and equipment clean and free of dirt and contaminants while connecting the hydraulic lines. Failure to maintain clean hydraulic fluid can result in damage to the EHPS. The hydraulic supply must be connected to the supply connection on the servo valve.

The attitude in which the EHPS is installed does not affect the performance of the unit. However, it is recommended that the EHPS be mounted vertically due to its weight. Adequate support must be provided if the unit is not mounted vertically.

Connect the supply and return hydraulic lines to the EHPS. Supply pressure can be from positive displacement or centrifugal-type pumps. Use a pressure switch in the supply line to be sure that correct supply pressure is established before start-up and maintained thereafter.

The manifold of the EHPS has two ports labeled A and B. These ports are 2-inch NPT threaded ports for connection to the customer-supplied hydraulic cylinder. Depending on the action of the cylinder the ports will need to be connected differently. The port labeled “A” will increase in pressure when an increasing command signal is given to the control system. Port “B” will increase in pressure when a decreasing command signal is given by the control system. When zero command signal is given, Port “B” will be pressurized, suggesting that this port should be connected to the failsafe side of the output cylinder.

Hydraulic Supply Requirements

Hydraulic Source:	Prime mover lubricating system or external independent supply
Fluid Types:	Mineral or synthetic based oils may be used. Contact Woodward for specific oil recommendations.
Recommended Viscosity:	0.6 to 400 centistokes
Specific Gravity:	0.6 to 1.0
Required Filtration:	10 µm nominal, 25 µm absolute
Supply Pressure:	552 kPa minimum to 1724 kPa maximum limit (80 psi minimum to 250 psi maximum limit)
Return Pressure:	Maximum 10% of Supply Pressure

Hydraulic Flow Requirements:

Supply Pressure	Steady State Flow	Maximum Transient Flow
552 kPa (80 psig)	7.6 L/min (2.0 US gal/min)	378 L/min (100 US gal/min)
1724 kPa (250 psig)	11.4 L/min (3.0 US gal/min)	662 L/min (175 US gal/min)

The hydraulic system should be capable of supplying the maximum transient flow on a constant basis to avoid sluggish servo valve response.

It is very important that the linkage between the power servo output and the fuel system be of correct relationship to ensure proper operation. Use as much of the power servo output travel as possible between minimum and maximum flow points.

Electrical Supply Requirements

The EHPS is an integrating actuator without feedback. The installation of the EHPS requires an external feedback device along with a suitable control system. The Woodward Servo Position Controller (SPC) is ideal for controlling the device when an external feedback device is installed. See Woodward Manual 26236 for details of wiring the EHPS with a Woodward Servo Position Controller (SPC).

The EHPS requires a 0–200 mA current input to the servo valve of the 1st stage with a 100 mA null current. Therefore any current below 100 mA, will result in pressure increasing from Port “B”. Any current above 100 mA, will result in pressure increasing from Port “A”.

For field wiring, use copper wire rated 60 °C only. Torque clamping screw terminal connectors for field wiring to 1.4 N·m (12 lb-in).

The wiring connections are detailed in Figures 1-3 and 1-4.

NOTICE

Due to the hazardous location listings associated with this product, proper wire type and wiring practices are critical to operation.

Chapter 3. Initial Operation

General

Before the initial operation of the EHPS, be sure that all previous installation and hookup procedures are accomplished and all linkages (if any), electrical connections, and hydraulic fittings are secure and properly connected.

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.

NOTICE

Be sure the correct hydraulic supply pressure to the EHPS is established before start-up. Trapped air within the hydraulic system may cause momentary erratic behavior of the EHPS during initial operation. Trapped air in the unit itself may have to be bled to ensure proper operation (contact Woodward personnel for information on this procedure). Use the correct Woodward manual for the Woodward electronic control to begin prime-mover operation.

Adjustments

Normally all operating adjustments are made to the EHPS during factory calibration according to specifications provided by the customer and should not require any further adjustment. Do not attempt adjustments to the EHPS unless thoroughly familiar with proper procedures.

Adjustments are available at the factory to set the level position of the output, the distance of output for a given control voltage change, and total movement of the power servo output.

Chapter 4.

Principles of Operation

The EHPS consists of four basic stages:

- Stage 1—A torque motor servo valve, receiving an output signal from the control
- Stage 2—A 19.05 mm (0.750 inch) diameter spool valve, with mechanical feedback to first stage
- Stage 3—A 50.80 mm (2.000 inch) diameter spool valve, with mechanical feedback to second stage
- Stage 4—A hydraulic Servo with electrical position feedback to the control (customer supplied)

See schematic drawing, Figure 4-1, for an illustration of the working relationship of the various parts.

