



Product Manual 26306
(Revision J, 1/2015)
Original Instructions

Electric Liquid Metering Valve (ELMV)
Electric Water Metering Valve (EWMV)
Electric Liquid Bypass Valve (ELBV)

Installation and Operation Manual



General Precautions

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.



Revisions

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Proper Use

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.



Translated Publications

If the cover of this publication states "Translation of the Original Instructions" please note:

The original source of this publication may have been updated since this translation was made. Be sure to check manual **26455**, *Customer Publication Cross Reference and Revision Status & Distribution Restrictions*, to verify whether this translation is up to date. Out-of-date translations are marked with . Always compare with the original for technical specifications and for proper and safe installation and operation procedures.

Revisions—Changes in this publication since the last revision are indicated by a black line alongside the text.

Woodward reserves the right to update any portion of this publication at any time. Information provided by Woodward is believed to be correct and reliable. However, no responsibility is assumed by Woodward unless otherwise expressly undertaken.

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Warnings and Notices

Important Definitions



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.

- **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

**Overspeed /
Overtemperature /
Overpressure**

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.

WARNING

**Personal Protective
Equipment**

The products described in this publication may present risks that could lead to personal injury, loss of life, or property damage. Always wear the appropriate personal protective equipment (PPE) for the job at hand. Equipment that should be considered includes but is not limited to:

- Eye Protection
- Hearing Protection
- Hard Hat
- Gloves
- Safety Boots
- Respirator

Always read the proper Material Safety Data Sheet (MSDS) for any working fluid(s) and comply with recommended safety equipment.

WARNING

Start-up

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.

WARNING

**Automotive
Applications**

On- and off-highway Mobile Applications: Unless Woodward's control functions as the supervisory control, customer should install a system totally independent of the prime mover control system that monitors for supervisory control of engine (and takes appropriate action if supervisory control is lost) to protect against loss of engine control with possible personal injury, loss of life, or property damage.

NOTICE**Battery Charging
Device**

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.

Electrostatic Discharge Awareness

NOTICE**Electrostatic
Precautions**

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts:

- Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).
- Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.
- Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.

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*.

Follow these precautions when working with or near the control.

1. 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.
2. 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.

Regulatory Compliance

European Compliance for CE Marking:

These listings are limited only to those units bearing the CE Marking.

Low Voltage Directive (Motor): Declared to 73/23/EEC COUNCIL DIRECTIVE of 10 February 1973 on the harmonization of the laws of the Member States relating to electrical equipment designed for use within certain voltage limits.

EMC Directive: Declared to 2004/108/EC COUNCIL DIRECTIVE of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and all applicable amendments.

Pressure Equipment Directive (ELMV, ELBV): Certified to Pressure Equipment Directive 97/23/EC of 29 May 1997 on the approximation of the laws of the Member States concerning pressure equipment, Category II
TUV Rheinland Module H Certificate 01 202 USA/Q-11 6617

ATEX – Potentially Explosive Atmospheres Directive (Actuator): Declared to 94/9/EEC COUNCIL DIRECTIVE of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres.
Zone 2, Category 3, Group II G, Ex nA IIC T3 X Gc IP55

Other European and International Compliance:

Compliance with the following European Directives or standards does not qualify this product for application of the CE Marking:

Machinery Directive: Compliant as partly completed machinery with Directive 2006/42/EC of the European Parliament and the Council of 17 May 2006 on machinery.

Pressure Equipment Directive (EWMV): Compliant as “SEP” per Article 3.3 to Pressure Equipment Directive 97/23/EC of 29 May 1997 on the approximation of the laws of the Member States concerning pressure equipment.

GOST R: Certified for use in explosive atmospheres within the Russian Federation per GOST R certificate POCC US. МЛ14.В00192 as ExnAII T3 X

North American Compliance:

CSA (Actuator): CSA Certified for Class I, Division 2, Groups A, B, C, & D, T3 at 93 °C Ambient
For use in Canada and the United States
Certificate 1635932

Actuator is certified for North America as on-engine systems component connected to the certified Digital Valve Positioner.

Wiring must be in accordance with North American Class I, Division 2, or European Zone 2, Category 3 wiring methods as applicable, and in accordance with the authority having jurisdiction.

Special Conditions for Safe Use:

- Connect the ground terminal to earth ground.
- Maximum ambient temperature 93 °C (200 °F).
- Use supply wires suitable for 10 °C (18 °F) above surrounding ambient.

Compliance with the Machinery Directive 2006/42/EC noise measurement and mitigation requirements is the responsibility of the manufacturer of the machinery into which this product is incorporated.

 **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 or Zone 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 ou Zone 2.

Chapter 1.

General Information

Introduction

The Electric Liquid Metering Valve (ELMV), Electric Water Metering Valve (EWMV), and Electric Liquid Bypass Valve (ELBV) control the flow of liquid fuel and water to the combustion system of an industrial or utility gas turbine. The integral electric actuator consists of a brushless dc motor, resolver for motor commutation and position sensing, valve stem resolver for redundant position sensing, fail safe spring for fail-safe operation, and a soft stop for fail-safe operations. Later versions of these valves utilize a device (ID Module) containing all the configuration and calibration information that is read by the Digital Valve Positioner (DVP) when the valve/actuator is connected and powered up.

ELMV—The Electric Liquid Metering Valve (ELMV) controls the flow rate of liquid fuel to various stages of an industrial gas turbine combustion system. The unique design integrates the valve, actuator and a throttling regulator into a cost-effective, compact assembly. The valve is designed to provide a highly accurate flow-versus-stroke characteristic independent of pressure drop across the valve. The integral throttling regulator maintains a nearly constant pressure drop across the metering plug over a wide pressure range allowing the valve to directly meter flow. For applications requiring extreme accuracy the throttling regulator characteristics can be added to the control system to compensate for minor changes due to the total pressure drop across the valve.

EWMV—The Electric Water Metering Valve (EWMV) controls the flow rate of water to various stages of an industrial gas turbine combustion system. The valve is similar to the ELMV except that the throttling regulator is made from a specially selected ceramic to meet the harsh cavitation environment when controlling water across a high pressure drop.

ELBV—The Electric Liquid Bypass Valve (ELBV) controls the liquid fuel system pressure of an industrial gas turbine combustion system. The unique design integrates the valve, actuator and a cavitation control regulator into a cost-effective, compact assembly. The valve is designed to bypass fuel from the discharge side of the positive displacement pump in order to control system pressure. The integral regulator allows the valve to operate with a low outlet pressure and a high differential pressure without cavitation damage. The valve utilizes the common integrated actuator design as the other liquid valves but with a normally open valve configuration.

These valves are intended to operate only with a Woodward Digital Valve Positioner (DVP). Contact your sales person for part numbers for your specific applications.

