

Product Manual 35017 (Revision E, 12/2023) Original Instructions



GSxP Rotary Stop Valve with Pneumatic Actuation

75 mm / 3-inch 100 mm / 4-inch 150 mm / 6-inch 200 mm / 8-inch

Installation and Operation Manual



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

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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Warnings and Notices

Important Definitions



This is the safety alert symbol 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.



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.



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.

Regulatory Compliance

European Compliance for CE Marking:

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

Pressure Equipment Directive:	Directive 2014/68/EU on the harmonisation of the laws of the Member States relating to making pressure equipment available on the market. GS75P, GS100P: PED Category II GS150P, GS200P: PED Category III PED Module H - Full Quality Assurance
ATEX – Potentially Explosive Atmospheres Directive:	Directive 2014/34/EU on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres. This suitability is the result of ATEX compliance of the individual components as follows:
	Solenoid Valve per SIRA 05ATEX1156 Zone 1, Category 2, Group II G, Ex d IIC T4 Gb.
	Proximity Switches per Baseefa 08ATEX0360X
	Zone 1, Category 2, Group II G, Ex d IIC T3 Gb.
	Thread Adapters per Sira 00ATEX1094X Zone 1, Category 2, Group II G, Ex d IIC Gb
Other European Complian	ICE:

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

- EMC Directive: Not applicable to this product. Electromagnetically passive devices are excluded from the scope of the 2014/30/EU Directive.
 ATEX Directive: Exempt from the non-electrical portion of the ATEX Directive 2014/34/EU due to no potential ignition sources per EN ISO 80079-36:2016 for Zone 2 installation.
 Machinery Compliant as partly completed machinery with Directive 2006/42/EC of
 - **Directive:** the European Parliament and the Council of 17 May 2006 on machinery.

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Other International Compliance

IECEx Certified for use in hazardous locations.

This suitability is the result of IECEx compliance of the individual components as follows:

Solenoid Valve per IECEx SIR 05.0029 Zone 1, Category 2, Ex d IIC T4 Gb

Proximity Switches per IECEx BAS 08.0122X Zone 1, Category 2, Ex d IIC T3 Gb

Thread Adapters per IECEx SIR 12.0016X Zone 1, Category 2, Ex d IIC Gb

North American Compliance:

These listings are limited only to those units bearing the certifying agency's identification. Suitability for use in North American Hazardous Locations is the result of compliance of the individual components:

Solenoid Valve:	(P/N: Y013AA3V2BS) FM Certified for Class I, Division 1, Groups B, C and D
	T4 and Class I, Zone 1, AEx d IIC T4 for use in the United States only per FM
	3038295 (P/N Y013AA3L2BS-CSA) CSA Certified for Class I, Division 1,
	Groups B, C, and D T4 for use in the United States and Canada per CSA
	1805901 (LR51486)
Proximity Switch:	CSA Certified for Class I, Division 1, Groups A, B, C and D T3C for use in the
	United States and Canada per CSA 1372905.
Thread Adapter	CSA Certified for Class I, Division 1 & 2 Groups A, B, C and D for use in the
	United States and Canada per CSA 1248014 (LR 106084)

Special Conditions for Safe Use

Wiring must be in accordance with North American Class I, Division 1, or European or other international Zone 1, Category 2 wiring methods as applicable, and in accordance with the authority having jurisdiction. This applies for installation in a Division 2 / Zone 2 area.

The integral supply cables of the proximity switches must be mechanically protected and terminated in a suitable terminal or junction facility.

The external earth bonding connection for the proximity switches may be maintained by connection to the solenoid ground terminal and/or the internal cable gland/conduit entry thread. The bond path between the solenoid valve and proximity switches is sufficient for one external earth connection only, if desired.

Use only one adaptor or reducer with any single cable entry.

The temperature codes assigned to the hazardous location components reflect conditions without process fluid in the valve. The surface temperature of this valve approaches the maximum temperature of the applied process fluid. It is the responsibility of the user to ensure that the external environment contains no hazardous gases capable of ignition in the range of the process fluid temperatures.

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.

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.