Operation begins with a 0 to 200 mA (the operating null current is 100 mA) signal from the control system. When this current is changed to a value other than 100 mA (within its 0–200 mA range), it causes the torque-motor armature to move to a position that will be proportional to the input current. The torque-motor armature controls the flapper/nozzle section of the first-stage servo valve. The output of this servo valve is a differential pressure signal (C1-C2).

This signal is proportional to the armature position and is applied to the ends of the second-stage spool valve, causing the spool valve to move. Movement of the spool valve causes a force to be applied to the cantilevered spring on the torque-motor armature. This force re-centers the torque-motor armature and brings the pressure signal to zero pressure differential, which stops the spool from moving. The position of the spool is, therefore, proportional to the input current, and since the spool valve is a flow control, flow is proportional to input current.

This flow in the A1-B1 port system is directed to the third-stage spool valves. The direction of flow determines which valve (A1 or B1) will move to open the P1 supply flow to the “A” (manifold) port connection to the servo. Movement of the third-stage valve system is fed back to the second-stage bushing. This movement re-centers the bushing on the spool valve and stops the flow to the third-stage valve system. With this action, the third-stage position and flow are now proportional to input current.

The output flow from the third stage is directed to the servo to provide the necessary force (servo diameter) and position (servo stroke) to operate the steam turbine throttling valves. With flow from the third stage, the servo will integrate in the direction dictated by the flow path direction (manifold “A” or “B”).

When the servo is in the position requested by the control system, the feedback signal from the position transducer in the servo will cause the control to re-null the first-stage torque motor (i.e., bring the input current to the operating null of 100 mA). This action will bring the second stage to its null position and cause the third stage to re-null, stopping flow to the fourth stage and establishing a position of the servo that meets the needs of the control system. Control system commands will then cause the servo to change its position to increase or decrease steam flow to the turbine stages.

