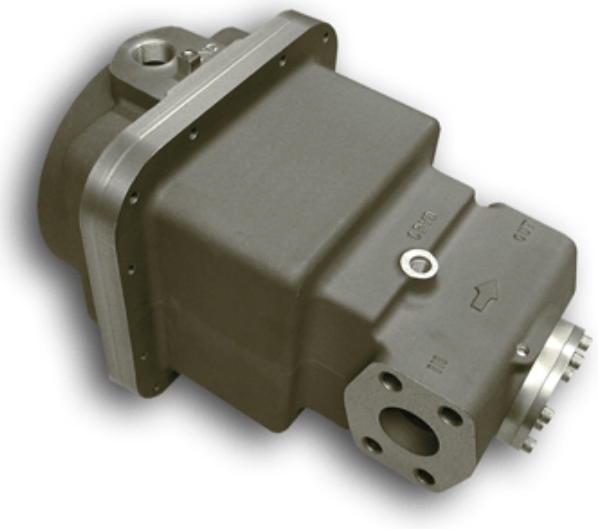


GS6 Gas Valve

with On-board Driver

- Single moving part for reliable performance
- All-electric actuation
- On-board driver
- Fast dynamic response
- Robust self-cleaning valve
- Digital and/or 4–20 mA interface
- Highly accurate fuel metering
- Discrete fault output and independent shutdown
- Certified for North American Hazardous Locations
- Compliant with applicable CE Directives—ATEX, Pressure Equipment, EMC, and Machinery

APPLICATIONS

The Woodward GS6 gas fuel metering valves are designed to meet the high performance standards required for the control of fuel to industrial gas turbines. The assembly provides reliable, cost-effective interfaces between the electronic engine control system and the gas turbine as applied in power generation, compressor, or mechanical drive applications. The valve can be used in a single valve configuration for single-manifold base turbines or in multiple valve configurations for Dry Low Emission turbines.

DESCRIPTION

The GS6 valve incorporates the highly robust Woodward self-cleaning metering valve design with a high-torque actuator to ensure extended operation in all types of gaseous fuel service. The valve features an on-board electric actuator driver for ease of packaging and installation.

Valve versions with dual position feedback resolvers are available for critical applications. The drivers supplied with these valves incorporate dual signal conditioning, resolver fault detection, and selectable failure management options.

The GS6 is an electrically actuated fuel valve with an on-board electronic position controller. Highly accurate flow control is achieved by the use of a spherical fuel metering element with a precision machined fuel metering port. A seal shoe is located against the spherical valve element to allow accurate flow area control and the achievement of position flow shut-off. The use of rare earth permanent magnets in a highly efficient electromagnetic circuit provides high actuation forces while minimizing package size. The closely integrated mechanical design eliminates backlash and provides virtually infinite valve positioning resolution.

The self-cleaning, shear-type metering action keeps the metering port free from performance-limiting deposits of gas condensates, contaminants, and system debris. The valve uses a single moving part with the fuel metering element, actuator rotor, and single or dual redundant position feedback resolvers mounted on a single solid-piece shaft. Accurate flow versus input signal characteristics are achieved on each valve version by precision forming of the valve metering port, the use of extended valve travels, and high precision resolvers for valve position feedback. The GS valves can achieve flow turn-down ratios in excess of 100 to 1 and a positive flow shut-off rating exceeding the requirements of ANSI B16.104 Class IV.

ON-BOARD DRIVER

The valve driver and wiring terminal box are integral with the valve assembly, eliminating interconnecting wiring, reducing package size requirements, and lowering the installed cost. The on-board driver can be interfaced to the turbine control via a 4–20 mA input and feedback signals or through a DeviceNet network. The GS6 can be configured to accept both the 4–20 mA signal and DeviceNet position command in a redundant configuration. With this arrangement, if either demand signal fails, the driver will switch to the healthy input demand signal. The valve driver operates with an 18 to 32 Vdc power supply.

The on-board valve driver performs the following functions:

- Fast and accurate closed loop position control of the gas valve in response to the 4–20 mA or DeviceNet input command signal
- Actual valve position feedback via 4–20 mA or DeviceNet
- Independent remote shutdown input
- Valve/Driver Fault output

The driver includes protection and alarm indications for the following faults:

- Analog input out of range
- Feedback—open wire and short
- Input Power out of range
- Position Error
- Internal Driver Faults
- Actuator Open/Short
- Driver Overcurrent

All faults are available through the DeviceNet connection or through an RS-232 connection when using an analog control interface.

FUEL FLOW

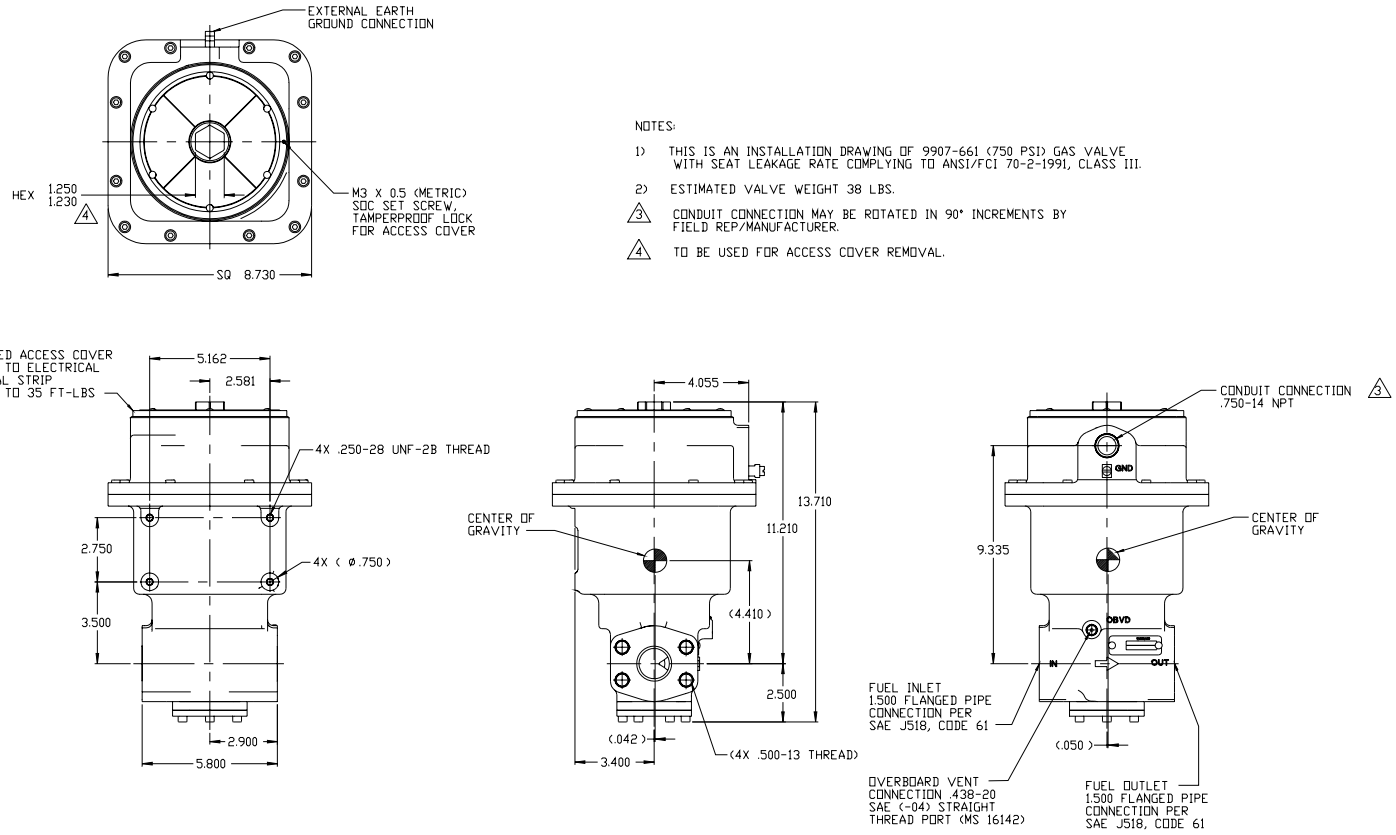
Gas fuel flow is normally achieved by the accurate scheduling of metering valve port area, based on values for gas properties, operating pressures, and temperature. The GS6 valve is factory calibrated under flow at full flow and pressure conditions to provide an accurate valve metering to the input demand signal. Flow equations for the GS6 valves are located in the GS6 manual. These can be used to set up the valve for any site-specific conditions.