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



The surface temperature of the GSxP valve approaches the maximum temperature of the applied process fluid. It is the responsibility of the user to ensure that the external environment contains no hazardous gases capable of ignition in the range of the process fluid temperatures.



EXTERNAL FIRE PROTECTION—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.

Chapter 1. General Information

Introduction

The GSxP Rotary Stop Valve with Pneumatic Actuation allows the flow of gas fuel to the fuel metering valves of an industrial or utility gas turbine. The integral pneumatic actuator consists of a Scotch Yoke mechanism for high torque, quick exhaust valve for rapid closing, and piston return springs for fail-safe operation. A three-way solenoid valve controls the actuator, and dual proximity switches provide position indication.

RCIO260SR Actuator

The RCIO260SR consists of dual pistons connected to a Scotch Yoke mechanism that provides high torque; piston return springs for fail-closed operation, and quick exhaust port for rapid closure. Integral travel stops are factory set for maintenance free operation. Actuator position is controlled by a 24 VDC, three-way, direct acting solenoid valve.

Actuator Position Indication

Proximity switches provide valve position feedback at both open and closed positions. Each can be wired as normally open or normally closed. There is also a visual position indication arrow on the coupling between actuator and valve.

Valve

The rotary control valve consists of a valve housing, round port metering ball, metering shoe, bonnet, and actuator adapter yoke. The regulating elements of this valve are a round port ball and cylindrical shoe. The metering port is round to provide maximum flow and minimum pressure drop when open.

Table 1-1. Valve Characteristics Data

GSXP Flow Characteristics – 100% Open								
	GS75	Р	GS1	00P	GS ²	150P	GS2	200P
Pressure ratio	ACd	YCv	ACd	YCv	ACd	YCv	ACd	YCv
.992	14 in ²	295	30 in ²	599	51 in ²	999	54 in ²	1278

ACd is calculated using:

- Mass flow rate M (lbm/hr)
- Inlet pressure P1 (psia)
- Ratio of specific heats k (Cp/Cv)
- Gas specific gravity
- Gas temperature T (°R)
- Pressure ratio R (P2/P1)
- Isentropic flow equation:

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$$ACd = \frac{M}{3955.289 \cdot P1 \cdot \sqrt{\frac{k \cdot sg}{(k-1)T} \cdot (R^{\frac{2}{k}} - R^{\frac{1+k}{k}})}}$$

Figure 1-1. Isentropic Flow Equation

YCv is calculated using:

- Mass flow rate M (lbm/hr)
- Density ρ (lbm/cu ft)
- Gas temperature T (°R)
- Inlet pressure P1 (psig)
- Outlet pressure P2 (psig)

$$YCv = \frac{\dot{M}}{\rho * 1360 * P1 * \sqrt{\frac{T}{\left(\frac{P1 - P2}{P1}\right)}}}$$

Figure 1-2. Equation for YCv

Calibration

The actuator and valve are calibrated for open-closed operation at the factory. No additional steps are required from the operator.

NOTICE

Please contact Woodward for the correct settings for your application.

Valve Serial Number Specific Parameters

Each valve, regardless of valve type or part number, will have a set of unique settings corresponding to the calibration process done on each unit at the factory.

GSxP Rotary Control Valve Specifications

Description	3, 4, 6, and 8-inch (75, 100, 150, and 200 mm) pneumatically actuated gas stop values
Mean Time Between Failure (MTBF)	100 000 hrs operation combined valve per valve/actuator
Ambient Temperature Range	(–17 to +79) °C / (0 to +175) °F
PNEUMATIC ACTUATOR Description Failure Mode Closing Time Visual Position Indication Ingress Protection Solenoid Input Rating Solenoid Pull-in Voltage Solenoid Drop-out Voltage Proximity Switch Input Ratings Actuation Fluid Actuation Fluid Pressure Test pressure per BS EN 15714	Dual piston Scotch Yoke with spring return Fail Close <350 ms (at >70 °F ambient) Yes IP66 24 Vdc (7.8W) >21 Vdc 2.4 to 4.8 Vdc 2A @ 240VAC, 0.5A @ 24VDC Dry Air (cleanliness 20 micron max) 5.5 to 8 bar (80 to 116 psig) 11.4 bar (165 psig)
ROUND PORT BALL VALVE Process Fluid Gas Filtration Connections	Natural gas 25 µm absolute at 75 beta requirement ANSI Class 300 # RF flanges ANSI Class 600 # RF flanges Overboard Vent Drain (OBVD) (see Outline Drawing)
Min Process Fluid Temperature Max Process Fluid Temperature Max Thermal Shock Differential Min Working Pressure Max Working Pressure Max Process Fluid Containment Pressure	 -29°C (-20°F) 260°C (500°F) 37.8° C (100° F) within valve due to thermal transient 0 kPa (0 psig) 4.17 MPa (605 psig) [3", 4", & 6" valves]. 4.62 MPa (670 psig) [8" valves] Class 300 (WCC) flanges: See ASME B16.34, Table 2-1.2 (VII-2-1.2) Class 300 (CF8M) flanges: See ASME B16.34, Table 2-2.2 (VII-2-2.2) Class 600 (WCC) flanges: See ASME B16.34, Table 2-1.2 (VII-2-1.2) 3", 4" & 6" valves follow Class 300 limits 8" valve follow Class 600 limits
Proof Test Pressure Burst Pressure Overboard Leakage Trim Sizes	 Class 600 (CF8M) flanges: 3" & 6" valves = 4.17 MPa (605 psig) 4" valve follow Class 300 limits per ASME B16.34, Table 2-2.2 (VII-2-2.2) 8" valve follow Class 600 limits per ASME B16.34, Table 2-2.2 (VII-2-2.2) Per ASME B16.34 5x maximum working pressure <20 sccm as shipped (see OBVD Port section) 75 mm (3-inch) 100 mm (4-inch) 150 mm (6-inch) 200 mm (8-inch)

NOTICE

Damage to GSxP could occur when exceeding maximum working pressure.

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Chapter 2. Installation

General

	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.
_	
WARNING Extreme Temperatures	The surface of this product can become hot 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.
WARNING Exposed Valve Hazard	The regulator ball within the valve has a high spring force and sharp elements. To prevent serious injury, DO NOT place hands, fingers, or any object inside the valve.
CAUTION Hearing Protection	Wear hearing protection when working on or around the GSxP valve. During actuation of the valve, the rapid exhaust is loud enough to cause temporary hearing damage (105 dB).



Removal of actuation pressure will not cause the valve to close. Pressure will be stored in the actuator and gradually leak to exhaust or the valve may close unexpectedly. Remove all power and actuation pressure from the actuator to ensure it is fully closed.



The GSxP contains preloaded springs that work to close the valve upon loss of power. To prevent bodily harm, do not disassemble any part of the product unless instructed to do so in these instructions.



The coupling between the actuator and valve is exposed and accessible by hand. The shaft rotates quicker in proportion to the valve operation, and could cause minor injury. Keep hands, fingers, and all other items away at all times.



This valve is intended for installation in a fully enclosed environment. Exposure to outdoor conditions can cause excessive wear or failure.

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Inlet sleeve assembly screws (circled in red) are not designed to hold pressure loads. If bench testing, do not apply pressure to the valve without ANSI flanges (see below figures).



Figure 2-1. Inlet Sleeve Assembly Screws (circled in red)

Raised face inlet sleeves should be secured with a blind flange or welding neck flange when bench testing



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Figure 2-2. Raised Face Inlet Sleeves

GSxP Valve Unpacking

Use care when unpacking the valve. Abuse can damage seals, installation surfaces, and factory adjustments. Notify the shipper and Woodward if damage is found.

Be sure to check proper operation of the valve to verify ball rotation before connecting it to the piping.

If operating the valve prior to connection with the piping to verify regulating ball rotation:

- Ensure electrical connections are properly installed per these instructions.
- Verify rotation using the visual position indicator.
- DO NOT place hands or any object inside the valve. A flashlight may be used externally to aid in viewing the metering ball.

GSxP Lifting



The GSxP valve must be lifted by sling as shown in Figure 2-1a.

