

PROPORTIONAL SOLENOID VALVE SP SERIE (Manifold Mounted, (G1/8" , G1/4"))

What is Ventilation Machine?

Ventilation machine is a device that can mechanically send / receive the respiratory air to the lungs. Breathing equipment is used in cases where the patient has difficulty breathing on his own or during special treatment processes on respiratory organs.

The breathing apparatus is applied to patients in two ways:

- 1) Connecting to the mouth and nose with the help of a mask (Non-invasive ventilation)
- 2) Applied directly to the lung via the trachea. (intubated or invasive ventilation).

Depending on the physical properties of the patient and the treatment process, the air needs to be transferred to the patient in different pressure, flow and oxygen ratios.

At this point, precise flow control is extremely important in these devices. In this context, our company produces sensitive solenoid valves to these devices with its experience of fluid control over 35 years.



What is Proportional Solenoid Valve?

Solenoid valves are widely used in the industry as they are fast opening and closing, compact, cost effective and long life. In general, solenoid valves are used in the industry for On / Off applications. However, it is also possible to achieve flow control proportionally, in other words flow rate control by changing the control signal, in solenoid valves.

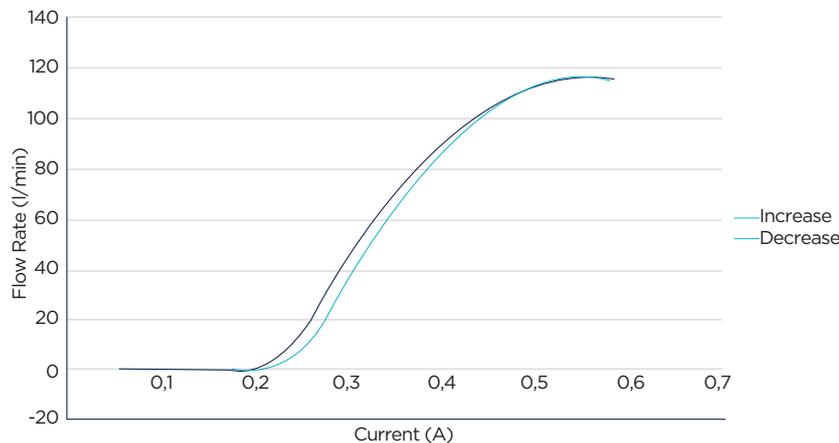
TORK SP series proportional solenoid valves are designed as a result of special calculations provide flow control with voltage change. For example, when you gradually increase the supply voltage starting from zero to a proportional solenoid valve operating with a 24VDC coil, the valve will be opened gradually and the flow rate will increase. Similarly, when you gradually decrease the 24VDC voltage, the valve will be gradually closed and the flow rate will decrease.

Proportional solenoid valves of TORK SP series can provide very precise (3% precision) flow control.

Hysteresis and Repeatability:

One of the important concepts in proportional flow control is the hysteresis concept. While the voltage of a proportional solenoid valve, ie the control signal increases, it takes certain flow values and reaches fully open, maximum flow. When we do the opposite of this process, while decreasing the voltage, the flow takes certain values and the valve becomes fully closed. These two increases and decreases may not always be on the same curve. In other words, if the voltage x corresponds to the y flow rate during the voltage increase, the voltage at the x value corresponds to the y flow value. This situation is defined as Hysteresis in proportional flow control. Hysteresis is an undesirable event, as it often complicates precise control.

Thanks to the special designs and tests carried out on proportional solenoid valves of TORK SP series, the products show an average of 4% hysteresis. In this way, flow control process can be done more easily and with high precision.



TORK SP serie proportional solenoid valves' Hysteresis curve.

Another issue that is important in proportional flow control equipment is Repeatability. When you turn a product on and off several times, the same change in flow rate shown against the voltage change means that the product shows good repeatability. It is very important for a product to be repeatable in terms of control sensitivity and ease.

The coils of the solenoid valves increase their temperature when they are energized for a long time due to their nature. The increase in temperature means the magnetic field force decreases in the coils. For this reason, it is not an easy process to keep the force balance constant in proportional solenoid valves and to ensure the repeatability of the product. However, TORK SP series shows a very good repeatability behavior (3% deviation) compared to its competitors thanks to its special magnetic field analysis and sensitive electro-mechanical design made in solenoid valves.

Proportional Solenoid Valve Body

TORK SP series proportional solenoid valves are produced as 1/8", 1/4" or plate in different orifice size from 1mm to 4mm. In addition, it is possible to produce this product in different connection ways according to the connection surface of the user. Brass material is generally used in industry as body material. However, it is possible to produce proportional solenoid valves made of aluminum or stainless materials specifically for sectors such as health, chemistry and food.

Sealing Materials

One of the parts that play a very important role in all flow control materials is sealing materials. In general, sealing materials are selected according to the type and temperature of the fluid passing through the valve. In proportional solenoid valves, it is possible to use different sealing materials depending on the type and temperature of the fluid passing through the valve. Silicon-based sealing materials are preferred for solenoid valves, which will generally be used in ventilation.

TORK SP Serie Proportional Solenoid Valves technical Features

| Feature | Value |
|----------------------------|---|
| Valve Type | 2/2 Normalde Kapalı |
| Connection | 1/8" , 1/4" , plate |
| Body Material | Brass, Aluminium, Stainless, PVC |
| Sealing Material | NBR, Viton, EPDM, Silicon |
| Suitable Fluid Type | Air, Oxygen, Nitrogen, Helium, Hydrogen Argon, methane and non-aggressive gases |
| Environment Temperature | -10 °C ; +60 °C |
| Coil | 24VDC ; 12VDC |
| Recommended Control Signal | PWM 250Hz (24VDC) PWM 500 Hz (12VDC) |
| Coil Power | 18W |
| Repeatability | %3 |
| Precision | %3 |
| Hysteresis | %4 |
| IP Protection | IP65 (On request IP68) |
| Continuous Energy | ED %100 |
| Coil Isolation Class | H Class |
| Max. Working Pressure | 10 bar (1mm orifice) |
| Weight | 0,35 kg |
| Fluid Conductivity (Kv) | 6,4 l/min. (4mm orifice) |