

Improving safety, emissions rates and energy efficiency with the latest safety shut-off technologies



ASCO™ 158/159 Series Motorised Double Safety Shut-Off Valve



By Asaël Hervet-Binois*

Two of the highest priorities across today's furnace industry are protecting people and the environment. Facilities that use furnaces for heat-treating processes, including melting, smelting and reheating furnaces or vertical hearth, galvanizing and surface treatment furnaces, seek solutions that offer better combustion safety and energy efficiency. Manufacturing and operating furnaces that are safer and produce fewer emissions

start with specifying components that improve safety and energy use.

There may be no components in a furnace fuel train that are more important to safety than the safety shut-off valves. These elements either block or allow fuel to flow between the source feed and burner, and their function and design can influence the reliability and performance of the furnace overall. If safety shut-off valves perform optimally, they can help

conserve energy and save lives. If they do not perform as required, the results can range from inefficiencies in combustion drives and increased fuel consumption to life-threatening explosions.

Because of their critical role, safety shut-off valve technology requires careful selection. There are many options to choose from. The latest advancements in safety shut-off valves help manufacturers design and end users operate reliable

furnace fuel trains that use less energy.

A new generation of safety shut-off valve technologies offers greater temperature ranges, higher pressure ratings and improved product capabilities and meets key global standards and regulations. Their specification in furnace fuel trains can optimise furnace performance, significantly improving safety and energy efficiency in addition to reducing emissions.

Higher fuel flow rates, faster valve response times

Heat-treatment facilities use a substantial amount of energy to produce their products. To save energy, these facilities look at both process and facility energy consumption to determine where losses may occur. When facilities use energy inefficiently, high emissions can result. To help save valuable energy and lower emissions, it's important to consider the safety shut-off valves in the fuel trains of boilers, ovens and furnaces.

Safety shut-off valves provide on/off control to completely stop the flow of fuel and high/low/off control to modulate valve status from fully open to fully closed. Component designers have engineered new, motorised safety shut-off valves to achieve higher fuel flow rates, which can improve energy efficiency as well as furnace performance.

Optimised curvature, volumes and capacities can achieve higher flow through the valves as well as the fuel train at large. These updates take into consideration the devices along the fuel train that slow fuel flow or change the pressure profile, resulting in pressure drops. The traditional double safety shut-off valve, for instance, is responsible for 65% of pressure drop incurred. Higher flow rates significantly reduce pressure drop, even when inlet pressure is low, to adequately maintain fuel flow.

This makes it possible to generate greater heat output and allows burners to function at a set higher turndown ratio, which reduces the number of stops and starts and, in turn, fuel consumption and emissions. It can also improve load control and even extend burner life.

Selecting motorised safety shut-off valves over solenoid-activated on/off valves can also save energy. Motorised valves offer greater flexibility with placement in the low or high fire position. Instead of wasting energy by fully firing the burner when demand doesn't require it, the actuator can modulate valve opening and closing to better meet demand and optimise energy use.

The latest pneumatic piston safety shut-off valves feature very fast response times that enhance pulse-firing

fuel consumption and the emissions that result.

Durable valves that open and close the fuel line quickly are preferred in these applications due to cycle frequency. Some valves may cycle 500,000 times per year. It's important that the valves chosen for these applications have a very long lifetime and cycle quickly.

With improved flow, these valves can also handle a range of fuels and other media at pressures up to 25 bar (360 psi), including coke oven gas, vacuum, oxygen, steam or hot water, hydrogen, ammonia, nitrogen and oil.

Compared to conventional pneumatic ball valves, the latest pneumatic piston valves consume less air, and have a lower actuator volume, than conventional pneumatic ball valves. They also have a smaller footprint and longer expected lifetime.

Higher pressure ratings and greater temperature ranges

In addition to improving efficiency, higher turndown ratios also enable valves to handle a much wider range of pressures. High close-off pressure ratings are also essential for burner applications subject to high system pressure spikes, which are often found in remote locations. Powerful motorised actuators enable some of the latest safety shut-off valves to handle gas pressures as high as 1.4 bar (20 psi) and close safely against higher pressure from 3 bar (30 psi) up to 5.2 bar (75 psi). This helps provide reliable operation no matter where burners are located.

Industrial furnaces and gas-burning appliances can be found in nearly every climate. They may be located indoors, where they provide heat, or they may be outside, where they're exposed to sweltering or freezing temperatures. But no matter what the thermometer says, it's critical that safety shut-off valves operate reliably, even in punishing environmental conditions.

A new generation of safety shut-off valves offer reliable performance in a broader temperature range, from extreme cold to high heat. The robustness of the motorised actuator design and material



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<https://www.emerson.com/en-gb/automation/solenoids-pneumatics/asco/combustion-solutions>
Image courtesy of Emerson.

applications, like those used in the metals industry, which can help reduce energy consumption and decrease emissions. Instead of firing continuously, the burners in pulse firing are frequently cycled between ON/OFF functions. By not firing all the time, pulse firing reduces

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composition of the latest motorised safety shut-off valves are rated to function from -40°C (-40°F) up to 66°C (150°F). This is a big change in countries with cold climates, including Canada or Russia, as the low-temperature limit for motorised valves has been about -10°C (14°F) or -20°C (-4°F).

For gas-burning appliances subject to dirt, precipitation, water or the dust and soot found in metal and glass processing, a weatherproof, NEMA-4 and IP65 rated enclosure is also available. This optional protection helps ensure safety shut-off valves perform as expected, even in extreme or harsh conditions.

The high configurability of the latest pneumatic piston valves makes it possible for these valves to reliably function in temperatures that range from -60°C (-76°F) to 80°C (176°F), as well as in hazardous environments. Bronze or stainless-steel body selection can meet a broad range of connections, including flanges while the air-operated actuator can be plastic

or stainless steel if greater corrosion resistance is required. There's also a broad range of signaling box options. Some are air pilot integrated, some are approved for explosive atmospheres (ATEX) while some have visual indication or proportional control.

Global compliance and simplified procurement

Although a furnace may be manufactured in one area of the world, lots of manufacturers source components from and supply their products to regions far from where they're located. As such, it's critical that global manufacturers and their component suppliers know applicable regional and international regulations and standards.

Most, if not all, of these standards are intended to protect people and the environment and are often in accordance with detailed safety, construction or performance criteria. To meet exacting criteria, ensure reliable performance and

achieve compliance, safety shut-off valves must undergo highly rigorous testing to last hundreds of thousands of cycles.

To simplify compliant furnace designs across all regions, there are global certifications and approvals to look for in safety shut-off valves. These include UL, FM, CSA and EN 161 Class A, as well as RoHS directives.

Comprehensive pneumatic angle seat valves include European use with EN norms, including EN 161, EN 16678 and EN 13611, and have ATEX certifications. These additional standards approve use in gas-burning applications, including those with complex fuel needs where typical solenoid valves fail.

Greater safety and energy efficiency:

When using industrial furnaces in heat-treating processes, the primary way to protect people and the environment is to start with reliable components that help save energy. It's critical to know which features and capabilities to look for in safety shut-off valve technologies depending on its operating location, including the climate, conditions and regulations. Fuel trains equipped with compliant, long-lasting valves that consume less fuel mean a safer, cleaner combustion system for manufacturers and end users alike. ■

ASCO™ Series 290D Air-Operated Piston Valve

The quick opening time and longevity of the new ASCO™ 290D Series Air-Operated Piston Valve from Emerson make it ideal for pulse firing. It's EN 161 and EN 16678 certified. Image courtesy of Emerson.