PORT SIZES

The GS6 is available with five different port sizes to optimize valve performance for various flow and pressure drop requirements. Standard port sizes are:

- 0.15 in² (96.8 mm²)
- 0.30 in² (193.5 mm²)
- 0.45 in² (290.3 mm²)
- 0.60 in² (387.1 mm²)
- 0.75 in² (483.9 mm²)

The standard metering ports are contoured to provide approximately square law relationships between commanded position and effective area.



GS6 Valve Outline Drawing (single resolver)
(Do not use for construction)

SPECIFICATIONS

Valve Parameters	Gas Flow Range:	4.5 to 6800 kg/h (10 to 15 000 lb/h)
	Gas Supply Pressure:	690 to 5170 kPa (100 to 750 psig)
	Gas Temperature:	–40 to +93 °C (–40 to +200 °F)
	Minimum Pressure Differential:	138 kPa (20 psid) recommended for accurate flow characteristics
	Maximum Pressure Differential:	5170 kPa (750 psid)
	Gas Filtration Recommendations:	25 µm Absolute
	Metering Ports (maximum area):	0.15 in² (97 mm²), 0.30 in² (194 mm²), 0.45 in² (290 mm²), 0.60 in² (387 mm²), and 0.75 in² (484 mm²)
	Metering Valve Leakage:	0.1% of rated flow maximum
	Slew Rate:	<100 ms
	Position Loop Bandwidth:	10 Hz at –3 dB at 24 Vdc and 450 psi (3100 kPa) supply
	Flange to Flange Dimension:	5.80 inches (147.3 mm) nominal
	Materials:	Aluminum housing with SST (stainless steel) wetted parts, NACE MR0175-2000 compliant
	Weight:	17.1 kg (37.6 lb)
Gas Connections	Inlet and Discharge:	1.5 inch (38 mm) SAE flanges per J518 Code 61
	Overboard Vent:	Port per SAE J1926/1-4
Flow Accuracy	Analog Input:	The lesser of 5% of point or 2% of full scale
	Digital Input:	2% of point
Repeatability	Analog Input:	±0.5% of full scale
	Digital Input:	±0.1% of full scale
Temperature Drift	Analog Input:	0.05% of full scale input demand (4–20 mA) per degree F 0.09% of full scale input demand (4–20 mA) per degree C
	Digital Input:	N/A
Electrical Specifications	Input Power:	24 Vdc (18–32 Vdc)
	Steady State Current:	< 2 A typical
	Maximum Transient Current:	7 A for 100 ms
Electrical Connections		Field Wires enter junction through 0.750-14 NPT threaded conduit connection Terminal blocks in integral junction box, stud for external ground
	Valve Position Demand Signal:	4–20 mA current signal into 249 Ω impedance or DeviceNet interface
	Valve Position Feedback Signal:	4–20 mA current signal into < 500 Ω impedance or DeviceNet interface
	Shut-down/Reset Command:	Close contact to run, open to shut down
	System Fault Output:	Isolated FET for direct control connection with or without interposing relays
	Maximum Current:	500 mA (10 µA leakage)
Environmental Specifications		
	Operating Temperature Range:	–40 to +93 °C (–40 to +200 °F)
	Electromagnetic Compatibility (EMC):	EN 61000-6-2 (2001): Immunity for Industrial Environments EN 61000-6-4 (2001): Emissions for Industrial Environments
	Shock:	US MIL-STD-810C method 516.2, procedure 1 (10 G Peak, 11 ms duration, sawtooth waveform)
	Vibration:	US MIL-STD-810C, Method 514.2, Procedure I, Figure 514.2-2, Curve AR (2 G test from 10 to 2000 Hz)
	Humidity:	US MIL-STD-E-8593, paragraph 4.6.2.3.3
	Salt Fog:	US MIL-STD-810, Method No. 509
	Ingress Protection:	IP56 per EN 60529

Regulatory Compliance

European Compliance for CE Marking:

EMC Directive: Declared to 89/336/EEC COUNCIL DIRECTIVE of 03 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility.

Pressure Equipment Directive: Certified to Pressure Equipment Directive 97/23/EC of 29 May 1997 on the approximation of the laws of the Member States concerning pressure equipment, Category II

ATEX – Potentially Explosive Atmospheres Directive: Declared to 94/9/EEC COUNCIL DIRECTIVE of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres.
LCIE 02.ATEX.6049
Zone 1, Category 2, Group II G EEx d IIB T3
Zone 2, Category 3, Group II G EEx nA IIC T3

Other European Compliance:

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

Machinery Directive: Compliant as a component with 98/37/EC COUNCIL DIRECTIVE of 23 July 1998 on the approximation of the laws of the Member States relating to machinery.

North American Compliance:

CSA: CSA Certified for Class I, Division 1, Groups C and D and Class I, Division 2, Groups A, B, C, and D, T3 at 93 °C Ambient for use in Canada and the United States

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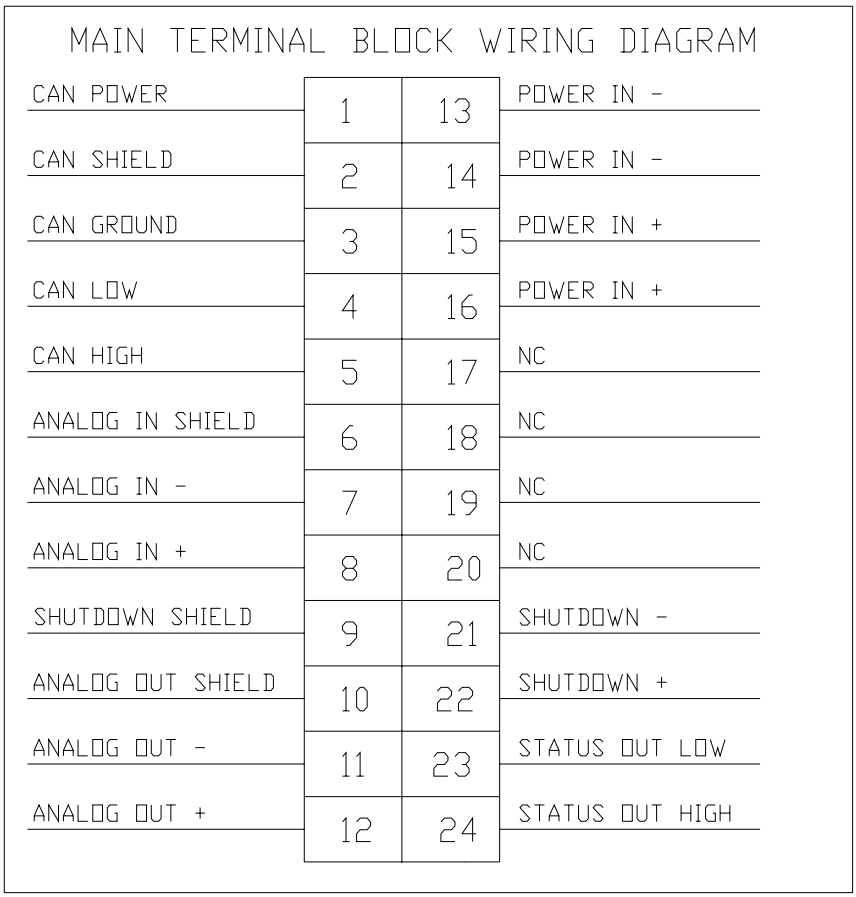

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GS6 Valve Wiring Diagram

For detailed information, see Woodward manual 26171.

For more information contact: