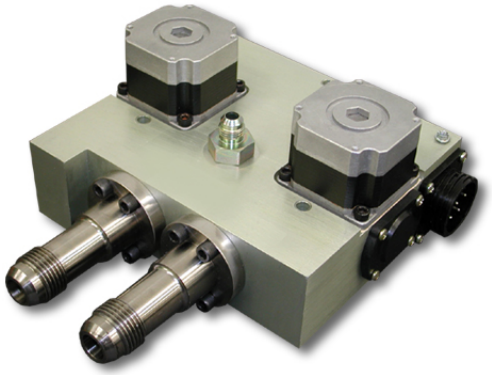
Swift™

Gas Metering System

Applications

The Woodward Swift™ Gas Metering System (GMS) is suitable for use on microturbines, miniturbines, small industrial gas turbines (up to 2 MW), and high-pressure fuel cell applications. The Swift system has four valve sizes with maximum fuel flows between 6.3 and 88.9 g/s (50 and 695 lb/hr) of standard natural gas, depending on system pressures. The system is designed for installation within the engine enclosure and can operate with gas temperatures up to 121 °C (250 °F).

Description



The main system components of the Swift GMS include one or two metering valves and one electronic valve driver module.

The development of the Swift GMS focused on meeting the performance requirements of emerging distributed resource applications, including gas turbines and fuel cells. Both cost and performance are critical in these applications. Hence, every element of the design and production process has been driven to reduce cost. The result of this effort is an accurate, fast, and robust valve at a low price. Turbine and fuel cell manufacturers no longer have to sacrifice performance to meet their cost targets.

The core component within the GMS is the Swift valve. This valve consists of a sonic flow metering section (with pressure recovery) and a contoured valve needle which is positioned by a stepping motor. Woodward's experience with sonic flow metering valves has produced several product platforms that operate at sonic conditions with pressure ratios (P2/P1) up to 0.85. The use of the sonic flow valve allows precise gas flow control without measurement and compensation for gas pressure variations downstream of the metering device.

In addition, the Swift valve has been designed for gas temperatures up to 121 °C (250 °F), reducing the requirement for gas cooling after a gas compressor.

The stepping motor allows for accurate valve positioning and very low power usage. The flow turndown ratio of the metering valve is better than 20:1, which allows accurate engine start reliability and consistent performance.

The valve is available in a characterized configuration (Model 200) for the best accuracy. It is also available in an uncharacterized configuration (Model 600) for applications requiring excellent repeatability but not absolute accuracy.

- High accuracy gas flow metering
- Low cost
- Fast response
- High flow turndown ratio
- Designed for high gas temperatures
- Contaminant resistant
- Compact, modular design meets wide range of applications
- Based on Woodward's SonicFlo™ platform
- No field adjustments or rigging
- Certified for North American Hazardous Locations
- Compliant with applicable CE Directives–ATEX, Machinery, and EMC

Because the valve needle only contacts the nozzle when fully closed, the unit is very resistant to the effects of contamination in the gas flow. To provide a robust and reliable system, a Woodward digital electronic valve driver allows the valve to operate with very fast and accurate transient response.

The Swift valve allows for easy integration into a two-valve configuration. For fuel systems requiring two independently modulated fuel flows, the primary valve can be integrated with a second independently controlled metering valve. The primary valve can accommodate this integration without duplicating either electrical or mechanical connections. In addition, a combined driver is available that controls both valves. This integration results in a low-cost system that can be applied to staged combustors without increasing cable, piping, and installation costs.

Specification for Single Swift Valve

Inlet Pressure (operating)	0–2070 kPa / 0–300 psia (all models except Swift-65) 0–1380 kPa / 0–200 psia (Swift-65)
Maximum Pressure (non-operating)	3100 kPa / 450 psia
Gas Temperature	–29 to +121 °C / –20 to +250 °F
Ambient Temperature	–29 to +70 °C / –20 to +158 °F
Slew Rate (90–10%)	150 ms
Power Supply	18–32 Vdc
Max. Power (steady state)	37.8 W
Max. Power (transient)	48 W
Input Signal	PWM, 4–20 mA, DeviceNet
Shutoff Capability	ANSI B16.104 Class IV (0.01% of maximum flow at 50 psia / 345 kPa)
Envelope (valve)	127 x 152 x 102 mm / 5 x 6 x 4 inches
Envelope (driver)	241 x 163 x 58 mm / 9.5 x 6.4 x 2.3 inches
Weight (single valve)	4 kg / 8 lb
Weight (dual valve)	5 kg / 10 lb
Weight (driver)	2 kg / 4 lb
Electrical Connector (valve)	AMP P/N 788158 9-pin connector
Electrical Connector (driver)	Cinch P/N 581-01-30-001S
Overboard Vent Port	–4 SAE J514
Inlet Port	–12 SAE J514
Discharge Port	–10 SAE J514 OR –12 SAE J514
Technical Manual	26363

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.

