WOODWARD

Product Manual 26418
(Revision P, 10/2025)
Original Instructions

GS16 Dual Resolver with Off-Board Digital Valve Positioner Gas Metering System

Fuel Valve with Off-board Electronic Controller

Installation and Operation Manual

General Precautions

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment.

Practice all plant and safety instructions and precautions.

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

Revisions

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.

Woodward Industrial Support: Get Help

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.

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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.

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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.

⚠WARNING

Automotive Applications

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

NOTICE

Battery Charging Device

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

Electrostatic Discharge Awareness

NOTICE

Electrostatic Precautions

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

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

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

Follow these precautions when working with or near the control:

1. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.
2. Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:
   - Do not touch any part of the PCB except the edges.
   - Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.
   - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. After removing the old PCB from the control cabinet, immediately place it in the antistatic protective bag.

Regulatory Compliance

European Compliance for CE Marking:

EMC Directive: Declared to Directive 2014/30/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 electromagnetic compatibility (EMC).

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.
PED Category II
PED Module H – Full Quality Assurance

ATEX – Potentially Explosive Atmosphere 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.
II3 G, Ex ec IIC T3 Gc

Other European and International Compliance:
Compliance with the following European Directive does not qualify this product for application of the CE Marking:

ATEX: 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.

RoHS Directive: Restriction of Hazardous Substances 2011/65/EU:
Woodward Turbomachinery Systems products are intended exclusively for sale and 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.

Machinery Directive: Compliance as Partially Completed Machinery with 2006/42/EC Council Directive of 17 May 2006 on the approximation of the laws of the Member States relating to machinery.

IECEx: Certified for use in hazardous locations IECEx TUR 11.0014X, Ex ec IIC T3 Gc

CCCx: **GS:** Gas Metering Valve
气体计量阀

6: 6,000 lbs. per hour flow rate
流速为 6,000 磅/小时

16: 16,000 lbs. per hour flow rate
流速为 16,000 磅/小时

FS: Fail-Safe Return Spring
故障安全复位弹簧

DR: Dual Resolver
双分解器

HP: High Pressure
高压

See additional certification information after the Declarations section of this manual.

North American Compliance:

CSA: CSA Certified for Class I, Division 2, Groups A, B, C, and D, T3C at 93 °C ambient for use in USA and Canada.
Certificate 160584-1214202 (LR 79726)

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

Special Conditions for Safe Use:
Field wiring for the GS16DR valve power input must be suitable for at least 125 °C.

Connect the ground terminal of the GS16DR valve to earth ground.

Only certified cable glands, plugs or conduit entries, which are sufficient for the explosion protection, shall be used

⚠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 et/ou Zone 2.

⚠WARNING

Due to typical noise levels in turbine environments, hearing protection should be worn when working on or around the GS16DR Valve.

⚠WARNING

The surface of this product can become hot or cold enough to be a hazard. Use protective gear for handling the product in these circumstances. Temperature ratings are included in the specification section of this manual.

NOTICE

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

Chapter 1.
General Information

The GS16DR fuel valve is electrically actuated by the 125 Vdc Digital Valve Positioner (DVP) off-board driver. The valve/DVP Gas System is designed to accept a demand signal, and then accurately position the spherical fuel metering element, exposing the port effective area proportional to flow.

The metering element is designed to promote self-cleaning by a shear-type action created by the spherical element and shoe. Position feedback is achieved using two resolvers. The resolvers are directly coupled to the fuel-metering element, thus eliminating the need for couplings or gear trains and their associated inaccuracies. The use of a second resolver provides redundancy in terms of position feedback.

NOTICE

The customer installation should provide proper fuel filtration and adequate heating to prevent fuel saturation, constituent precipitation, and/or hydrate formation on the wet parts of the valve. Performance degradation or valve failure may result.

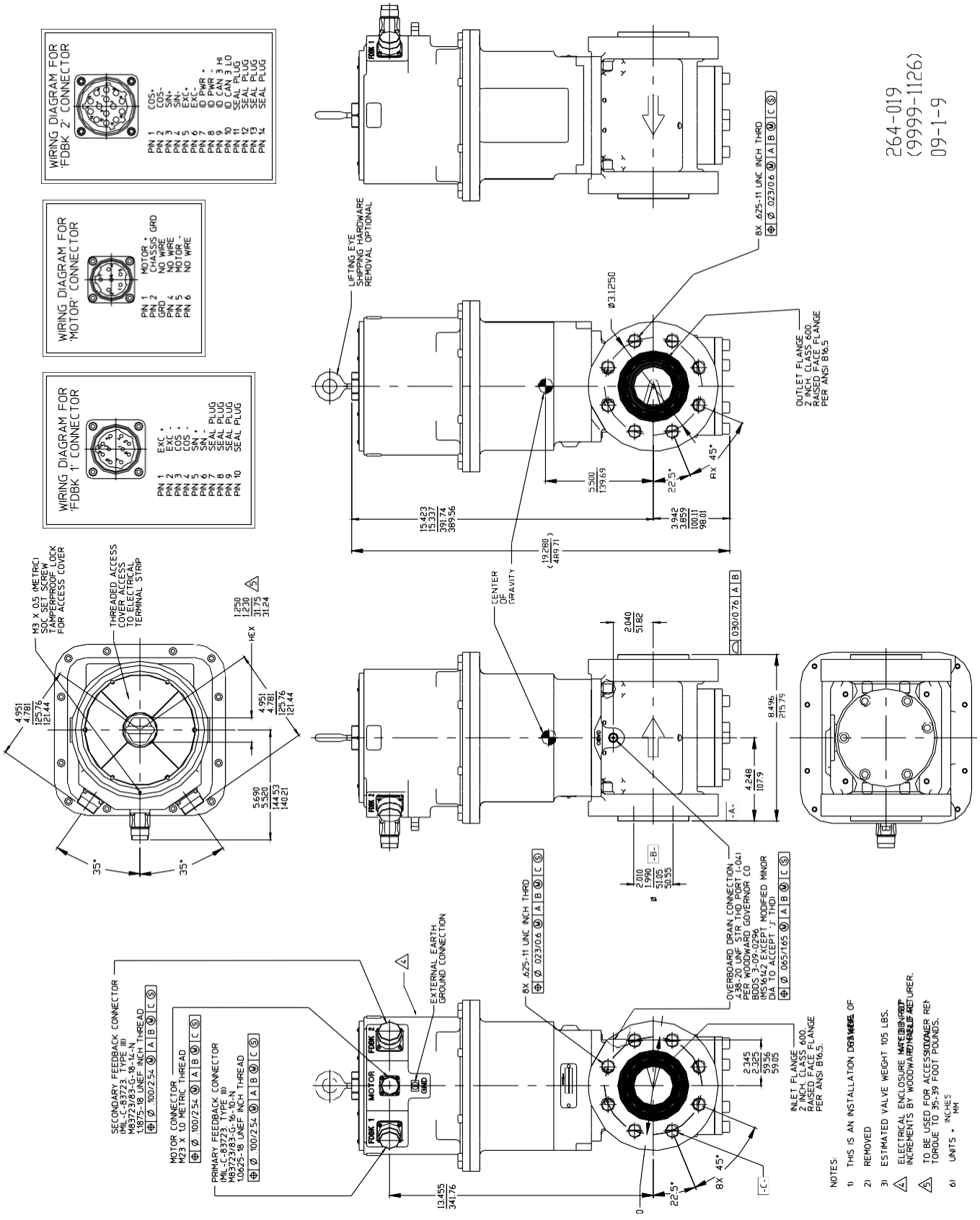


Figure 1-1. GS16DR Valve Outline Drawing, Standard Valve
(dimensions shown are in inches)