ELMV, EWMV, and ELBV Specifications

Description	2" electrically actuated liquid fuel metering valve 2" electrically actuated water metering valve 2" electrically actuated liquid bypass valve
Mean Time Between Failure (MTBF)	149 000 hrs operation combined metering valve per valve/actuator/DVP/cable subsystem

ACTUATOR

Description	Brushless dc motor with dual position feedback sensors
Coil	Class H insulation
Failure Mode	Spring type to drive valve to safe position with loss of signal (Fail Close: ELMV & EWMV; Fail Open: ELBV)
Bandwidth	40 rad/s with no more than 6 dB attenuation and less than 180 degrees phase loss at $\pm 0.5\%$ to $\pm 2\%$ magnitude and minimum supply voltage at DVP
Response Time	Power slew rate = 500%/s (minimum) in the closed direction for the ELMV and EWMV and in the open direction for the ELBV, 100%/s (minimum) in the open direction for the ELMV and EWMV and in the closed direction for the ELBV
Visual Position Indication	Yes
Ambient Temperature Range	-40 to +93 °C (-40 to +200 °F)
Ingress Protection	IP55 per EN60529
Voltage (typical)	125 Vdc
Voltage (max)	152 Vdc
Voltage (min)	90 Vdc

VALVE

Operating Fluid	Diesel fuel, kerosene, or naphtha (lubricity = 0.825 mm wear scar diameter max per ASTM D5001) - filtered to 5~10 μm or demineralized water filtered to 20 μm
Connections	ANSI Class 900 # RF flanges
Nominal Piping Size	2"– DN 50 mm
Min Fluid Temperature	The greater of: -40 °C (-40 °F) and 11 °C (20 °F) above the wax point temperature at the supply pressure, or the temperature required to achieve fuel viscosity of 12 centistokes maximum
Max Fluid Temperature	66 °C (150 °F) ELMV and ELBV 121 °C (250 °F) EWMV
Max Pressure	14 893 kPa at 38 °C, 13 859 kPa at 66 °C, 12 204 kPa at 121 °C (2160 psid at 100 °F, 2010 psid at 150 °F, 1770 psid at 250 °F). Interpolate per ASTM B16.34 Table 2-2.2 or Table VII-2-2.2 for temperatures/pressures between these points.
Min Pressure	690 kPa (100 psig) for ELMV and EWMV 1724 kPa (250 psig) for ELBV
Proof Test Pressure	Production 22409 kPa (3250 psig) min
Overboard Leakage	1 cm ³ /min
Minimum Required ΔP	690 kPa (100 psid) ELMV and EWMV
ELBV Regulator Back Pressure	1103 kPa (160 psid) nominal 1034 kPa (150 psid) min at low flows 1379 kPa (200 psid) max at 757 L/min (200 US gal/min)
Approximate Weight	180 kg (400 lb)

ELMV Flow

Valve Maximum Cv: 20.8

Operating mode	Min Flow	Sub-Idle Flow	Max Flow
P1 (psig)	500	500	1200
P2 (psig)	15	55	1100
Flow (pph)	1000 (2.3 gpm)	2000 (4.7 gpm)	49,425 (116 gpm)
Plug dP (psid)	53	51	39
Plug Cv	0.3	0.6	17.1
Valve Stroke (%)	13%	17%	82%
Accuracy (% of point)	±10.00%	±5.00%	±5.00%

Typical diesel fuel properties used in calculations (0.85 SG)

EWMV Flow

Valve Maximum Cv: 20.8

Operating mode	Min Flow	Sub-Idle Flow	Max Flow
P1 (psig)	1200	1200	1200
P2 (psig)	15	55	1100
Flow (pph)	1150 (2.3 gpm)	2300 (4.6 gpm)	60,000 (120 gpm)
Plug dP (psid)	60	59	45
Plug Cv	0.3	0.6	17.9
Valve Stroke (%)	13%	17%	84%
Accuracy (% of point)	±10.00%	±5.00%	±5.00%

Typical water properties used in calculations (1.0 SG)

ELBV Flow

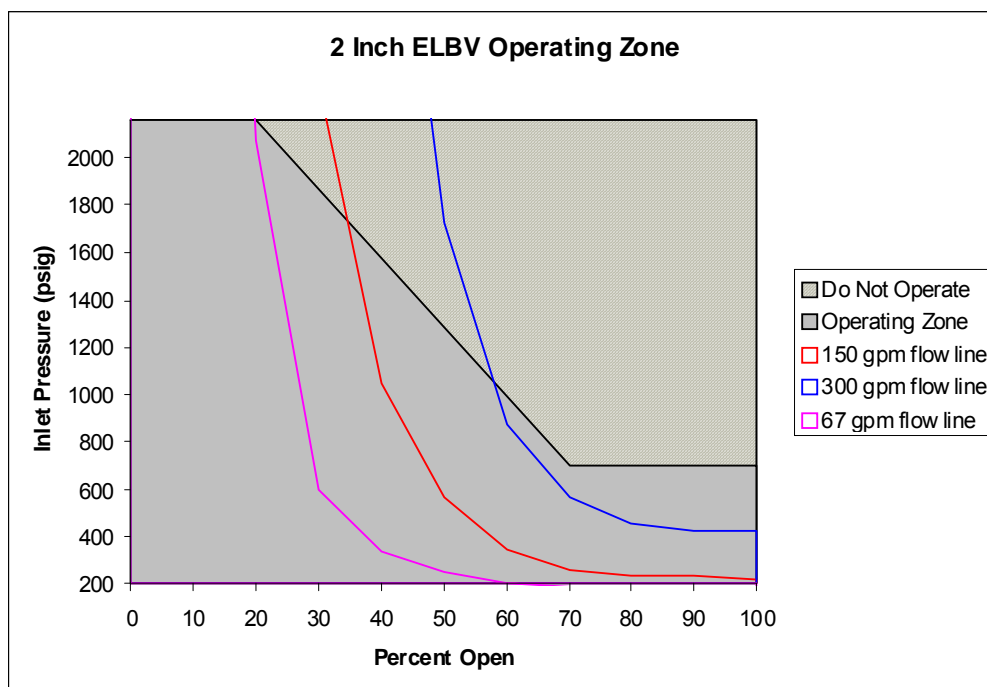
Valve Maximum Cv: 18.7

Operating mode	Min Flow	Max Flow
P1 (psig)	1200	350
P2 (psig)	0	50
Flow (USGPM)	10 max*	200
Regulator Back Pressure (psid)	160	183
Cage dP	1040	117
Cage Cv	N/A*	17
Valve Stroke (%)	0%	79%

Typical diesel fuel properties used in calculations (0.85 SG)

* Flow dominated by fluid viscosity (0.5 to 12 cSt)

2 Inch ELBV Operating Range: The 2 Inch ELBV is a contoured plug valve. Actuation forces for this type of valve are a function of inlet pressure and valve position. Actuation forces can become very large if the inlet pressure is very high at high valve openings (these large forces tend to open the valve). This is not expected to occur when this valve is used to control fuel system pressure from a positive displacement pump for a turbine. The flow (Percent Open) through the ELBV is typically only high at low system pressures during startup and as the system pressure increases to provide flow to the turbine the ELBV flow is decreased. Additionally, positive displacement pumps cannot maintain high pressures at high flows. This operating range should be considered if the valve is used for some other application. The outlet pressure from the valve is assumed to be low at all times (< 50 psig). If this is not the case the inlet pressure can be replaced with the valve differential pressure in the table below.





