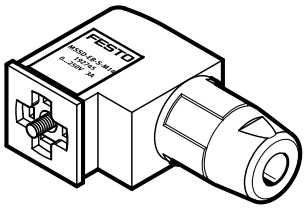
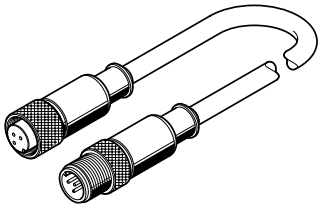
Blue Star Pneumatics – Top Tips: Valves



C Type Din plug



M12 plug connectors

Standard pin connectors

Connectivity

When it comes to pneumatic solenoid valves, there's a bewildering array of different connection types available, making it difficult to know which one to choose. Here we look at the benefits of some of the more common types.

C-type Din plug – this is a common solenoid cap used throughout industry and can be supplied pre-wired if required often with a different moulded connector at the other end speeding up installation and reducing wiring errors. This type of connection is especially popular due to its robust design when there is risk of mechanical damage occurring through the plug being knocked.

M8 or M12 plug connector - these are typically used with more compact pneumatic valves where size is critical. As with the C-type plug these connectors can be pre-wired and also offer a high IP rating. Another benefit of this type of connector is the ease with which valves can be integrated into distributed control systems by directly screwing the connector into I/O terminals.

Standard pin connections – these are more suited to cabinet installations where a lower IP rating or lower level of mechanical protection is required. This type of connection also provides a lower cost and compact cabling solution for OEMs.

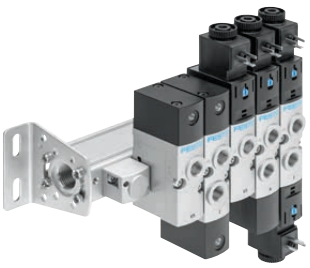
Whatever connection you choose, make sure either your valve or connector also has a built in LED to show when the valve is operating. This will make any future fault finding a lot easier.

Mounting

Most valve manufacturers have developed a number of ways to mount and connect valves that either simplify their installation, connection or both.

One option is to mount the valve directly onto the cylinder body. This enables the tubing from the valve to be kept as short as possible which gives better and more repeatable dynamic response. However this is not always practical where there are a number of valves in your machine. Here consider using a supply rail where a single mains air supply connects to all valves, reducing connections and potential leak points. A further cost saving can be achieved by also porting all exhaust air through the manifold rail. Savings are made in silencers plus the installation is generally tidier. But beware of valves with differing exhaust flow rates as this can cause other problems such as the higher pressure exhaust air switching valves with lower pressure as the air enters through the exhaust port.

In conclusion, if you're using a number of valves in your machine and are connecting them all individually, you could be creating more work for yourself than you need.



Mains air only through the manifold

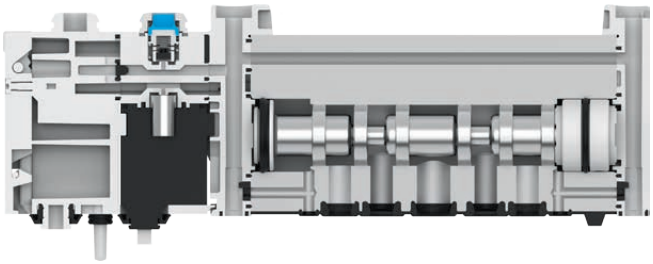
Mains and exhaust air through the manifold

Operation

The increasing demands placed on valve technology in recent years have led to an extension of the range of available technologies and valve types, models, and their properties. The most commonly used are poppet valves and piston spool valves. However, choosing the right technology for your application is sometimes difficult as all types come with their advantages and disadvantages.

Poppet valves are often lower cost due to the reduced number of seals required and the actuation strokes are small providing shorter switching times. In addition the sealing technology is more forgiving to contaminants in the air. However the construction of them also means they provide a lower flow and can sometimes be noisier with leakage between the channels.

Spool valves come in two types: hard and soft sealed. Hard seals are more durable and do not suffer from stiction after long periods of inactivity – however you can always expect leakage due to the construction and their flow is lower than the same valve size with a soft seal. Soft seals traditionally used a gasket or sealing ring but the design of the contact parts needed to be very precise to ensure that excessive wear of this seal did not occur, pushing the price of



Soft seal valve with cartridge technology

construction up. However soft seal spool valves now normally come with a cartridge which holds the gaskets and sealing rings – meaning that the construction is far easier and the wear is greatly reduced, increasing the working life. In addition the cartridge allows the valves to operate at up to 16 bar and also with vacuum.

Therefore if you are looking for a valve with low leakage, the option of vacuum and ejector pulse, or if you require higher operating pressures, the most suitable is probably a piston spool valve with cartridge sealing technology.

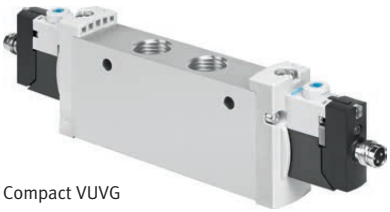
Selection

When selecting a pneumatic valve there are a number of things to consider.

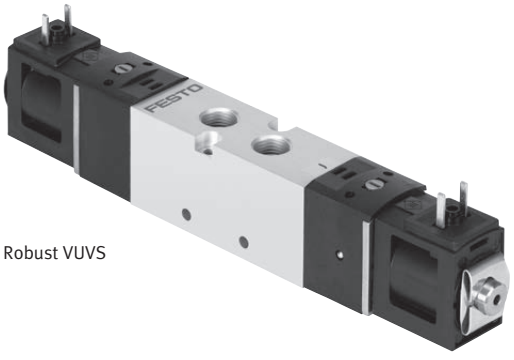
The image shows two valves that effectively perform the same function but are clearly very different in construction. One is a more robust valve suited for arduous environments. The other is a compact valve designed for mounting in a control cabinet or enclosure.

Once the required valve construction has been established the operation of the valve needs to be considered. Does the application require a 3/2-way valve, or a 5/2, single or double solenoid? And what size valve is required? Oversized valves often lead to connectors, tubing and sometimes actuators being larger than are necessary which adds additional component cost as well as using more air and therefore energy.

Undersized valves on the other hand act as restrictions in the circuit and can seriously impact the performance of the system. Historically valves were selected by matching the port size of the valve to that of the actuator but with the modern valve this is no longer the best way to choose the valve size. Today's valves tend to be physically smaller and have greater flow rates than their predecessors, tend to switch faster, cost less and consume less power. However perhaps the most important factor affecting valve selection is its flow rate. To find this, first calculate the flow rate required to move the cylinder in a given time then select a valve that is slightly above the required flow rate to compensate for any restrictions due to tubing and fittings used to connect it. Take care however, if the valve is too large, component and operating costs are added unnecessarily.



Compact VUVG



Robust VUVS

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