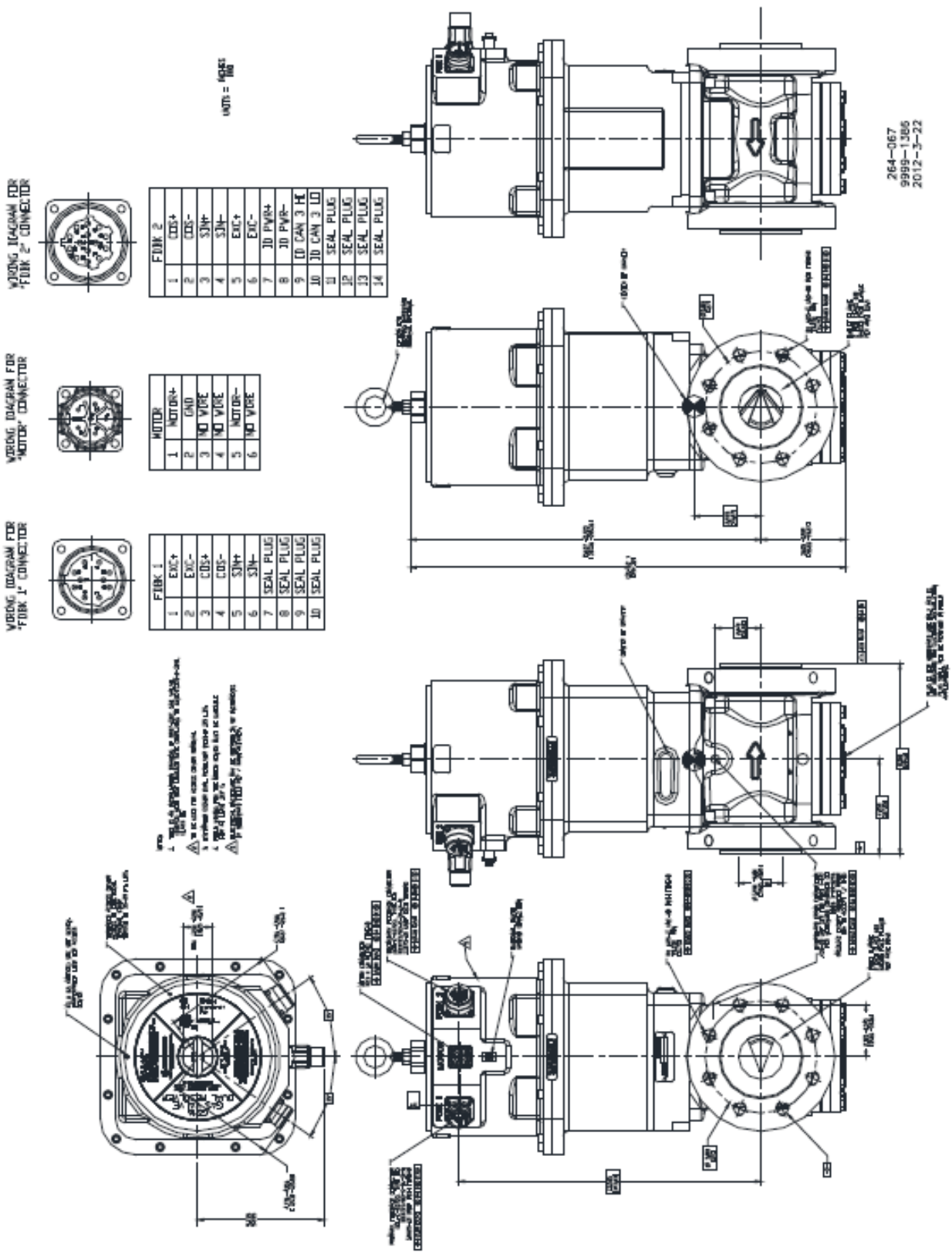


Figure 1-2. GS16DR Valve Outline Drawing; High Pressure 900 psig Valve
(dimensions shown are in inches)

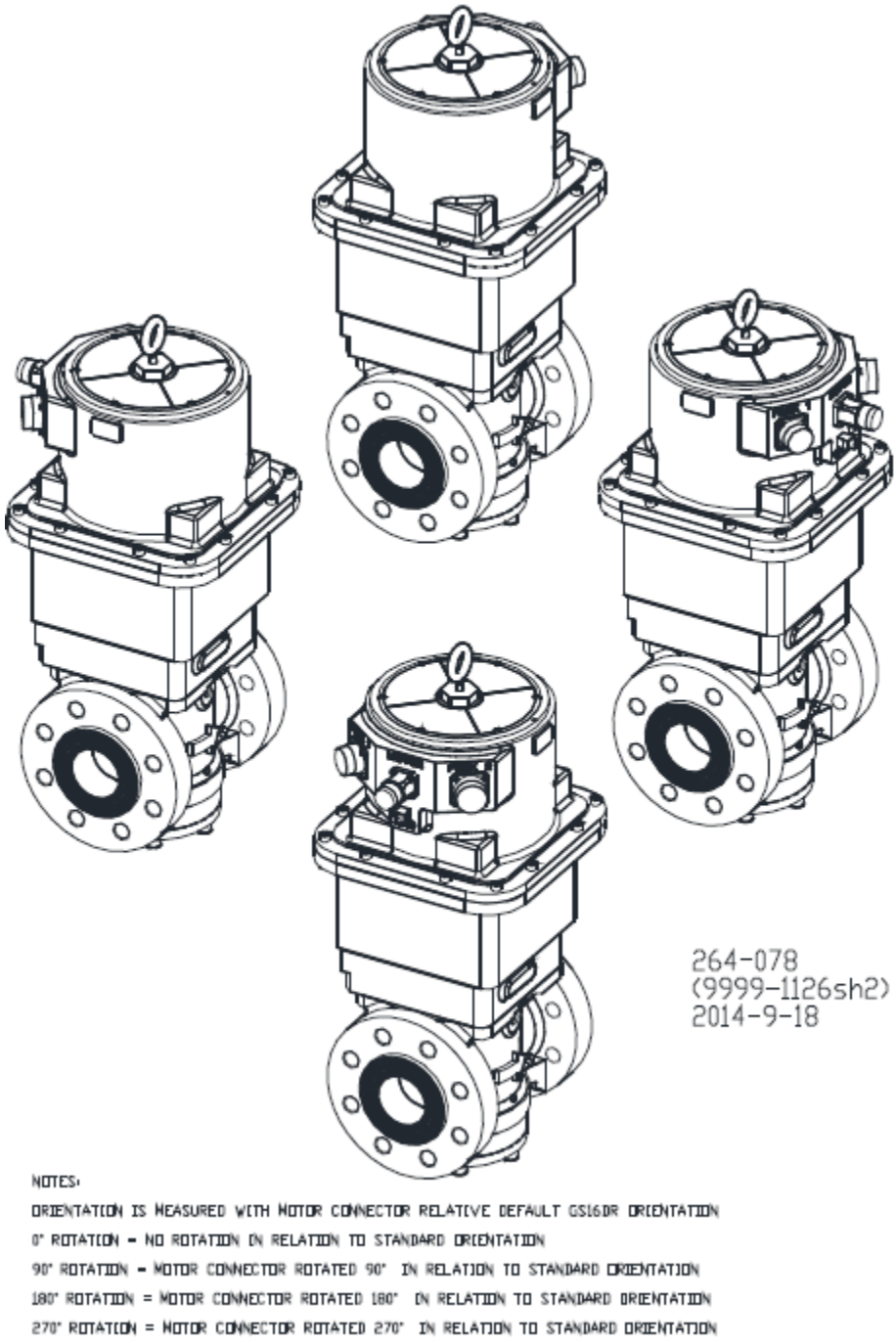


Figure 1-3. GS16DR Valve Orientations

Chapter 2.
Installation

Introduction

⚠WARNING

The GS16DR valve weighs 48 kg (105 lb). To prevent injury, use the supplied lifting eye for lifting assistance.

⚠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.

⚠WARNING

Due to typical noise levels in turbine environments, hearing protection should be worn when working on or around the GS16DR valve.

⚠WARNING

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.

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.

Take care when unpacking the GS16DR valve. Check the assembly for signs of damage, such as bent or dented covers, scratches, and loose or broken parts. Notify the shipper and Woodward if damage is found.

Mounting

The GS16DR valve is designed to operate within a temperature range of –40 to +93 °C (–40 to +200 °F) with a gaseous fuel flow temperature of –40 to +177 °C (–40 to +350 °F).

The overboard (OBVD) drain port is a vent between dual redundant shaft seals. It must be connected by means of rigid steel piping to a fuel connection, purge, vent, or flare-off system so as not to be exposed to danger of obstruction, physical damage, or back pressure in excess of 69 kPa (10 psig).

NOTICE

Pressures exceeding 10 psid (69 kPa) on the OBVD port will result in internal seal damage to the valve, resulting in excessive OBVD leakage. This leakage will affect the flow accuracy of the valve.

NOTICE

Do not plug the OBVD port. This can cause pressure to build up in the vent cavity, potentially damaging the valve and/or causing external gas leakage.

The GS16DR can be mounted directly to the piping system using the 2 inch (50.8 mm) ANSI flanges. Consideration must be given to the strength of the piping system to support the 48 kg (105 lb) weight of the GS16DR.

NOTICE

The lower end cap of the High Pressure GS16DR contains a stainless steel ¼ inch straight thread O-ring plug. This plug is only used during production calibration testing at the Woodward factory and should not be removed in the field by the customer.

The mounting interfaces of the GS16DR are designed to support only the weight of the valve itself. Failure to properly support components (piping, valves, etc.) mounted to the GS16DR can result in binding loads on the GS16DR body and may adversely affect valve performance.

Refer to ASME B16.5 for details of flange, gasket, and bolt types and dimensions. Verify that the piping flange-to-flange dimensions meet the requirements of the outline drawings (Figures 1-1 and 1-2) 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. Mechanical devices such as hydraulic or mechanical jacks, pulleys, chain-falls, or similar should never be used to force the piping system to align with the valve flanges.

ASTM/ASME grade bolts or studs should be used to install the valve into the process piping. Flange gasket material 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 stud/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.

The inlet piping of the GS16DR valve must be in accordance with ANSI/ISA- S75.02 as required for flow metering accuracy. Below is a figure summarizing these requirements.

⚠WARNING

Explosion Hazard—Leak check all gaseous fuel connections. Gaseous fuel leaks can cause explosion hazards, property damage, or loss of life.

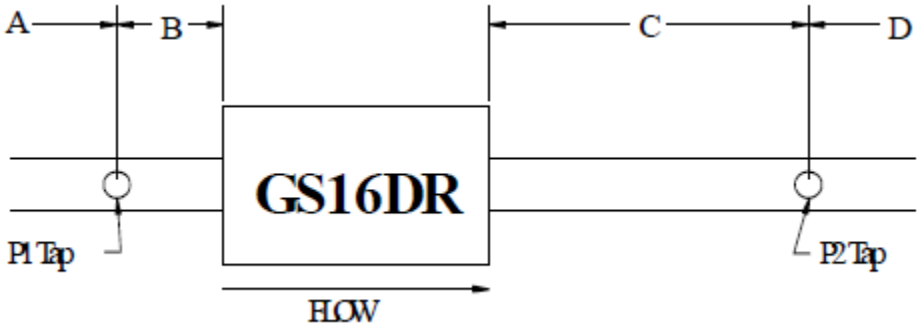


Figure 2-1. Piping Requirements

Dimensions should be:

A At least 18 nominal pipe diameters of straight pipe (36.0 inch/915 mm). This may be reduced to 8 nominal pipe diameters (16 inch/407 mm) if straightening vanes are used.
B Two nominal pipe diameters of straight pipe (4.0 inch/102 mm)
C Six nominal pipe diameters of straight pipe (12.0 inch/305 mm)
D At least 1 nominal pipe diameter of straight pipe (2.0 inch/51 mm)

Electrical Connections

⚠WARNING

The engine, turbine, or other type of prime mover should be equipped with an overspeed, misfire, detonation detection shutdown device(s), that operate completely independent of the prime mover control device(s) to protect against runaway or damage to the engine, turbine, or other type of prime mover with possible personal injury or loss of life should the system fail.

NOTICE

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

Do not connect any cable grounds to "instrument ground", "control ground", or any non-earth ground system. Make all required electrical connections based on the wiring diagrams.

This product is designed for use with three dedicated cables that connect the Digital Valve Positioner (DVP) to the GS16DR valve assembly. These cables must be used for the system to meet all CSA, ATEX, and EMC requirements.

Figures 2-2a, 2-2b, and 2-2c show drawings typical of the three dedicated cables used to connect the GS16DR valve to the DVP driver. The drawings in these figures include wiring diagrams and connector descriptions. Application-specific requirements such as termination at the DVP, length and environmental conditions, etc., may result in a custom implementation of these cables by the customer.

Position Control Architecture

The DVP/GS16DR system will take a position demand signal and provide the corresponding position of the GS16DR valve. This positioner controller supports an external flow control algorithm that provides an input to the DVP as either an analog or a digital demand signal. Refer to DVP manual 26329 for more detailed information.

Valve Identity Module (ID Module)

The GS16DR has the identity module physically positioned within the valve assembly. The purpose of the ID module is to store and provide to the DVP driver parameter information that is specific to the valve, including but not limited to valve type, resolver position calibration, and flow characterization information.

This information is transferred to the DVP upon initial start-up or when explicitly invoking an auto detection procedure.

It is by means of the Service Tool interface that these parameters can be viewed by the customer. The Service Tool interface manual describes using the Service Tool interface in detail.

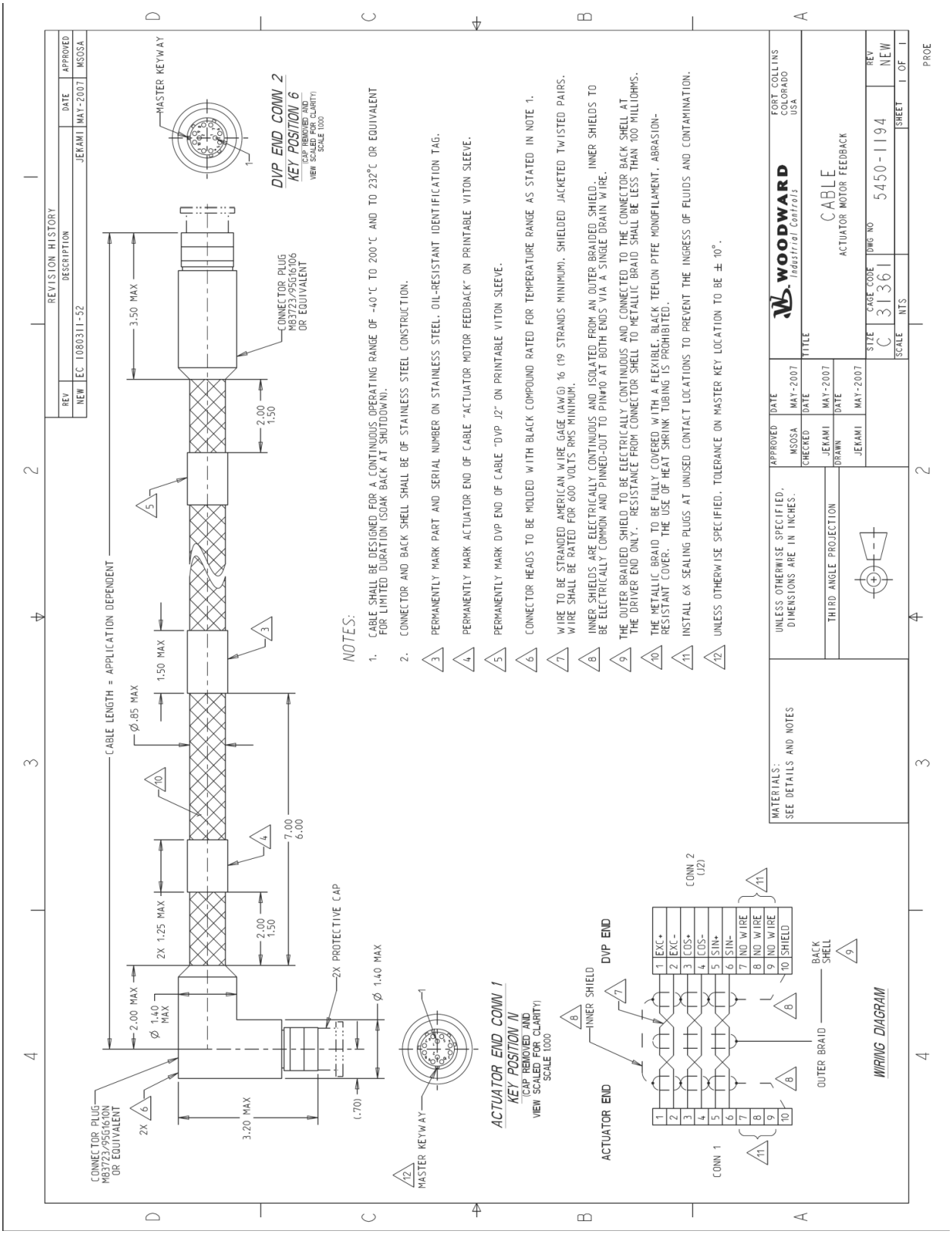


Figure 2-2a. Cable, Feedback 1 Resolver Signal

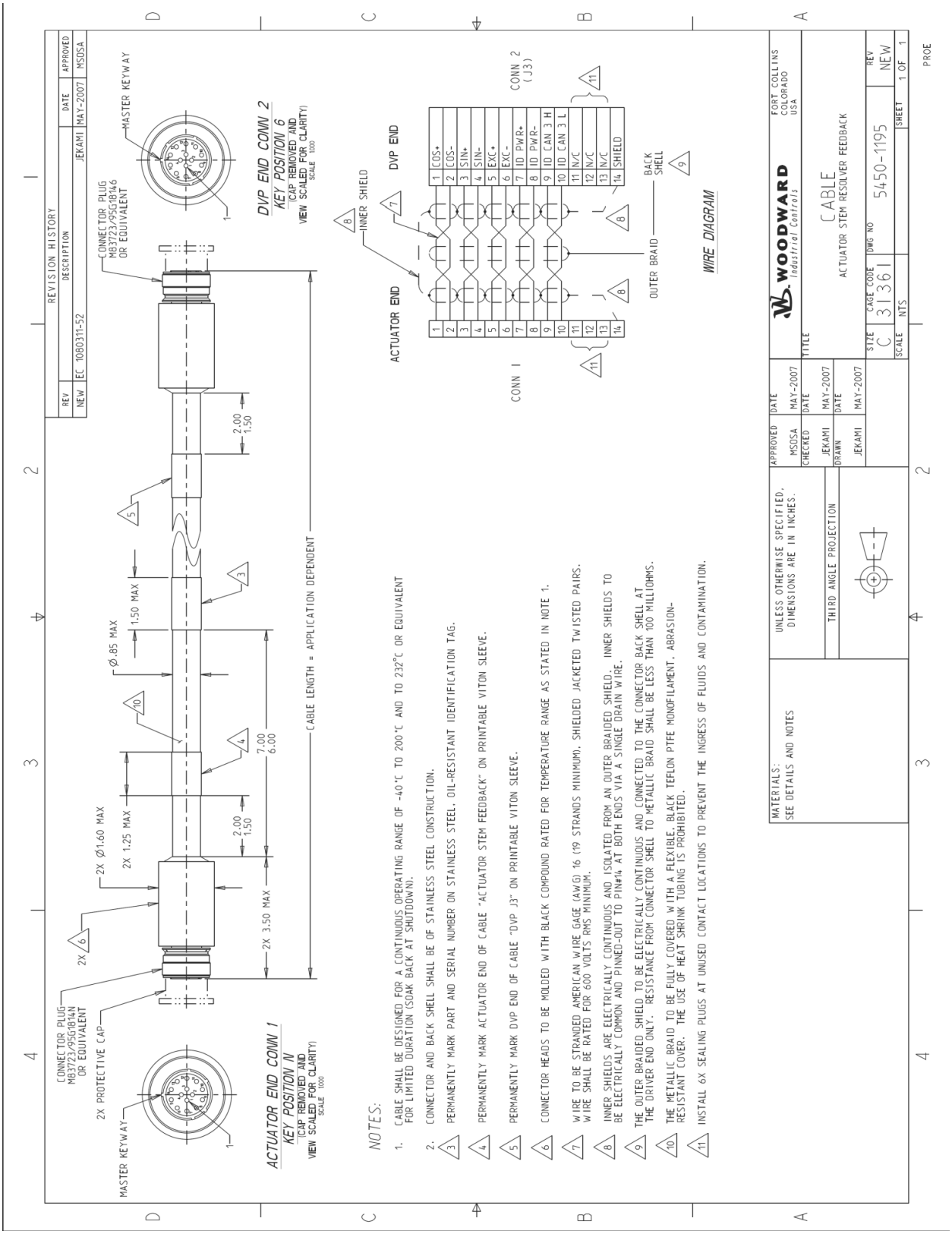


Figure 2-2b. Cable, Feedback 2 Resolver Signal

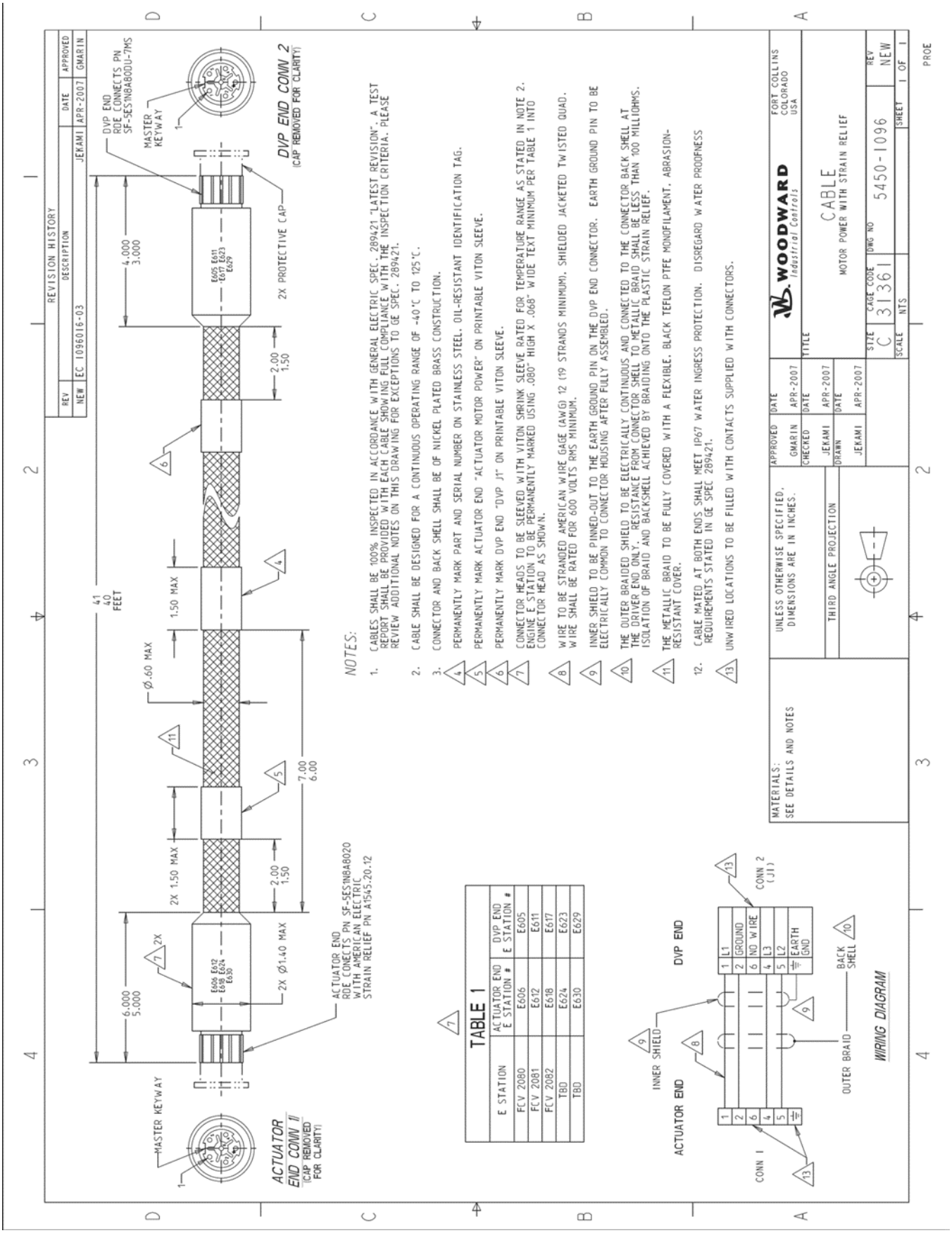


Figure 2-2c. Cable, Motor Power

Valve Specific Parameters for GS16DR

The following is a description of the valve-specific parameters accessible with the Service Tool interface. See DVP manual 26329 for specific information and complete guide.

Table 2-1. Valve Specific Parameters

User Configurable Parameter Area	Service Tool Page Location	Service Tool Section	Parameter Name
Relubrication Function	Setpoint Source Selection	Relubrication Function Settings	Mode
			Position Step
			Impulse Half Duration
			Delay Time
Shaft Resolver Redundancy Manager	LAT Control Operating Summary	Position Feedback Redundancy Manager	Use Resolver
			Max Resolver Difference Alarm
			Max Resolver Diff Shutdown
Input Filter Settings	LAT Actuator/Valve Configuration	Input Filter Settings	Filter Mode
			Bandwidth (Corner/Frequency)
			Damping Factor
			Noise Suppression Threshold
			Noise Supp. Gain (Below Threshold)

The GS16DR valve is connected to the DVP, which is connected to the engine control system. Reference DVP manual 26329 for installation details.

Chapter 3.
Description of Operation

Description

WARNING

Due to typical noise levels in engine environments, wear hearing protection when working on or around the GS16DR valve.

GS16DR/DVP Operating Modes

The valve can be in four operational modes:
- Running
- Shutdown
- Shutdown position
- Shutdown system

See DVP manual 26329 for configuration options.

Running:
In this mode, the valve is operating normally and is in position control.

Shutdown:
In this mode, the valve is still in position control, but there has been a situation that forced the valve into shutdown. The position will be set to zero %.

There are different situations that will force the valve into shutdown. See troubleshooting for more details.

Shutdown Position:
If the valve is in the shutdown position mode, the valve will no longer control the position. The driver will try to close the valve in the current control mode.

WARNING

Repeated use of "Shutdown Position" command from an external source (i.e., Service Tool, Digital Communication, or Discrete Input) as a method of closing the valve should not be done. This will cause damage to the actuator travel stop.

Shutdown System:
If the valve is in the shutdown system mode, the driver will try to close the valve with a PWM signal. This is the last attempt to close the valve.

See troubleshooting for more details on the different situations that will put the valve into the different modes.

Position Control:
In position control, a setpoint is defined based on demand from external sources.

Specifications

Electrical Characteristics

Input Voltage Range (into DVP):	90–150 Vdc
Nominal Current:	2 A
Max Transient Current:	20 A

Mechanical Characteristics

Valve Effective Area [ACd]:	
Standard Valve Design	645 mm² (1.0 in²) or 1290 mm² (2.0 in²)
High Pressure Valve Design	645 mm² (1.0 in²) only
Weight	48 kg (105 lb)
Mounting	See installation drawings
Fuel Connections	Recommend Gas Filtration: 25 µm See installation drawings

Environmental

Fuel Type	Natural gas
Ingress Protection	IP66 per IEC EN 60529

Pressure

Standard Valve Design

Operating Inlet Fuel Pressure Range:	690 to 5171 kPa (100 to 750 psig)
Proof Pressure:	7757 kPa (1125 psig)
Burst Pressure:	25 856 kPa (3750 psig)
Nominal Piping Size (DN):	50.8 mm (2 inch)
Maximum Overboard Drain Port (OBVD) Backpressure:	69 kPa (10 psig)

High Pressure Valve Design

Operating Inlet Fuel Pressure Range:	690 to 6205 kPa (100 to 900 psig)
Proof Pressure:	9308 kPa (1350 psig)
Burst Pressure:	31 026 kPa (4500 psig)
Nominal Piping Size (DN):	50.8 mm (2 inch)
Maximum Overboard Drain Port (OBVD) Backpressure:	69 kPa (10 psig)

Temperature

Ambient:	–40 to +93 °C (–40 to +200 °F)
Fuel Temperature:	–40 to +177 °C (–40 to +350 °F)

Vibration and Shock

Swept Sine Vibration:	Per US MIL-STD-810C, Method 514.2, Procedure I, Figure 514.2-2, Curve AR (2g)
Shock:	Per US MIL-STD-810C, Method 516.2, Procedure I, (10g)

Flow Characteristics

Steady State Accuracy:	The % of point steady state accuracy of the port scheduling is: 105 to 600 pph: 10% at 105 pph linearly decreasing to 2.5% at 600 pph; 600 to 15120 pph: 2.5% max.

Chapter 4.
Valve Sizing

Standard Valve Calculations

Determination of Effective Area

In order to confirm that the size of the GS16DR valve is appropriate for the application, the effective area required to meet the maximum flow requirement must first be determined. The effective area is determined using the following equations.

Critical Pressure Ratio:

$$R7 = \left(\frac{2}{1+K}\right)^{\frac{K}{K-1}}$$

If $\frac{P2}{P1} \geq R7$, then the Effective Area is calculated as follows:

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

If $\frac{P2}{P1} < R7$, then the Effective Area is calculated as follows:

$$ACd = \frac{Wf}{3955.289 \cdot P1 \cdot \sqrt{\left[\frac{K \cdot SG}{(K-1) \cdot T \cdot Z}\right] \cdot \left[R7^{\frac{2}{K}} - R7^{\frac{1+K}{K}}\right]}}$$

Where:
ACd = Effective Area (square inches)
Wf = Mass Flow Rate (pph)
R7 = Critical Pressure Ratio
P1 = Valve Inlet Pressure (psia)
P2 = Valve Discharge Pressure (psia)
K = Ratio of Specific Heats (1.300 typical for standard natural gas at 60 °F)
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

For sizing purposes, Z (Gas Compressibility Factor) is approximately 1.0 since its effect on the equation is relatively small.
It is recommended that the effective area for the chosen port be at least 10% larger than the calculated value from the equations previously described 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 maximum temperature.

Determination of Metering Port Size

Once the effective area has been determined and 10% margin has been added, confirm that the metering port size is appropriate for the application by using the following graph.

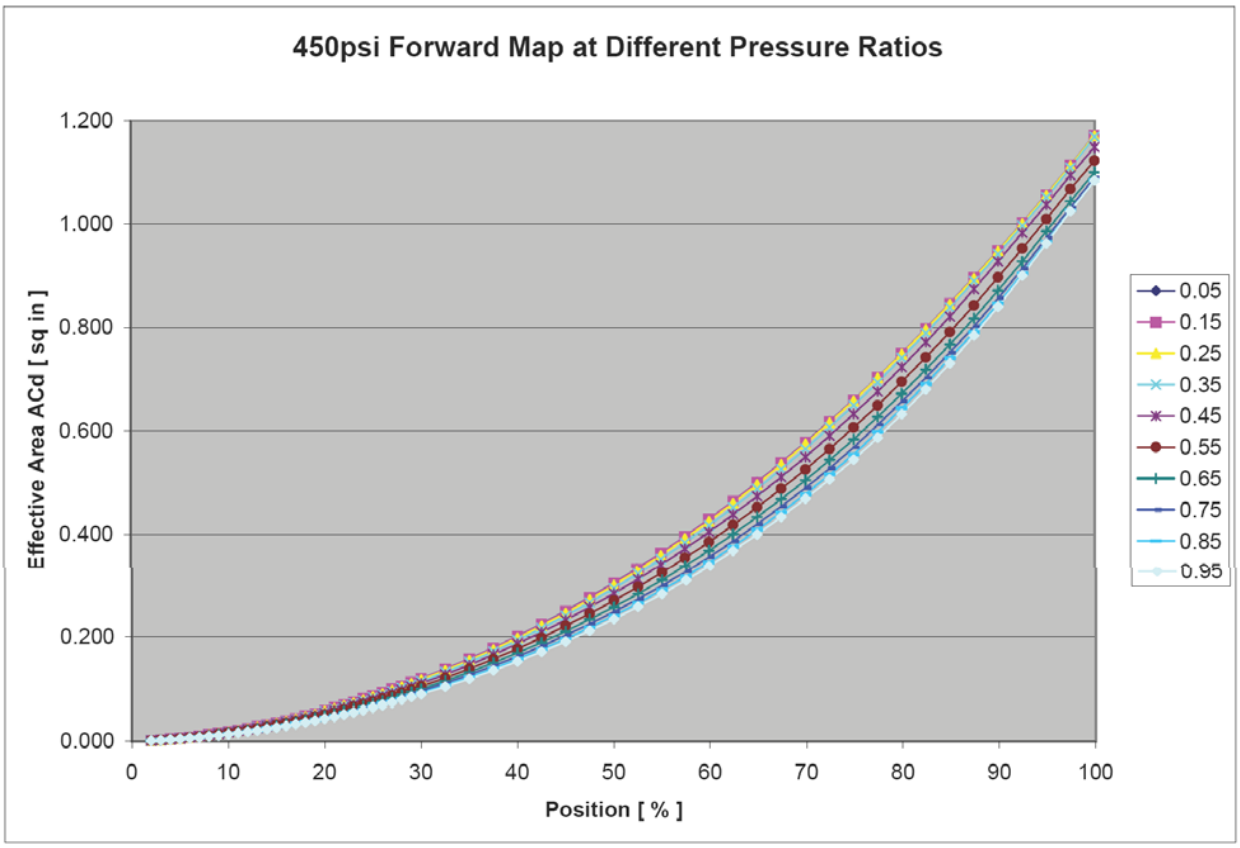


Figure 4-1. GS16DR Port Metering Flow Capability

2.0 in² Effective Area (ACd) Version Specifications

This section provides additional details specific to the 2.0 in² (1290 mm²) ACd version of the GS16DR.

Specifications (Unique to the 2.0 in² ACd Version)

Valve Effective Area (ACd): 1290 mm² (2.0 in²)
Effective Area Accuracy: ±5% of point