Woodward

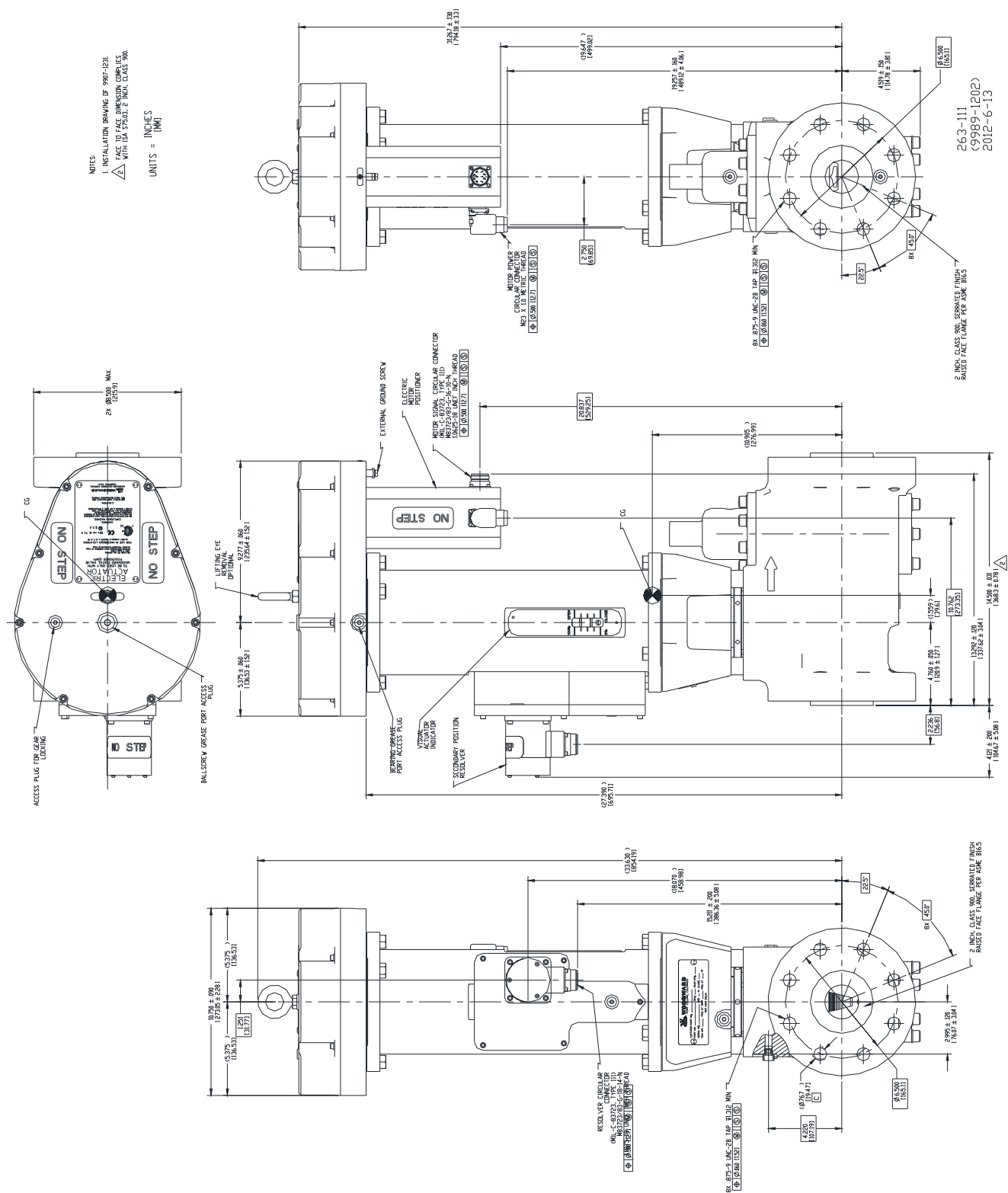


Figure 1-2. Outline Drawing (2" EWMV)

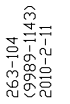


Figure 1-3. Outline Drawing (2" ELBV)

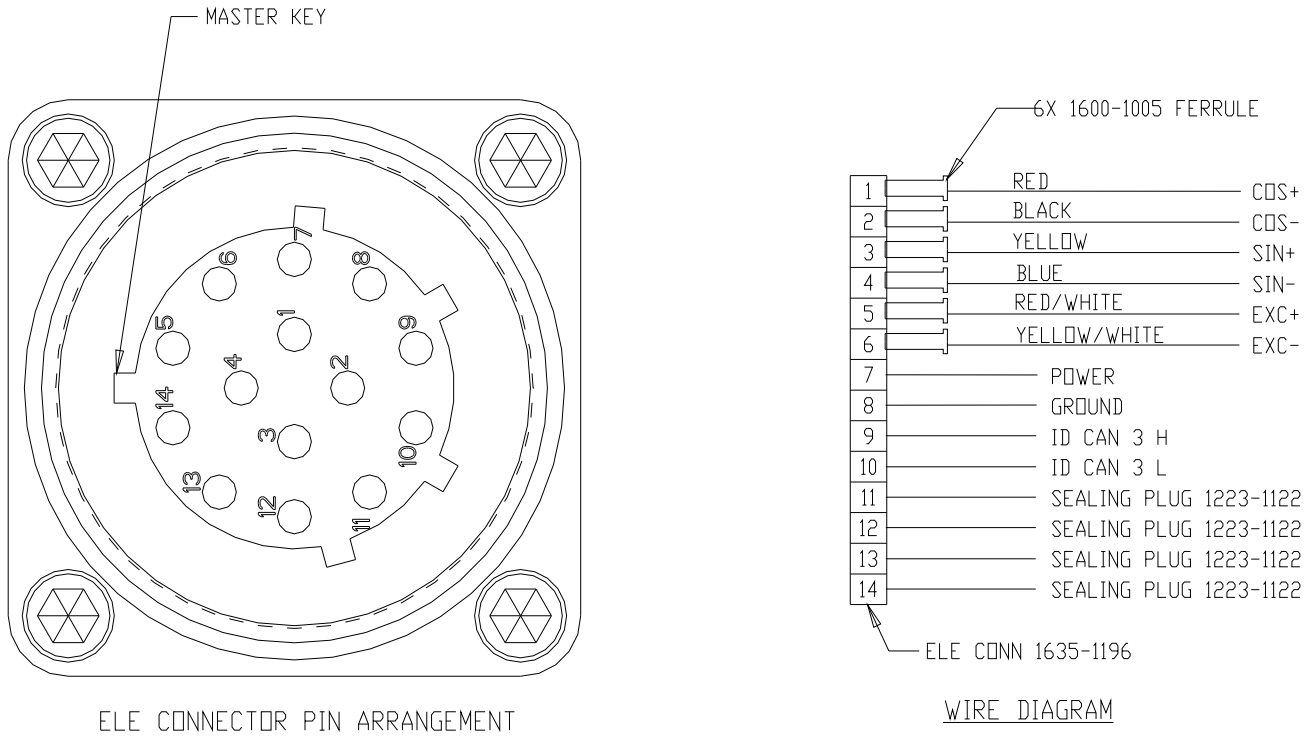
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Figure 1-4a. Valve Stem Resolver Wiring Diagram (All Valves)

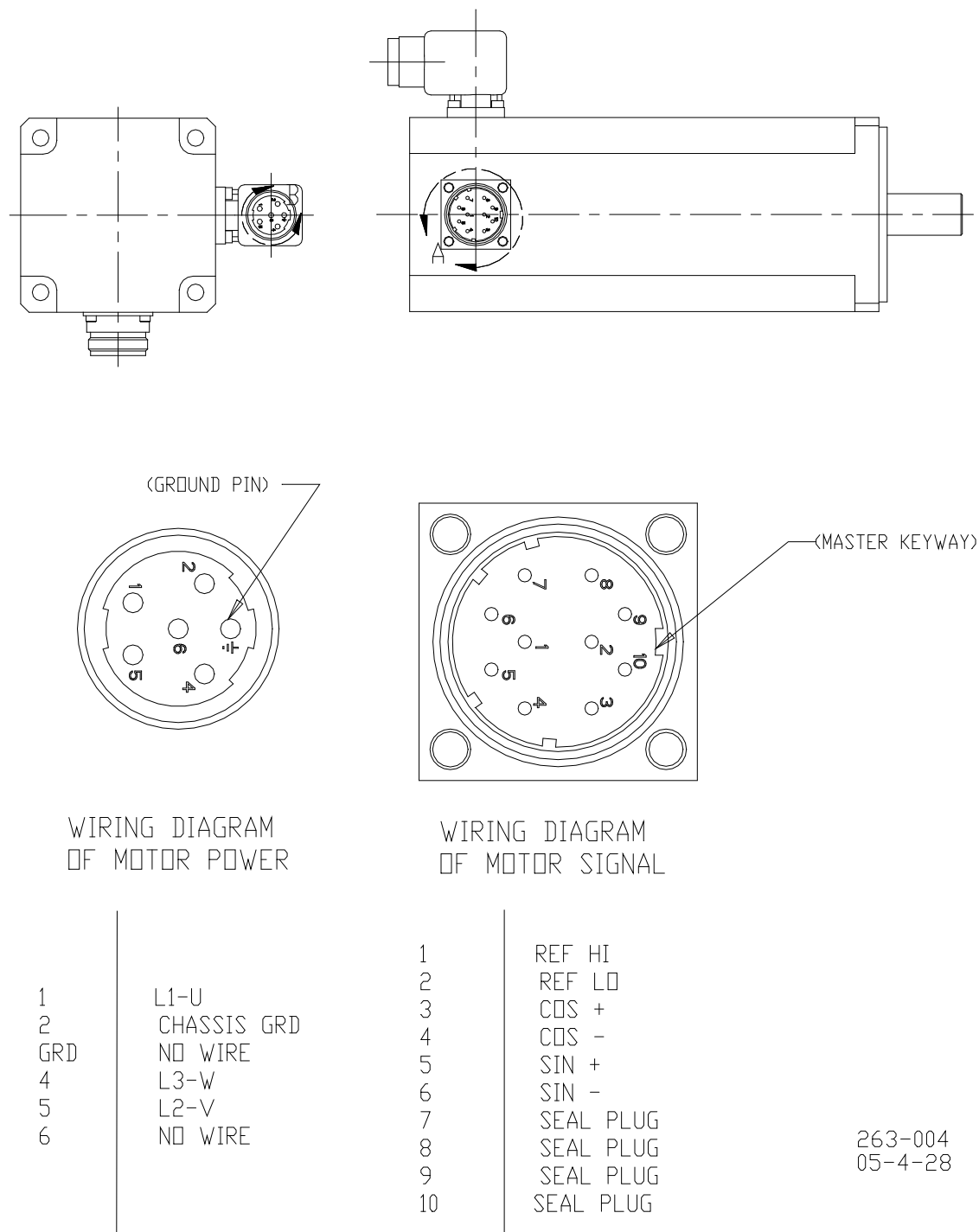


Figure 1-4b. Motor and Motor Resolver Wiring Diagram (All Valves)

Chapter 2. Description

Electrical Mechanical Actuator Assembly

The electrical-mechanical actuator consists of a brushless dc motor that provides torque, an integral resolver for motor commutation and position feedback to the controller, a valve stem resolver for motor resolver verification, and a high-efficiency ball screw for rotary-to-linear motion conversion. The actuator also contains a fail-safe spring designed to extend the actuator if power is removed from the actuator.

- A soft-stop spring to dissipate motor rotor inertia during fail-safe shutdown and prevent ball screw damage
- A cam follower to provide opposing torque during slew operations
- A lifting eye to aid installation

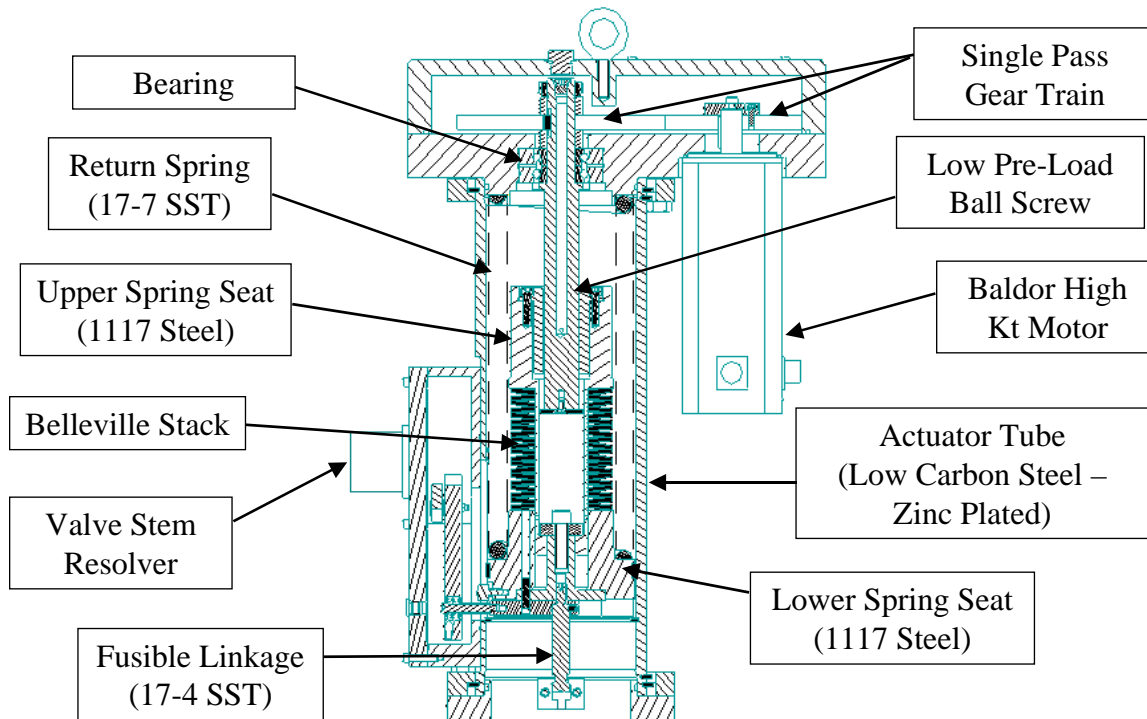


Figure 2-1. Electrical-Mechanical Actuator

Brushless DC Motor

The actuator uses a permanent magnet, electrically commutated, brushless dc motor. The components used in the motor are rated for service from -40 to $+155$ $^{\circ}\text{C}$ (-40 to $+311$ $^{\circ}\text{F}$). The motor is a permanently lubricated assembly with a sealed enclosure rating of IP 55.

Resolver Position Feedback Sensors

The primary position feedback transducer is the resolver that is integral to the dc brushless motor. The actuator also has a valve stem resolver. This resolver is used as a watchdog function of the primary motor control, to prevent runaway conditions, and to ensure that the primary motor resolver is reading correctly. Linear shaft motion is converted to angular rotation for the valve stem resolver through a linkage. Parameter files are loaded onto the DVP to specifically match the valve characteristics in order to obtain the most accurate position sensing.

Soft Stop Spring

Integral to the actuator is a soft stop spring. This provides a bumper-like action if the actuator is driven hard into the fully extended position. This will occur only on loss of power, certain wiring faults, and in rare cases, internal fault conditions within the positioner. The soft stop mechanism is not used when the positioner is controlling the actuator. Although the positioner will rapidly drive the actuator toward the minimum position, it also decelerates the actuator as the actuator approaches the mechanical minimum stop. Under the control of the positioner, the actuator should not reach the mechanical minimum stop at a high velocity.

Valve

All valve configurations share a common modular design consisting of a flow metering section and a pressure regulating section. The metering valves (ELMV and EWMV) use a throttling regulator to maintain a constant differential pressure across the flow metering section for accurate flow metering while the bypass valve (ELBV) uses a pressure increasing regulator for cavitation mitigation. The metering sections of the valves control the flow schedule as required for the specific valve application.

The metering section of each valve consists of a housing, plug, seat, sleeve, and bonnet. The metering elements of this valve are a contoured plug and a matching seat. The plugs in the metering valves (ELMV and EWMV) are contoured to provide an approximately equal percent flow characteristic. These valves are designed to provide a highly accurate effective area. The metering section of the bypass valve (ELBV) is contoured to provide the opposite flow characteristic to the metering valves. This opposite flow characteristic allows the bypass valve to have a fail-safe open feature while the metering valves have a fail-safe close feature.

The regulator section of each valve consists of a piston, sleeve, spring(s), and covers. In the metering valves the spring and intermediate pressure balances the inlet pressure across the piston in order to maintain a constant differential pressure across the metering section. The regulator in the water metering valve is made from a specially selected ceramic to meet the harsh cavitation environment when controlling water across a high pressure drop. In the bypass valve the springs and outlet pressure balance the intermediate pressure across the piston in order to maintain sufficient backpressure to the metering section for cavitation mitigation.

Highly accurate position sensing and control permit for all valves to achieve extremely accurate flow control. Each valve is flow tested before shipment.

Shaft seals are elastomer energized PTFE. There is no packing that would require periodic maintenance or compression checks.

Chapter 3. Installation

General

See the outline drawings (Figures 1-1, 1-2, 1-3) for:

- Overall dimensions
- Process piping flange locations
- Electrical connections
- Lift points and center of gravity

Installation attitude does not affect actuator or fuel valve performance, but a vertical position is generally preferred to conserve floor space as well as ease of making electrical and fluid connections. The valves are designed for support by the piping flanges alone; additional supports are neither needed nor recommended. Do not use this valve to provide support to any other component in the system. The piping should be aligned and adequately supported such that excessive piping loads are not transmitted to the valve body.

WARNING

Due to typical noise levels in turbine environments, hearing protection should be worn when working on or around the Electric Metering or Bypass Valves.

WARNING

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

External fire protection is not provided in the scope of this product. It is the responsibility of the user to satisfy any applicable requirements for their system.

Piping Installation

Refer to ANSI B16.5 for details of flange, gasket, and bolt types and dimensions. Verify that the process piping face-to-face dimensions meet the requirements of the outline drawings (Figures 1-1, 1-2, 1-3) within standard piping tolerances. The valve should mount between the piping interfaces such that the flange bolts can be installed with only manual pressure jacks applied to align the flanges. Mechanical devices such as hydraulic or mechanical jacks, pulleys, chain-falls, or similar equipment should never be used to force the piping system to align with the valve flanges.

ASTM/ASME grade bolts or studs should be used to install the valve into the process piping. The length and diameter for Class 900 flanges shall conform to the following table according to the valve flange size.

Nominal Pipe Size	Number of Bolts	Diameter of Bolts	Stud Length	Machine Bolt Length
51 mm/ 2 inch	8	22 mm/ 7/8 inch	114.3 mm/ 4.5 inch	82.55 mm/ 3.25 inch

Flange gasket materials should conform to ANSI B16.20. The user should select a gasket material which will withstand the expected bolt loading without injurious crushing, and which is suitable for the service conditions.

When installing the valve into the process piping, it is important to properly torque the studs/bolts in the appropriate sequence in order to keep the flanges of the mating hardware parallel to each other. A two-step torque method is recommended. Once the studs/bolts are hand-tightened, torque the studs/bolts in a crossing pattern to half the torque value listed in the following table. Once all studs/bolts have been torqued to half the appropriate value, repeat the pattern until the rated torque value is obtained.

Bolt Size	Torque
22 mm/ 7/8 inch	508–529 N·m/ 375–390 lb·ft/

Electrical Connections



WARNING

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

NOTICE

Do not connect any cable grounds to “instrument ground”, “control ground”, or any non-earth ground system. Make all required electrical connections based on the wiring diagrams (Figures 1-4a and 1-4b).

This product is designed for use with three specific General Electric cables that connect the DVP to the valve/actuator assembly. These cables must be used for the system to meet all CSA, ATEX, EMC, and LVD requirements. Make sure that the cable connectors are fully engaged and tightened.

Process Fluid Vent Port

There is a process fluid vent port that must be vented to a safe location. In normal operation, this vent should have very low leakage. However, if excessive leakage is detected from this vent port, contact a Woodward representative for assistance. NEVER PLUG THE VENT PORT. Plugging the fuel vent port may cause the valve to malfunction or operate improperly. The process fluid vent port connection is in a different physical location in the water metering valve (EWMV) as compared to the fuel metering valve (ELMV) and the bypass valve (ELBV). The difference in locations is depicted in the outline drawings (Figures 1-1 through 1-3).

The vent system must never produce more than 50 psig (345 kPa) backpressure to the valve vent ports. The maximum leakage through the vent ports upon complete seal failure is 9 US gal/min (34 L/min) with a fluid supply pressure of 1340 psig (9239 kPa) (11 US gal/min at 2160 psig) (42 L/min at 14 893 kPa). The vent system tubing should be sized such that the failure of one valve seal system will not produce excessive pressure on any valve connected to the same vent system.

Valve Characteristic Data

Flow testing is conducted on every metering valve before shipment. Results from this flow testing produce flow characteristics of the valve. Each valve must demonstrate predetermined flow characteristics before it can be shipped.

Calibration

The actuator and positioner perform an automatic rigging procedure. When the actuator positioner is activated, it performs an automatic rigging procedure that checks system health and verifies the valve is in the proper position. No additional steps are required from the operator.

Valve/Actuator Configuration Settings

The Digital Valve Positioner (DVP) must be configured with the proper settings for the valve/actuator to which it will be connected. Modification of these settings is performed via the PC Service Tool. A list of the required settings and their descriptions are given below. A more comprehensive overview of the DVP and PC Service Tool is given in the DVP manual.

Newer valves utilize a device (ID Module) containing all the configuration and calibration information that is read by the Digital Valve Positioner (DVP) when the valve/actuator is connected and powered up. Initial configuration settings for the valve/actuator do not need to be entered into the DVP due to the ID Module communicating directly with the positioner. However, in the event the configuration settings must be entered manually, either due to having a legacy version or in the unlikely event the ID Module is not functioning correctly, the following instructions can be used to add the necessary configuration settings for these valves into the DVP. Please see the DVP manual for more details and Service Tool instructions.

Flow Rig Offset:

Flow testing is conducted on every valve prior to shipment. Results from this flow testing produce effective area characteristics of the valve. A reference effective area is checked for each S/N valve and the difference in stroke required to match the test unit's flow performance to the nominal valve performance is determined. This difference value is the Flow Rig Offset. This value corrects for unit/unit variation in flow performance (particularly low flow positions). This value must be entered for each unit using the DVP Service Tool.

Example: An EGMV (Electric Gas Metering Valve) 0.6 in² valve is flow rigged at a reference Effective area of 0.02108 in². The nominal map indicates that this should occur at 3% stroke. During flow testing, this effective area is found at 3.12% travel. The difference is +0.12. Therefore the Flow Rig Offset value for this particular S/N is +0.12%.

Motor Resolver Offset:

Each valve/actuator has a somewhat unique motor resolver reading at the 0% position. This value is determined and recorded for each valve/actuator system during production testing. For multi-turn motor operated actuators, incremental positions above 0% are determined by counting the number of turns from this reference position. For limited angle actuators, the position will be scaled based on a specified range of a single rotation above this offset value. This value is specific for each S/N and must be entered using the DVP Service Tool.

Feedback 1 and Feedback 2 Start-up Range Settings:**Min. and Max. Current Settings:**

During the start-up check for 3-phase actuators, the positioner performs a sequence of pre-start checks. A controlled current level is applied in both the open and closed directions. The current setting results in a torque sufficient to move the actuator (to remove any geartrain backlash), but not enough to overcome the spring preload. As a result, the valve remains in its seated (0%) position. During each reset, the 0% motor resolver reading and the backlash in the geartrain is measured and compared against the upper and lower limit values. If the actuator does not repeat the 0% position, or if too much backlash is measured (within the specified limits), a start-up fault will occur and will be annunciated.

The amount of motor current applied is dependent on two variables: the gear ratio and motor torque constant Kt. The table below lists the appropriate motor current for each actuator set-up.

Start-up Current Setting (Amps)	
1.5:1 Gears	3:1 Gears
2.000	1.000

P/N Specific Settings:**Motor Turns:**

The value of this parameter determines the number of turns the motor makes to travel to full stroke. This value is dependent upon the type of valve and the gear ratio of the actuator. The table below lists the appropriate motor turns for each actuator-valve set-up. This value is determined by uploading the correct parameter file for the application.

NOTICE

If this value is incorrectly set, the performance of the valve will not match the specified characteristics. Also, if the valve stroke parameter is too large for the given application, damage to the valve or operated load may occur.

Physical Stroke and Motor Rotations at 100%			
Product Type	Body/Trim Classification	Stroke Range (in)	Min to Max Turns 1.5:1 Gear Ratio
EGMV *	2" Class 600 ACd - 0.6 in ²	1.500	9.525
	3" Class 600 ACd - 3 in ²	2.000	12.700
ELMV	2" Class 900 Cv - 20.71	1.500	9.525
EWMV	2" Class 900 Cv - 20.71	1.500	9.525
ELBV	2" Class 900 Cv - 18.7	1.500	9.525

*—EGMV = Electric Gas Metering Valve

Zero Cut-off Settings:

When the Zero Cut-off function is enabled from the mode selection, position control is disabled when the demand setpoint drops below the Lower Limit setting and remains below this value for the value specified by the time delay. While in the zero-cutoff mode, the return spring applies the required force on the valve closure element to minimize seat leakage. With the spring providing proper closing force, there is virtually no variation of seat leakage over temperature. When the demand setpoint exceeds the Upper Limit setting, the valve resumes normal position control. There is no time delay when switching out of the zero-cutoff mode. The recommended values indicated in the table below are based on typical application requirements, however the user can modify the zero-cutoff settings if necessary using the settings wizard.

IMPORTANT

If the Zero-cutoff function is disabled, there may be noticeable variation in valve leakage at the 0% setpoint. This is a result of thermal expansion effects, which can change effective loading on the seat when the device is in closed-loop control at or near 0% setpoint.

Recommended Zero Cut-off Settings			
Product Type	Body/Trim Classification	Low Limit Setting	High Limit Setting
EGMV	2" Class 600 ACd - 0.6 in ²	0.25%	0.75%
	3" Class 600 ACd - 3 in ²	2.00%	4.00%
ELMV	2" Class 900 Cv - 20.71	4.00%	6.00%
EWMV	2" Class 900 Cv - 20.71	11.00%	13.00%
ELBV	2" Class 900 Cv - 18.7	Inactive	

Secondary Feedback Calibration:

The secondary feedback system provides a second verification of actuator position. For three-phase, geared ball screw actuators, this secondary resolver is installed at the output of the linear actuator. The secondary feedback system includes a linkage to the rotary resolver transducer. To accurately convert the rotary reading of the resolver to the linear displacement of the actuator unit a calculation is used which requires unit specific angles and linkage lengths which are determined during production testing. The calibration values of a given S/N are listed in the secondary feedback calibration block of variables.

Chapter 4.

Maintenance and Hardware Replacement

Maintenance

The only maintenance required for the Electric Metering or Bypass Valves is lubricating the ball screw and bearings every 12 months, in accordance with the descriptions below.

Should any of the standard components of the valve become inoperative, field replacement is possible. Contact the turbine manufacturer (primary contact) or Woodward (secondary contact) representative for assistance. Do not attempt to service the return spring.

Hardware Replacement

WARNING

EXPLOSION HAZARD—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 valve and actuator before beginning any maintenance or repairs.

WARNING

Lift or handle the valve only by using the eyebolts.

WARNING

Due to typical noise levels in turbine environments, hearing protection should be worn when working on or around the Electric Metering or Bypass Valves.

WARNING

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.

To facilitate field replacement of items, spare parts should be kept on-site. See the outline drawings (Figures 1-1, 1-2, 1-3) for the locations of items. Contact Woodward for a complete list of field-replaceable parts and additional instructions for their replacement.

NOTICE

Use only Woodward-approved grease to lubricate the ball screw and bearing in this actuator. Use of any other grease will reduce performance and reliability. Woodward lubrication kits are available as part number 8923-1186.

Ball Screw Lubrication Procedure

Lubricating the Ball Screw Assembly

1. Clean the outside of the actuator to ensure that no debris gets inside the actuator during the lubrication process. Any debris on the ball screw will reduce its life.
2. Remove the ball screw access plug located on the top of the gear cover with a 5/16 inch hex wrench (Figure 4-1).
3. Remove the ball screw port plug with a 3/16 inch hex wrench (Figure 4-2).
4. Set the ball screw access and port plugs aside and keep clean, ensuring that they are not scratched or marred.
5. Attach the thread connector of the grease syringe to the threaded grease port of the ball screw. The fitting should be fully seated (Figure 4-3).
6. Inject 2 cm³ of Woodward approved grease (8923-1186) into the ball screw grease port.
7. Remove the grease syringe from the ball screw grease port and install the ball screw port plug. Do not torque the port plug (Figure 4-4).
8. Remove the plug that is adjacent to the ball screw port, set aside, and keep clean, ensuring that the plug is not scratched or marred (Figure 4-5).
9. Using a permanent marker or tape, mark a 5/32 inch Allen wrench at 2.75 inches from the bottom. Make sure the top of the marking is at 2.75 inches (Figure 4-6).
10. Insert the Allen wrench into the port located adjacent to the ball screw port. The Allen wrench is seated if the marking is below the top surface of the gear cover (Figure 4-7).
11. If the Allen wrench is not seated, rotate the gears using a 3/16 inch hex wrench on the ball screw port plug and rotate clockwise until the 5/32 inch Allen wrench is seated.
12. Once the 5/32 inch Allen wrench is seated, torque the ball screw port plug to 38–42 lb-in (4.3–4.7 N·m) (Figure 4-8).
13. Remove the 5/32 inch Allen wrench from the port, install the plug into the port located adjacent to the ball screw port, and torque to 38–42 lb-in (4.3–4.7 N·m) (Figure 4-9).
14. Install the ball screw access plug and torque to 145–155 lb-in (16.4–17.5 N·m) (Figure 4-10).



Figure 4-1



Figure 4-2

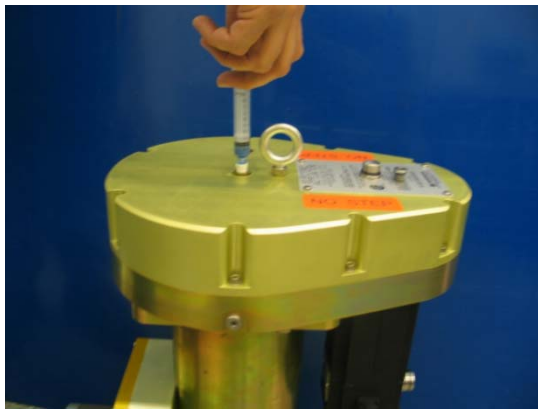


Figure 4-3



Figure 4-4



Figure 4-5



Figure 4-6

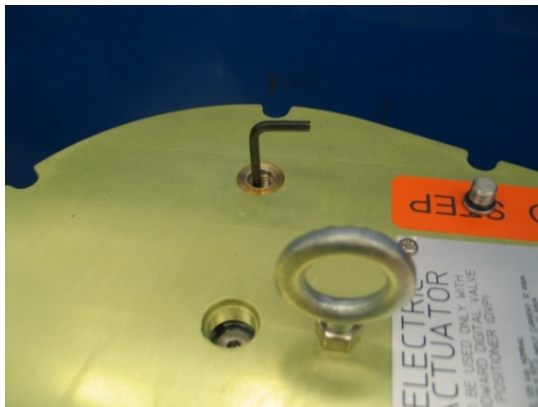


Figure 4-7



Figure 4-8



Figure 4-9



Figure 4-10

Bearing Lubrication Procedure

Lubricating the Bearing Assembly

1. Clean the outside of the actuator to ensure that no debris gets inside the actuator during the lubrication process. Any debris in the bearing will reduce its life.
2. Remove the bearing port plug with a 3/16 inch hex wrench (Figure 4-11).
3. Set the plug aside and keep clean, ensuring that the inside plug surface is not scratched or marred.
4. Attach the thread connector of the grease syringe to the threaded bearing grease port. The fitting should be fully seated (Figure 4-12).
5. Inject 2 cm³ of Woodward approved grease into the bearing grease port.
6. Remove the grease syringe from the bearing port and install the bearing port plug. Torque to 38–42 lb-in (4.3–4.7 N·m) (Figure 4-13).



Figure 4-11

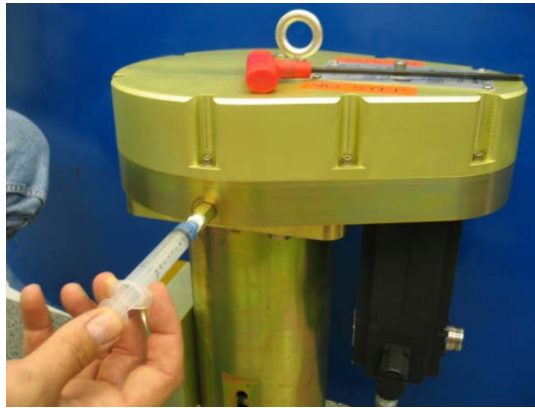


Figure 4-12



Figure 4-13

Chapter 5.

Troubleshooting

Faults in the fuel control or governing system are often associated with speed variations of the prime mover, but such speed variations do not always indicate fuel control or governing system faults. Therefore, when improper speed variations occur, check all components, including the engine or turbine, for proper operation. Refer to the applicable electronic control manuals for assistance in isolating the trouble. The following steps describe troubleshooting for the control valves.

Disassembly of the control valve in the field is not recommended due to the dangerous forces contained in the springs. Under unusual circumstances, where disassembly becomes necessary, all work and adjustments should be made by personnel thoroughly trained in the proper procedures.

When requesting information or service help from Woodward, it is important to include the part number and serial number of the valve assembly in your communication.

Symptom	Possible Causes	Remedies
Valve will not move because positioner will not reset	Motor wires not properly connected between positioner and actuator	Connect wires according to diagram in this manual. Conduct continuity check.
	Resolver wires not properly connected between positioner and actuator	Connect wires according to diagram in this manual. Conduct continuity check.
Positioner will reset but valve will not move	Resolver sine wires high and low are flipped	Connect wires according to diagram in this manual. Conduct continuity check.
	Resolver cosine wires high and low are flipped	Connect wires according to diagram in this manual. Conduct continuity check.
	Resolver sine and cosine wires are swapped	Connect wires according to diagram in this manual. Conduct continuity check.
Upon enabling, valve will move and then return to fail-safe position	Resolver sine and cosine wires are swapped, and sine wires high and low are flipped	Connect wires according to diagram in this manual. Conduct continuity check.
	Resolver sine and cosine wires are swapped, and cosine wires high and low are flipped	Connect wires according to diagram in this manual. Conduct continuity check.
Poor flow accuracy	Characterization data in engine control does not match the valve	Verify characterization data matches the valve serial number.
	Build-up of contamination on the seat	Remove valve and inspect flow elements.
	Regulator spring out of adjustment	Return valve to Woodward for service.
	Regulator spring broken	Return valve to Woodward for service.
	Regulator piston stuck	Return valve to Woodward for service.
	Regulator worn	Return valve to Woodward for service.
Poor position stability	One motor wire disconnected	Connect wires according to diagram in this manual. Conduct continuity check.

Symptom	Possible Causes	Remedies
Valve stem resolver indicates position error	Incorrect parameter file loaded	Verify the parameter file matches the valve serial number.
	Valve stem resolver wires not properly connected between DVP and actuator	Contact manufacture for instructions or return to manufacturer for repair.
	Faulty resolver	Return to manufacturer for repair.
	Drive train failure	Return to manufacturer for repair.
High overboard vent leakage	Internal seals damaged	Return to manufacturer for repair.
High minimum flow	Damage to valve seat or plug	Remove valve and inspect flow elements. Return to manufacturer for repair.
	Contamination buildup in seat or plug	Remove valve and inspect flow elements. Return to manufacturer for repair.
	Valve not fully closed	Remove valve and verify plug is not properly seated. Return to manufacturer for repair.
	Regulator spring out of adjustment	Return valve to Woodward for service.
	Regulator piston stuck	Return valve to Woodward for service.
	Regulator worn	Return valve to Woodward for service.
External leakage	Piping flange gaskets missing or deteriorated	Replace gaskets.
	Piping flanges improperly aligned	Rework piping as needed to achieve alignment requirements detailed in Chapter 3.
	Piping flange bolts improperly torqued	Rework bolts as needed to achieve torque requirements detailed in Chapter 3.
	Packing missing or deteriorated	Return actuator to Woodward for service.

Chapter 6.

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:

- Consult the troubleshooting guide in the manual.
- Contact the manufacturer or packager of your system.
- Contact the Woodward Full Service Distributor serving your area.
- Contact Woodward technical assistance (see “How to Contact Woodward” later in this chapter) and discuss your problem. In many cases, your problem can be resolved over the phone. If not, you can select which 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 Turbine Retrofitter (RTR)** is an independent company that does both steam and gas turbine control retrofits and upgrades globally, and can provide the full line of Woodward systems and components for the retrofits and overhauls, long term service contracts, emergency repairs, etc.

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

Product Service Options

The following factory options for servicing Woodward products are available through your local Full-Service Distributor or the OEM or Packager of the equipment system, based on the standard Woodward Product and Service Warranty (5-01-1205) that is in effect at the time the product is originally shipped from Woodward or a service is performed:

- 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 is a flat-rate program and includes the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205).

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.

Charges for the Replacement/Exchange service are based on a flat rate 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 within 60 days, a credit for the core charge will be issued.

Flat Rate Repair: Flat Rate Repair is available for the majority of standard 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. 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: 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 and carry with it the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205). 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 authorization 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 offers various Engineering Services for our products. For these services, you can contact us by telephone, by email, or through the Woodward website.

- 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. Emergency assistance is also available during non-business hours by phoning Woodward and stating the urgency of your problem.

Product Training is available as standard classes at many of our worldwide locations. 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.

Field Service engineering on-site support is available, depending on the product and location, from many of our worldwide locations or 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 us via telephone, email us, or use our website: www.woodward.com.

Contacting Woodward's Support Organization

For the name of your nearest Woodward Full-Service Distributor or service facility, please consult our worldwide directory at www.woodward.com/directory, which also contains the most current product support and contact information.

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		Products Used in Engine Systems		Products Used in Industrial Turbomachinery Systems	
<u>Facility</u>	<u>Phone Number</u>	<u>Facility</u>	<u>Phone Number</u>	<u>Facility</u>	<u>Phone Number</u>
Brazil	+55 (19) 3708 4800	Brazil	+55 (19) 3708 4800	Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727	China	+86 (512) 6762 6727	China	+86 (512) 6762 6727
Germany:		Germany	+49 (711) 78954-510	India	+91 (129) 4097100
Kempen	+49 (0) 21 52 14 51	India	+91 (129) 4097100	Japan	+81 (43) 213-2191
Stuttgart	+49 (711) 78954-510	Japan	+81 (43) 213-2191	Korea	+82 (51) 636-7080
India	+91 (129) 4097100	Korea	+82 (51) 636-7080	The Netherlands	+31 (23) 5661111
Japan	+81 (43) 213-2191	The Netherlands	+31 (23) 5661111	Poland	+48 12 295 13 00
Korea	+82 (51) 636-7080	United States	+1 (970) 482-5811	United States	+1 (970) 482-5811
Poland	+48 12 295 13 00				
United States	+1 (970) 482-5811				

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 _____

Turbine Model Number _____

Type of Fuel (gas, steam, 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.

Revision History

Changes in Revision J—

- Updated Declaration of Incorporation

Changes in Revision H—


- Updated Regulatory Compliance information and Declarations

Changes in Revision G—

- Updated EWMV outline drawing (Figure 1-2)
- Updated information about Process Fluid Vent Port (page 13)

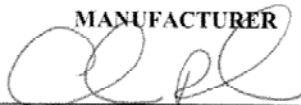
Declarations

DECLARATION OF CONFORMITY

DoC No.: 00269-04-EU-02-05.DOCX
Manufacturer's Name: WOODWARD, INC
Manufacturer's Address: 1000 E. Drake Rd., Fort Collins, CO, USA, 80525
Model Name(s)/Number(s): Electric Liquid Fuel Metering and Bypass Valves, with and without ID Module
Conformance to Directive(s): 97/23/EC COUNCIL DIRECTIVE of 29 May 1997 on the approximation of the laws of the Member States concerning Pressure Equipment
 94/9/EC COUNCIL DIRECTIVE of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres
 For models with ID Module:
 2004/108/EC COUNCIL DIRECTIVE of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and all applicable amendments.
Marking:  Category 3 Group II G, Ex nA IIC T3X Gc IP55
Applicable Standards: ASME B31.3 Process Piping, 2008
 ASME Boiler and Pressure Vessel Code VIII, Div. 1, 2007/A08
 ASME Boiler and Pressure Vessel Code II, Part D, 2007/A08
 EN 1503-2 : 2000 Valves – Materials for bodies, bonnets, and covers – Part 2 : Steels other than those specified in European Standards
 EN60079-0, 2012: Electrical apparatus for explosive gas atmospheres – Part 0: General Requirements
 EN60079-15, 2010: Electrical apparatus for explosive gas atmospheres – Part 15: Type of protection 'n'
 EN 61000-6-4, 2007: EMC Part 6-4: Generic Standards - Emissions for Industrial Environments
 EN 61000-6-2, 2005: EMC Part 6-2: Generic Standards - Immunity for Industrial Environments
Conformity Assessment: PED Module H – Full Quality Assurance, Certificate 01 202 USA/Q-11 6617
Notified Body TUV Rheinland Industrie Service GmbH (0035)
For Pressure Equipment: Am Grauen Stein, D-51105 Köln

This declaration of conformity is issued under the sole responsibility of the manufacturer.
 We, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s).

MANUFACTURER



Signature

Christopher Perkins

Full Name

Engineering Support Manager

Position


Woodward, Inc., Fort Collins, CO, USA

Place

10-DEC-2013

Date

DECLARATION OF CONFORMITY

DoC No.: 00269-04-EU-02-06.DOCX
Manufacturer's Name: WOODWARD INC
Manufacturer's Address: 1000 E. Drake Rd.
Fort Collins, CO, USA, 80525
Model Name(s)/Number(s): Electric Water Metering Valve with and without ID Module
Conformance to Directive(s): 94/9/EC COUNCIL DIRECTIVE of 23 March 1994 on
the approximation of the laws of the Member States
concerning equipment and protective systems intended
for use in potentially explosive atmospheres
**The object of the declaration described above
is in conformity with the following Directives
of the European Parliament and of the
Council:** For models with ID Module:
2004/108/EC COUNCIL DIRECTIVE of 15 December
2004 on the approximation of the laws of the Member
States relating to electromagnetic compatibility and all
applicable amendments.
Markings in addition to CE mark:  Category 3 Group II G, Ex nA IIC T3X Gc IP55
Applicable Standards: EN60079-0, 2012: Electrical apparatus for explosive gas atmospheres –
Part 0: General Requirements
EN60079-15, 2010: Electrical apparatus for explosive gas atmospheres
– Part 15: Type of protection 'n'
EN 61000-6-4, 2007: EMC Part 6-4: Generic Standards - Emissions for
Industrial Environments
EN 61000-6-2, 2005: EMC Part 6-2: Generic Standards - Immunity for
Industrial Environments

This declaration of conformity is issued under the sole responsibility of the manufacturer
We, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s).

MANUFACTURER**Signature****Christopher Perkins****Full Name****Engineering Support Manager****Position****Woodward Inc., Fort Collins, CO, USA****Place****10 - DEC - 2013****Date**

5-09-1182 (REV. 15)

**DECLARATION OF INCORPORATION
Of Partly Completed Machinery
2006/42/EC**

Manufacturer's Name: WOODWARD INC.

Manufacturer's Address: 1000 E. Drake Rd. 3800 N. Wilson Ave.
Fort Collins, CO, USA, 80525 Loveland, CO, USA 80538

Model Names: Electric Liquid Fuel and Bypass Valves – 9907-505, 9907-512,
9907-1144, and 9907-1146
Electric Water Metering Valve – 9907-506, 9907-1145, 9907-1231,
9907-1250

**This product complies, where
applicable, with the following
Essential Requirements of Annex I:** 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7

The relevant technical documentation is compiled in accordance with part B of Annex VII. Woodward shall transmit relevant information if required by a reasoned request by the national authorities. The method of transmittal shall be agreed upon by the applicable parties.

The person authorized to compile the technical documentation:

Name: Dominik Kania, Managing Director
Address: Woodward Poland Sp. z o.o., ul. Skarbowa 32, 32-005 Niepolomice, Poland

This product must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of this Directive, where appropriate.

The undersigned hereby declares, on behalf of Woodward Governor Company of Loveland and Fort Collins, Colorado that the above referenced product is in conformity with Directive 2006/42/EC as partly completed machinery:

MANUFACTURER

Signature

Christopher Perkins

Full Name

Engineering Manager

Position

Woodward Inc., Fort Collins, CO, USA

Place

23 - DEC - 2014

Date

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication **26306J**.



B26306:J

For more information contact:



U.S. Toll Free 877-544-5201
Lada S/C Mexico 888-418-DRAK (3725)
www.drakecontrols.com



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1000 East Drake Road, Fort Collins CO 80525, USA
Phone +1 (970) 482-5811 • Fax +1 (970) 498-3058

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.