ATEX – Potentially Explosive Atmospheres Directive: Declared to 94/9/EC 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.
Zone 2, Category 3, Group II G, EEx nA II T3

Special Conditions for Safe Use:

Ambient Temperature Range: –29 to +70 °C (valves)
–40 to +70 °C (driver)
Use Supply wires suitable for a maximum ambient temperature of +90 °C.

Other European Compliance (Valves only):

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.

Pressure Equipment Directive: Compliant as “SEP” per Article 3.3 to Pressure Equipment Directive 97/23/EC of 29 May 1997 on the approximation of the laws of the Member States concerning pressure equipment.

North American Compliance:

CSA: CSA Certified for Class I, Division 2, Groups A, B, C, and D, T3C at 70 °C Ambient for use in Canada and the United States

This product is certified as a component for use in other equipment. The final combination is subject to acceptance by the authority having jurisdiction or local inspection.

Valve Sizes

Four valve sizes meet a wide range of applications. The table below provides a breakdown of the maximum rated flow rates at various pressure conditions. Two-valve systems with any combination of sizes are available.

	Inlet Pressure / Discharge Pressure					
	85/68 psia	**200/160 psia**	**300/240 psia**	**600/480 kPa**	**1400/1120 kPa**	**2000/1600 kPa**
Swift-11	50 lb/hr	115 lb/hr	175 lb/hr	6.3 g/s	14.8 g/s	21.1 g/s
Swift-20	90 lb/hr	210 lb/hr	315 lb/hr	11.5 g/s	26.9 g/s	38.4 g/s
Swift-36	160 lb/hr	380 lb/hr	575 lb/hr	21.0 g/s	48.9 g/s	69.8 g/s
Swift-65	295 lb/hr	695 lb/hr	*	38.2 g/s	88.9 g/s	*

* Further development is ongoing to determine performance at higher flows and pressures.

Valve Accuracy

Swift 200 Accuracy

Effective Area Accuracy	±2% of point
Gas Mass Flow Accuracy	±2.5% of point
Repeatability	< 1% of point

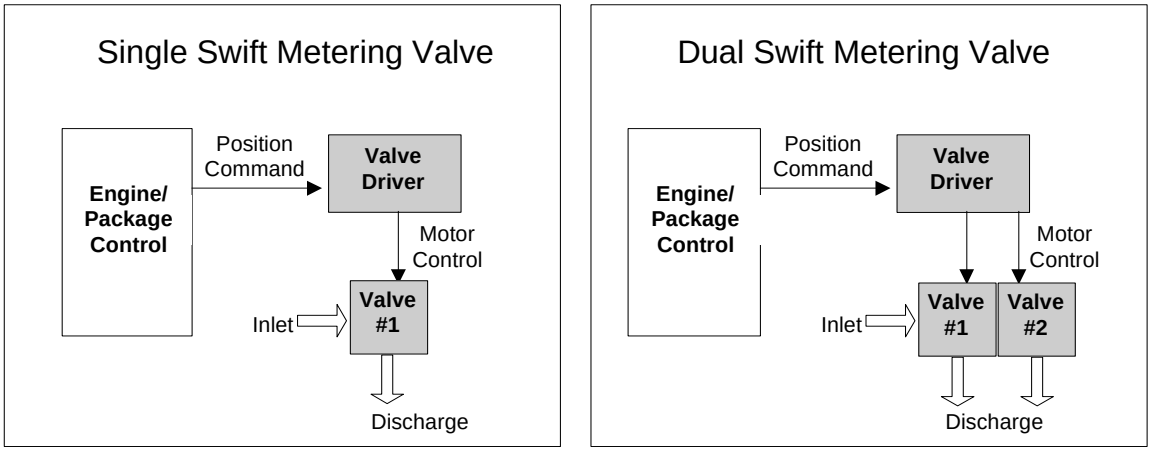
Swift 600 Accuracy

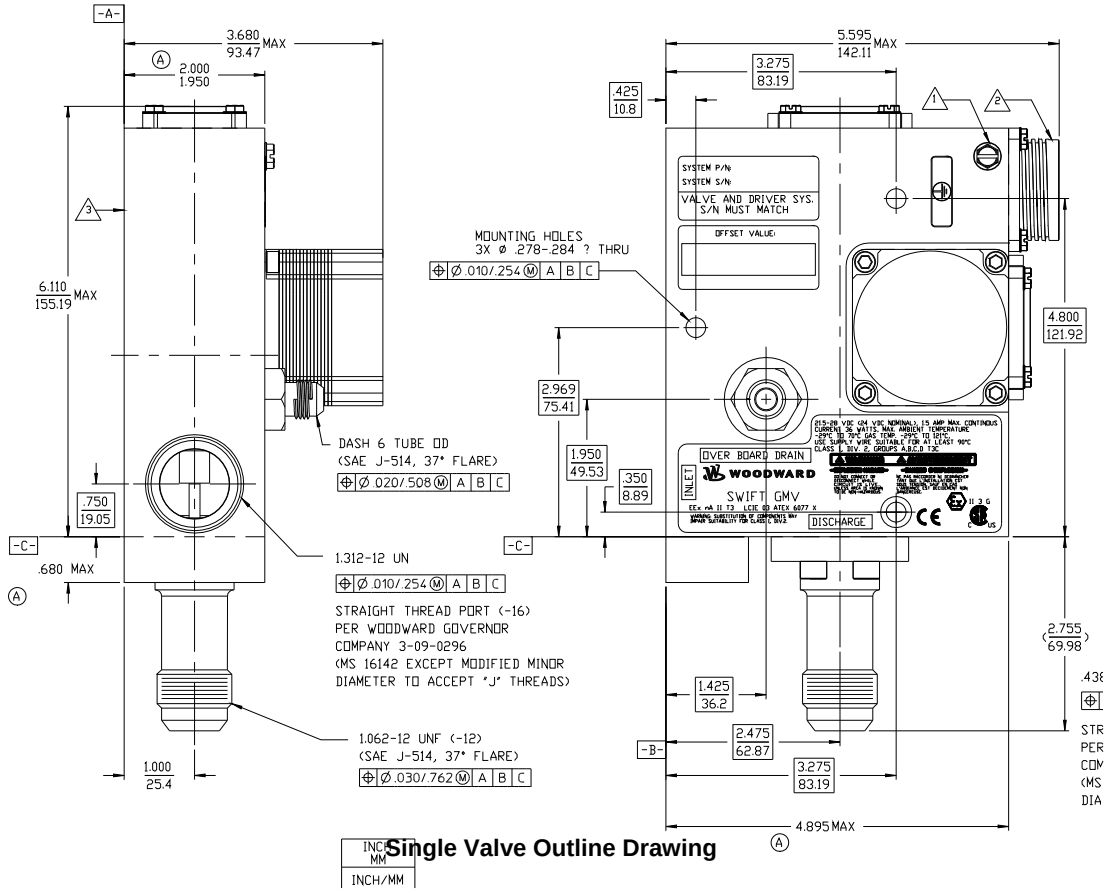
Effective Area Accuracy (at 10% flow)	±2% of full scale
Effective Area Accuracy (at max flow)	±7% of full scale
Repeatability	< 1% of point

Valve and System Configurations

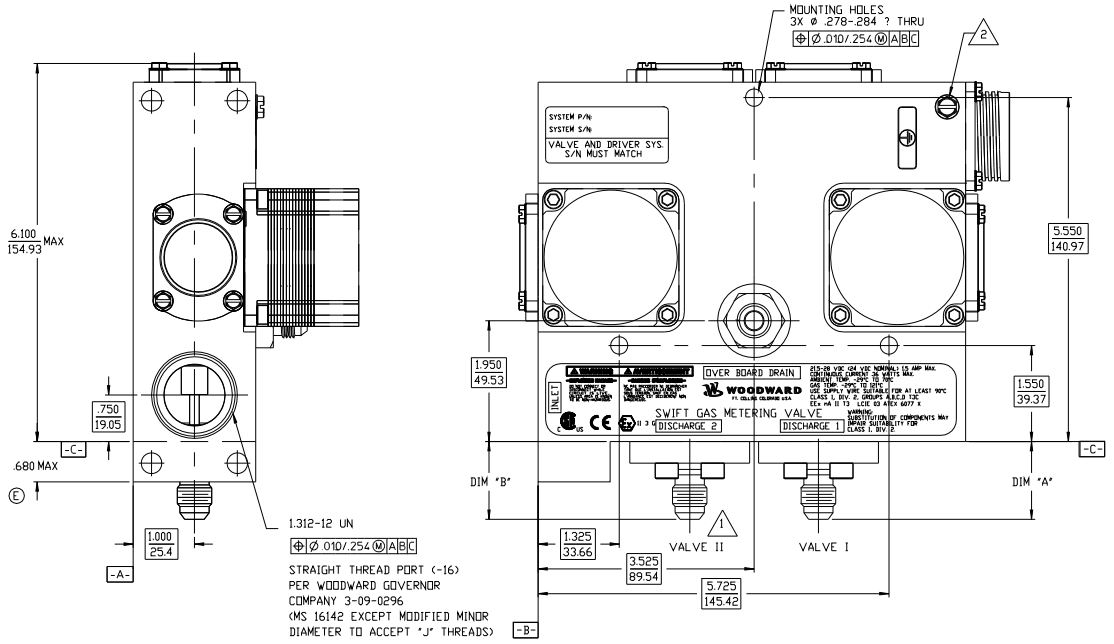
The valves can be provided in a variety of configurations including:

Configuration	Example
Single Swift Metering Valve	Swift 11
Dual Swift Metering Valve	Swift 11/36





Single Valve Outline Drawing



Dual Valve Outline Drawing (Do not use for construction)

WOODWARD

PO Box 1519, Fort Collins CO, USA 80522-1519
1000 East Drake Road, Fort Collins CO 80525
Tel.: +1 (970) 482-5811 ◆ Fax: +1 (970) 498-3058
www.woodward.com

Distributors & Service

Woodward has an international network of distributors and service facilities. For your nearest representative, call the Fort Collins plant or see the Worldwide Directory on our website.

For more information contact: