



## **Application Note**

# **Controllers for Stanadyne Pumps Using DC-70025 Integrated Actuators**

## **Calibration Instructions**

**Manual 36579**

## **WARNING—DANGER OF DEATH OR PERSONAL INJURY**



### **WARNING—FOLLOW INSTRUCTIONS**

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.



### **WARNING—OUT-OF-DATE PUBLICATION**

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### **WARNING—OVERSPEED PROTECTION**

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—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.

## **CAUTION—POSSIBLE DAMAGE TO EQUIPMENT OR PROPERTY**



### **CAUTION—BATTERY CHARGING**

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.



### **CAUTION—ELECTROSTATIC DISCHARGE**

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.

## **IMPORTANT DEFINITIONS**

- A **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
- A **CAUTION** indicates a potentially hazardous situation which, if not avoided, could result in damage to equipment or property.
- A **NOTE** provides other helpful information that does not fall under the warning or caution categories.

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

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## Electrostatic Discharge Awareness

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

Follow these precautions when working with or near the control.

1. Before doing maintenance on the electronic control, discharge the static electricity on your body to ground by touching and holding a grounded metal object (pipes, cabinets, equipment, etc.).
2. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.
3. Keep plastic, vinyl, and Styrofoam materials (such as plastic or Styrofoam cups, cup holders, cigarette packages, cellophane wrappers, vinyl books or folders, plastic bottles, and plastic ash trays) away from the control, the modules, and the work area as much as possible.



### **CAUTION—ELECTROSTATIC DISCHARGE**

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

# **Chapter 1.**

## **General Information**

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### **Introduction**

This manual provides calibration instructions for Woodward controllers on Stanadyne pumps using a DC-70025 integrated actuator.

It includes the following part numbers:

8270-1013 (12V)

8270-1014 (24V)

8270-1033 (12V CE controller)

Input Signal Frequency on all units is 2500 to 5000 Hz.

The 8270-1033 controller has an integral upper limit potentiometer that is not present on the 8270-1013 and 8270-1014 controllers.

## Chapter 2.

# Calibration Procedure

1. Wire the controller as shown in the wiring diagram.
2. Set the GAIN potentiometer at 30%, the INTEGRAL UPPER LIMIT completely counterclockwise (CCW) [see NOTE], and the DROOP potentiometer completely counterclockwise (CCW).
3. Place the IDLE RUN SWITCH in the IDLE position and adjust the IDLE speed by turning the 20 turn potentiometer clockwise (CW) to increase and counterclockwise (CCW) to decrease speed.
4. Place the IDLE RUN SWITCH in the RUN position and adjust the RUN speed by turning the 20-turn potentiometer clockwise (CW) to increase, and counterclockwise (CCW) to decrease speed.
5. With the engine running at no load rated speed, slowly turn the GAIN potentiometer clockwise (CW) until the engine becomes unstable. Once unstable, slowly turn the potentiometer counterclockwise (CCW) until stable. Interrupt the governor by momentarily removing power from the governor. The engine should recover in 3 to 5 diminishing oscillations.



### NOTE

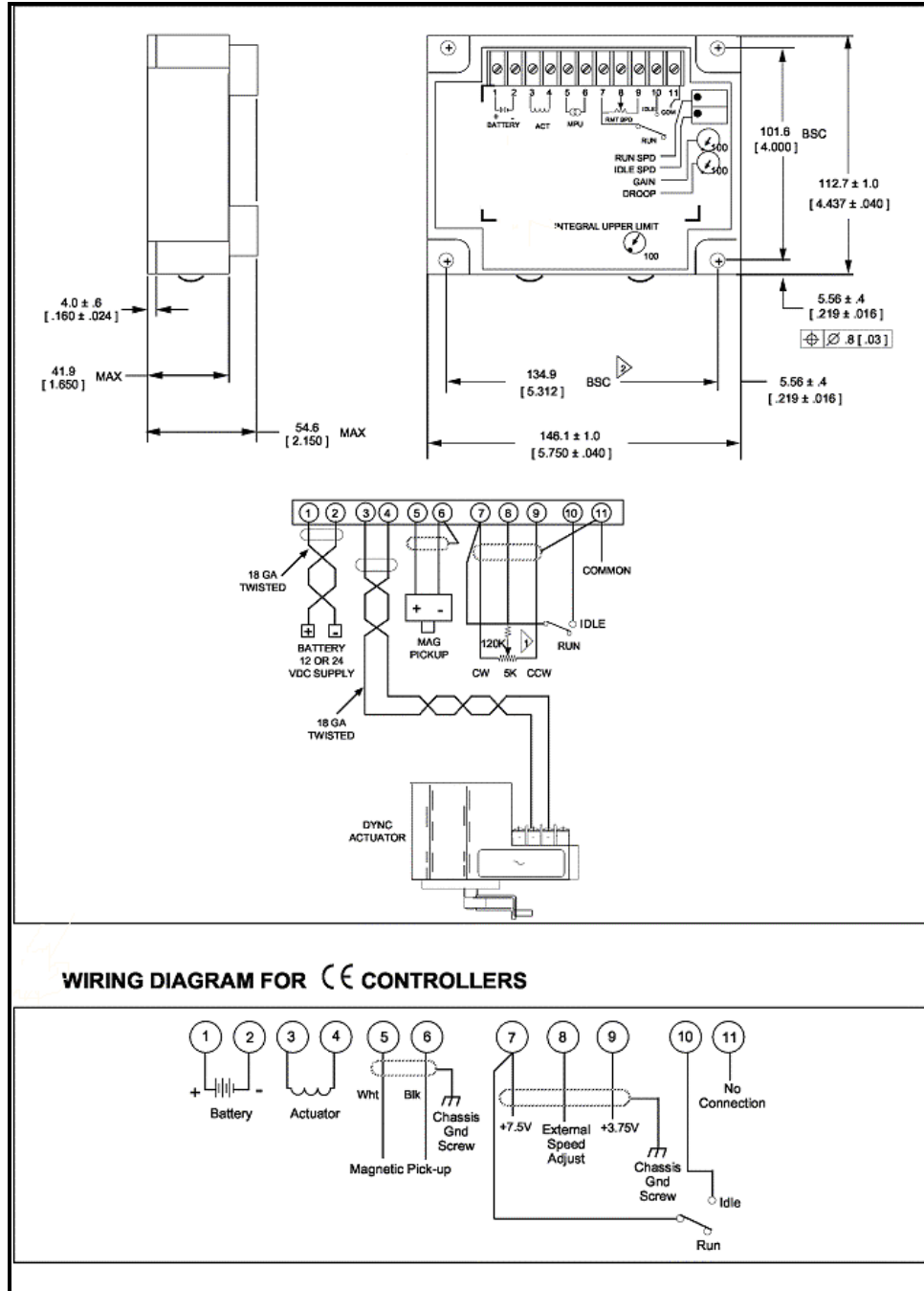
Perform Step 6 only if you have an 8270-1033 controller.

6. After GAIN and SPEED are adjusted, load engine to 100% (full load).
  - a. While observing frequency or RPM meter, turn Integral Upper Limit potentiometer slowly clockwise (CW) until frequency or RPM starts to decrease.
  - b. Turn Integral Upper Limit potentiometer slowly counterclockwise (CCW) until frequency or RPM returns to the original set speed.

### Droop Operation

1. Set the engine run RPM at the desired no load speed.
2. Apply full rated load to the engine.
3. While watching the engine RPM, slowly turn the DROOP potentiometer clockwise (CW) until the percentage of droop is obtained.
4. Unload the engine and readjust the no load RPM.

## Chapter 3. Wiring Diagrams



## Chapter 4. Troubleshooting

PROBLEM	DETECTION	CORRECTIVE ACTION
<b>System appears dead</b>	Check battery voltage at controller with power switch "ON." Measure DC battery voltage between terminal 1 (B+) and terminal 2 (B-). Battery voltage should be present.	Check connections to battery.
	NO SIGNAL OR WEAK SIGNAL FROM MAGNETIC PICKUP. Measure AC voltage between terminals 5 & 6 on the controller while cranking engine. Voltage should be 2.5 volts RMS or greater. (AC input impedance of meter must be 5000 ohms/volt or greater.)	Check for damage to or improper adjustment of magnetic pickup. Replace or readjust.
	Check actuator with power "ON" to controller, and the engine not running. Measure following terminals on control box with respect to terminal 2 (B-). <b>a. Terminal 3 to terminal 2:</b> 0 volts to be measured <b>b. Terminal 4 to terminal 2:</b> 0 volts to be measured <b>NOTE:</b> The following checks are to be made with nothing connected to the terminals. <b>c. Terminal 7 to terminal 2:</b> $7.5 \pm 0.5V$ to be measured <b>d. Terminal 8 to terminal 2:</b> $3.75 \pm 0.5V$ to be measured <b>e. Terminal 9 to terminal 2:</b> $3.75 \pm 0.5V$ to be measured	Replace controller if battery voltage is present.       Replace controller if battery voltage is not present.
<b>Engine fails to achieve full load</b>	Improper integral adjustment  Fuel restriction	Readjust integral limit.  Check the supply and return fuel lines for blockage.
<b>Engine overshoots on startup</b>	Improper integral adjustment	Readjust integral limit.
<b>Engine has excessive overspeed when rejecting load</b>	Improper integral adjustment	Readjust integral limit.



## Troubleshooting (cont'd.)

PROBLEM	DETECTION	CORRECTIVE ACTION
<b>Actuator hunts during operation</b>	Improper governor adjustment	Readjust calibration.
	<p>Inadequate power supply voltage</p> <ul style="list-style-type: none"> <li><b>a.</b> Turn power switch "OFF."</li> <li><b>b.</b> Connect a DC voltmeter to terminal 1 &amp; terminal 2 at control box.</li> <li><b>c.</b> Disconnect both leads to actuator at terminals 3 &amp; 4.</li> <li><b>d.</b> Connect one actuator lead to terminal 1 and one actuator lead to terminal 2 of the control box.</li> <li><b>e.</b> Momentarily turn "ON" the DC power. The actuator should go to full fuel and the DC voltage must be greater than 80% of supply.</li> </ul> <p>24 Vdc @ 80% = 19.2 Vdc 12 Vdc @ 80% = 9.6 Vdc</p> <p><b>NOTE:</b> Reconnect actuator leads properly after completing this test.</p>	<p>If actuator doesn't get to full fuel, then check actuator leads. If voltage is less than specified, check for loose or poor connections to battery, or get larger supply leads or larger power supply.</p>

## Chapter 5. Service Options

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### Product Service Options

The following factory options are available for servicing Woodward equipment, based on the standard Woodward Product and Service Warranty (5-01-1205) that is in effect at the time the product is purchased from Woodward or the service is performed:

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

If you are experiencing problems with installation or unsatisfactory performance of an installed system, the following options are available:

- Consult the troubleshooting guide in the manual.
- Contact Woodward technical assistance (see “How to Contact Woodward” later in this chapter) and discuss your problem. In most cases, your problem can be resolved over the phone. If not, you can select which course of action you wish to pursue based on the available services listed in this section.

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

This option allows you to call 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 Woodward facility as explained below (see “Returning Equipment for Repair” later in this chapter).

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 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.]

**Return Shipment Authorization Label.** To ensure prompt receipt of the core, and avoid additional charges, the package must be properly marked. A return authorization label is included with every Replacement/Exchange unit that leaves Woodward. The core should be repackaged and the return authorization label affixed to the outside of the package. Without the authorization label, receipt of the returned core could be delayed and cause additional charges to be applied.

## **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 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 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.



### **CAUTION**

**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*.**

## **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.

## **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 arrange for issue of a purchase order for the item(s) to be repaired. No work can be started until a purchase order is received.



### **NOTE**

**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.**

## **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.

## **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.

<b><u>Facility</u></b>	<b><u>Phone Number</u></b>
Brazil	+55 (19) 3708 4800
India	+91 (129) 230 7111
Japan	+81 (476) 93-4661
The Netherlands	+31 (23) 5661111

You can also contact the Woodward Customer Service Department or consult our worldwide directory on Woodward's website (**[www.woodward.com](http://www.woodward.com)**) for the name of your nearest Woodward distributor or service facility. [For worldwide directory information, go to **[www.woodward.com/ic/locations](http://www.woodward.com/ic/locations)**.]

## 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](mailto:icinfo@woodward.com)

Website—[www.woodward.com/ic](http://www.woodward.com/ic)

**Technical Support** is available through our many worldwide locations or our 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 and reference **Customer Services** and then **Technical Support**.

**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 and reference **Customer Services** and then **Product Training**.

**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 and reference **Customer Services** and then **Technical Support**.

## **Technical Assistance**

If you need to telephone for technical assistance, you will need to provide the following information. Please write it down here before phoning:

### **General**

Your Name \_\_\_\_\_  
Site Location \_\_\_\_\_  
Phone Number \_\_\_\_\_  
Fax Number \_\_\_\_\_

### **Prime Mover Information**

Engine/Turbine Model Number \_\_\_\_\_  
Manufacturer \_\_\_\_\_  
Number of Cylinders (if applicable) \_\_\_\_\_  
Type of Fuel (gas, gaseous, steam, etc) \_\_\_\_\_  
Rating \_\_\_\_\_  
Application \_\_\_\_\_

### **Control/Governor Information**

Please list all Woodward governors, actuators, and electronic controls in your system:

Woodward Part Number and Revision Letter \_\_\_\_\_

Control Description or Governor Type \_\_\_\_\_

Serial Number \_\_\_\_\_

Woodward Part Number and Revision Letter \_\_\_\_\_

Control Description or Governor Type \_\_\_\_\_

Serial Number \_\_\_\_\_

Woodward Part Number and Revision Letter \_\_\_\_\_

Control Description or Governor Type \_\_\_\_\_

Serial Number \_\_\_\_\_

*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.*



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**Please include the manual number from the front cover of this publication.**



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