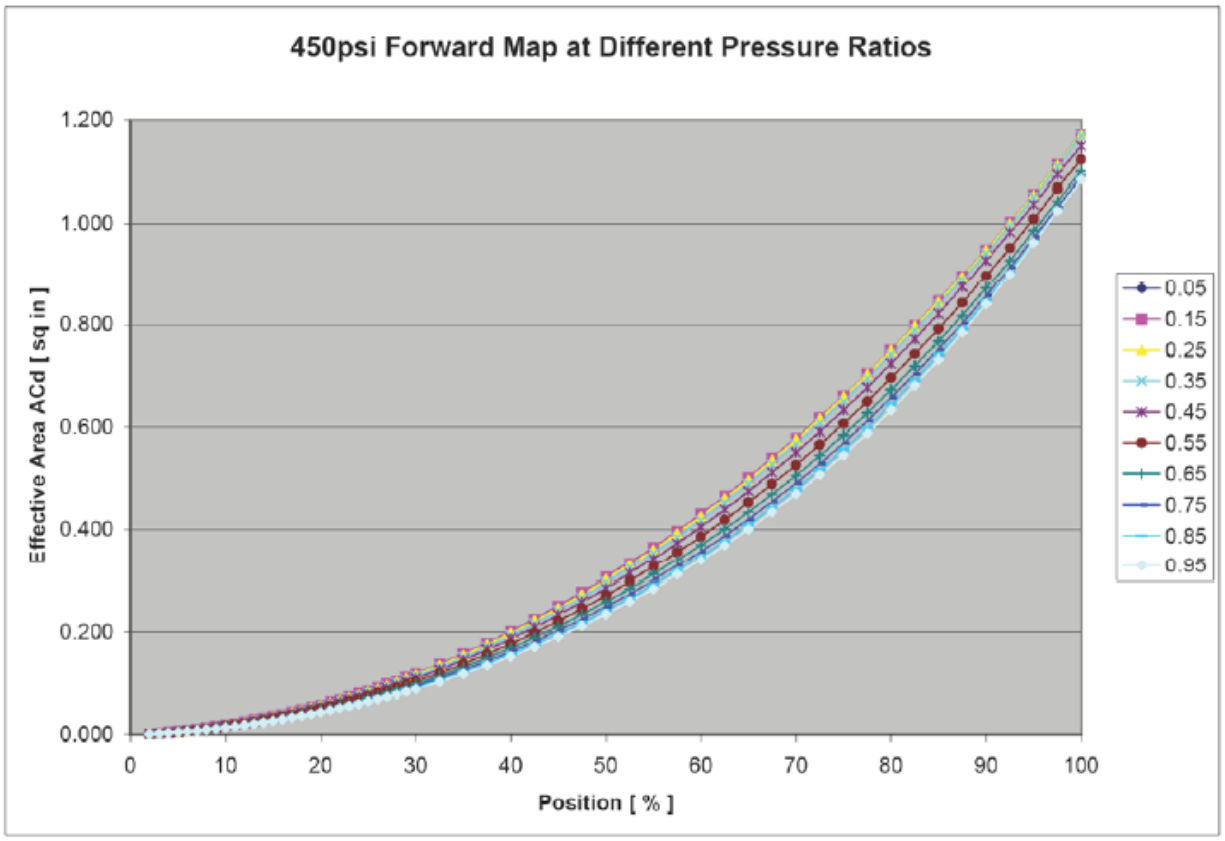


Figure 4-2. Metering Port ACd vs Position Characteristics

GS16DR 2.0 in² ACd Pressure Drop Operational Limits

The pressure drop across the 2.0 in² (1290 mm²) ACd GS16DR valve must be less than the maximum allowable delta pressure across the valve as outlined in the chart below. Figure 4-3 shows pressure drop across the valve as a function of valve position.

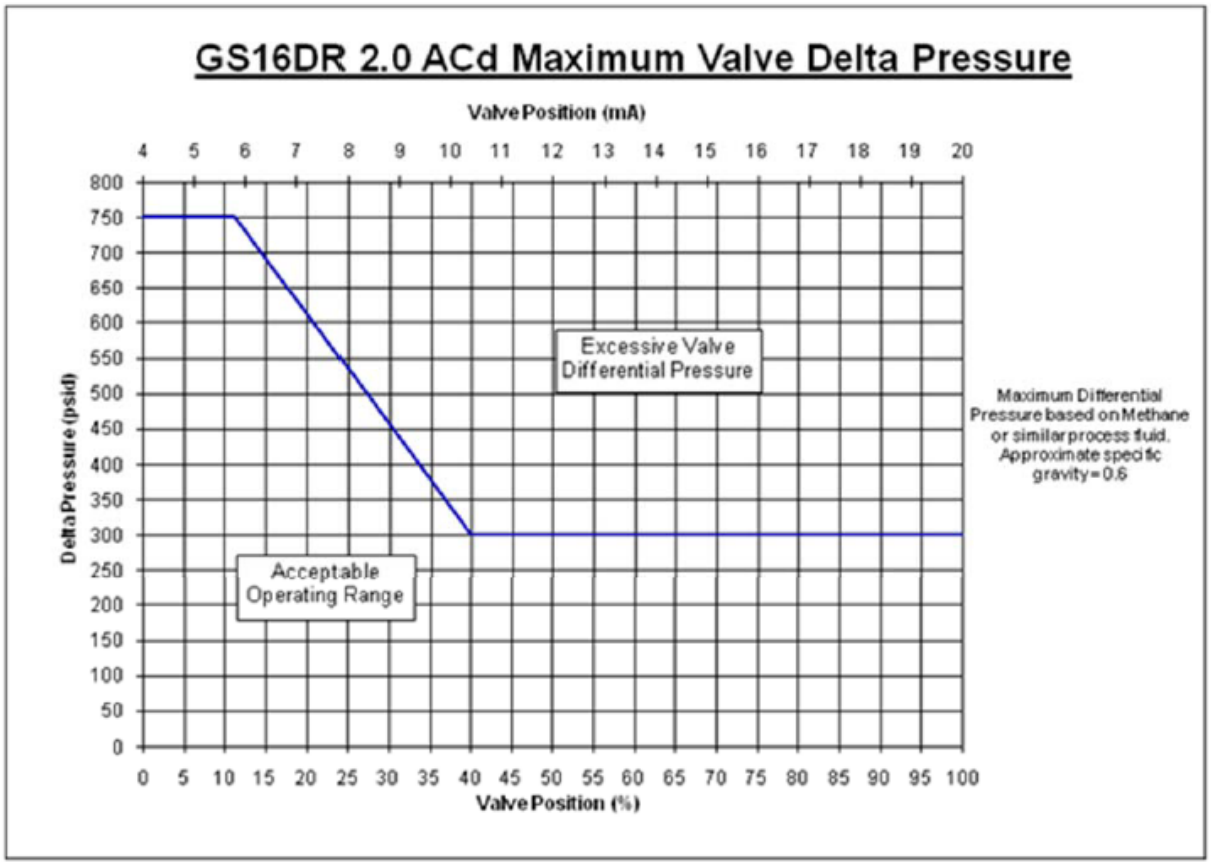


Figure 4-3. 2.0 ACd Maximum Valve Delta Pressure

Chapter 5. Troubleshooting

Refer to DVP manual 26329 for troubleshooting.

Startup Position Error (Shutdown Position)	During valve startup, the valve is closed to detect if the resolver is at the programmed position. If it is not, the valve will shutdown.	Reset the valve, and the test will be performed again if the valve is shutdown. Check if there is an obstruction in the valve. Check if the valve needs cleaning. Check pressure rating.
Position Error (Shutdown Position)	During run time, the valve will check if the position feedback and the demanded position are the same. If not, a position error will be flagged, and the valve will be shut down.	Check if there is an obstruction in the valve. Check if the valve needs cleaning. Check pressure ratings.
Tracking Error	The difference between the Device Net position demand and the Analog position demand is greater than the configured limit (1% default).	Check the control system analog output and the valve analog input.
Position Sensor Error (Shutdown Position)	The valve is continuously checking if the signals for the resolver are correct. If the resolver signals are missing or incorrect, a Position Sensor Error 1 is set.	Check wiring in the valve. Replace valve.

Chapter 6.
Maintenance

It is recommended to periodically clean the valve with a petrochemical solvent using a wash and brush. High-pressure power washing is not recommended. When cleaning the metering element and the inside of the valve body, do not use sharp objects that may scrape or dent the metering element, as this could degrade the accuracy of the valve.

When using solvent or water to clean the valve, ensure all access points into the enclosure are closed and/or covered (electronics cover, conduit entry, OBVD port).

⚠WARNING

To prevent possible serious personal injury, or damage to equipment, ensure that all electric power, hydraulic pressure, and gas pressure have been removed from the valve before beginning any maintenance or repairs.

⚠WARNING

Due to typical noise levels in turbine environments, hearing protection should be worn when working on or around the GS16DR valve.

⚠WARNING

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

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.

Chapter 7.
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 receive 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 P—
- Replaced EU DoC

Changes in Revision N—
- Added GS definitions and Chinese translations to the Regulatory Compliance section
- Added Installation Instructions Requirement page

Changes in Revision M—
- Updated Declarations

Changes in Revision L—
- Chapter 3: Added warning note to not use “shutdown position” command repeatedly.

Changes in Revision K—
- Removed CE line from Pressure Equipment Directive
- Updated EU Declaration of Conformity

Changes in Revision J—
- Updated Certifications
- Updated DOC/DOI

Changes in Revision H—
- Added Figure 1-3 to show various orientations

Changes in Revision G—
- Updated Declaration

Changes in Revision F—
- Updated Regulatory Compliance section
- Added nominal & max. transient currents (page 13)

Changes in Revision E—
- Updated Regulatory Compliance information
- Added performance caution to page 1
- Added outline drawing (Figure 1-2) and specifications for 900 psi version
- Added cautions and expanded installation information to Chapter 2

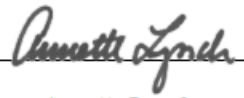
Declarations

EU DECLARATION OF CONFORMITY

EU DoC No.:	00143-04-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 Fuel Metering Valves: GS6, GS6DR, GS6FS, GS16, GS16DR, GS16DR HP Liquid Fuel Metering Valves: LQ6, LQ6T, LQ6BP
The object of the declaration described above is in conformity with the following relevant Union harmonization legislation:	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 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 Gas Fuel Metering Valves: PED Category II ; All others: SEP Directive 2014/30/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 electromagnetic compatibility (EMC)
Markings in addition to CE marking: *Note: See Appendix*	All Except GS16DR, GS16DR HP: Ⓔx II 2 G, Ex db IIB T3 Gb All: Ⓔx II 3 G, Ex ec IIC T3 Gc
Applicable Standards:	ASME Boiler and Pressure Vessel Code VIII, Div. 1, 2015. EN IEC 60079-0:2018: Explosive atmospheres – Part 0: Equipment - General requirements EN IEC 60079-1:2014: Explosive atmospheres – Part 1: Equipment protection by flameproof enclosures "d" EN IEC 60079-7:2015/A1:2018 Explosive atmospheres – Part 7: Type of protection by increased safety "e" EN 61000-6-4 : 2007/A1:2011: EMC Part 6-4: Generic Standards - Emissions for Industrial Environments EN 61000-6-2: 2005: EMC Part 6-2: Generic Standards - Immunity for Industrial Environments
Third Party Certification:	Category 2: TUV 13ATEX7404X Category 3: TUV 13ATEX7409X TUV Rheinland Industrie Service GmbH (0035) Am Grauen Stein, D51105 Cologne
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 ATEX Annex IV - Production Quality Assessment, 01 220 113542 TUV Rheinland Industrie Service GmbH (0035) Am Grauen Stein, D51105 Cologne

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

Engineering Manager
Position

Woodward, Fort Collins, CO, USA
Place

14 April 2025
Date

5-09-1183 Rev 43

Appendix – Limitations on compliance vs. models

Valve Type	Model	CE Marking				
		EMC	Machinery	ATEX Zone 1	ATEX Zone 2	PED
Gas Fuel	GS6	C	C (DoI)	C	C	C
	GS6DR	C	C (DoI)	C	C	C
	GS6FS	C	C (DoI)	C	C	C
	GS16	C	C (DoI)	C	C	C
	GS16DR	C	C (DoI)	N	C	C
	GS16DR HP	C	C (DoI)	N	C	C
Liquid Fuel	LQ6	C	C (DoI)	C	C	C (SEP)
	LQ6T	C	C (DoI)	C	C	C (SEP)
	LQ6BP	C	C (DoI)	C	C	C (SEP)
C - Compliant ; N - Not Compliant						

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

File name:	00143-04-EU-02-03
Manufacturer's Name:	WOODWARD INC.
Contact Address:	1041 Woodward Way Fort Collins, CO 80524 USA
Model Names:	GS6, GS6DR, GS6FS, GS16, GS16DR, GS16DR HP, LQ6, LQ6T, LQ6BP Fuel Metering Valves
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 Inc., Fort Collins, CO, USA
Place

11 August 2022
Date

Document: 5-09-1182 (rev. 21)

安装使用要求

Installation Instructions Requirements

认证编号 CN2023C2307-000776

Certification No.

本产品经认证符合 CNCA-C23-01: 2019《强制性产品认证实施规则 防爆电气》的要求。

The product(s) is verified and certified according to CNCA-C23-01: 2019 China Compulsory Certification Implementation Rule on Explosion Protected Electrical Product.

#	产品名称 Product 型号 Type	防爆标志 Ex Marking
1	气体计量阀 GS6, GS6DR, GS16, LQ6, LQ6T, LQ6BP, GS16DR, GS16DR HP, S6FS	Ex ec IIC T3 Gc, Ex db IIB T3 Gb

依据标准 GB/T3836.1-2021, GB/T3836.2-2021, GB/T3836.3-2021

Series standards

安全使用条件

Specific conditions of safety use:

- 阀门的接地端子必须接地。
- 应配用经 CCC 认证且适合使用条件的电缆夹紧密封接头、堵头或导管密封装置，并正确安装。
- 当存在爆炸性环境时，不得使用 RS 232/485 接口。
- GS6 阀门电源输入现场布线的温度应至少为 103°C，GS6FS、GS16DR 和 GS16DR HP 现场布线的温度应至少为 125°C。
- 其他见产品使用说明书。
- Connect the ground terminal of the valve to earth ground.
- Only CCC certified cable glands, plugs or conduit entries, which are sufficient for the use in Ex db resp. Ex ec equipment, shall be used.
- The RS 232 / 485 interface shall not be used when an explosive atmosphere is present.
- Field wiring for power input at the GS6 valve must be suitable for at least 103 °C, and 125 °C for the GS6FS, GS16DR and GS16DR HP.
- See instruction for other information.

Woodward, Inc.

产品上的符合性标志:

Compliance marks on product:

中国强制性认证

China Compulsory Certification

CCC:

Doc No.:

Approved:

Released

We appreciate your comments about the content of our publications.

Send comments to: industrial.support@woodward.com

Please reference publication 26418.

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PO Box 1519, Fort Collins CO 80522-1519, USA
1041 Woodward Way, Fort Collins CO 80524, USA
Phone +1 (970) 482-5811

Email and Website—www.woodward.com

Woodward has company-owned plants, subsidiaries, and branches, as well as authorized distributors and other authorized service and sales facilities throughout the world.

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