Note: Do not lift by any of the electrical components or pneumatic piping.



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Figure 2-3a. View Showing Proper Hoisting

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J FOR FIRST ARTICLE INSPECTION (FAI) REQUIREMENTS, SEE 4-09-2704.
^
4 FLANGE MOUNTING DIMENSIONS FOR 300 LBS CLASS PER ASME B16.5
3-INCH VERSION: Ø6.62 (168.3) B.C., 8X .750-10 UNC
4-INCH VERSION: Ø7.88 (200.1) B.C., 8X .750-10 UNC
6-INCH VERSION: Ø10.62 (270.0) B.C. , 12X .750-10 UNC
8-INCH VERSION: Ø13.00 (330.2) B.C., 12X .875-9 UNC
FLANGE MOUNTING DIMENSIONS FOR 600 LBS CLASS PER ASME B16.5:
3-INCH VERSION: Ø6.62 (168.3) B.C. , 8X .750-10 UNC
4-INCH VERSION: Ø8.50 (215.9) B.C., 8X .875-9 UNC
6-INCH VERSION: Ø11.50 (292.1) B.C. , 12X 1-8 UNC
8-INCH VERSION: Ø13.75 (349.2) B.C. , 12X 1.125-7 UNC
8-INCH VERSION: Ø13.75 (349.2) B.C., 12X 1.125-7 UNC

5. FLANGE DIMENSIONS PER ANSI/ISA 75.08.02-2003. 6 1/2-14 NPT TO M20 X 1.5 CERTIFIED THREAD ADAPTERS PROVIDED.

7. SEE MANUAL B35017 FOR INSTALLATION IN HAZARDOUS LOCATIONS.

Figure 2-3b. Outline Drawing (GSxP) 9999-3179 R3



Figure 2-3c. Outline Drawing (GSxP) 9999-3179 R3

Piping Installation

Installation attitude does not affect actuator or fuel valve performance, but a vertical position is generally preferred to conserve floor space as well as provide ease of making electrical and fuel connections. The GSxP is 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.

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 (Figure 1-1) within standard piping tolerances. The valve should mount between the piping interfaces such that the flange bolts can be installed with only manual pressure applied to align the flanges. Never use mechanical devices such as hydraulic or mechanical jacks, pulleys, chain-falls, or similar equipment to force the piping system to align with the valve flanges.

Use ASTM/ASME grade bolts or studs to install the valve into the process piping. The bolt length and diameter shall conform to the following table according to the valve flange size and class. All threaded flange connections are UNC.

Flange Class	Nominal Pipe Size	Number of Bolts	Diameter of Bolts	Stud Length	Machine Bolt Length
300	75 mm	0	19 mm	N/A	57.1 mm
	3 inch	0	0.75 inch		2.25 inch
300	100 mm	0	19 mm	114.3 mm	63.5 mm
	4 inch	0	0.75 inch	4.5 inches	2.5 inch
300	150 mm	10	19 mm	114.3 mm	69.8 mm
	6 inch	12	0.75 inch	4.5 inches	2.75 inch
300	200 mm	10	22.2 mm	N/A	69.8 mm
	8 inch	12	0.875 inch		2.75 inch
600	75 mm	0	19 mm	N/A	69.8 mm
	3 inch	0	0.75 inch		2.75 inch
600	100 mm	0	22.2 mm	N/A	82.5 mm
	4 inch	0	0.875 inch		3.25 inch
600	150 mm	10	25.4 mm	N/A	101.6 mm
	6 inch	12	1 inch		4 inch
600	200 mm	10	28.5 mm	N/A	101.6 mm
	8 inch	IΖ	1.125 inch		4 inch

Table 2-1. Flange, Gasket, and Bolt Type Dimension Details

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, properly torque (important) the studs/bolts in the appropriate sequence in order to keep the flanges of the mating hardware parallel to each other. Recommend a multi-step torque method.

Bolt Tightening Sequence for 8-Bolt Flanges

During all of the following steps, keep any gap between flanges even all around the circumference.

- 1. Assemble the valve in the pipework and hand-tighten all the bolts.
- 2. First time around, tighten the bolts to 25% recommended torque following the sequence in Figure 2-2.
- 3. Second time around, tighten the bolts to 75% recommended torque following the sequence in Figure 2-2.
- 4. Third time around, tighten the bolts to 100% recommended torque following the sequence in Figure 2-2.
- 5. Continue tightening nuts around the flange until bolts do not move under 100% recommended torque.



Figure 2-4. Bolt Tightening Sequence (8-Bolt Flanges)

Bolt Tightening Sequence for 12-Bolt Flanges

During all of the following steps, keep any gap between flanges even all around the circumference.

- 1. Assemble the valve in the pipework and hand-tighten all the bolts.
- 2. First time around, tighten the bolts to 25% recommended torque following the sequence in Figure 2-3.
- 3. Second time around, tighten the bolts to 75% recommended torque following the sequence in Figure 2-3.
- 4. Third time around, tighten the bolts to 100% recommended torque following the sequence in Figure 2-3.
- 5. Continue tightening bolts around the flange until nuts do not move under 100% recommended torque.



Figure 2-5. Bolt Tightening Sequence (12-Bolt Flanges)

Do not insulate the valve or actuator, but insulate pipe from the flange to at least 10 feet upstream and downstream.

Shoe Retaining Bolts

The shoe retaining bolts are used to hold the shoe in place during shipping and transportation. If the valve is removed from the pipework, the shoe retaining bolts should be re-torqued.

Valve Size	Shoe Retaining Bolt Torque
75 mm	7.3 - 8.5 N m
3 inch	65 - 75 IN. LB.
100 mm	7.3 - 8.5 N m
4 inch	65 - 75 IN. LB.
150 mm	10.2 - 11.3 N m
6 inch	90 - 100 IN. LB.
200 mm	21.5 - 22.6 N m
8 inch	190 - 200 IN. LB.

Table 2-2. Shoe Retaining Bolt Torque Recommendations

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The shoe retaining bolts are only used to prevent movement of the shoe and shoe carrier during shipping and transportation when not installed in pipework. The bolts DO NOT affect seat leakage when installed in pipework.



Figure 2-6. Shoe Retaining Bolt Locations

Allowable Flange Loads

Piping loads considered "typical" have been used in the design of the housing to ensure that there is not an adverse effect from the stresses applied to the housing from the inlet and outlet piping. The loads, used in the design of these housings, are in the Table below and apply by valve size regardless of flange class. It is the responsibility of the customer to ensure that the predicted and actual flange loads are within the specified limits.

Table 2-3.	Allowable	Flange	Loads

Valve Size	Maximum Axial Pipe Force	Maximum Pipe Moment
75 mm	5400 N	3300 N∙m
3 inch	1214 lb	2434 lb-ft
100 mm	7200 N	4400 N∙m
4 inch	1618.6 lb	3245.3 lb-ft
150 mm	11000 N	6600 N∙m
6 inch	2472.9 lb	4867.9 lb-ft
200 mm	14300 N	8600 N·m
8 inch	3214.8 lb	6343 lb-ft

Overboard Vent Drain (OBVD) Installation

Vent the OBVD to a safe location. The location and size of this port is shown in the Outline drawing, Figure 2-1b.



Never plug the OBVD port. Plugging the OBVD port may cause damage to the seals.

Actuation Air Connections

Operating medium shall be filtered dry air or inert gas, filtered to 20-micron particle size or less, 80 psig minimum, and 116 psig maximum. The fitting shall be torqued to 30 N·m (22.1 ft·lbf) maximum. A screen protects the solenoid exhaust port from debris.



Figure 2-7. Solenoid Air Supply Connector

Electrical Connections



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



The GSxP has components certified to Zone 1 / Div. 1 method of protection. Wiring methods must comply with the method of protection for installation in Zone 2 / Div 2 classified atmosphere

Solenoid Valve

A terminal block is provided under the threaded explosion proof cover on the solenoid valve. To remove the cover, first loosen the M5 locking screw, and then unscrew the lid.

Refer to the specification section of this manual for electrical and temperature requirements before selecting a power cable. The terminal block can accept maximum 18 AWG wire size 2.5 mm². Minimum wire size must handle maximum current of 0.325 A. Make internal connections as labelled. See wiring diagram in Figure 2-7 for clarity.

Install cable using an appropriately certified gland fit for duty (max torque 40 Nm), or install conduit seal within 18 in (45 cm) of the conduit port. A certified thread adapter is provided loosely installed from the factory to convert the $\frac{1}{2}$ NPT threads to M20 x 1.5.

Ensure all connections are tight prior to commissioning, including terminal block, cable gland/conduit, threaded access cover, and M5 locking screw. Apply Loctite 243 or equivalent thread locking compound to the M5 locking screw, then torque to 5.4 Nm. When tightening the conduit fittings and/or cable glands, support the solenoid against undue torque with a wrench (See Figure 2-8)



Figure 2-8. Solenoid Power Connector (shown with plastic shipping plug and certified thread adapter installed)



Figure 2-9. Solenoid Terminal Block

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Figure 2-10: Support Solenoid when Tightening Conduit Fittings or Cable Glands. (Ref. Maxseal ICO3S IOM Instructions, MI0294)

Proximity Switches

Proximity switches are installed on the assembly and calibrated for accuracy by Woodward to detect a rotating cam attached to the top of the actuator. No calibration is required prior to installation. Both proximity switches come with 12-foot flying leads and M20 x 1.5 thread adapters. The flying leads on each switch include options to wire normally open or normally closed (SPDT). Refer to the wiring/installation drawing (Figure 2-10) for connection states on each switch when the valve is closed.



Figure 2-11. Proximity Switch Connection Locations



Figure 2-12. Proximity Sensor Wiring Diagram

There is a default suggested wiring configuration. The switches are named as shown in Figure 2-11. The switch labeled "Left" in Figure 2-11 shares a bracket with the Maxseal Solenoid and is labeled "Closed Switch" on the outline drawing. The switch named "Right" in Figure 2-11 is on its own bracket and is labeled "Open Switch" on the outline drawing.



Figure 2-13. Proximity Switch Names

When the switches are wired according to the following table, both switches will provide identical response for a given valve position. If both signals do not match, it indicates that the valve is at an intermediate position.

Table 2-4.	Default	Wiring	Configuration	and	Response
------------	---------	--------	---------------	-----	----------

	Basic	Wiring Description	
Switch	Wiring	Signal Response,	Signal Response,
Position	Configuration	Valve Closed	Valve Open
Left	Normally open	Low	High
Right	Normally closed	Low	High

If a different switch response from the default configuration is desired, the following table will guide installation.

	Detailed	Wiring Description	
Switch	Wiring	DC Resistance,	DC Resistance,
Position	Configuration	Valve Closed	Valve Open
Left	Normally closed	>20 MΩ	<1.0 Ω
	Normally open	<1.0 Ω	>20 MΩ
Right	Normally closed	<1.0 Ω	>20 MΩ
	Normally open	>20 MΩ	<1.0 Ω

Table 2-5. Generic Wiring Options and Response

Install appropriately certified conduit seals within 18 in (45 cm) of the conduit port on each switch. A certified thread adapter is provided loosely installed (15-20 in-lbf preload to prevent movement during shipping) from the factory to convert the $\frac{1}{2}$ NPT threads to M20 x 1.5 (Fig. 2-5). Properly torque all connections prior to commissioning.

Support proximity switch with a wrench on the hexagonal end when tightening connections. Failure to properly support switch can cause switch malfunction or damage to the switch or actuator. Switches are installed and calibrated at the factory and must not be adjusted.

The integral supply cables of the proximity switches must be mechanically protected and terminated in a suitable terminal or junction facility.

Refer to the specifications section of this manual for acceptable loads on each switch. These must be resistive loads per the applicable certifications.



Figure 2-14. Proximity Switch Thread Adapter

Grounding

Grounding terminals are provided on the solenoid valve, both internal and external to the enclosure.

Maintain grounding for the proximity switches by connection to the solenoid ground terminal and/or the internal cable gland/conduit entry thread. The bond path between the solenoid valve and proximity switches is sufficient for one external earth ground connection only, if desired.

Chapter 3. Maintenance

Maintenance

The only maintenance required for the GSxP Rotary Gas Stop Valve is: Inspect the Overboard Vent Drain every 12 months, in accordance with the descriptions below. The valve must be overhauled every 3 years

No field maintenance or repair is possible. Return to Woodward or an authorized service facility.

WARNING Review all warnings and safety information in the Installation section (Chapter 3) prior to performing any maintenance or service. Failure to do so could result in serious injury or death.



DO NOT adjust actuator stop settings from factory-optimized levels. Adjustment by unqualified operators may damage valve and actuator components affecting valve performance.

Overboard Vent Drain (OBVD) Inspection

There is an overboard vent drain 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.

NOTICE

Never plug the OBVD port. Plugging the OBVD may cause damage to the seals.

Overboard Vent Drain Annual Inspections

Pressurize the valve section of the assembly to the rated pressure of 3447 kPa (500 psig) and perform the following inspections:

- Inspect external sealing surfaces for leakage using leak detect fluid (no leakage is permitted). These locations include the inlet and discharge flange connections, as well as the pilot sleeve/valve body interface.
- Inspect for excessive overboard vent leakage (100 cm³/min maximum) from the OBVD Port.

Chapter 4. Troubleshooting

Introduction

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 gas fuel control valve.

WARNING Do not disassemble the GSxP Rotary Gas Stop valve due to dangerous forces contained in the springs. Only Woodward or an Authorized Service Center shall perform all disassembly.



If the valve is removed during troubleshooting, be sure to re-torque the shoe retaining bolts (see Piping Installation in Chapter 3).

NOTICE

DO NOT adjust actuator stop settings from factory-optimized levels. Adjustment by unqualified operators may damage valve and actuator components affecting valve performance.

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.



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

|--|--|

The valve has a high spring force and sharp elements. To prevent serious injury, DO NOT place hands or fingers inside the valve.

Table 4-1. Troubleshooting Guide

Symptom	Possible Causes	Remedies
Proximity switch signals do not match	Switch is damaged or malfunctioning	Check continuity
Valve will not open	Lack of supply air	Check that air supply pressure is 80 psig minimum
	Lack of power to solenoid	Check that solenoid is receiving appropriate voltage
Upon enabling, valve will open and then fail closed	Lack of supply air	Check that air supply pressure is 80 psig minimum
High overboard vent leakage	Internal seals damaged	Return to manufacturer for repair.

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	The regulator ball within the valve has a high spring force and sharp elements. To prevent serious injury, DO NOT place hands, fingers, or any object inside the valve.
	If the regulator ball is not fully closed, removing any obstruction will release hazardous spring energy. Return the valve to the manufacturer for repair.

Symptom	Possible Causes	Remedies
High seat leakage	Damage to valve seat	Remove valve and inspect flow elements. Return to manufacturer for repair.
	Contamination buildup in seat	Remove valve and inspect flow elements. Return to manufacturer for repair.
	Valve not fully closed	
		Remove valve and verify port ball is not properly closed. Return to manufacturer for repair.
External gas fuel 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 to manufacturer for repair.

If operating valve when not connected to the piping to verify regulator rotation:

- Ensure electrical connectors are properly installed per these instructions.
- Verify rotation using the visual position indicator.
- DO NOT place hands or any object inside the valve. A flashlight may be used externally to aid in viewing the regulator.

Chapter 5. 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 current list of Woodward Business Partners is available at: https://www.woodward.com/en/support/industrial/service-and-spare-parts/find-a-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 (5-09-0690) 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 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 5-09-0690).

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 5-09-0690) 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 5-09-0690). 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	Products Used in	Products Used in Industrial
Electrical Power Systems	Engine Systems	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) 8818 5515	China +86 (512) 8818 5515	China +86 (512) 8818 5515
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 (32) 422-5551
Korea+82 (32) 422-5551	Korea+ 82 (32) 422-5551	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 History

Changes in Revision D—

- Removed CE line under Pressure Equipment Directive
- Revised ATEX Directive
- Updated Declarations

Changes in Revision D—

- Added new warning concerning Bench Testing to Chapter 2
- Added Figures 2-1 and 2-2 to Warnings section concerning Bench Testing
- Renumbered remaining figures in Chapter 2

Changes in Revision C—

New Proof Test Pressure and Max Process Fluid Containment Pressure references in Specifications table

Changes in Revision B—

- Added YCv values to Table 1-1 and equation to Chapter 1
- Updated Specifications table in Chapter 1
- Updated Figures 2-1b and 2-1c
- Added Figure 2-8
- Added Important box in Chapter 2
- Added proximity switch image to figure 2-9
- Added proximity switch paragraph to Chapter 2
- Updated Remedies in Troubleshooting Guide
- Updated Compliance and Declarations Sections.

Changes in Revision A—

- Updated and standardized terms in the Specification section in Chapter 1
- Added Notice Box to Chapter 1
- Changes Process Media to Process Fluid in Chapter 1.

Declarations

EU DECLARATION OF CONFORMITY

EU DoC No.: Manufacturer's Name:	00493-EU-02-02 WOODWARD INC.
Manufacturer's Contact Address:	1041 Woodward Way Fort Collins, CO 80524 USA
Model Name(s)/Number(s):	GS75P, GS100P, GS150P and GS200P (GSxP) Rotary Stop Valves
The object of the declaration described above is in conformity with the following relevant Union harmonization legislation:	Directive 2014/68/EU of the European Parliament and of the Council of 15 May 2014 on the harmonization of the laws of the Member States relating to the making available on the market of pressure equipment GS75P, GS100P: PED Category II GS150P, GS200P: PED Category III
Applicable Standards:	ASME Boiler and Pressure Vessel Code VIII, Div. 2, Part 5(2013)
Conformity Assessment:	PED Module H – Full Quality Assurance CE-0062-PED-H-WDI 001-22-USA Bureau Veritas SAS (0062) Tour ALTO, 4 Place des Saisons, 92400 COURBEVOIE, FRANCE

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

psch Signature

Annette Lynch Full Name Engineering Manager Position

Place

25 August 2023 Date

Woodward, Fort Collins, CO, USA

5-09-1183 Rev 33

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DECLARATION OF INCORPORATION Of Partly Completed Machinery			
	2006/42/EC		
File	e name: 00493-EU-02-01		
Manufacturer's	Name: WOODWARD INC.		
Contact Ac	ddress: 1041 Woodward Way Fort Collins, CO 80524 USA		
Model N	Names: GSxP (GS75P, GS100P, GS150P, GS200P)		
This product complies, applicable, with the fol Essential Requirements of An	where llowing 1.1, 1.3, 1.4, 1.5, 1.6, 1.7 nnex I:		
The relevant technical do Woodward shall transmit r authorities. The method of	ocumentation is compiled in accordance with part B of Annex VII. relevant information if required by a reasoned request by the national f transmittal shall be agreed upon by the applicable parties.		
The person authorized to co	ompile the technical documentation:		
Name: Dominik K Address: Woodward	Cania, Managing Director I Poland Sp. z o.o., ul. Skarbowa 32, 32-005 Niepolomice, Poland		
This product must not be pu has been declared in confor	It into service until the final machinery into which it is to be incorporated rmity with the provisions of this Directive, where appropriate.		
The undersigned hereby de Colorado that the above ref completed machinery:	leclares, on behalf of Woodward Inc. of Loveland and Fort Collins, ferenced product is in conformity with Directive 2006/42/EC as partly		
	MANUFACTURER		
	A. Ho L I		
Signature	Cannette and		
Signature	Annette Lynch		
Full Name	e		
	Engineering Manager		
Position	Woodward Inc. Fort Collins. CO. USA		
Position	Woodward Inc., Fort Collins, CO, USA		
Position	Woodward Inc., Fort Collins, CO, USA 25 August 2023		
Position Place Date	Woodward Inc., Fort Collins, CO, USA 25 August 2023		
Position Place Date	Woodward Inc., Fort Collins, CO, USA 25 August 2023		

Released

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Please reference publication **35017**.





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Email and Website—www.woodward.com

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