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Application Note 51629 (Revision A, 8/2023) Original Instructions

Observed Field Installation Issues with VariStroke-I

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Application Note 51629

General

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.

Precautions Failure to follow instructions can cause personal injury and/or property damage.



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Revisions

http://www.woodward.com

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.



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VariStroke-I Observed Field Installation Issues

Introduction

The VariStroke 1 product manual B26727 describes proper installation procedures. Deviation from these procedures can cause internal components to fail prematurely.

Unsealed Conduit Entry Ports Description

Chapter 3 of the product manual details "using cable and cable glands, the gland fitting must meet the same hazardous locations criteria". Occasionally, a field repair unit is received where the plastic thread protectors are still in place. The result is water ingress, which rusts/seizes the internal components.

Example of conduit entry ports with the plastic thread protector shipping plugs still in place, leading to water ingress.

Example of internal components rusting and seizing from water ingress.





Example of conduit entry ports with the plastic thread protector shipping plugs still in place, leading to water ingress.



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Example of internal components rusting and seizing from water ingress.



Plastic thread protector shipping plugs replaced with NPT metal seal plugs from the available Zone-1 plug kit 8923-3203.

Unseated or Missing Electronics Chamber Cover Description

Chapter 3 of the product manual details to "replace the top access cover and tighten until the O-ring seal is compressed and the cover is fully seated against the housing". Water ingress has occurred when the electronics cover lid was not fully seated as shown. The O-ring in the lid is designed to seal into the housing chamfer, creating an environmental seal. Torque the cover to (120 to 150) N·m / (90 to 110) lb-ft; Torque set screw to (0.6 to 0.7) N·m / (5.5 to 6.2) lb-in.



Example of the VariStroke top cover not being fully seated. Note the gap between the lid (in black) and housing (in grey) on the left, and fully seated on the right.



Example of rust below the sealing O-ring indicating the lid was not fully seated onto the housing.



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Example of field installation with top cover is absent.

Conduit Condensation Description

Condensation can form inside the conduit, especially in humid environments. In those conditions it is important to seal the individual cables before they enter the electronics chamber and avoid downward entry into the electronics chamber to avoid a drain path.



Examples of the preferred routing of conduit upwards to the VariStroke electronics chamber.



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Examples of the non-preferred horizontal or downward conduit routing.

Stripped Thread in Conduit Ports Description

Occasionally a field repair unit is received where the conduit entry ports have the threads stripped out. The result is possible water ingress and loss of hazardous location compliance.



Example of conduit entry ports with stripped thread.



Conductive Debris on the PCBA Description

Chapter 3 of the product manual details the "good wiring practices must be followed". This includes stripping wires before they are brought into the electronics chamber.

IMPORTANT Strip wires away from the PCBA chamber to avoid the possibility of conductive strands of wire contacting the PCBA.

Occasionally a field repair unit is received where wire stripping and conductive debris are on the PCBA. The result is erratic performance.



Example of conductive debris on the PCBA.



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Example of routing wires through conduit, then stripping outside of the electronics chamber, then securing to the electronics shield.

PCBA Cracked from Removal Description

The aftermarket kit details the replacement for the PCBA. Occasionally, a field repair unit is received where the PCBA was attempted to be removed with pliers on the center nut. This PEM nut is integral to the PCBA and not user removable. The result is a cracked PCBA and erratic behavior.



Example of PCBA nut that was attempted to be removed with pliers.

Spool Magnet Damaged Description

The aftermarket kit details the replacement for the spool and sleeve. Occasionally, a field unit is received where the spool magnet is broken from extracting without the proper protection tool. If the magnet is broken, the VariStroke will move erratically on command.



Example of broken spool magnet, and the tool which protects it during extraction.

Stator Wires Reversed Description

The aftermarket kit details the replacement for the PCBA and stator. Occasionally a field unit is received where the stator wires were crossed to the wrong terminal. Left wire connects to the Left terminal, Right wire connects to the Right terminal. If crossed, the VariStroke will fail to move on command.



Example of stator wires being crossed to the wrong terminal (left) and correct (right).

Sensor Cable Gland Fitting is Stripped Description

The aftermarket kit details the replacement for the cylinder position sensor. Occasionally, a field unit is received where the cable gland fitting inside the electronics chamber was cross-threaded and stripped in the housing. The result is loss of the hazardous zone compliance rating.



Example of stripped cable gland fitting for the position sensor.

Cabling Pulled Through Conduit with Pliers Description

The aftermarket kit details the replacement for the cylinder position sensor. Occasionally, a field unit is received where the wires were pulled through the conduit with pliers. This can result in broken insulation and wires shorted. The result is failure to move on command.



Example of position sensor wires with plier marks.

Over-Temperature Description

The VariStroke's operating temperature is 85C. Operating above that range can result in wire insulation degrading and shorting. The result is failure to move on command.





Example of position sensor wires exposed to excess heat.



Example of (darkened) stator wires exposed to excess temperature, compared to a typical field use (light color).

Example of material left in the hydraulic ports.

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Voltage Drop in Power Wiring Description

The Input Power section of product manual B26727 specifies the maximum length of 30 meters between the power source and the VariStroke. Installations with a longer runs need a much larger wire gauge for most of the run, and possibly a voltage stabilizing capacitance near the VariStroke.



Example of wire gauge step-up step-down to achieve longer runs.

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Debris Inside Hydraulic Ports Description

Occasionally, a field repair unit is received where a large amount of plastic/cloth/paper is packed into the hydraulic ports and spool. None of these are used in the factory manufacturing/assembly/test/painting process. The result is failure to move on command.







Damage to Cylinder Rod Description

Occasionally, a field repair unit is received with damage to the cylinder rod. These dings and dents will erode the cylinder seals and result is hydraulic fluid loss.



Example of installation damage to the hydraulic cylinder rod.

Large Debris in Hydraulic Fluid Description

Occasionally, a field repair unit is received with large pipeline debris. These can jam in the servo or cylinder and prevent movement or scratch sealing surfaces and result in high leakage.



Example of large debris in hydraulic oil which scored the cylinder walls.



Ammonia Contaminated Hydraulic Fluid Description

Occasionally, a field repair unit is received with seals which are cracked or swollen from ammonia in the hydraulic oil. This can occur in fertilizer plants. VariStroke uses Viton seals, which are not compatible ammonia. Woodward offers a chemically resistant seals upgrade using Parker FF-400-80. Damaged seals can result in high leakage.



Example of swollen, broken seal.

Imperial Bolts Used in Metric Threads Description

The product manual details the metric threads used for the hydraulic connections. Occasionally, a field repair unit is received where an imperial thread was installed. The result is a pressure connection cannot be made.



Example of an English (imperial) bolt used in a metric thread.

Scoring on Hydraulic Sealing Face Description

Occasionally, a field repair unit is received where the hydraulic sealing face is scored or dented where the O-ring is located. The result is a pressure connection cannot be made.





Example of scoring on the hydraulic sealing face.

Spring Wound Backwards Description

The aftermarket kit details the replacement for the spool and sleeve. Occasionally, a field repair unit is received where the fail-safe return spring is re-installed backwards. The spring assembly has "R" stamped on one side, and "E" stamped on the opposite side. For a fail-retract configured Servo, the "R" should be visible. For a fail-extend configured Servo, the "E" should be visible. The VariStroke will shut down with a Spring Check error.



Example of fail-safe return spring installed backwards and now jammed.

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/local-partner

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

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Replacement/Exchange: Replacement/Exchange is a premium program designed for the user who needs 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 5-01-1205 North American Terms and Conditions of Sale (Industrial Business Segment).

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 most 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 5-01-1205 North American Terms and Conditions of Sale (Industrial Business Segment) 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 5-01-1205 North American Terms and Conditions of Sale (Industrial Business Segment). 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



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 one of the Full-Service Distributors listed at <u>www.woodward.com/local-partner.</u>

Contacting Woodward's Support Organization

For the name of your nearest Woodward Full-Service Distributor or service facility, please consult our worldwide directory at <u>https://www.woodward.com/support</u>, 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
Facility Phone Number	FacilityPhone Number	FacilityPhone Number
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 +49 (711) 78954-510	Germany +49 (711) 78954-510	India+91 (124) 4399500
India+91 (124) 4399500	India+91 (124) 4399500	Japan+81 (43) 213-2191
Japan+81 (43) 213-2191	Japan+81 (43) 213-2191	Korea+82 (51) 636-7080
Korea+82 (51) 636-7080	Korea+82 (51) 636-7080	The Netherlands+31 (23) 5661111
Poland+48 12 295 13 00	The Netherlands+31 (23) 5661111	Poland+48 12 295 13 00
United States+1 (970) 482-5811	United States+1 (970) 482-5811	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 Checklist

Revision A

• Removed content from Unsealed Conduit Entry Ports Description

Revision -

New manual



We appreciate your comments about the content of our publications. Send comments to: <u>industrial.support@woodward.com</u>

Please reference publication 51629.





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