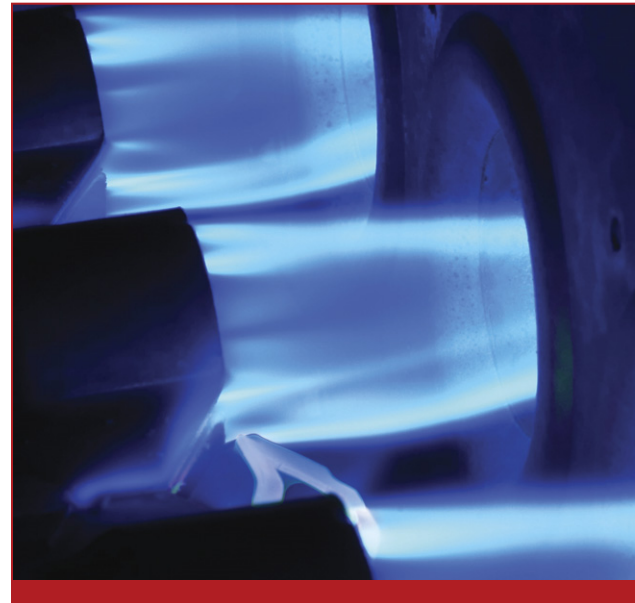


*Reviewing the Technology  
Breakthroughs:*

# The Insiders' Guide to Modular Gas Valves

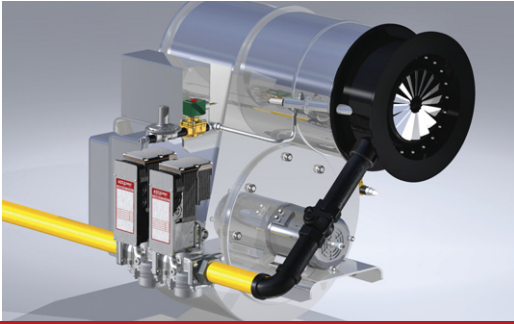
*by Gerry Longinetti, Marketing Manager, ASCO  
James Chiu, Marketing Product Engineer, ASCO*



A White Paper From ASCO Valve, Inc.

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## Introduction

Fuel gas shutoff valves represent the main line of defense in combustion devices such as burners and boilers. They're key to the safe operation of equipment for nonresidential comfort heating, commercial and industrial heating, and power and steam generation applications worldwide.

While conventional modular gas valve designs are popular and effective, the latest generation of valves has even more dramatic improvements. Recent technological advancements — in models such as new modular gas valves from ASCO — offer breakthrough features and benefits. These include higher flows, more compact footprints, and greater modularity and flexibility to enable downsizing of fuel train components, as well as broader temperature ranges, higher close-off pressures, more immediate availability, and reduced costs of ownership.

Tapping the expertise of valve manufacturing insiders, this report reveals how original equipment manufacturers (OEMs) and end users alike can take maximum advantage of these new factors. It's intended to offer useful guidance in choosing the right valve for a variety of vital applications.

## Decide to Downsize

Most importantly, the newest modular gas shutoff valves can enable designers to actually reduce the size and cost of their gas trains — for truly significant savings.

The experience of several major burner manufacturers confirms this capability. Once they decided to integrate the latest modular valves into their equipment, they were able to achieve substantially smaller gas trains by reducing the sizes of their components. Results: savings of up to 30% of fuel train component costs.

### ***Downsize via higher flow rates***

OEMs are able to lessen component sizes because of several improvements in valve designs. First, leading gas valve manufacturers have managed to increase flow capacity.



Using computational fluid dynamics (CFD) and finite element analysis (FEA) software, makers have trimmed the valve's weight while enhancing its internal geometry. Objective: to maximize flow in as small a size as possible.

These efforts have paid off.

Solenoid gas valves are typically short-stroked devices, so achieving even minimal gains is difficult. Yet some new solenoid offerings display a respectable 40% increase in flow rates over previous models.

And on longer stroke electrohydraulic versions, the increase is spectacular. Depending on pipe size, a model such as the new ASCO Hydramotor modular gas valve displays up to a 100% boost in flow rate, among the highest flows of any existing modular gas valve.

These gains can enable OEMs to downsize by using, for example, a 1 ½-inch valve instead of a 2-inch model, with the same flow rate as before. Nor does the downsizing stop with the valve itself. Now the designer can specify similarly reduced sizes for the fuel train's associated manual ball valve, pressure regulator, butterfly valve, and associated piping!

So today, insiders emphasize that it's crucial for valve buyers and specifiers to carefully evaluate competing flow specifications. Now more than ever, not all modular gas valves are created equal.

### ***Downsize with small-footprint designs***

These days, especially for space-constrained units such as some burners, boilers, or makeup air heaters, smaller is often better. For preassembled units, all elements of the gas train must fit through standard entryways. Even for trains assembled onsite, users may demand smaller footprints to free up space for production or to provide greater access to other parts of the heating equipment.

A major way in which valve manufacturers have enabled component downsizing is by providing flanged end connections for space-saving, face-to-face mounting. This eliminates the need for pipe nipples when joining two valves in series, and provides the smallest face-to-face double-valve footprint.

When equipment must go into tight locations, look for modular gas valves offering this important space-saving design feature.

### ***Downsize despite low supply pressure***

Designers of gas-fired combustion systems for use in a number of North American cities face a special challenge: low supply pressure. Across New York City, for example, many gas mains provide supply pressure under 10 inches of water column (IWC). In a typical installation, designers must balance the available supply pressure against the pressure drop or pressure consumed by the heating equipment and the related components in the fuel supply train.



Where supply pressure is minimal, designers must compensate by either including a gas booster device — an added expense to the customer — or by oversizing all piping and components in the gas train, adding considerable space, inefficiency, and cost.

Fortunately, some newer modular gas valves offer a better solution. Their high flow rates require lower pressure drops. For instance, at 2 IWC inlet pressure and 1 IWC drop, the new ASCO Hydramotor 1½-inch gas valve offers almost twice the flow of the old valve (3.0 million Btu/hr vs. 1.7 million Btu/hr).

## Choose the Most Flexible Technology

### ***Mix and match components***

Modular gas valve buyers can choose from two basic valve operating technologies. *Solenoid* valves work electromechanically, with electrical current running through a solenoid coil to magnetically actuate valve opening or closing. *Electrohydraulic* valves work by converting electrical current into hydraulic flow to actuate opening or closing.

A few manufacturers offer modular valves in the full range of configurations, including double solenoid, solenoid and electrohydraulic, and double electrohydraulic. Choosing these suppliers allows fine-tuning of valve stocks to fit precise application needs.

For example, ASCO's Hydramotor modular gas valve provides among the highest flow and Btu ratings in the industry. A double solenoid modular version offers minimum footprint for the smallest possible gas train. And a solenoid/electrohydraulic modular valve is optimized for slow-opening applications.

### ***Simplify installation and maintenance***

Until recently, manufacturers of gas shutoff valves offered no choice in mounting options. Both monobloc and modular versions required adding adaptors to their flanges to connect to piping.

Recently, however, one maker — ASCO — has standardized on dual end connections.

Where customers prefer to simplify subsequent valve removal, avoid pipe unions, and minimize maintenance downtime, the usual flange adaptors are available. However, for customers who want to eliminate the expense of adaptors, valve bodies are also internally NPT threaded for direct "hard-pipe" mounting.

This dual field mounting option is yet another case where new designs offer increased choice, flexibility, and convenience.

### ***Apply in broad temperature ranges***

Many gas shutoff valves must function in varying — and challenging — environmental conditions. For instance, a building in northern latitudes, such as Minnesota in the U.S. or



any province in Canada, may have valves installed in a boiler room that stays hot year-round. However, it may also have valves in a rooftop makeup air unit that gets extremely cold on frigid winter nights. Formerly, users were forced to purchase and stock multiple sets of valves rated for different temperatures.

To avoid bloated inventories, insiders look for modular gas valves designed with wider ambient temperature ranges. Look for offerings rated for operation down to  $-40^{\circ}\text{F}$  ( $-40^{\circ}\text{C}$ ) and up to  $140^{\circ}\text{F}$  ( $60^{\circ}\text{C}$ ) for solenoid models and up to  $150^{\circ}\text{F}$  ( $66^{\circ}\text{C}$ ) for electrohydraulic valves.

## Look for Even More Advantages

### ***Consider higher close-off pressures***

In many locations, the gas supply entering a site is pressurized to around 30 psi. Additionally, a primary regulator, and sometimes a secondary regulator, upstream of the safety valve reduces the gas going to the gas train and heating equipment to 5 psi or below.

As a result, conventional modular gas shutoff valves usually carry maximum operating pressure differential (MOPD) ratings of 5 psi. These valves can safely open and close against that amount of line pressure.

However, unexpected spikes in gas supply pressure hold the potential to rupture the regulator's diaphragm, which could lead to an overpressure condition — and unsafe combustion. Some newer valves are designed with a high close-off pressure rating, typically 50 psi. These valves will close against gas pressure upstream of the regulator up to the valves close-off pressure rating. This rating is important because if the upstream regulator ruptures, the high gas pressure would trip the high gas pressure limit switch, calling for the main gas shutoff valves to close. An overpressure protection device, such as a pressure relief valve, needs to be installed if the gas valves do not have a close-off pressure rating higher than the line pressure upstream of the regulator.

Consider new model valves with a close-off pressure rating greater than the building supply pressure. Insiders report that incorporating these models early in the design process can eliminate the effort and expense of relief devices.

### ***Evaluate availability***

Even the newest technology won't help if you can't get it when you want it. Due to ongoing economic troubles and long-distance sourcing, some suppliers have failed to meet the availability needs of OEM and end-user customers.

Insiders suggest looking for a supplier that has modular gas valves readily available. Select one with a quick-ship program that maintains published timeframes, which it meets a high percentage of the time.



## Cut Costs of Ownership

As detailed above, choosing the right next-generation modular gas valve can substantially impact costs. Insiders sum up the savings this way:

- Higher flow rates allow selection of smaller and less expensive components throughout the gas train
- Higher flow rates avoid expensive gas boosting or compensatory gas train oversizing due to low supply pressure
- Dual end connections allow flange adaptors to save future maintenance downtime costs, but also include threading if users prefer to save adaptor expenses
- Wide ambient temperature ranges cut inventory costs
- Higher close-off pressures avoid expensive pressure relief or venting

## Conclusion

For the first time, selecting the right modular gas shutoff valve for a given piece of combustion equipment can have substantial impacts on costs and performance — impacts that affect OEMs and end users alike.

Insiders report that higher flow rates, space-saving construction, new mounting options, wider temperature ranges, greater close-off pressures, a wide range of readily available products, and solutions for problems such as low supply pressure or high cost of ownership present significant opportunities for specifiers and buyers. They can now downsize existing components, decrease inventories, and reduce time and costs for installation and maintenance.



## Global contacts

[www.ascovalve.com](http://www.ascovalve.com)

### ASCO

Location

**World headquarters (U.S.A.)**

Canada

Australia

Brazil

Mexico

France

Germany

United Kingdom

China

Singapore

Japan

Phone

**(1) 800-972-ASCO (2726)**

(1) 519-758-2700

(61) 2-9-451-7077

(55) 11-4208-1700

(52) 55-3640-0200

(33) 1-47-14-32-00

(49) 7237-9960

(44) 1695-713600

(852) 2-343-8580

(65) 6556-1100

(81) 798-65-6361

E-mail

**info-valve@asco.com**



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