CAMPAIGN FOR ROBUSTNESS OF GAS FUEL METERING

Vicosol, in collaboration with our trusted supplier Woodward, is pleased to present this campaign for the new gas fuel metering valves. We can offer you a good price, effective execution of the changeout and incorporation of the new valves to secure up-time and robustness of your LM gas turbine application.

Get in touch with us today for a review of your application!

INTRODUCTION

For decades, LM applications have used Woodward gas fuel metering valves. The valves have been provided with external/on-board drivers, various port sizes, high torque/ limited torque versions, analog and/or digital interfaces.

The existing Woodward valves were initially controlled with hydraulic actuation, and later via external EM valve drivers. In the early 2000, Woodward introduced the GS6/16 with driver embedded on the valve and proceeded to launch the DVP as a common digital valve driver for the rest of the valve family.

Valves with limited torque have proven to be vulnerable to the gas fuel supply, resulting in sticky valves and unexpected shutdowns. This has resulted in the need to maintain the old 3103 and 3171 valves in production, in order to have solutions for sites that could not guarantee clean gas.

As a result of product improvement over years, Woodward now releases the new GS40/50 family: a uniform valve platform that can cover all applications.

With its design based on Woodward experience through decades, this will contribute to robustness of any gas fuel metering application. These valves can replace the existing valves, with the added value of enhanced function, robustness, and features.

The Vicosol team has more than 20 years of experience with control systems, and in-depth knowledge of the Woodward valves. Our specialty is to turn old and obsolete control systems into new, modern, and effective control solutions by using state of the art technology. As a small organization we support the customer with a lean and cost-effective implementation of the new GS40/50-series into their application. We are fully supported by Woodward, with an agreement of SW and HW purchase, as well as repair.

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OVERVIEW EXISTING VALVE SERIES

The table below is a brief overview of some of the most common gas fuel metering valves utilized.

	GS6	GS16	GS16DR	3103MR	3171MR
Onboard Driver	Yes Basic Driver	Yes Basic Driver	No DVP Driver	No DVP Driver	No DVP Driver
Actuator	Limited Torque	Limited Torque	Limited Torque	High Torque + Gear Box	High Torque
Pressure Capability	750psig	750psig	750 or 900psig	750 or 900psig	750psig
Digital Control	Simplex CANopen	Simplex CANopen	Dual CANopen	Dual CANopen	Dual CANopen
Service Tool	Serial Interface PC Tool	Serial Interface PC Tool	Serial Interface PC Tool	Serial Interface PC Tool	Serial Interface PC Tool
Electrical Interface Access	x2 $^{3}/_{4}$" Ports	x2 $^{3}/_{4}$" Ports	MIL-SPEC Connectors to DVP	x4 $^{1}/_{2}$" Ports	MIL-SPEC Connectors to DVP
Fail-Safe Spring Return	No	No	No	Yes	No
Service Interval (min)	50,000hrs	50,000hrs	50,000hrs	50,000hrs	50,000hrs
LM Applications	LM2500 DLE	LM2500 SAC	LM6000 DLE	LM6000SAC/DLE	LM2500 DLE

GS40/50 VALVES

The GS40/50 valves bring the latest version of rotary control valves that are built on decades of application experience by Woodward in the gas turbine market. With the updated design, the gas fuel metering valves are ideal for applications ranging from clean pipeline gas to wellhead gas.

The Woodward GS40 and GS50 valve series have several enhanced features compared to the existing valves utilized in existing systems.

Direct Drive

With the new gearless direct drive, the torque margin is greatly increased to provide a more robust performance in the harshest conditions. In addition, the service overhaul is increased from 50000 hours to 64000 hours.

Torque capability of the actuator is 6xGS6 for the GS40 and 4xGS16 for the GS50.

Self-Cleaning

The self-cleaning, shear-type metering action keeps the metering port free from performance-limiting deposits of gas condensates, contaminants, and system debris. This brings about a valve that is less vulnerable for the gas quality, making it ideal for applications ranging from clean pipeline to wellhead gas.

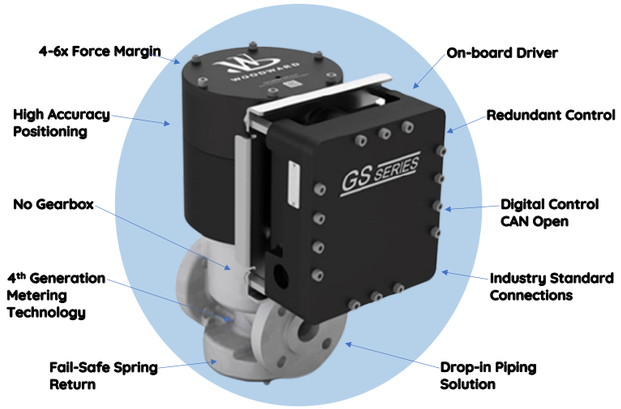
On-Board Driver

With the on-board driver there is no need for additional cabinets. In addition, some of the cabling is eliminated, resulting in an easier install and lower installation costs.

Valve Operation

The on-board driver can be interfaced to the turbine fuel controller via analog signals or CAN bus communication.

For analog control redundant 4-20 mA input and feedback signals are used. The control via CAN bus communication is done through redundant CAN Open control networks.



It is possible to configurate the GS40/50 valves for redundant control, so both 4-20 mA and CAN Open commands are accepted. The benefit of this configuration is that if the demand signal in operation fails, the driver will switch to the healthy input demand signal.

Advanced Control

The integrated driver incorporates redundant signal conditioning, fault detection, and selectable failure management options.

Return Spring

At shutdown, the valve failsafe returns to closed position.

Direct Replacement

The new valves were designed specifically to be replacements for the GS6 & GS16 valves.

GS40/50

Onboard Driver	Yes Advanced Driver	**Electrical Interface Access**	Connector Model Conduit Model (x4 1” Ports)
Actuator	High Torque Direct Drive	**Fail-Safe Spring Return**	Yes
Pressure Capability	1440psig	**Service Interval (min)**	64,000hrs
Digital Control	Dual CANopen RT Ethernet	**LM Applications**	LM2500 SAC/DLE LM6000 SAC/DLE
Service Tool	Ethernet Interface Built-in Secure Tool		

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MAIN REWORK REQUIRED

Rebuild to the new valve requires review and evaluation of the mechanical- and electrical layout, as well as the controller SW.

Mechanical

Since the new valves were designed specifically to be replacements for the GS6 & GS16 valves, the mechanical work is very limited. The valves have the same flange-to-flange dimensions as their predecessors, i.e., no piping changes are necessary.

Due to the on-board driver design, the overall physical size of the valve is a bit different. Hence, the current installation needs to be verified to ensure enough space is available around the valve top.

The conduit entry location has changed due to the side-mounted driver; hence slight changes are required in the cable routing. The driver’s radial orientation relative to flanges can be specified at the time of assembly in 90-degree increments. I.e., the driver positioning can be adjusted to give an optimal fit for the application.

Electrical

Review of the control philosophy for the updated valve application will clarify which control signals will apply, either running analog control only, or a combination of analog- and digital control. In most cases it is anticipated that existing wiring can be reused.

In addition, the following must be evaluated:

- Capacity and wiring for the powering of the new valve
- Will the driver on the new valve be interfaced with conduit solution, or through the connectorized interface available?

Vicosol will support in review and guidance for the new application.

SW update

The SW update required for a valve upgrade is limited and dependent of existing solutions. For an analog controlled application, there is normally no need for any software modifications. Digital controlled applications require updates to the hardware interface part of the software. As the new digital driver has a lot more statuses available on the digital communication link, update to any SAS/DCS/ICSS Modbus link might be necessary.

SCOPE OF DELIVERY

Vicosol provides the complete kit of parts, drawings, and SW modification to replace the existing gas fuel metering valves, including updated documentation.

A typical delivery consists of:

- Review of the existing application
- Application notes for the updated design
- GS40/50 valve selected and configured to replace existing valve
- Required SW updates
- HMI updated upon request
- Additional cabling (if required)
- Gaskets
- Fixing material
- Update of documentation, such as:
    - P&IDs
    - Functional description
    - GA/Mechanical layout
    - Field wiring
    - Datasheets and manuals

BUDGETARY PRICING

Pricing will be provided based upon request.

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