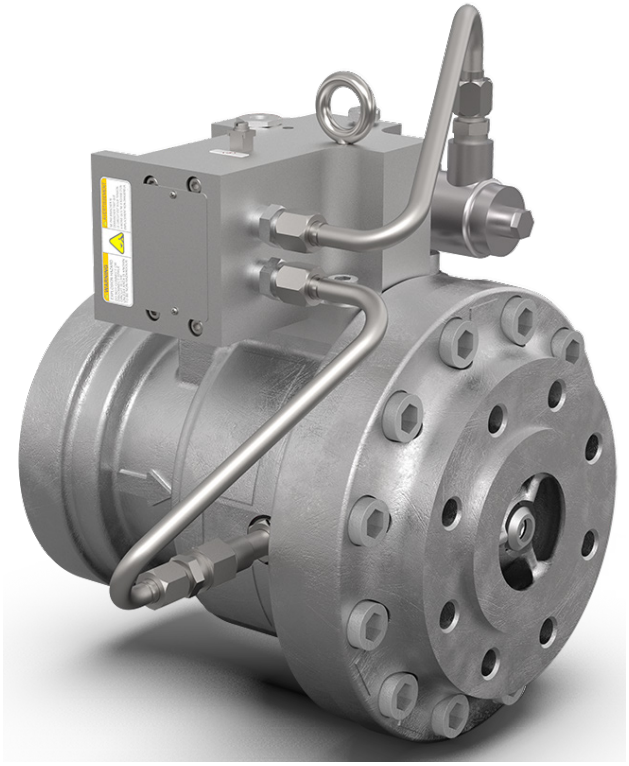
WOODWARD

Product Manual 35189
(Revision C, 6/2025)
Original Instructions



Gas Shutoff Valve
GSOV80 - 3 in (80 mm)

Installation and Operation Manual

Released

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

This publication may have been revised or updated since this copy was produced. The latest version of most publications is available on the Woodward website.

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If your publication is not there, please contact your customer service representative to get the latest copy.

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. The latest version of most publications is available on the Woodward website.

Woodward Industrial Support: Get Help

Always compare with the original for technical specifications and for proper and safe installation and operation procedures.

If your publication is not on the Woodward website, please contact your customer service representative to get the latest copy.

Revisions— A bold, black line alongside the text identifies changes in this publication since the last revision.

Manual 35189

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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.

⚠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.

Regulatory Compliance

European Compliance for CE Marking:
These listings are limited only to those units bearing the CE Marking.

ATEX – Potentially Explosive Atmospheres Directive:
Connector Versions:
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.
II 3 G Ex ec nC IIC T3 Gc

Flying Lead Versions:
This assembly is ATEX compliant per the compliance of the individual components below:
Solenoid Valve – II 3G Ex ec IIC T3 Gc, Sira 11ATEX4210X
Proximity Switch – II 3G Ex ec nC IIC T2 Gc, Baseefa18ATEX0064X

Pressure Equipment Directive:
Directive 2014/68/EU on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment. PED Category II.
PED Module H – Full Quality Assurance

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

RoHS Directive
Restriction of Hazardous Substances 2011/65/EU:
Woodward Turbomachinery Systems products are intended exclusively for sale use only as a part of Large Scale Fixed Installations per the meaning of Art.2.4(e) of directive 2011/65/EU. This fulfills the requirements stated in Art.2.4(c), and as such, the product is excluded from the scope of RoHS2.

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 1 installations.

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

Other International Compliance
These listings are limited only to those units bearing the appropriate identification marks.

IECEx:
Connector Versions, GSOV Actuation System:
Certified for use in explosive atmospheres per Certificate:
IECEx CSA 18.0028X, Ex ec nC IIC T3 Gc

Flying Leads Versions:
IECEx compliant per the compliance of the individual components below:
Solenoid Valve – IECEx SIR 11.0102X, Ex ec IIC T3 Gc
Proximity Switch – IECEx BAS 18.0044X, Ex ec nC IIC T2 Gc

North American Compliance:
These listings are limited only to those units bearing the appropriate identification marks.

CSA & UL: Connector Versions, GSOV Actuation System:
CSA Certified for Class I, Division 2, Groups A, B, C and D, T3 at 93 °C Ambient. For use in Canada and the United States. Certificate 70184121.

Flying Leads Versions:
Compliant for North America per the compliance of the individual components below:
Solenoid Valve – Class I, Div 2, Groups A, B, C, and D, T3. Certificate CSA 1260548
Proximity Switch – Class I, Div 2, Group A, B, C, and D, T3. Certificate UL E79070

SIL Compliance:

GSOV80 Gas Shutoff Valve – Certified SIL 3 Capable for Product in safety instrumented systems. Evaluated to IEC 61508 Parts 1-7. Refer to the instructions of this Installation and Operation Manual, Chapter 4 Safety Management.
SIL Certificate WOO 2104047 C001

GSOV80 H2 Gas Shutoff Valve - pending

***Unless directly called out, the regulatory compliance listed applies to all versions of the GSOV80 and GSOV80 H2**

Special Conditions for Safe Use (for Connector Versions)

Wiring must be in accordance with North American Class I, Division 2, or European or other international Zone 2, Category 3 wiring methods as applicable, and in accordance with the authority having jurisdiction.
Specific conditions from the relevant certificates:

IECEx Zone 2

- Field wiring external to the enclosure affixed by way of MIL style socket connection, shall be terminated by means of a type of protection listed in 60079-0 or in a safe area. Mating MIL connection to be suitably rated IP54 for use in Zone 2 applications.
- Equipment is to be installed in accordance with IEC 60079-14 with the appropriate cable selection for Zone 2 Ex 'ec' protection.

CSA Class I, Div 2

- Field wiring external to the enclosure affixed by way of MIL style socket connection, shall be terminated by means of a type of protection suitable for Class I, Div 2.
- For field connections, a wiring method suitable for use in Class I, Div 2 locations is to be used, and is subject to acceptance of local Authorities Having Jurisdiction.

Field wiring must be suitable for at least 125 °C (250 °F). Electrical supply cables must not have a cross sectional area that exceeds the cross-sectional area of the ground terminal 4 mm^2. See Installation section.

The mating electrical connector must be tightly installed to maintain the IP66 and Type 4 Enclosure ratings.

The GSOV Actuation System may only be used on the GSOV80 connector versions for a maximum process fluid temperature of 193 °C (380 °F) and at maximum ambient temperature of 93 °C (200 °F). See Chapter 1 for more information regarding the GSOV Actuation System.

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.
For CSA Class I, Div. 2 equipment, the power supply is to be suitable for use in Class I, Div. 2 locations or located in a safe area. Input from the power supply to the equipment is to be limited to the electrical parameters defined in the specifications section of this manual and on the product marking label.

⚠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 assurez 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.

Safety Symbols


Direct current


Alternating current


Both alternating and direct current


Caution, risk of electrical shock


Caution, refer to accompanying documents


Protective conductor terminal


Frame or chassis terminal

Chapter 1.
General Information

Introduction

The GSOV80 (3 inch / 80 mm Gas Shutoff Valves Family) is a high-speed fuel shutoff valve designed to terminate the turbine gas fuel supply should the electronic fuel control or sequencer interrupt the permissive electrical signal.

IMPORTANT

Shutoff valves in this manual are not intended to be used as automatic safety shutoff valves, where they would be relied on for fire suppression or loss of life prevention. These valves are intended to be used as a fast acting fuel shutoff valves, installed downstream of the safety shutoff valve(s), to prevent overspeed or other damaging events to the turbine.

GSOV Description

The GSOV80 valve is a normally closed, three-stage device, designed to terminate fuel flow in less than 100 ms at fuel pressures per ASME B16.34 class 600, materials group 2.2, after interruption of the electrical supply current. Valve closure is due to the stored energy of a coiled spring in the final stage.

The valve is compatible with most gaseous fuels, including natural gas, propane, ethane, and methane. A separate model is fully capable of up to 100% hydrogen. All-stainless-steel components with Polymide and PTFE seal materials accommodate the constituents typical in the fuel types listed in the specifications table.

An integral 40 µm (nominal) filter screen protects the first and second stage components from damage due to particulate contamination. The fuel shutoff valve is constructed of corrosion-resistant materials.

The GSOV Connector version weighs 88 kg (194 lb).
The GSOV Flying Leads version weighs 80 kg (177 lb).
The valve will positively seal in a reverse-pressure condition up to 5171 kPa (750 psig).

The GSOV valve is designed to be NACE compliant per ANSI/NACE MR0175/ISO 15156, Petroleum and Natural Gas Industries - Materials for use in H_2S-containing environments in oil and gas production.

All GSOV80 versions are compliant to ASME B31.3-2024, Chapter VIII for inclusion in a Category M Fluid Service piping system.

GSOV Actuation System

The GSOV Actuation System is a subassembly of the electrical components necessary to control the shutoff valve, which includes the solenoid valve, proximity switch(es), electrical connector*, and related tubing and junction box enclosure*. See the installation section for relevant information on each component.

*GSOV80 Connector version only

GSOV80 Specifications

Table 1-1. GSOV80 Specifications

Description:	Pneumatically actuated gas shutoff valve
Closing Time:	Less than 100 ms
Opening Time:	Less than 1 s
Valve Seat Leakage:	ANSI/FCI 70-2-2013 Class VI, forward and reverse
MTBF:	125,000 hours for two valves in series
Cycle Life:	10,000 cycles
Nominal Pipe/Flange Size:	3 inch (80 mm) Class 600, CF8M, Raised Face per ASME B16.5 except with 8X 0.750-10 tapped holes
Valve Effective Area (ACd):	5.5 in^2 (3548 mm^2) - See page 23 for definition
Weight:	88 kg (194 lb) GSOV80 Connector version 80 kg (177 lb) GSOV80 Flying leads version
GSOV80 Fuel Compatibility:	Natural gas, propane, ethane, methane, or other typical gas fuels
GSOV80 H2 Fuel Compatibility:	Fuels with H2 (hydrogen) blend up to 100%, natural gas, propane, ethane, methane, or other typical gas fuels
Required Fuel Filtration	Less than or equal to 10 µm: 30 ppm by volume maximum Greater than 10 µm: 0.3 ppm by volume maximum
Min Gas Fluid Temperature:	-40 °F (-40 °C)
Max Gas Fluid Temperature:	380 °F (193 °C)
Max Gas Fluid to Ambient Temperature Difference:	300 °F (167 °C) – See warning below
Maximum Allowed Gas Pressure:	Per ASME B16.34, class 600, material group 2.2 1440 psig (9.93 MPa) at -40°F (-40°C) 1440 psig (9.93 MPa) at 100°F (38°C) 1224 psig (8.44 MPa) at 212°F (100°C) 1117 psig (7.7 MPa) at 302°F (150°C) 1044 psig (7.21 MPa) at 380°F (193°C)
Proof Test Pressure:	2175 psig (15.0 MPa) per ASME B16.34
Design Burst Pressure:	7200 psig (49.6 MPa)
Max Reverse Pressure:	750 psig (5.2 MPa)
Max Overboard Vent Leakage:	20 cm^3/min as new Up to 300 cm^3/min at end of life At ambient temperatures below -4ºF (-20ºC) leakage may be higher
Max Overboard Vent Back Pressure:	50 psig (345 kPa)
Ambient Temperature:	-40 °F to 200 °F (-40 °C to 93 °C)
Actuation Pressure:	80 to 140 psig (552 to 965 kPa)
Min Hold Open Pressure:	Approx. 60 psig (414 kPa)
Solenoid Input Voltage Models (absolute min/max):	18-32 Vdc (24 Vdc nominal) or 90-140 Vdc (125 Vdc nominal)
Solenoid Power Consumption:	17 W at 20 °C, max voltage 10 W at 20 °C, nominal voltage
Solenoid Typical Resistance:	24 Vdc model: 56 Ω 125 Vdc model: 1.5 kΩ
Proximity Switch Rating:	0.5 A, 125 Vdc
Rated Operating Elevation: (CSA rating)	3,000 m (10,000 ft) max
Environmental Protection Ratings:	IP66 per IEC 60529 Type 4 Enclosure per CSA C22.2 No. 94.2 / UL 50E

IMPORTANT

If the GSOV80 valve is installed outside where icy conditions may occur, consider replacing the vent breather plug, located at the top of the valve, with heat–traced vent tube. This will prevent the vent breather passage from clogging. If the vent breather passage is clogged, the valve may not open.

⚠WARNING

The difference between the maximum process fluid to ambient temperature shall not exceed 300 °F (150 °C). Exceeding this limit may result in slower operating times.

Service Life Capabilities and Limitations

If properly installed, maintained, and operated within its design limits, the GSOV80 will operate up to 64,000 hours or up to 10,000 cycles before requiring repair or overhaul.

Periodically check the main seat leakage and overboard vent leakage. Excessive leakage may be an indicator of seal wear and warrant service.

The main seat is designed to provide ANSI/FCI 70-2 Class VI leakage capability up to 5000 cycles. Depending on operating fluid cleanliness, some degradation down to ANSI/FCI 70-2 Class V is considered within acceptable limits. The recommended service limit is when the forward seat leakage exceeds the Class V limits (as shown in Table 2-4 in the Maintenance section). Above this level, the valve should be overhauled.

IMPORTANT

GSOV80 leakage rates are specified for air.
Higher leakage rates may be expected on fuel.

Chapter 2.
Installation and Maintenance

Receiving

The GSOV80 is tested with dry air and then packed in a foam-filled box for shipment. The unit may be stored for an extended period in its original container.

Lifting

WARNING

Carefully review Figure 2-1 for lifting locations, weight, and center of gravity before moving the valve. Do not lift or handle the valve by its electrical connections or conduit tubing. When placing the valve on a flat surface, keep in mind that the valve will tend to roll and become unsteady.

The significant weight of the valve poses a crushing hazard that can result in personal injury or death. Unexpected rolling or dropping of the product may damage components.

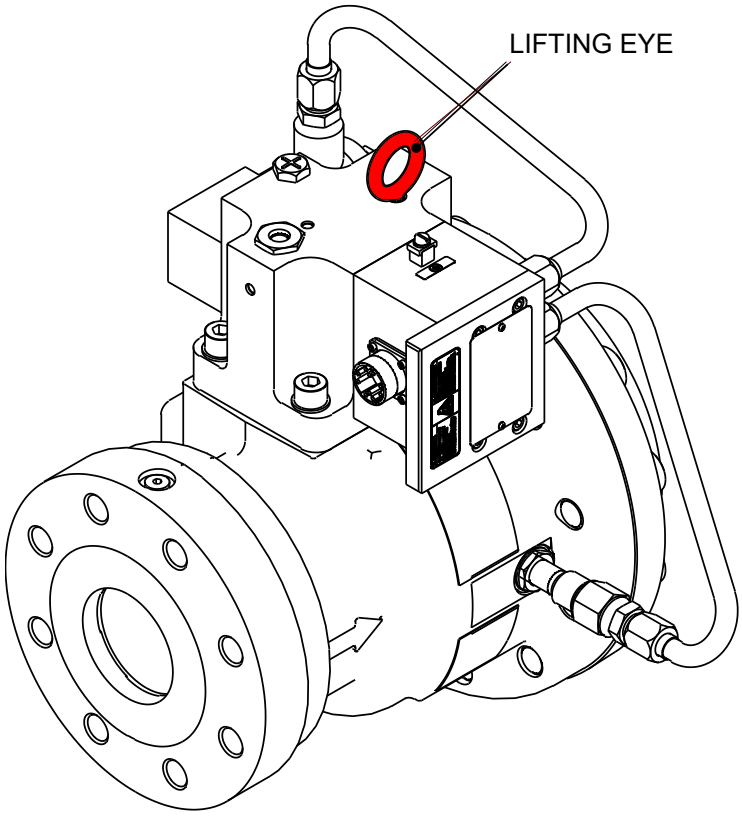


Figure 2-1. Lifting Eye Location

Use appropriate lifting equipment during installation. The lifting eye provided with the valve is rated for 1000 lb use in the vertical direction. Do not exceed angular lift beyond 60° from the vertical position without additional support. If additional straps are used, use caution to ensure they do not make contact with (and potentially damage) electrical components, tubing, or the connector.

Installation

⚠WARNING

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

⚠WARNING

Due to typical noise levels in turbine environments, hearing protection should be worn when working on or around the GSOV80 to prevent temporary or permanent hearing loss.

⚠WARNING

The valve has a high spring force and sharp elements. To prevent serious injury, do not place hands or fingers inside the valve when the ports are exposed.

⚠CAUTION

This product 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.

IMPORTANT

If the GSOV80 valve is installed outside where icy conditions may occur, consider replacing the vent breather plug (located at the top of the valve) with a heat–traced vent tube. This will prevent the vent breather passage from clogging. If the vent breather passage is clogged, the valve may not open.

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.

IMPORTANT

GSOV80 H2 connection piping systems should be designed and installed by a qualified person with specific training and experience in hydrogen piping systems.

IMPORTANT

The piping system, as well as any auxiliary instrumentation connected to the Gas Shutoff Valve (GSOV), shall be designed with respect to process fluid (fuel) to be used inside the valve. Special caution must be taken when hydrogen or hydrogen blends are used as fuel.

The GSOV80 valve is designed for installation between, and supported by, two standard 3-inch, Class 600 flanges per ASME B16.5. Additional supports are neither needed nor recommended. The inlet and outlet flanges are threaded per the outline drawings in Figures 2-2, 2-3, 2-4, and 2-5.

ASTM/ASME grade bolts/studs should be used to install the valve into the process piping. The length and diameter of the bolts and studs shall conform to ASME B16.5 according to the valve flange size and class. The thread size of the bolts/ studs is 0.750-10 UNC per ASME B1.1.

Flange gasket materials should conform to ASME 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 required torque. Once all studs/bolts have been torqued to half the appropriate value, repeat the pattern until the rated torque value is obtained.

Allowable Piping Loads

Typical piping loads 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.
These loads, used in the design analysis of the housings, are not to be exceeded.

Table 2-1. Piping Loads According to Valve Size

Valve Size	Max Pipe Axial Force	Max Pipe Shear Force	Max Pipe Moment	Max Flange Bolt Force (Per Bolt)
80 mm (3 inch)	5400 N (1214 lbs)	5400 N (1214 lbs)	3300 Nm (2434 LBFT)	40301 N (9060 lbs)

Overboard Connections

Securely connect overboard vent ports located on the side of the housing to the process fuel vent system. Never plug or restrict flow from overboard ports.

Back pressure on the overboard vent connections should not exceed 345 kPa (50 psig).

⚠WARNING

EXPLOSION HAZARD – Never plug or restrict flow from the overboard vent ports. Refer to specifications for maximum allowed back pressure. These vent ports must be connected to a drain header in a safe area.

Extremely Low Temperature Operation - Performance and Installation Considerations

When installed and operated in extremely low temperatures [below -4°F (-20°C)], the GSOV80 valve performance may differ as listed below, as compared to specifications listed in Table 1-1.

Opening Time: May increase up to 1.5 seconds.

Valve Seat Leakage REVERSE: May increase up to ANSI/FCI 70-2-2013 Class IV above 5000 cycles.

IMPORTANT

**GSOV80 leakage rates are specified for air.
Higher leakage rates may be expected on fuel.**

IMPORTANT

If the GSOV80 valve is installed outside where icy conditions may occur, consider replacing the vent breather plug (located at the top of the valve) with heat–traced vent tube. This will prevent the vent breather passage from clogging. If the vent breather passage is clogged, the valve may not open.

