

# Optimising two-port valve selection

SMC Corporation South Africa is a leading provider of automation and pneumatic components and system's support for local manufacturing industries. In this article, the company presents some important aspects to the selection of two-port valves.

**M**any give little consideration to 2-port valves because they are often perceived as simple devices that only open and close to control downstream fluid supply. Well, although that's mechanically true, choosing the optimal 2-port valve for your application can make a big difference, saving space, weight and, most notably, energy consumption – up to 63% in some cases.

To optimise the selection of a 2-port valve, you must first consider the specific application and fluid type. For general-purpose industrial applications, contact between the valve's internal moving parts and the fluid is not particularly critical; however, environmental resistance is very important: valves could be installed in high-humidity environments, for example. In such instances, a valve such as SMC's JSX series and its stainless-steel coil and body will prove ideal.

## Bring benefits to life

In life science applications, such as those in the medical and pharmaceutical device manufacturing sectors, it is necessary to avoid fluid contamination, which is why you should select valves that feature an isolated

structure and plastic materials. 2-port valves for life science applications must also offer low particle generation and small internal and dead volume.

Chemical applications, like those involving semiconductor manufacturing, also have their own set of criteria that influence the selection of 2-port valves. Fluids deployed in these applications can be very aggressive, so chemical compatibility becomes critical. Valve construction must therefore centre on the use of materials that provide high corrosion resistance, such as PTFE or super PFA. The reduction of micro-bubble generation, fluid contamination and leakage are further critical factors for these applications.

As a final example, dust extraction applications in sectors such as food and cement require valves such as the JSXF with high peak pressure capability, which aids element cleaning efficiency. The cleaning

*SMC's JSXFE Series pulse valve features high peak pressure and reduced air consumption and fast response times.*

of dust collectors typically takes place using air, supported by tank-mounted valves. Therefore, using valves with lower air consumption for the same size of valve can help OEMs to reduce the size of the air tank and cut manufacturing costs due to less material use.

Valves with higher

output peak pressure and low air consumption allow a reduction in tank size, helping to minimise cycle times. How? Well, the tanks in dust collector applications usually feature multiple valves that energise in sequence. A higher output peak pressure means better cleaning efficiency of the element, making it possible to reduce the energisation time of the valves.

The effect of this reduction is a lower pressure drop in the tank which, combined with a smaller tank size makes it faster to return the tank to full operating pressure. This may be just a few milliseconds, but some applications require dozens of valves, so reducing your total cleaning time can prove highly beneficial in the long term as it potentially becomes possible to complete more cleaning cycles in a day.

As a further benefit, every element cleaning cycle leads to less and less clogging, helping to extend element lifetime,

reduce maintenance requirements and increase productivity. With the application determining your valve type, it's time to start scrutinising additional parameters such as flow rate, pressure differential, orifice size, valve size, body and rubber materials, and certifications. After all, correct valve selection not only impacts the equipment manufacturer, but also the end user. For instance, although selecting the most compact valve size potentially helps to reduce equipment size and weight, selecting a valve with lower power consumption ensures the equipment is more energy efficient.

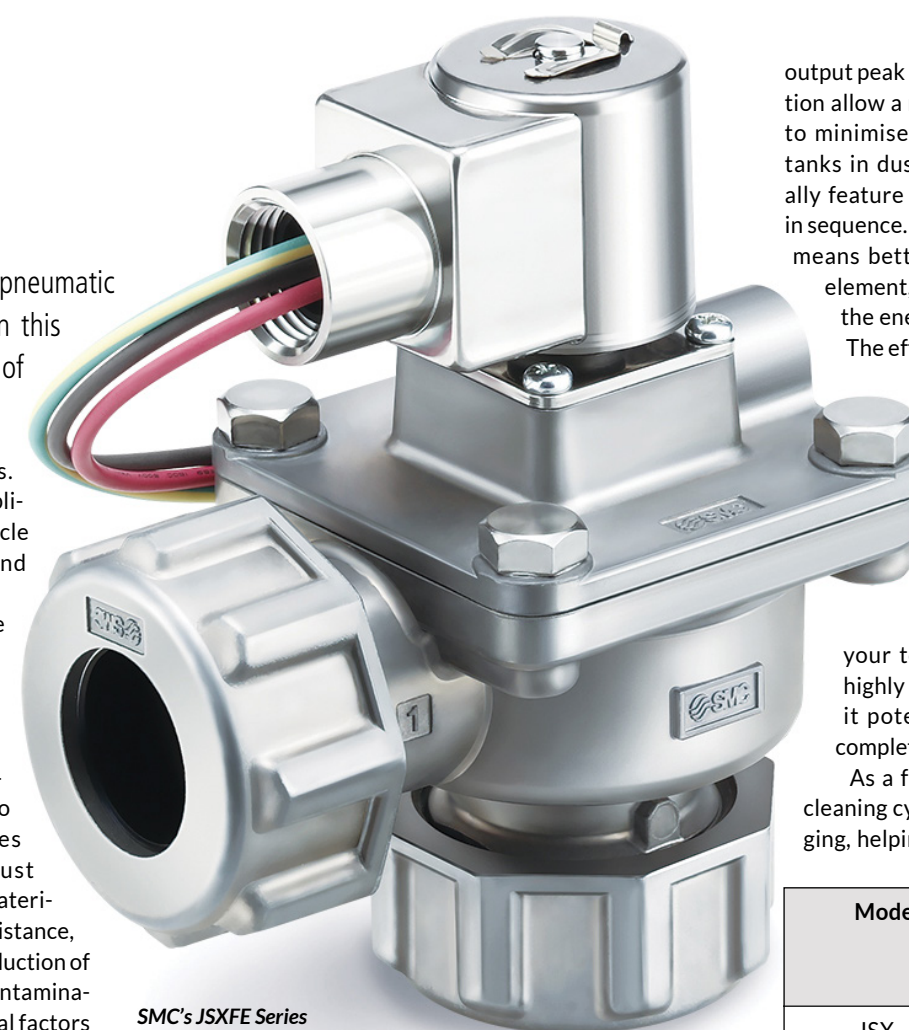
## Wash away inefficiency

A case in point is an industrial washing machine. Space for equipment is decreasing around the world in line with population growth. The obvious way to reduce the size of appliances is to use smaller components that offer the same performance as larger counterparts. For 2-port valves, this concept translates into more compact designs with high flow rate and

pressure differential specifications. Two SMC 2-port valves, for example – our JSX series and JSXU series energy saving valve type – demonstrate the gains possible from astute selection. While both valves offer the same flow rate (0.45 Kv) and pressure differential (1.0 MPa), the JSXU model is around 10% smaller and about 24% lighter. However, the biggest difference relates to power consumption, with the JSXU delivering savings of up to 63% by reducing the wattage required to hold the valve. This capability helps to control bills in an era of high energy prices and to provide a contribution to global sustainability.

If OEMs can deliver on customer demands for compact size and energy efficiency, it helps to generate brand loyalty and build a more robust business model for long-term success. If you've been taking your 2-port valve selection for granted, maybe it's time to think again and tap into the benefits available from SMC for more astute product choices.

[www.smcza.co.za](http://www.smcza.co.za)



| Mode | Size | Orifice diameter (mm) | Pressure differential (MPa) | Flow (Kv) | Dimensions (mm) |                 | Weight (g) | Power consumption (W) (holding) |
|------|------|-----------------------|-----------------------------|-----------|-----------------|-----------------|------------|---------------------------------|
|      |      |                       |                             |           | Total height    | Coil dimensions |            |                                 |
| JSX  | 3    | 4                     | 1                           | 0.45      | 78              | 42              | 450        | 8                               |
| JSXU | 2    | 4                     | 1                           | 0.45      | 68              | 36              | 350        | 3                               |

Table 1: Technical data for SMC's JSX and JSXU 2-port valves extracted from the JSX Series catalogue (CAT.EUS70-56C).

## Busch Vacuum Solutions introduces new R5 RA

The new rotary vane vacuum pump R5 RA 0520 A from Busch increases energy savings by up to 25%. It features a compact and hygienic design, reduced heat emissions, and enables faster and easier maintenance. The optional ECOTORQUE variable speed drive provides up to 50% additional energy savings and a 20% increase in pumping speed.

The proven R5 RA from Busch now comes in an improved version with a completely redesigned interior. The new vacuum pump is 25% more energy efficient than its predecessor, thanks to the optimised compression ratio, pump stage dimensions, and oil discharge path.

It is also available with ECOTORQUE, the Busch variable speed drive (VSD), that enables the pumping speed to be adapted to the exact requirements of any process. As a result, additional energy savings of up to 50% and a 20% increase in pumping speed can be achieved. The accessory extends the supply voltage range supported by the vacuum pump, making it suitable for use in

almost all countries around the world. This compact and cost-effective solution is also available as a retrofit.

Compared to the previous generation, the R5 RA 0520 A has a 20% smaller footprint, is 25% lower in height, and the absence of external piping improves leak tightness. The compact and hygienic design features surfaces that repel water and dirt. The total number of spare parts has been reduced by 40%, making maintenance fast and efficient, with all service-related parts located on one side. Heat emissions have also been decreased through an improved cooling system that combines optimal pump operating temperature with compact construction.

The new vacuum pump is made for continuous operation in the rough vacuum range with vacuum levels down to 0.1 hPa/mbar. Field tests were successfully carried out to validate performance and reliability.

The R5 RA 0520 A and the R5 RA 0520 A ECOTORQUE set a new standard in vacuum

technology. The pumps are suitable for various applications in vacuum packaging, food and plastics processing, and many other industries. They are an excellent choice for companies looking to improve their processes while minimising energy costs and reducing their environmental impact.

[www.buschvacuum.com/za](http://www.buschvacuum.com/za)



*The new rotary vane vacuum pump R5 RA 0520 A from Busch offers energy savings of up to 25% and, if used with an ECOTORQUE variable speed drive, provides up to 50% additional energy savings and a 20% increase in pumping speed.*

*Left: SMC's 2/3 port solenoid valve for chemicals: the LVM Series liquid isolation valve, which features low power consumption and small internal volume. Middle: SMC's 2-port JSX Series solenoid valve featuring stainless steel construction and an IP67 enclosure rating. Right: SMC's 2-port JSX(U) Series solenoid valve is smaller and lighter and can deliver energy savings of up to 63% by reducing the power required to hold the valve.*