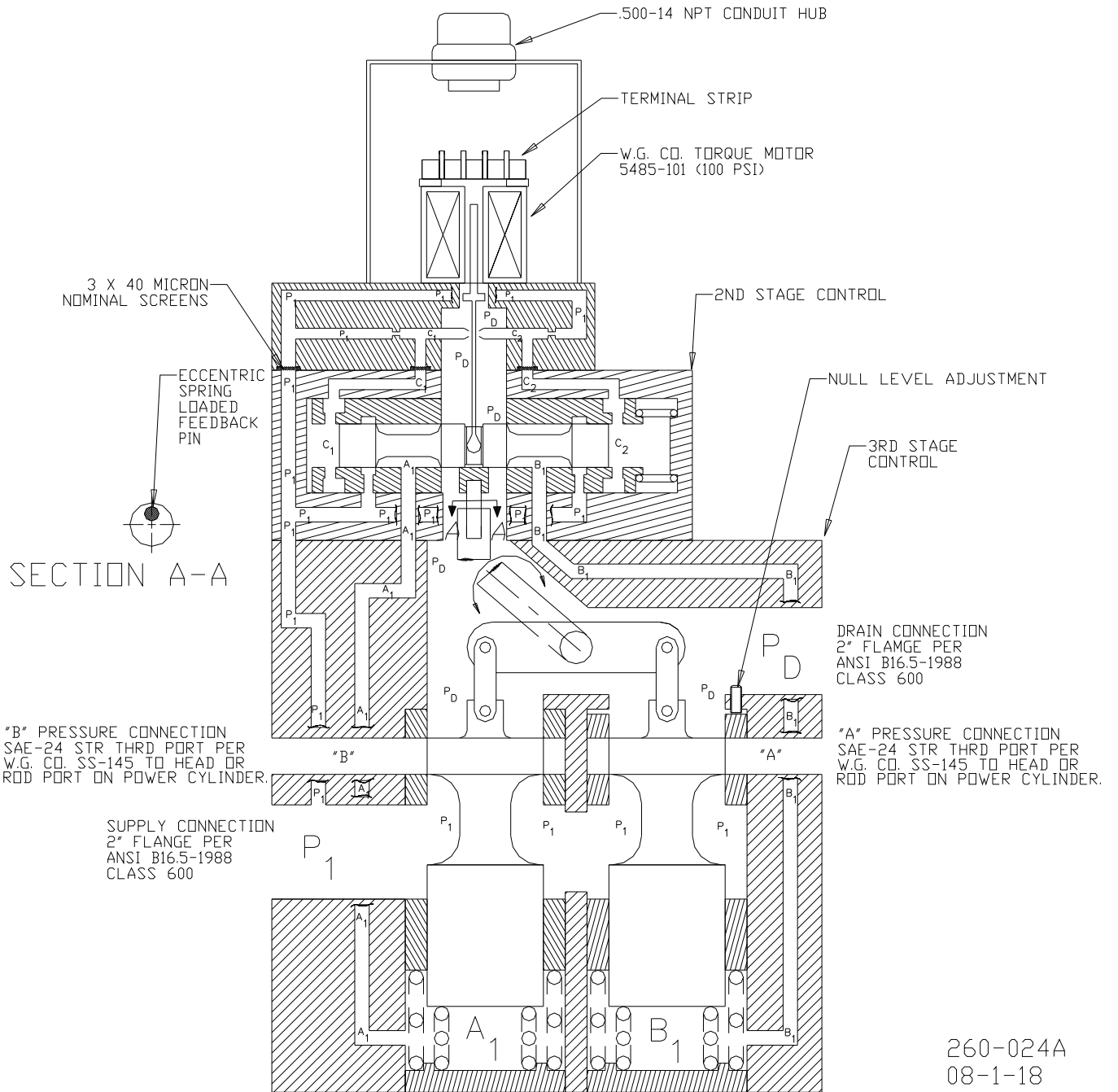


Figure 4-1. Schematic Drawing of Electrohydraulic Power Servo

The EHPS servo can be used in numerous applications; however, there are two primary installation methods: single acting and double acting. The double acting installation (see Figure 4-4) uses both output connections of the EHPS, whereas the single acting installation (Figure 4-5) utilizes only one of the output connections. In the single acting installation, either supply port may be used depending on whether the application calls for direct acting or in-direct acting.

Manifold Porting

The output connections on the manifold are labeled "A" and "B" (see Figure 4-2), and each will increase in pressure/flow depending on the input current to the EHPS. Port "A" increases in pressure/flow and port "B" decreases in pressure/flow when an increasing command signal is given to the servo. Conversely, when a decreasing command signal is given, port "B" increases in pressure/flow while port "A" decreases in pressure/flow. See Figure 4-3 for two examples of how to pipe the EHPS in a "double-acting" configuration. If the installation requires only one connection to the EHPS, make sure that the other connection is plugged, as it will see full hydraulic pressure during normal operation.

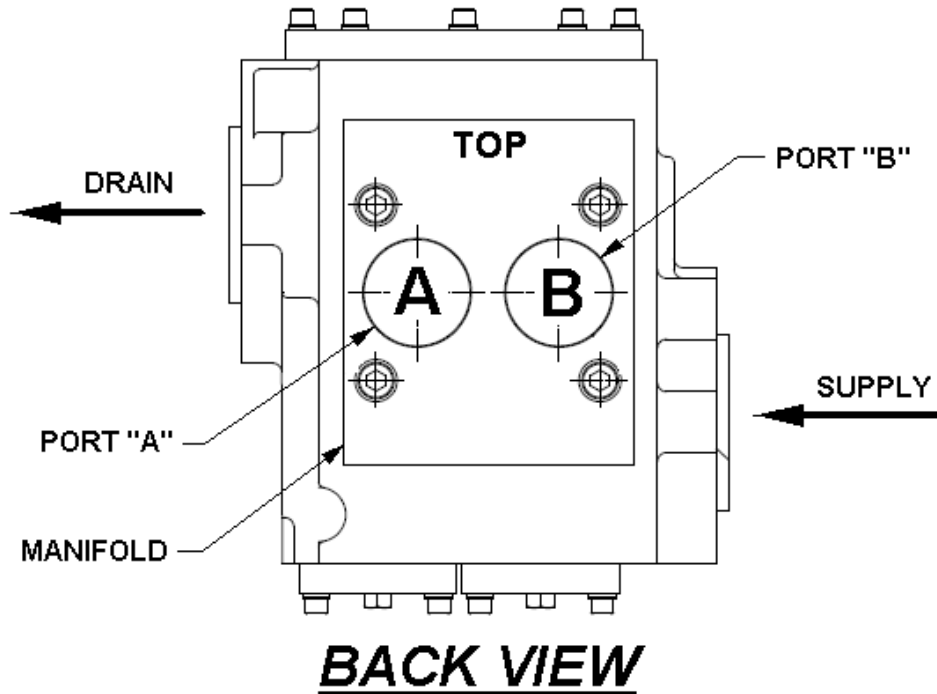
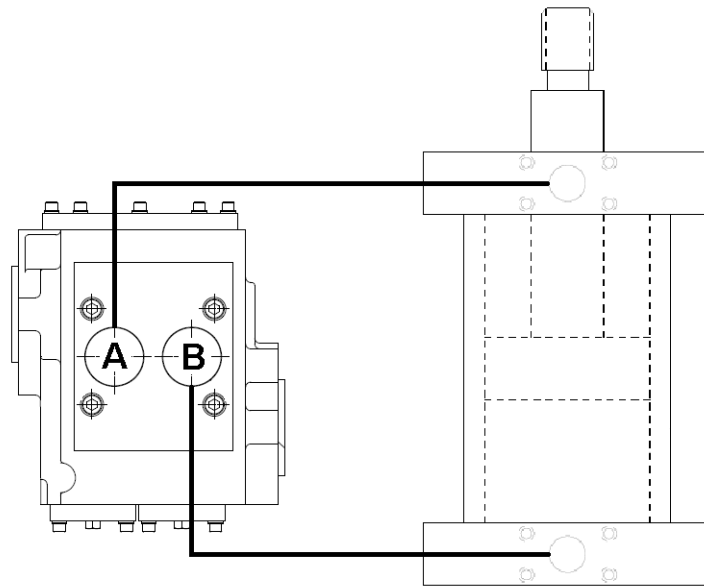
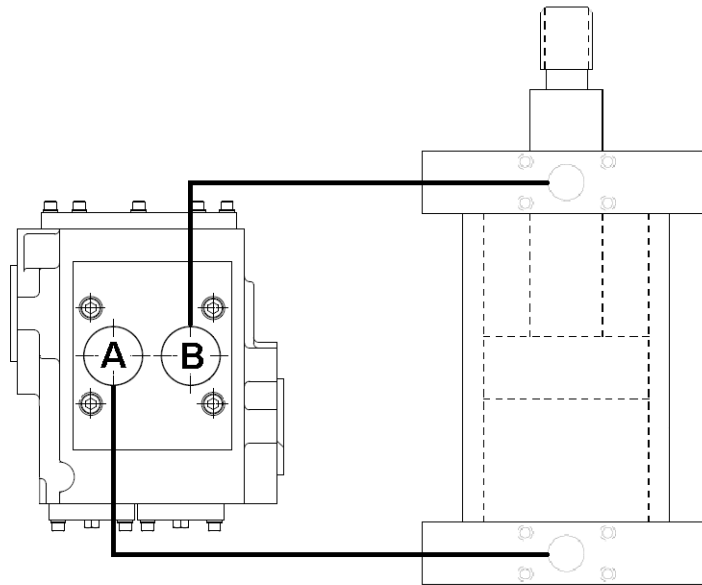


Figure 4-2. EHPS Manifold Porting Orientation



"RETRACT ON INCREASING CURRENT"



"EXTEND ON INCREASING CURRENT"

Figure 4-3. Schematic Drawing of Extend or Retract on Increasing Current

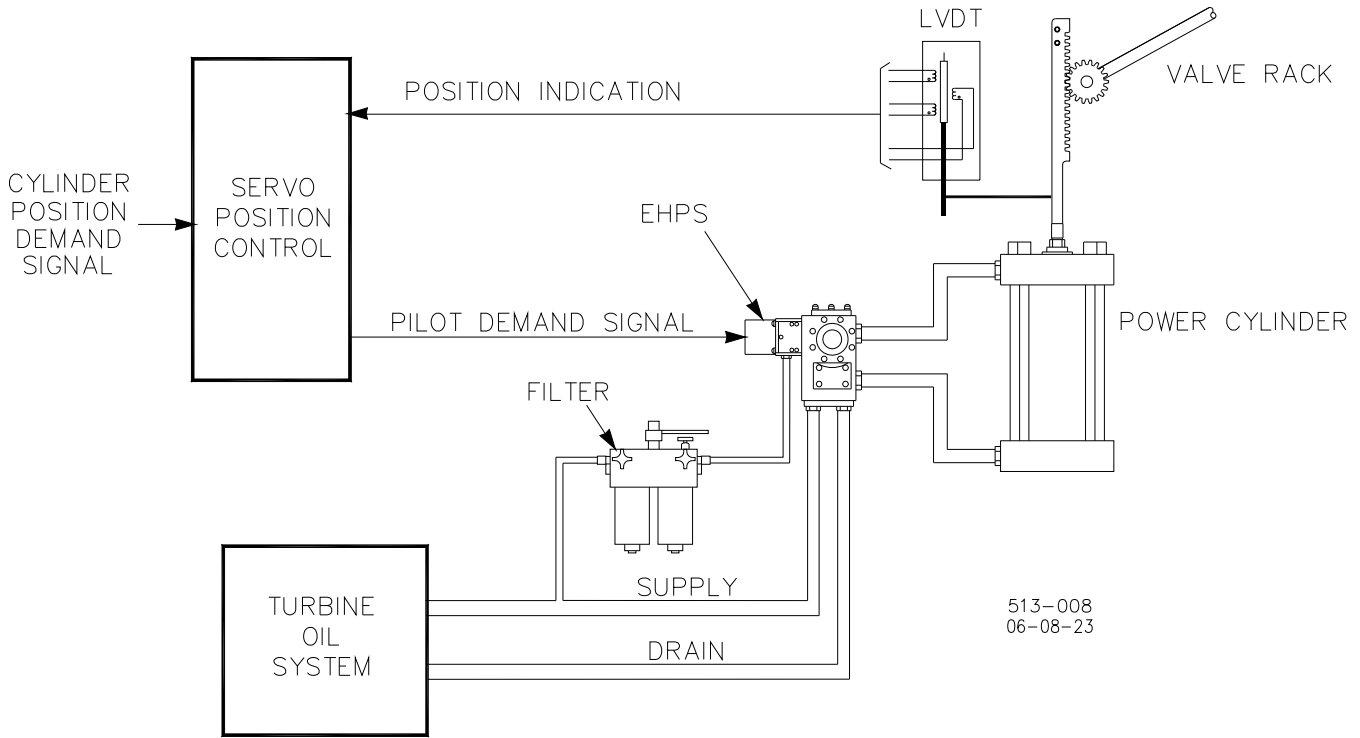


Figure 4-4. Typical EHPS Application—Double Acting Actuator

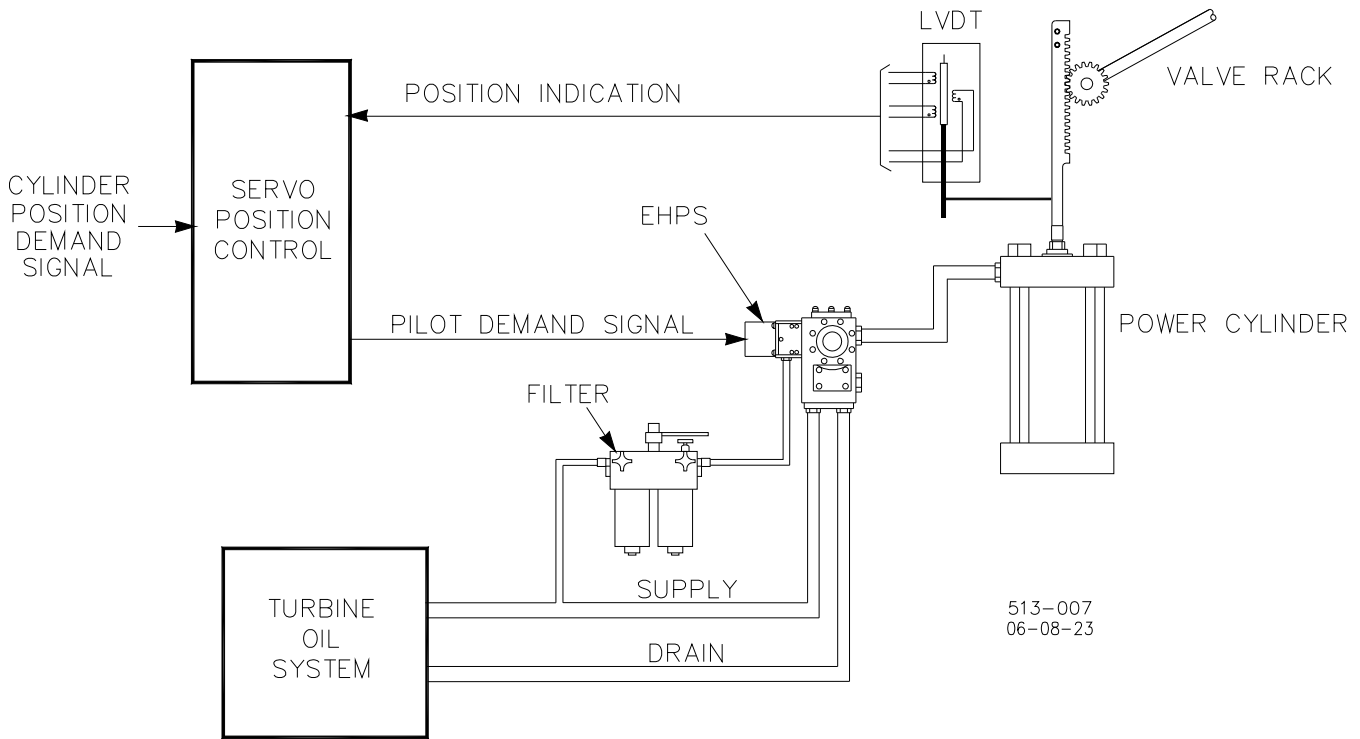


Figure 4-5. Typical EHPS Application—Single Acting Actuator

Chapter 5.

Maintenance and Troubleshooting

Maintenance

The EHPS requires no maintenance or adjustment for operation. All operating adjustments are made to the EHPS during factory calibration according to specifications provided by the customer and should not require any further adjustment. Do not attempt adjustments to the EHPS unless thoroughly familiar with proper procedures. Adjustments are available at the factory to set the level position of the output, the distance of output for a given control signal change and total movement of the power cylinder output. Optionally output shaft offset and distance, can be set by the system's electronic driver (servo position controller).

To verify optimum performance, it is recommended that the EHPS and its included servo system be periodically stroked and its operation and minimum and maximum limits verified.

Repair and Overhaul

Based on product line service history, it is recommended that the EHPS's performance be verified every 6 years of service. If tests verify that unit performance is not optimum, optionally an authorized Woodward field engineer can determine if the actuator's Stage-1-2 or Stage-3 requires repair or overhaul. For product and service warranty purposes, it is required that only authorized Woodward field engineers perform field repair or overhaul services.

Optionally a user can return the complete EHPS to Woodward or an authorized Woodward service facility, however, due to the size of this actuator, Woodward also offers partial repair and overhaul services on this product line. For product and service warranty purposes, it is required that only authorized Woodward field engineers perform field repair or overhaul services.

Please refer to the Chapter 6 in this manual for product in-warranty and after-warranty service options.

The following partial repair and overhaul options are available with this product line:

- Stage-1&2 Assembly (SV12)—Return to Woodward or for repair or overhaul.
- Stage-3 Assembly (SV32)—Return to Woodward for repair or overhaul.

Hydraulic Filtration

The service life of the actuator is increased with the use of clean hydraulic supply oil. Proper filtration of the hydraulic oil that is to be supplied to the unit is extremely important. A 10 μm nominal, 25 μm absolute filter must be installed in the supply to the EHPS within 1 m of the supply port. Failure to maintain clean hydraulic fluid can result in damage to the EHPS and a reduced product life span. Periodic cleaning or replacement of the supply line filter is recommended. If the filter becomes clogged, the EHPS may show evidence of sluggish response.

The EHPS is available with a separate supply port for the primary and second stage (SV-12) in cases where large, high flow filters are not reasonable. This separate port requires much lower flow rates, 38 L/min (10 US gal/min), at the 10 μm nominal, 25 μm absolute rating, while leaving the main hydraulic supply to have less filtration, 100 μm nominal.

Hardware Replacement

WARNING

EXPLOSION HAZARD—Do not connect or disconnect while circuit is live unless area is known to be non-hazardous.

Substitution of components may impair suitability for Class I, Division 2 or Zone 2 applications.

WARNING

To prevent possible serious personal injury, or damage to equipment, be sure all electric power, hydraulic pressure, and gas pressure have been removed from the actuator before beginning any maintenance or repairs.

CAUTION

The surface of this product can become hot enough or cold enough to be a hazard. Use protective gear for product handling in these circumstances. Temperature ratings are included in the specification section of this manual.

NOTICE

Do not lift or handle the actuator by any conduit. Lift or handle the actuator only by using the eyebolts.

To facilitate field replacement of items, it is recommended that spare parts be kept on-site. The following spare or replacement assemblies are available with this product line:

- Stage-1&2 assembly (SV12)—Contact your Woodward Customer Service Representative to establish the exact SV12 part number for your EHPS, and availability.
- Stage-3 assembly (SV32)—Contact your Woodward Customer Service Representative to establish the exact SV32 part number for your EHPS and availability.

Troubleshooting Guide

Malfunctions of the governing system are usually revealed as speed variations of the prime mover, but this does not necessarily mean that such speed variations indicate governing system problems. When improper speed variations appear, inspect all components, including the turbine, for proper operation. See the correct Woodward control manual for assistance in isolating the trouble.

The following steps describe troubleshooting the EHPS:

- If during the starting sequence, the EHPS exhibits a sluggish or slow response to electrical control input:
 1. Verify that the EHPS is receiving the correct supply oil pressure during transient movement.
 2. Verify that the EHPS supply oil filter is clean and not flow limited.
 3. Verify that the EHPS driver module (Servo Position Control) is dynamically adjusted for optimum performance. This can be performed, with the unit shutdown and turbine steam shut off, by using the control's valve demand signal to stroke the EHPS, to verify smooth, accurate, quick, stable, and repeatable operation.
 4. If supply oil pressure is verified to be within specification, but via stroking the EHPS it is proven not to operate correctly, it is recommend that the EHPS be repaired or overhauled.
 5. For product and service warranty purposes, it is required that only authorized Woodward field engineers perform field disassembly, repair, or calibration services.
 6. When requesting information or service help from Woodward, it is important to include in your communication the part number and serial number of the EHPS.

- If during the operation, the EHPS exhibits an unstable operation:
 1. Verify that the EHPS is receiving the correct supply oil pressure during transient movements.
 2. Verify that the EHPS supply oil filter is clean and not flow limited.
 3. With the unit shutdown and turbine steam off, via the control's valve demand signal, stroke the EHPS and verify smooth, accurate, and repeatable operation. (If proper EHPS operation is proven at this point troubleshoot other parts of the system for the stability problem.)
 4. If supply oil pressure is verified to be within specification, but via stroking the EHPS it is proven not to operate correctly, verify that the EHPS driver module (Servo Position Control) is dynamically adjusted for optimum performance. This can be performed, with the unit shutdown and turbine steam shut off, by using the control's valve demand signal to stroke the EHPS, to verify smooth, accurate, quick, stable, and repeatable operation.
 5. If supply oil pressure is verified to be within specification, but via stroking the EHPS it is proven not to operate correctly, it is recommend that the EHPS be repaired or overhauled.
 6. For product and service warranty purposes, it is required that only authorized Woodward field engineers perform field disassembly, repair, or calibration services.
 7. When requesting information or service help from Woodward, it is important to include in your communication the part number and serial number of the EHPS.

Chapter 6. Product Service

Product Service Options within the Warranty Period

Woodward Products covered under Woodward Product and Service Warranty (5-01-1205) are warranted to be free from defects in materials and workmanship, when installed and used in the manner for which they are intended, for a period of 18 months from the date of shipment from Woodward.

The following actions are recommended for servicing Woodward equipment, which experience unsatisfactory performance within the product warranty period:

- Consult the “Troubleshooting Guide” in Chapter 5 of this manual.
- Contact the OEM or Woodward channel partner who supplied the product for technical assistance, field service or replacement/exchange options. Refer to Woodward website (www.woodward.com/support/ic) for Woodward channel partner contact information.

OEM & Channel Partner Notes:

- For factory technical assistance, contact your local Woodward technical assistance center (specific contact information provided later in this chapter).
- For the following service options, contact your Woodward Customer Service Representative:
 - Replacement/Exchange product availability
 - Product Warranty and Repair services
 - Factory Field Service Engineer availability
 - Product Training Classes
 - Replacement / Spare Parts availability

Product Service Options after the Warranty Period

The following actions are recommended for periodical Woodward equipment service, or for units that demonstrate unsatisfactory performance after the product warranty period:

- Consult the Maintenance Chapter of this manual for recommended product service periods and actions, and to access the product “Troubleshooting Guide”.
- Contact the OEM who supplied the product or a Woodward channel partner for the following service options:
 - Flat Rate Repair
 - Flat Rate Remanufacture
 - Replacement/Exchange product availability
 - Special Repair Services
 - Factory Field Service Engineer availability
 - Product Training Classes
 - Replacement / Spare Parts availability

Refer to Woodward website (www.woodward.com/support/ic) for Woodward channel partner contact information.

- In emergency cases, contact Woodward technical assistance (specific contact information provided later in this chapter)

OEM & Channel Partner Notes:

- For factory technical assistance, contact your local Woodward technical assistance center (specific contact information provided later in this chapter).
- For the following service options, contact your Woodward Customer Service Representative:
 - Flat Rate Repair
 - Flat Rate Remanufacture
 - Replacement/Exchange product availability
 - Special Repair Services
 - Factory Field Service Engineer availability
 - Product Training Classes
 - Replacement / Spare Parts availability

Flat Rate Repair Program

Woodward's Flat Rate Repair program is available for the majority of standard products in the field. This program offers repair service for your products with the advantage of knowing in advance what the cost will be. All repair work carries the standard Woodward service warranty (Woodward Product and Service Warranty 5-01-1205) on replaced parts and labor.

Flat Rate Remanufacture Program

Woodward's Flat Rate Remanufacture program is applicable to mechanical products only, and is similar to the Flat Rate Repair program with the exception that the unit will be returned to you in "like-new" condition and carry with it the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205).

Replacement/Exchange Program

Woodward's Replacement/Exchange program is a premium program available for many of Woodward's standard products. This program is designed for the user who is in need of immediate service, and allows such users 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. This program also provides you with a "like-new" conditioned unit with a full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205).

This program allows you to call in the event of an unexpected outage, or in advance of a scheduled outage to request a replacement unit. If the unit is available at the time of the call, it can usually be shipped out within 24 hours. The field unit can then be replaced with a like-new replacement and the field unit returned to the Woodward facility.

Charges for the Replacement/Exchange service are based on a flat rate charge plus shipping expenses. You are invoiced the flat rate replacement/exchange charge plus a core charge at the time the replacement unit is shipped. If the core (field unit) is returned to Woodward within 60 days, Woodward will issue a credit for the core charge. [The core charge is the average difference between the flat rate replacement/exchange charge and the current list price of a new unit.]

To ensure prompt receipt of the Replacement/Exchange unit and avoid additional charges, the package must be properly marked. A Return Authorization Label is included with every Replacement/Exchange unit that leaves Woodward. When the returned unit is packaged for shipment to Woodward, the return authorization label must be affixed to the outside of the package. Without the return authorization label, receipt of the returned unit could be delayed resulting in the application of additional service charges.

Special Repair Services Program

If a Woodward Flat Rate Repair program does not exist for a specific product, or if a user desires not to utilize the Flat Rate Repair program, this program provides unit repair with charges based on a labor time and material cost basis. All repair work carries the standard Woodward service warranty (Woodward Product and Service Warranty 5-01-1205) on replaced parts and labor.

Replacement / Spare Parts

Refer to the Maintenance Chapter of this manual for a list of available replacement / spare parts. When ordering replacement parts for a product, include the following information:

- Unit part number(s) (XXXX-XXXX) that is on the enclosure nameplate
- Unit serial number, which is also on the nameplate

Returning Equipment to Woodward

If a product, or any part of the product, is to be returned to Woodward for repair, please contact Woodward in advance to obtain a Return Authorization Number. When shipping the item(s), attach a tag with the following information:

- Name and location where the control was installed
- Name and phone number of a site contact person
- All product part number(s) and serial number(s)
- Description of the problem
- Instructions describing the desired type of repair

Return Authorization Number

When returning equipment to Woodward, please telephone and ask for the Customer Service Department [1 (800) 523-2831 in North America or +1 (970) 482-5811]. They will help expedite the processing of your order through our distributors or local service facility. To expedite the repair process, contact Woodward in advance to obtain a **Return Authorization Number**, and to provide a purchase order for the repair services. No work can be started until a purchase order is received.

IMPORTANT

We highly recommend that you make arrangement in advance for return shipments. Contact a Woodward customer service representative at 1 (800) 523-2831 in North America or +1 (970) 482-5811 for instructions and for a Return Authorization Number.

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*.

How to Contact Woodward

In North America use the following address when shipping or corresponding:

Woodward Governor Company
 PO Box 1519
 1000 East Drake Rd
 Fort Collins CO 80522-1519, USA

Telephone—+1 (970) 482-5811 (24 hours a day)
 Toll-free Phone (in North America)—1 (800) 523-2831
 Fax—+1 (970) 498-3058

For assistance outside North America, call one of the following international Woodward facilities to obtain the address and phone number of the facility nearest your location where you will be able to get information and service.

<u>Facility</u>	<u>Phone Number</u>
Brazil	+55 (19) 3708 4800
India	+91 (129) 4097100
Japan	+81 (476) 93-4661
The Netherlands	+31 (23) 5661111

For a directory of, and contact information for, Woodward distributors and authorized service facilities go to www.woodward.com.

Engineering Services

Woodward Industrial Controls Engineering Services offers the following after sales support for Woodward products. For these services, you can contact us by telephone, by email, or through the Woodward website.

- Technical Support
- Product Training
- Field Service

Contact information:

Telephone—+1 (970) 482-5811

Toll-free Phone (in North America)—1 (800) 523-2831

Email—icinfo@woodward.com

Website—www.woodward.com

Technical Support is available through our many worldwide locations or our Recognized Turbine Retrofitters or authorized distributors, depending upon the product. This service can assist you with technical questions or problem solving during normal business hours. Emergency assistance is also available during non-business hours by phoning our toll-free number and stating the urgency of your problem. For technical support, please contact us via telephone, email us, or use our website as listed above and reference the **Technical Support** link.

Product Training is available at many of our worldwide locations (standard classes). We also offer customized classes, which can be tailored to your needs and can be held at one of our locations or at your site. This training, conducted by experienced personnel, will assure that you will be able to maintain system reliability and availability. For information concerning training, please contact us via telephone, email us, or use our website as listed above and reference the **Product Training** link.

Field Service engineering on-site support is available, depending on the product and location, from one of our many worldwide locations or from one of our authorized 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 field service engineering assistance, please contact us via telephone, email us, or use our website as listed above and reference the **Technical Support** link.

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication **26063D**.



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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.