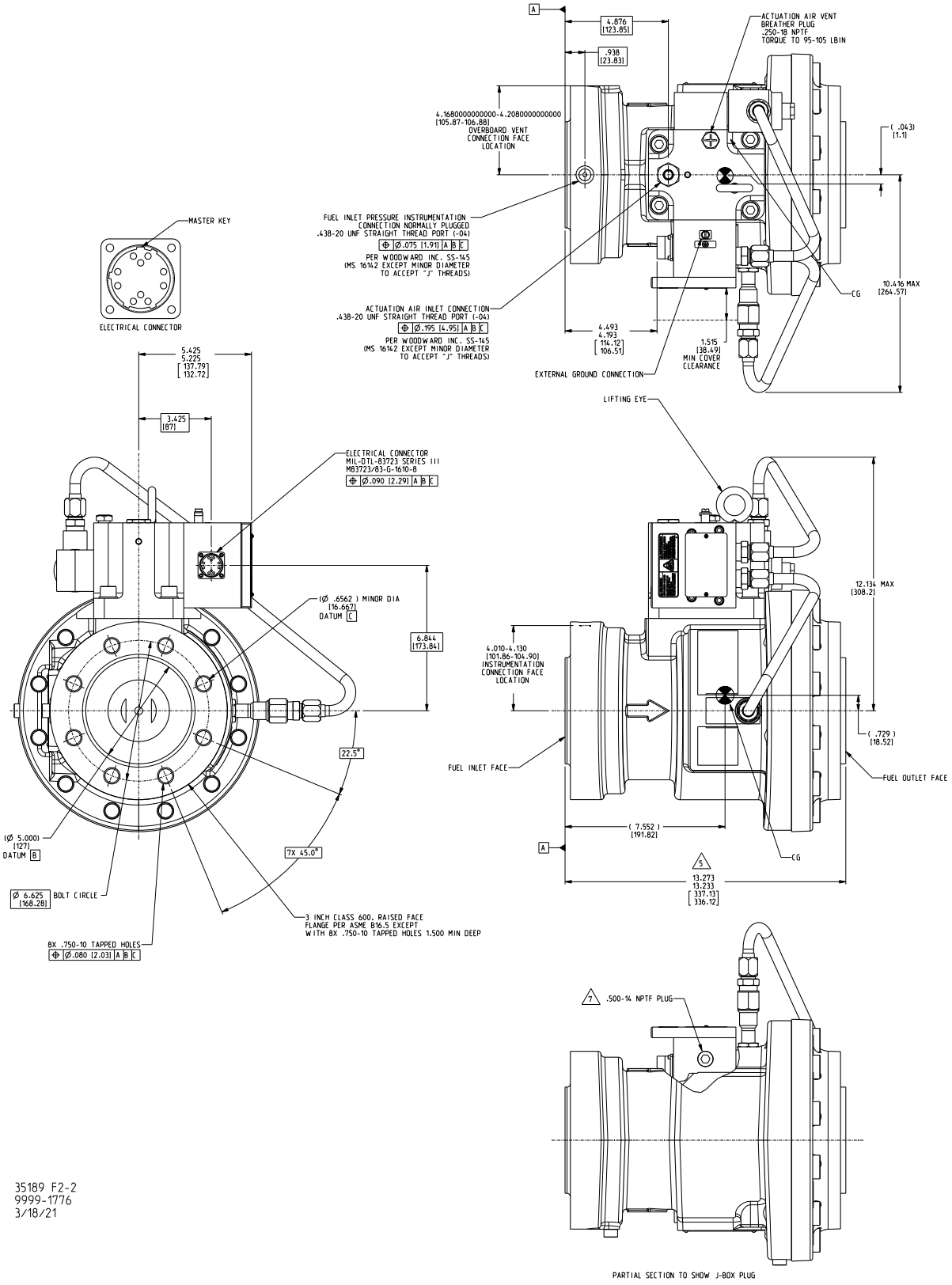
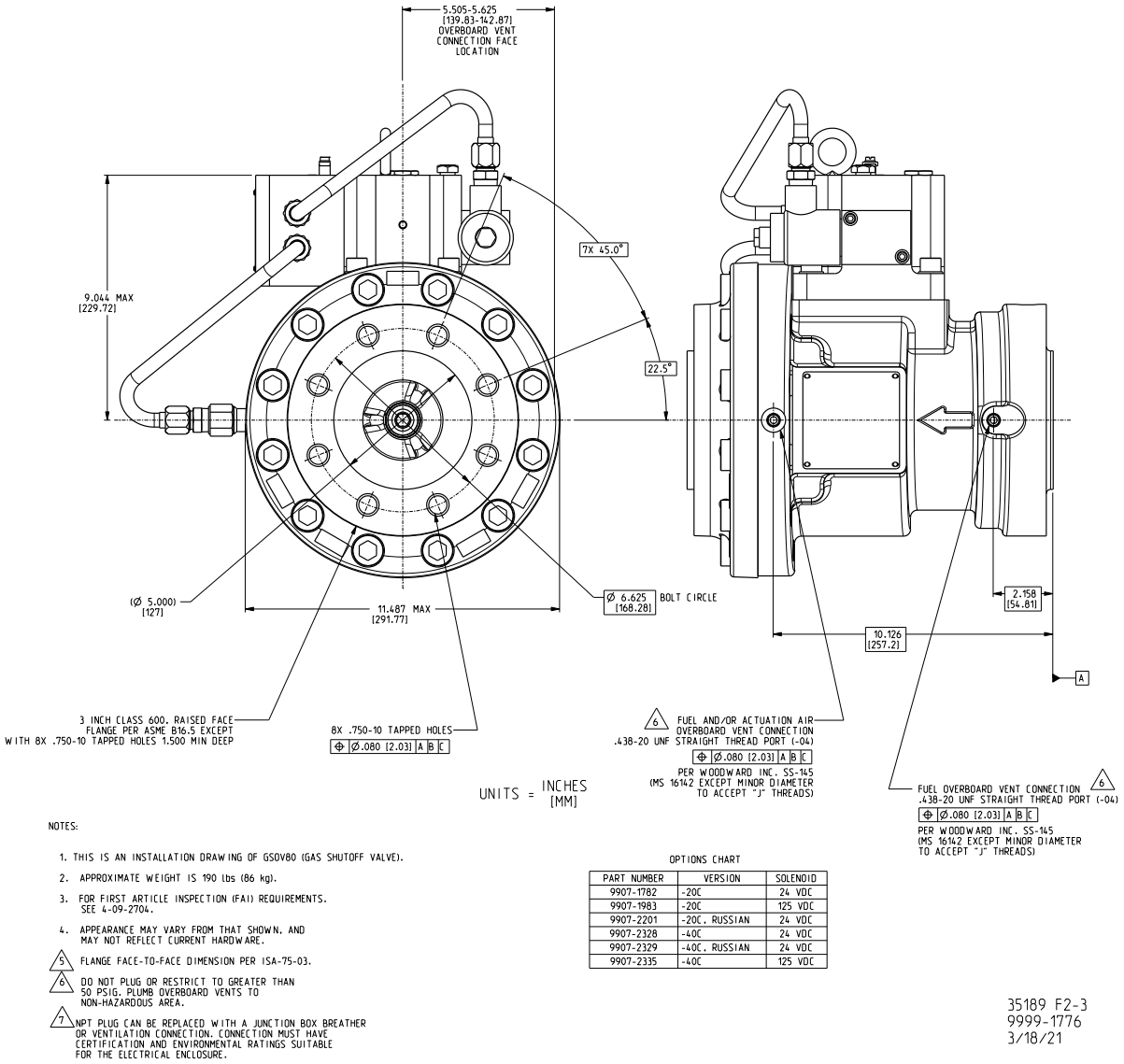


Figure 2-2. GSOV80 Connector Version Outline Drawing (Side A)



NOTES:

1. THIS IS AN INSTALLATION DRAWING OF GSOV80 (GAS SHUTOFF VALVE).
2. APPROXIMATE WEIGHT IS 190 lbs (86 kg).
3. FOR FIRST ARTICLE INSPECTION (FAI) REQUIREMENTS. SEE 4-09-2704.
4. APPEARANCE MAY VARY FROM THAT SHOWN, AND MAY NOT REFLECT CURRENT HARDWARE.

5 FLANGE FACE-TO-FACE DIMENSION PER ISA-75-03.

6 DO NOT PLUG OR RESTRICT TO GREATER THAN 50 PSIG. PLUMB OVERBOARD VENTS TO NON-HAZARDOUS AREA.

7 NPT PLUG CAN BE REPLACED WITH A JUNCTION BOX BREATHER OR VENTILATION CONNECTION. CONNECTION MUST HAVE CERTIFICATION AND ENVIRONMENTAL RATINGS SUITABLE FOR THE ELECTRICAL ENCLOSURE.

OPTIONS CHART

PART NUMBER	VERSION	SOLENOID
9907-1782	-20C	24 VDC
9907-1983	-20C	125 VDC
9907-2201	-20C, RUSSIAN	24 VDC
9907-2328	-40C	24 VDC
9907-2329	-40C, RUSSIAN	24 VDC
9907-2335	-40C	125 VDC

35189 F2-3
9999-1776
3/18/21

Figure 2-3. GSOV80 Connector Version Outline Drawing (Side B)

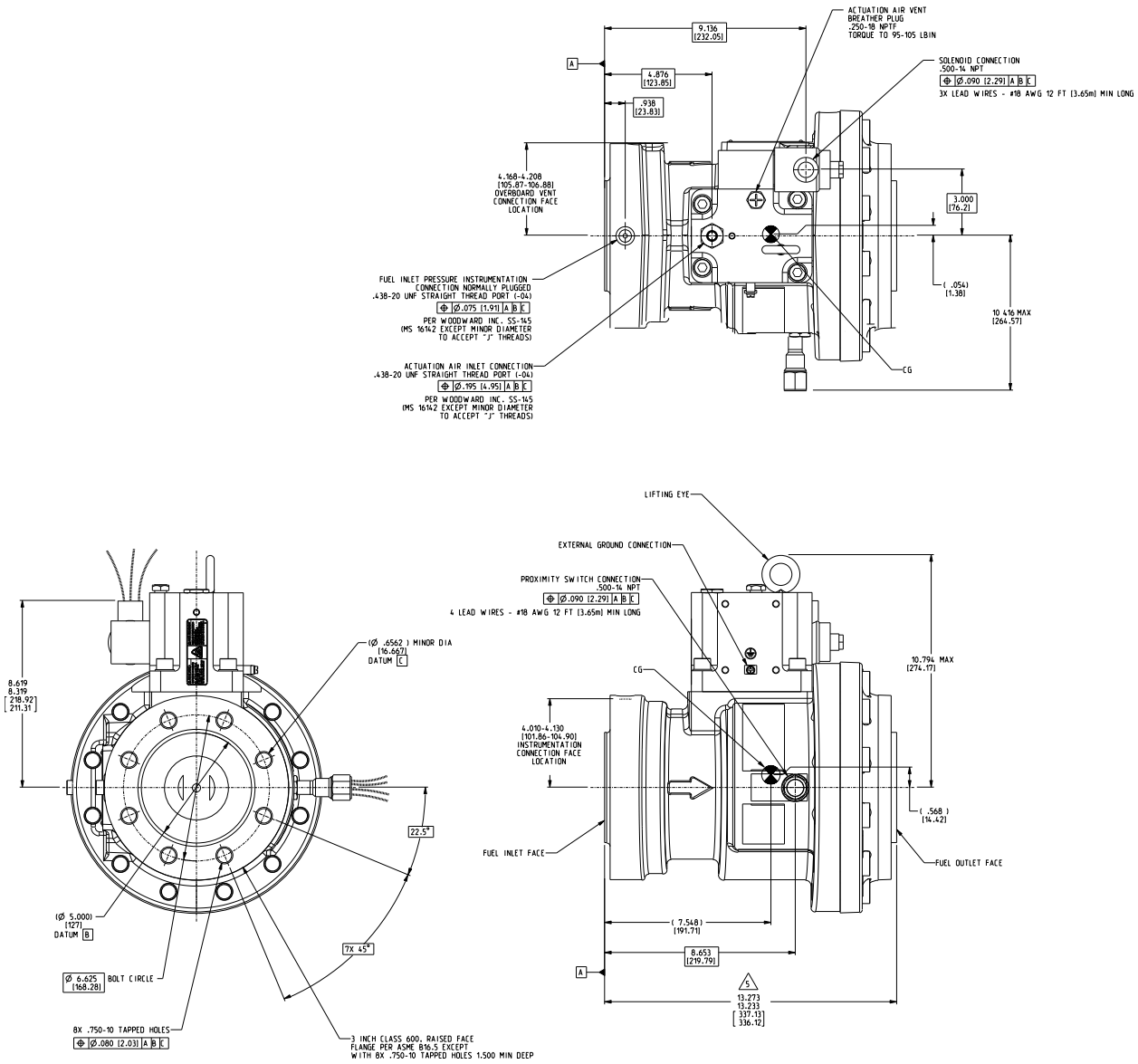


Figure 2-4. GSOV80 Flying Leads Version Outline Drawing (Side A)

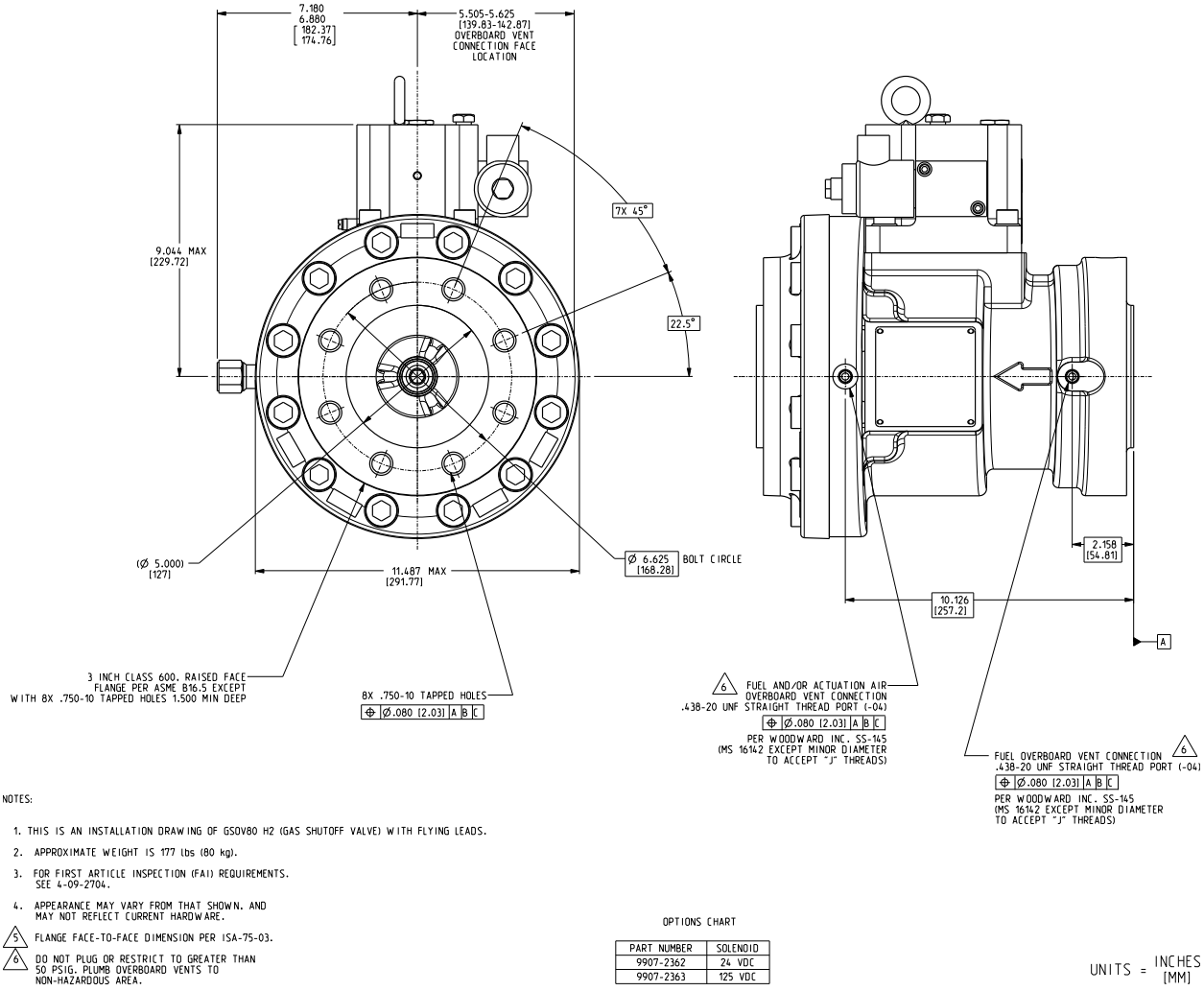


Figure 2-5. GSOV80 Flying Leads Version Outline Drawing (Side B)

Electrical Connections

WARNING

Due to the hazardous locations listings associated with this product, proper wire type and wiring practices are critical to safe operation. Review all applicable Special Conditions of Safe Use listed in the Regulatory Compliance chapter.

WARNING

The valve must be connected to suitable ground through both the internal ground on the connector and the external grounding terminal. See Figures 2-6 and 2-8 for wiring diagram. Redundant protective earth grounds are critical for safety certifications.

GSOV80 Connector Version

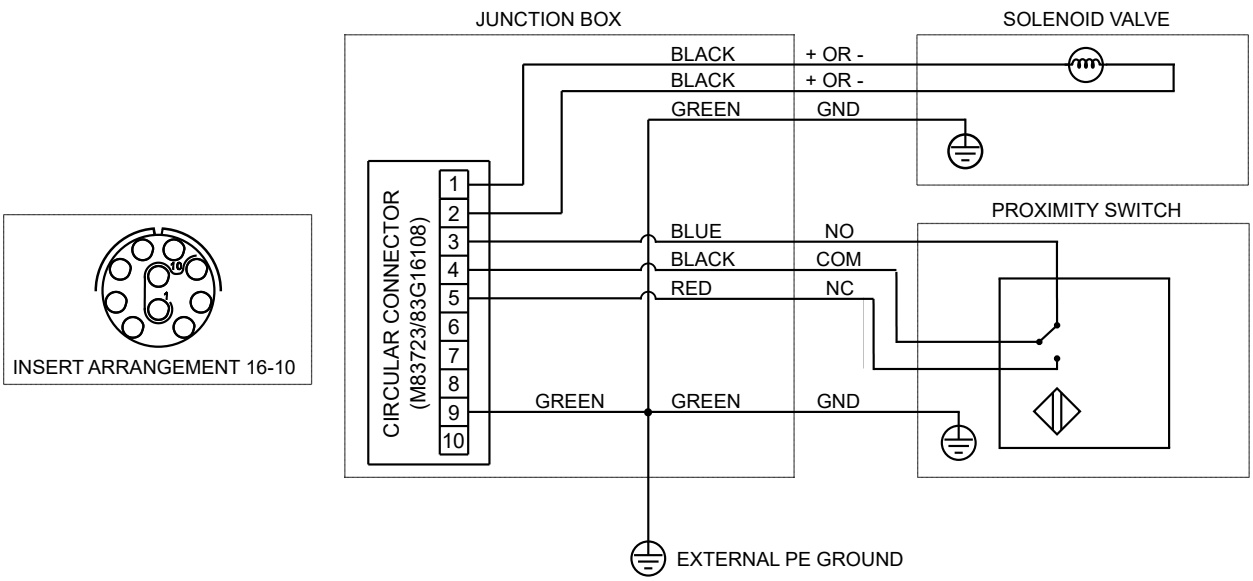


Figure 2-6. GSOV80 Connector Version Wiring Diagram (Valve Closed Position)

NOTICE

The electrical wiring/junction box is not intended to be opened as part of normal installation. All connections required for operation of the product are made by using the appropriate mating MIL connector.

The box is provided with NPT plug at the bottom which can be replaced with a drain pipe or vent if needed. Always use proper thread sealant when replacing the plug. See Figure 2-3 (note 7).

Customer wiring to the solenoid valve and proximity switch is provided via an externally mounted circular MIL style connector.
See Figure 2-6 for mating connector specifications and wiring diagram.
See Figure 2-7 for recommended cable construction.

Contact Woodward sales representative for the appropriate Woodward cable. Refer to P/N 5450-2207.XX (where XX is required length in ft, 10-100 ft in 10 ft increments).

All input power supply wires must comply with local code requirements and be of sufficient size that the power supply voltage minus the IR loss in the two lead wires does not drop below voltage requirements.

Electrical supply cables (field wiring) must be suitable for at least 125 °C (250 °F) and have a cross sectional area not exceeding the capacity of the ground lug 4 mm^2.

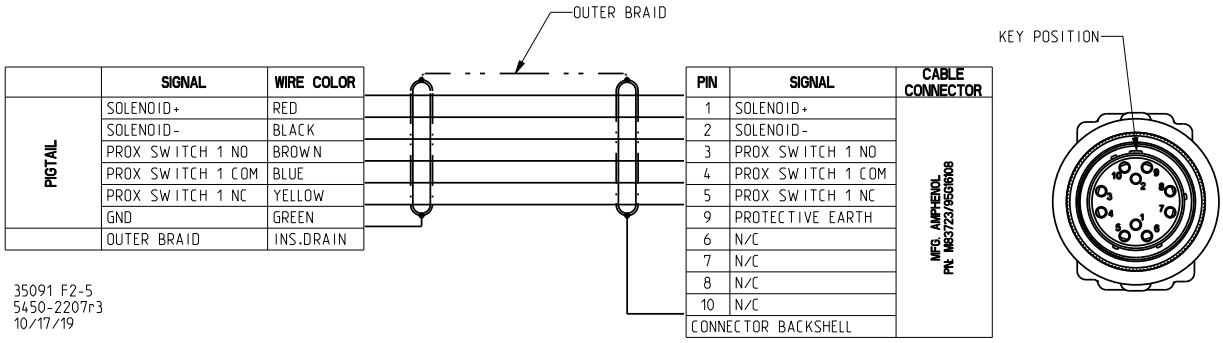


Figure 2-7. GSOV80 Connector Version Cable Construction

Solenoid Valve

The solenoid valve requires an input voltage between 18 and 32 Vdc for 24 Vdc models, or between 90 and 140 Vdc for 125 Vdc models. Polarity is not important. Review the specification table for expected power consumption when selecting a power supply.
See Figure 2-7 for Mating Connector wiring diagram (GSOV Connector version only).
See the Maintenance section below for more information on the solenoid valve.

IMPORTANT

The solenoid valve is not supplied with an input power disconnect device, or with means of overcurrent protection (fuse). These must be provided by the final installation in accordance with local codes and the authority having jurisdiction.

Proximity Switch

The proximity switch is designed to inform the operator when the valve is fully closed. Any intermediate positions will be indicated as valve open. The proximity switch is a single-pole, dual-throw (SPDT) type with Form C contacts. The contacts are rated for 0.5 A at 125 Vdc.
See Figure 2-7 for Mating Connector wiring diagram (GSOV80 Connector version only). See the Maintenance section below for more information on the proximity switch.

GSOV80 Flying Leads Version

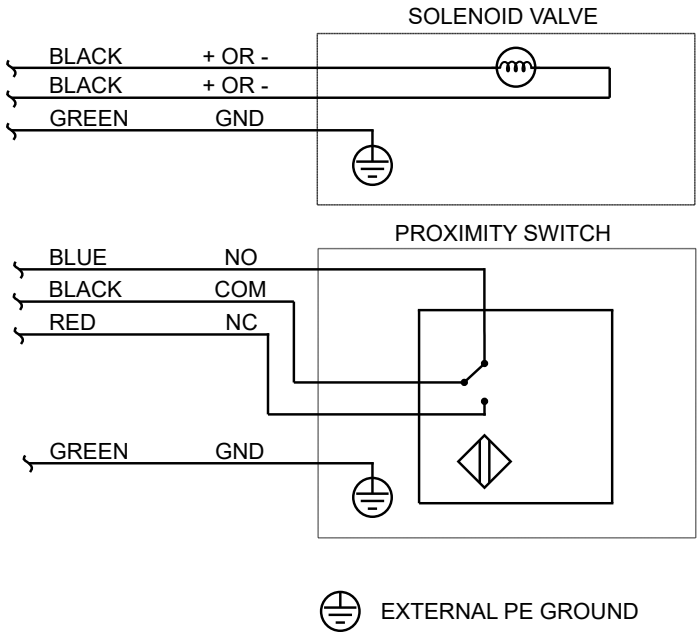


Figure 2-8. GSOV80 Flying Leads Version Wiring Diagram (Valve Closed Position)

Customer wiring to the solenoid valve and proximity switch is provided via flying leads.
Solenoid Valve Flying Leads: 3x #18 WG,12 feet (3.65 meter) long.
Proximity Switch Flying Leads: 4x #18 WG,12 feet (3.65 meter) long.

All input power supply wires must comply with local code requirements and be of sufficient size that the power supply voltage minus the IR loss in the two lead wires does not drop below voltage requirements.

Solenoid Valve

The solenoid valve requires an input voltage between 18 and 32 Vdc for 24 Vdc models, or between 90 and 140 Vdc for 125 Vdc models. Polarity is not important. Review the specification table for expected power consumption when selecting a power supply.
See Figure 2-7 for Mating Connector wiring diagram (GSOV80 Connector version only).
To connect external wiring tubing with solenoid valve (GSOV80 Flying Leads version only) use 0.500-14 NPT threaded port (see Figure 2-4).

See the Maintenance section below for more information on the solenoid valve.

IMPORTANT

The solenoid valve is not supplied with an input power disconnect device, or overcurrent protection means (fuse). These must be provided by the final installation in accordance with local codes and the authority having jurisdiction.

IMPORTANT

GSOV80 Flying Leads Version ONLY

To rotate or re-position the solenoid coil conduit housing: Remove the thin cap nut and loosen the large circular nut by turning it counterclockwise. Rotate the conduit housing to the desired position and tighten the circular nut by hand only. Do not use a tool on the circular nut, which could cause over-tightening. Re-install the thin cap nut and torque to 12–15 LBFT (16–20 Nm).

Proximity Switch

The proximity switch is designed to inform the operator when the valve is fully closed. Any intermediate positions will be indicated as valve open. The proximity switch is a single-pole, dual-throw (SPDT) type with Form C contacts. The contacts are rated for 0.5 A at 125 Vdc.
See Figure 2-7 for Mating Connector wiring diagram (GSOV80 Connector version only). See the Maintenance section below for more information on the proximity switch.

To connect external wiring tubing with proximity switch (GSOV80 Flying Leads version only) use 0.500-14 NPT threaded port (see Figure 2-4).

WARNING

GSOV Flying Leads version ONLY

The switch must be held in the factory installed position to ensure that it is not inadvertently moved during conduit nut tightening to maintain the proper gap between the proximity switch and the piston.

An absence of a gap between the proximity switch and the piston can cause the valve to malfunction or become inoperable. Carefully review Figure 2-9. Use a wrench to maintain the rotational orientation of the proximity switch during field conduit installation.

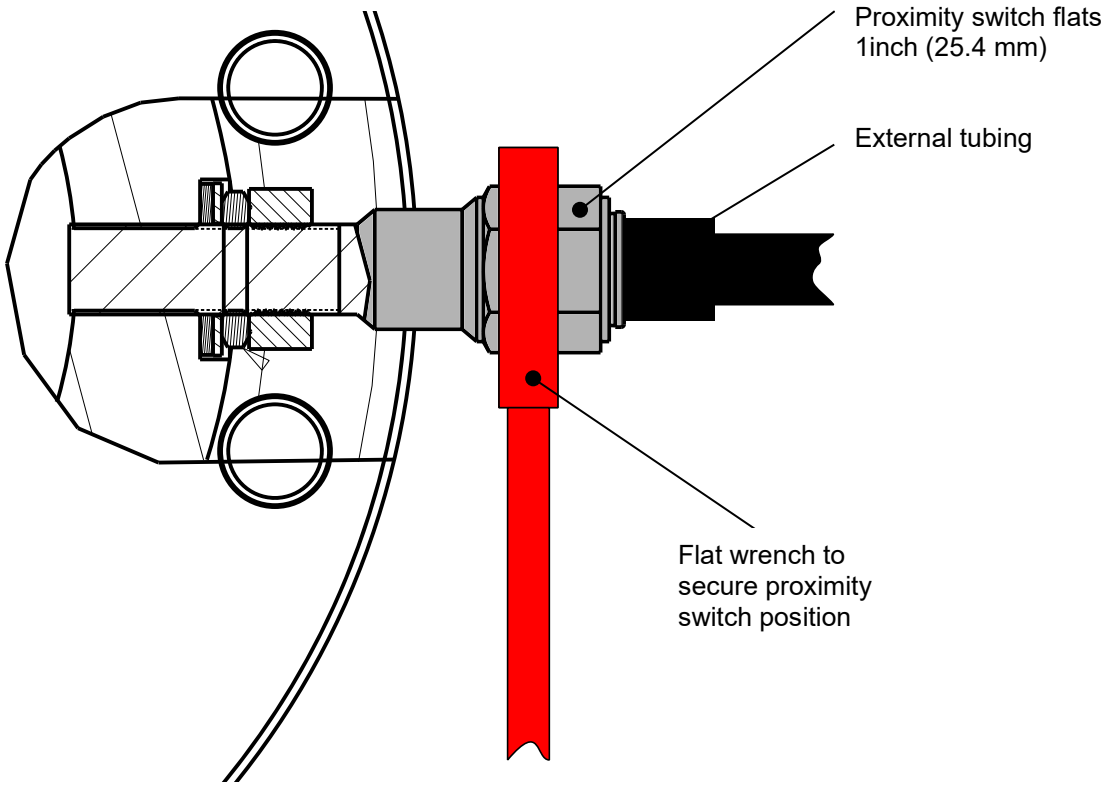


Figure 2-9. GSOV80 Flying Leads Version—Securing The Proximity Switch Position With a Flat Wrench

Maintenance

⚠WARNING

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

⚠WARNING

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 maintenance.

⚠CAUTION

Pressurized air discharge from the vent breather located at the top of the GSOV80 may injure skin that is in close contact during a closing event. Keep clear of the vent when cycling the valve.

Because of the critical function of the GSOV80, it is mandatory that turbine operators regularly monitor the condition of the valve. It should be inspected during all turbine maintenance intervals.

To verify proper operation during shutdown conditions:

- Ensure that the solenoid operator is de-energized.
- Verify that actuation air supply pressure between 552 kPa (80 psig) and 965 kPa (140 psig) is present at the actuation air supply port at standard conditions.
  During opening occurrence, a minimum of 13.8 m³/h (8.1 ft³/min) air supply flow rate is required to properly open the GSOV80 in specified time.
- Check for leakage from the valve seals by measuring the leakage flow rate from the fuel overboard vent connections. Leakage in excess of 18.3 in^3 (300 cm³)/min may indicate valve seal wear or a possible malfunction.
- At very low ambient temperatures, the overboard vent leakage may be higher.

If properly maintained and operated within its design limits, the GSOV80 will operate up to 64,000 hours or approximately 10,000 cycles before requiring repair or overhaul.

The following maintenance checks should be completed at the prescribed intervals.

Actuation Air Filter

To ensure optimum performance of the valve, the pilot-section filter should be removed and cleaned at least once per year, or more often if system contamination levels are higher than normal. See Figure 1-2 (outline drawing) for the location of the pilot filter. Remove the pilot filter by turning counterclockwise on the 25.40 mm (1.000 inch) hex head nut. The filter may be cleaned ultrasonically or backflushed with light solvent. Inspect the O-ring seals and replace as necessary. The replacement O-rings are available from Woodward by request. Lightly lubricate the O-rings with high temperature lubricant (Uniflor 8921 or equivalent) and torque pilot filter nut to 200 LBIN (23 Nm) after re-assembly.

Main Seat Leakage

The valve is designed to maintain main seat leakage at the level of ANSI/FCI 70-2 Class VI prorated up to max. pressure according to tables below:

Table 2-2. Main Seat Forward Leakage (Class VI)

Fuel Pressure [psig]	Leakage [cm^3/min]
50	0.9
300	5.4
600	10.8
900	16.2
1200	21.6
1440	26

Table 2-3. Main Seat Reverse Leakage (Class VI)

Fuel Pressure [psig]	Leakage [cm^3/min]
50	0.9
300	5.4
600	10.8
750	13.5

Main seat leakage performance will degrade towards ANSI/FCI 70-2 Class V, which is defined as the recommended overhaul limit for the GSOV80. The limits of Class V are shown in tables below:

Table 2-4. Main Seat Forward Leakage (Class V)

Fuel Pressure [psig]	Leakage [cm^3/min]
50	14.1
300	84.6
600	169.2
900	253.8
1200	338.4
1440	406

Table 2-5. Main Seat Reverse Leakage (Class V)

Fuel Pressure [psig]	Leakage [cm^3/min]
50	14.1
300	84.6
600	169.2
750	211.5

This leakage level shall be an indicator of necessary valve overhaul.

For reference ANSI/FCI 70-2 Class IV leakage limits for GSOV80 in reverse direction are shown below in standard liters per minute. Class IV is defined as 0.01% of valve flow capacity at given delta P.

Table 2-6. Main Seat Reverse Leakage (Class IV)

Fuel Pressure [psig]	Leakage [sLiters/min]
50	14.3
300	85.8
600	171.6
750	214.5

Gas / Actuation Air Overboard Vent Leakage

Diligent monitoring of the 2X overboard vent connections can provide early warning of seal degradation or internal contamination of the valve, which may result in unreliable valve operation. Should the overboard vent leakage from either port exceed 300 sccm, over the pressure range of 50 psig (0.34 MPa), up to the flange rated pressure, and when measured at room temperature, an overhaul of the valve is advised.

Solenoid Valve

There is no regular maintenance required on the solenoid valve, but the following information can be used to troubleshoot problems related to the solenoid valve.

Review the specification section for solenoid voltage requirements and expected resistance.

The solenoid valve can be replaced in the field if necessary. For more details, read Woodward manual CMM-03012.

Routinely check the shutdown switches or relays to be sure they are capable of terminating the electrical supply to the solenoid. The valve should be used whenever possible to be sure it is operating satisfactorily.

Proximity Switch

There is no regular maintenance required on the proximity switch, but the following information can be used to troubleshoot problems related to the proximity switch.

The switch contains a Form C contact with four leads extending from the switch.

- When the valve is closed, the DC resistance across the contacts should read:
  - Across connector pins 4 and 5: open circuit
  - Across connector pins 3 and 4: 0.1–1.0 Ω
- When the valve is open, the DC resistance across the contacts should read:
  - Across connector pins 4 and 5: 0.1–1.0 Ω
  - Across connector pins 3 and 4: open circuit

If an erroneous or intermittent switch indication is observed, check the continuity of each switch contact as described above. Lightly tap the proximity switch with a wrench or small hammer. The proximity switch should not be affected by these small mechanical disturbances. If the contacts change state with a light tap or do not read the correct dc resistance as given above, replace the switch. The proximity switch can be replaced in the field if necessary. For more details read Woodward manual CMM-03012.

Electrical Connector

There is no regular maintenance required on the electrical connector. The electrical connector can be replaced in the field if necessary. For more details read Woodward manual CMM-03012.

Chapter 3.
Principles of Operation

Valve Open

To open the valve, follow the steps below:

1. Energize the solenoid with the appropriate voltage.
2. The three-way solenoid connects actuation air pressure to the control land of the second stage piston.
3. At actuation air pressures in the acceptable range, the second stage piston is driven to the end of its bore, opening the actuation air pressure to the control land of the primary stage piston, while simultaneously sealing the passage from the vent connection.
4. The actuation air pressure on the primary stage piston control land overcomes the spring force of the return spring and drives the piston to the end of its bore, separating the piston from the primary seal.

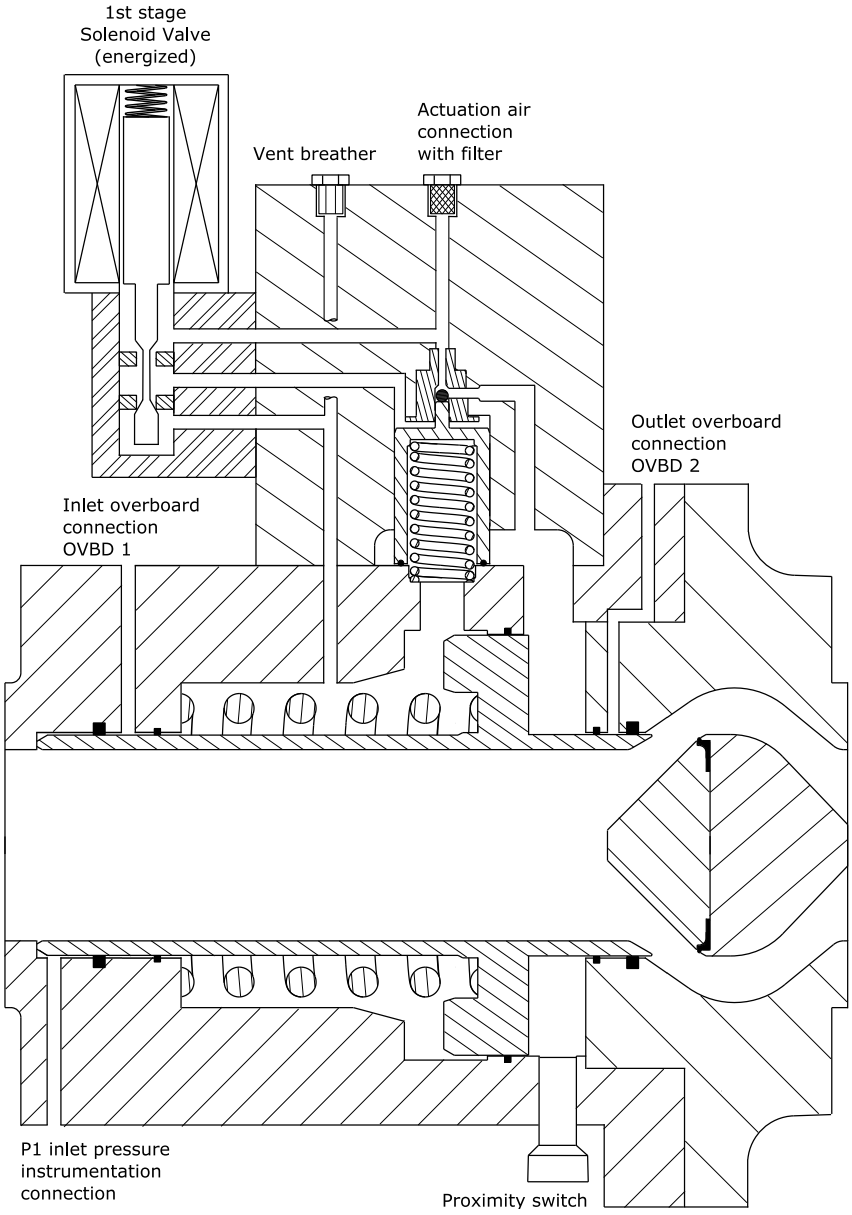


Figure 3-1. Valve Open

Valve Closed

To close the valve, follow the steps below:

1. De-energize the solenoid.
2. The three-way solenoid connects the pressure on the control land of the second stage piston to the vent.
3. The spring under the second stage piston overcomes the pressure on the control land and drives the second stage piston to the opposite end of its bore, seating the second stage ball seat and sealing the actuation air pressure from the primary stage piston control land.
4. As the second stage piston moves to the opposite end of its bore, the piston separates from the second stage piston seal and allows the pressure on the primary stage control land to vent.
5. The primary stage return spring overcomes the pressure on the control land and drives the primary stage piston against the primary stage piston seal.

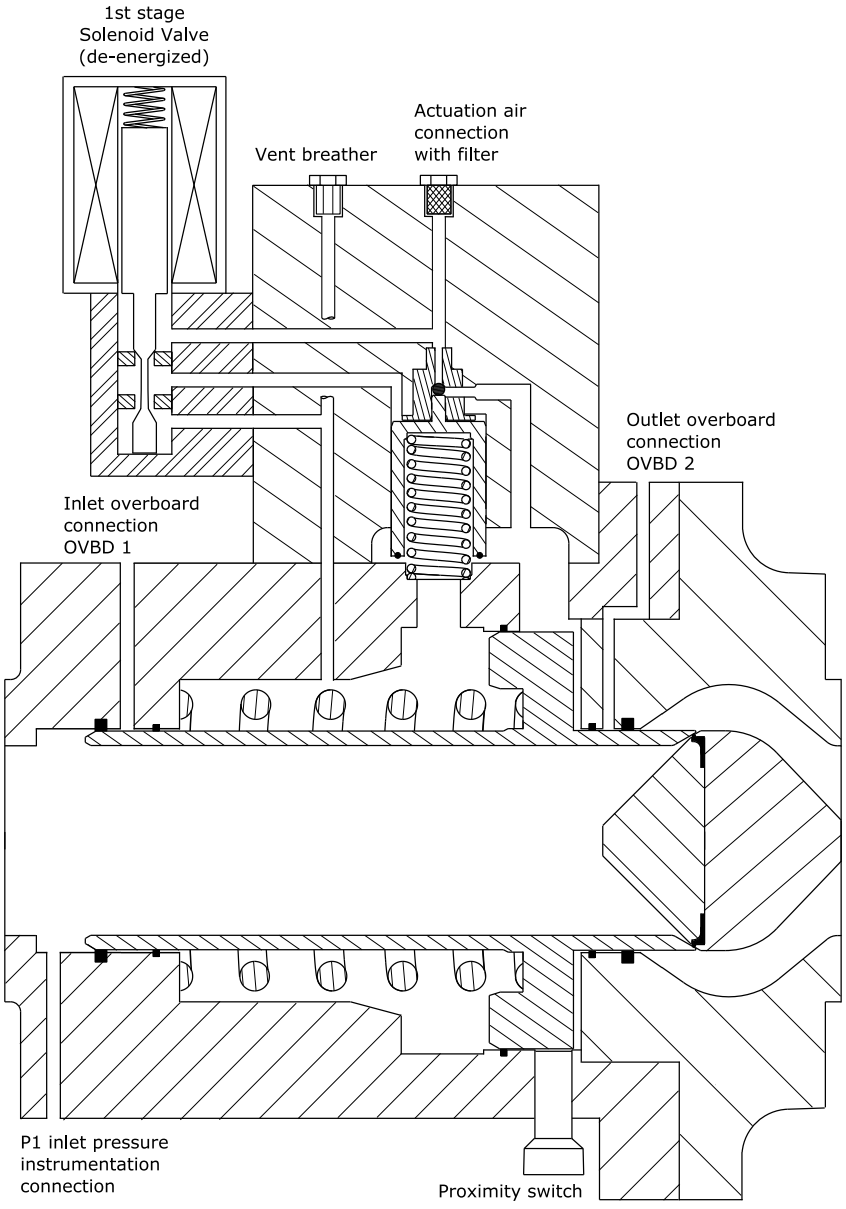


Figure 3-2. Valve Closed

A 40 µm last chance filter screen protects the actuation stage of the valve and the solenoid control valve from damage due to particulate contamination. No screen or filter is provided for the fuel flowing to the turbine. The valve is either fully open or closed, sealed tightly off.

Failsafe Principle

The GSOV80 operates with three stages of valving. This design is necessary to ensure the high-speed fuel isolation and maintain the low pressure drop/high flow rate valve. Each of the three stages is spring loaded with the force needed to ensure valve closure.

The first stage solenoid valve is a poppet-style solenoid, spring loaded with an Inconel spring to the closed position, requiring a voltage supply to allow pilot pressure to the second stage piston control land.

The second stage piston assembly has a dual function for the valve. In the normally closed position, the piston is spring loaded to seal pilot pressure from the primary stage by seating a stainless steel ball, while simultaneously opening a large vent that allows any pressure from the primary stage to vent through an external breather vent. Actuation air pressure greater than 552 kPa (80 psig) is required at the second stage control land to overcome the spring force and move the piston to the opposite end of its bore. In this position the vent connection is sealed by an encapsulated O-ring/face seal while simultaneously allowing actuation air pressure to fill the primary stage control land.

The primary stage piston is spring loaded to the closed position and seated against a face seal. Actuation air pressure greater than 552 kPa (80 psig) is required at the control land of the third stage piston to overcome the spring force and allow the piston to move to the open position.

Table 3-1. Failsafe Modes

Failure	Result
Loss of Pilot Pressure	When actuation air pressure is less than 414 kPa (60 psig), the spring force of the second stage piston overcomes the area/pressure of the control land, moving the piston to seal the pressure from the third stage piston, and opens the vent connection which allows any trapped pressure at the third stage control land to vent through the breather vent. The spring loaded third stage piston will move to the closed position within the 100 ms time specification.
Loss of Voltage to Solenoid	As the voltage is removed from the solenoid, the spring-loaded poppet valve in the solenoid closes the pressure to the second stage while opening a vent to allow any trapped pressure in this area to vent to the breather vent. When the spring loading of the second stage piston overcomes the area/pressure of the control land, the piston moves to seal the pressure from the third stage piston and opens the vent connection which allows any trapped pressure at the third stage control land to vent through the breather vent. The spring-loaded third stage piston will move to the closed position within the 100 ms time specification.

Determination of Effective Area (ACd)

To confirm the appropriate sizes of the GS valves for the application, the effective area necessary to meet the maximum flow requirement must first be determined. The flow rate attainable under a given set of process fluid conditions are constrained by the values of inlet pressure, inlet temperature, discharge pressure, and gas properties. Using these values, the flow rate can be determined for any given value of the valve capacity coefficient (ACd) using the following equation:

$$Wf = 3955.289 \cdot ACd \cdot P1 \cdot \sqrt{\left[\frac{K \cdot SG}{(K-1) \cdot T \cdot Z}\right] \cdot \left[\left(\frac{P2}{P1}\right)^{\frac{2}{K}} - \left(\frac{P2}{P1}\right)^{\frac{1+K}{K}}\right]}$$

Wf = Mass Flow Rate (pph)
ACd = Effective Area (square inches), GSOV80 ACd (gas) = 5.5 in² (3548 mm²)
R7 = Critical Pressure Ratio
P1 = Valve Inlet Pressure (psia)
P2 = Valve Discharge Pressure (psia)
K = Ratio of Specific Heats

Gas Type	Ratio of Specific Heats at 60 °F
Standard Natural Gas	1.300
Hydrogen	1.405

SG = Specific Gravity relative to air (0.60 typical for standard natural gas)
T = Absolute Gas Temperature (degrees Rankine) (Deg R = Deg F + 459.7)
Z = Gas Compressibility Factor (see note)

IMPORTANT

Notes

It is recommended that the effective area for the chosen port be at least 10% larger than the highest required mass flow using the equations shown in order to have margin.

The valve size selected should be adequate (with at least 10% margin) for worst-case flow conditions. This would be minimum P1, maximum P2, maximum flow, and at the maximum expected fuel temperature.

For general sizing purposes, a value for Z (Gas Compressibility Factor) of 1.0 can be used since its effect on the result is relatively small.

Flow Characteristics of the GSOV80

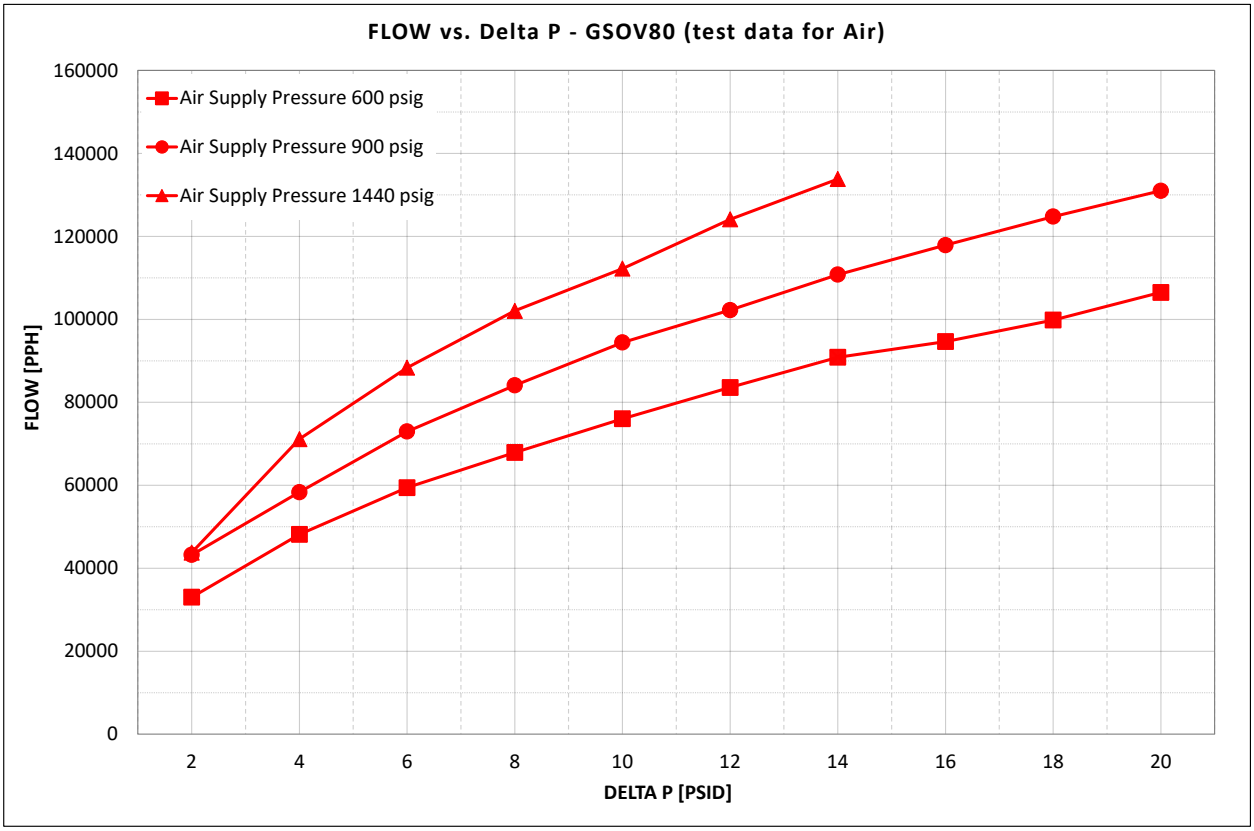


Figure 3-3. GSOV80 Flow vs. Delta P (Test Data for Air)

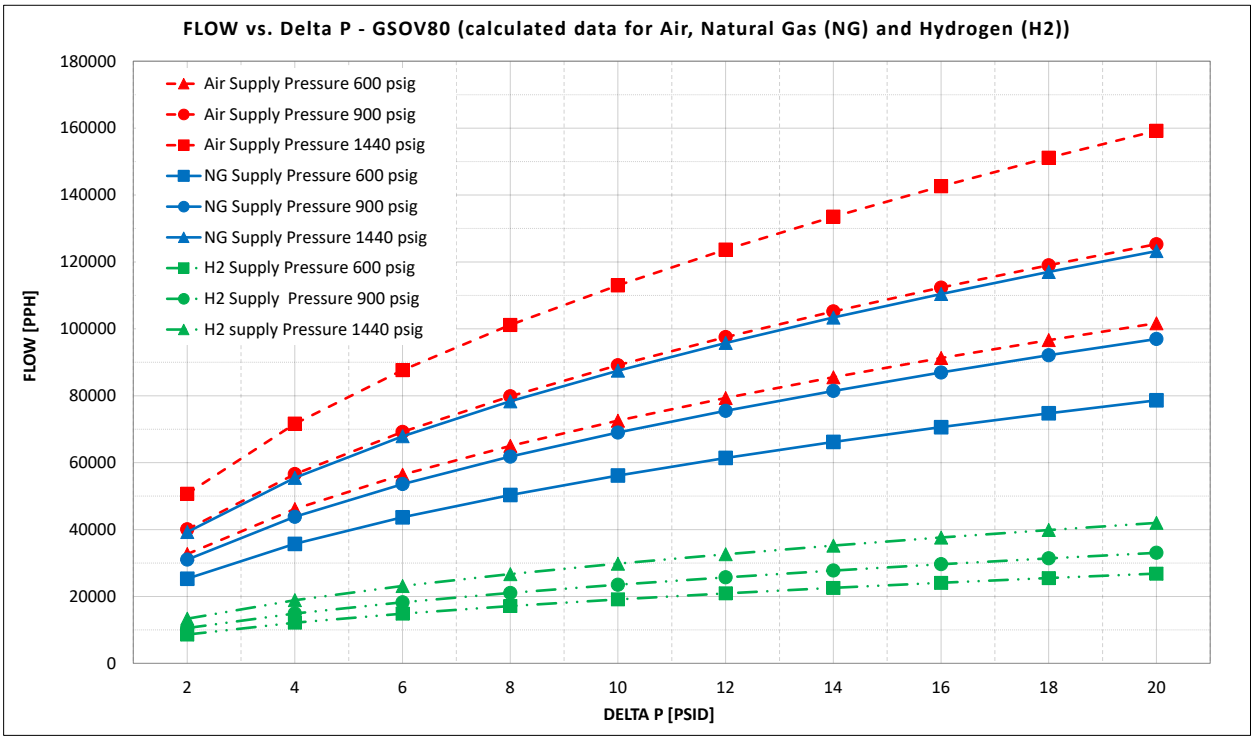


Figure 3-4. GSOV80 Flow vs. Delta P (Calculated Data for Natural Gas and Hydrogen)

Chapter 4.
Safety Management

Product Variation Certified

The GSOV80 Gas Shutoff Valve is designed and certified to the functional safety standards according to IEC61508. Reference SIL certificate* WOO 2104047 C001. The functional safety requirement in this manual applies to all GSOV80 Gas Shutoff Valves. The SIL rated valves will have a DU FIT of less than 1415 for Tight Shutoff and 853 for Full Stroke versions. Contact Woodward for a copy of the SIL certificate.

The GSOV80 Gas Shutoff Valve* is certified for use in applications up to SIL 3 according to IEC 61508.

The GSOV80 Gas Shutoff Valve is designed to provide fast shutoff of gaseous fuel flow to an industrial gas turbine. Gas flow is stopped when the valve is closed, with zero leakage from the inlet to the outlet.

The following versions were considered in the FMEDA of the GSOV80 Fuel Isolation Valve:

- GSOV80 Gas Shutoff Valve, Full Stroke: State where the valve is closed.
- GSOV80 Gas Shutoff Valve, Tight Shutoff: State where the valve is closed and sealed with leakage no greater than the defined leak rate. Tight shut-off requirements shall be specified according to the application. If shut-off requirements allow flow greater than ANSI class V, ANSI class IV, then Full Stroke numbers may be used.

The GSOV80 is only one part of a shutoff system that supports an over-speed shutdown SIF (Safety Instrumented Function). This system consists of a speed sensor, a processing unit and a fuel shutoff actuation sub-system of which the GSOV80 is a component.

The SFF (Safe Failure Fraction) for each subsystem should be calculated. The SFF summarizes the fraction of failures which lead to a safe state plus the fraction of failures which will be detected by diagnostic measures and lead to a defined safety action. This is reflected in the following formulas for SFF:

$$\text{SFF} = \frac{\lambda_{SD} + \lambda_{SU} + \lambda_{DD}}{\lambda_{SD} + \lambda_{SU} + \lambda_{DD} + \lambda_{DU}}$$

The failure rates listed below, for only the GSOV80, do not include failures due to wear-out of any components. They reflect random failures and include failures due to external events such as unexpected use.

Table 4-1. Failure Rates According to IEC61508 in FIT

Device	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
Tight Shut-off, Clean Service	0	683	0	1415
Full Stroke, Clean Service	0	683	0	853

According to IEC 61508 the architectural constraints of an element must be determined. This can be done by following the 1H approach according to 7.4.4.2 of IEC 61508 or the 2H approach according to 7.4.4.3 of IEC 61508. The 1H approach should be used for the GSOV80.

*GSOV80 Gas Shutoff Valve H2 version Sil certificate PENDING

Response Time

The GSOV80 full stroke response time to close is as follows:
Less than 100 ms when operated within the operating envelope listed in the product specifications.

Limitations

When proper installation, maintenance, proof testing, and environmental limitations are observed, the useful life of the GSOV80 is 10,000 cycles.

Management of Functional Safety

A Failure Modes, Effects and Diagnostic Analysis is one of the steps taken to achieve functional safety certification per IEC 61508 of a device. From the FMEDA, failure rates are determined. The FMEDA that is described in this report concerns only the hardware of the GSOV (Gas Shutoff Valve). For full functional safety certification purposes, consider all requirements of IEC 61508.

Restrictions

The user must complete a full functional check of the GSOV80 after initial installation, and after any modification of the overall safety system. No modification shall be made to the GSOV unless directed by Woodward. This functional check should include as much of the safety system as possible, such as sensors, transmitters, actuators, and trip blocks. Record the results of any functional check for future review.

Use the GSOV80 within the published specification in this manual.

Competence of Personnel

All personnel involved in the installation and maintenance of the GSOV80 must have appropriate training. Training and guidance materials are included the SIL3 GSOV80 manual 35189.

These personnel shall report to Woodward any failures detected during operation that may impact functional safety.

Operation and Maintenance Practice

A periodic proof (functional) test of the GSOV is required to verify proper operation. More information is in the “Proof Test” section below. The frequency of the proof test is determined by the overall safety system design, of which the GSOV80 is part of the safety system. The safety numbers are given in the following sections to help the system integrator determine the appropriate test interval.

The GSOV80 requires no special tools for operation or maintenance.

Installation and Site Acceptance Testing

Installation and use of the GSOV80 must conform to the guidelines and restrictions included in this manual. No other information is needed for installation, operation, and maintenance.

Functional Testing After Initial Installation

A functional test of the GSOV80 is required prior to use in a safety system. This should be done as part of the overall safety system installation check. For guidance on the functional test, see the Proof Test procedure below.

Functional Testing After Changes

A functional test of the GSOV80 is required after making any changes that affect the safety system. Although there are functions in the GSOV80 that are not directly safety related, it is recommended that a functional test be performed after any change.

Proof Test (Functional Test)

The GSOV80 must be periodically proof tested to reveal dangerous faults which are undetected by automatic diagnostic tests. This proof test should be performed at least once per 18 months during shutdown conditions and should consist of a full stroke of the actuator and valve per the following:

1. Bypass the safety function and take appropriate action to avoid a false trip.
2. Interrupt or change the air supply to the actuator to force the actuator/valve assembly to the Fail-Safe state and confirm that the Safe State was achieved and within the correct time.
3. Re-store the air supply to the Actuator, inspect the Actuator and Valve for any leaks, visible damage, or contamination, and confirm that the normal operating state was achieved.
4. Remove the bypass and otherwise restore normal operation.

For the test to be effective, the movement of the valve must be confirmed. To confirm the effectiveness of the test both the travel of the valve and slew rate must be monitored and compared to expected results to validate the testing.

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 (Woodward North American Terms and Conditions of Sale 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

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 North American Terms and Conditions of Sale 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 North American Terms and Conditions of Sale 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 North American Terms and Conditions of Sale 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

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 one of the Full-Service Distributors listed at: **https://www.woodward.com/en/support/industrial/service-and-spare-parts/find-a-local-partner**

Contacting Woodward's Support Organization

For the name of your nearest Woodward Full-Service Distributor or service facility, please consult our worldwide directory at **https://www.woodward.com/support**, 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

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 8818 5515
Germany	+49 (711) 78954-510
India	+91 (124) 4399500
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
Poland	+48 (12) 295 13 00
United States	+1 (970) 482-5811

Products Used in Engine Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 8818 5515
Germany	+49 (711) 78954-510
India	+91 (124) 4399500
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
United States	+1 (970) 482-5811

Products Used in Industrial Turbomachinery Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 8818 5515
India	+91 (124) 4399500
Japan	+81 (43) 213-2191
Korea	+ 82 (51) 636-7080
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 C

- Chapter 1: Added statement regarding compliance to ASME B31.3-2024, Chapter VIII for Category M Fluid Service.

Changes in Revision B

- Remove CE line for PED under Regulatory Compliance section
- Replaced both EU DoCs

Changes in Revision A

- Deleted references to GSOV80 H2 throughout the manual
- Revised GSOV description and actuation system (ch. 1)
- Revised GSOV80 specifications (Table 1-1)
- Revised important and warning boxes on page 9
- Replaced Figures 2-1, 2-4, 2-5, 2-6
- Revised Electrical Connections Section: Notice box (pg. 17), Solenoid Valve, Proximity Switch, GSOV80 Flying Leads Version, Solenoid Valve, Proximity Switch, Figure 2-9, and Determination of Effective Area (ACd)
- Updated Figures 3-1, 3-3, and 3-4
- Revised Regulatory Compliance section
- Replaced all Declarations

New Manual—

Declarations

EU DECLARATION OF CONFORMITY

EU DoC No.:	00554-EU-02-01
Manufacturer's Name:	WOODWARD INC.
Manufacturer's Contact Address:	1041 Woodward Way Fort Collins, CO 80524 USA
Model Name(s)/Number(s):	Gas Shutoff Valve, GSOV80 / GSOV80 H2, Connector Versions – 3 inch
The object of the declaration described above is in conformity with the following relevant Union harmonization legislation:	Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres 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 Gas Shutoff Valve, 3 inch: PED Category II
Markings in addition to CE marking:	Ⓔx II 3 G Ex ec nC IIC T3 Gc
Applicable Standards:	
PED:	ASME Boiler and Pressure Vessel Code VIII, Div. 2, 2015 ASME B16.34 Valves Flanged, Threaded and Welding End (2017)
ATEX:	EN IEC 60079-0: (2018) - Explosive Atmospheres - Part 0: Equipment – General requirements EN IEC 60079-7: (2015/A1:2018) – Explosive Atmospheres – Part 7: Equipment protection by increased safety "e" EN 60079-15: (2010) - Explosive Atmospheres - Part 15: Equipment protection by type of protection "n"
Conformity Assessment:	PED Module H – Full Quality Assurance CE-0062-PED-H-WDI 001-25-USA-rev-A Bureau Veritas SAS (0062) 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

Signature	Annette Lynch
Full Name	**Annette Lynch**
Position	**Engineering Manager**
Place	**Woodward, Fort Collins, CO, USA**
Date	15 April 2025

5-09-1183 Rev 43

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

File name: 00554-EU-02-02
Manufacturer's Name: WOODWARD INC.
Manufacturer's Address: 1041 Woodward Way
Fort Collins, CO 80524 USA
Model Names: Gas Shutoff Valve, GSOV80 / GSOV80 H2 – 3 inch
This product complies, where applicable, with the following Essential Requirements of Annex I: 1.1, 1.2, 1.3, 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.

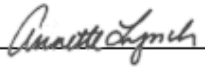
The person authorized to compile the technical documentation:

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 Inc. 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

Annette Lynch

Full Name

Engineering Manager

Position

Woodward, Fort Collins, CO, USA

Place

October 27, 2022

Date

EU DECLARATION OF CONFORMITY

EU DoC No.:	00554-EU-02-03
Manufacturer's Name:	WOODWARD INC.
Manufacturer's Contact Address:	1041 Woodward Way Fort Collins, CO 80524 USA
Model Name(s)/Number(s):	Gas Shutoff Valve, GSOV80 / GSOV80 H2, Flying Leads Versions – 3 inch
The object of the declaration described above is in conformity with the following relevant Union harmonization legislation:	Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres Combined ATEX Equipment Assembly - See items below No additional ignition hazards identified by risk assessment 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 Gas Shutoff Valve, 3 inch: PED Category II
Markings in addition to CE marking:	Ⓔx II 3G IIC T3
Applicable Standards: **PED:**	ASME Boiler and Pressure Vessel Code VIII, Div. 2, 2015 ASME B16.34 Valves Flanged, Threaded and Welding End (2017)
Conformity Assessment:	PED Module H – Full Quality Assurance CE-0062-PED-H-WDI 001-25-USA-rev-A Bureau Veritas SAS (0062) 4 Place des Saisons, 92400 COURBEVOIE, FRANCE
Items in the assembly that have been separately assessed as ATEX Equipment:	Solenoid Operated Valve Assembly (G.W. Lisk Type M3-XXXX-(XX)) II 3G Ex ec IIC T3 Gc, Sira 11ATEX4210X EN IEC 60079-0:2018 EN IEC 60079-7:2015/A1:2018 Proximity Switch (Topworx 70 Series GO Switch 73 Series) II 3G Ex ec nC IIC T2 Gc, Baseefa18ATEX0064X IEC 60079-0:2017 EN 60079-7:2015 IEC 60079-15:2017

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	Annette Lynch
Full Name	**Annette Lynch**
Position	**Engineering Manager**
Place	**Woodward, Fort Collins, CO, USA**
Date	15 April 2025

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Released

We appreciate your comments about the content of our publications.

Send comments to: industrial.support@woodward.com

Please reference publication 35189.

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