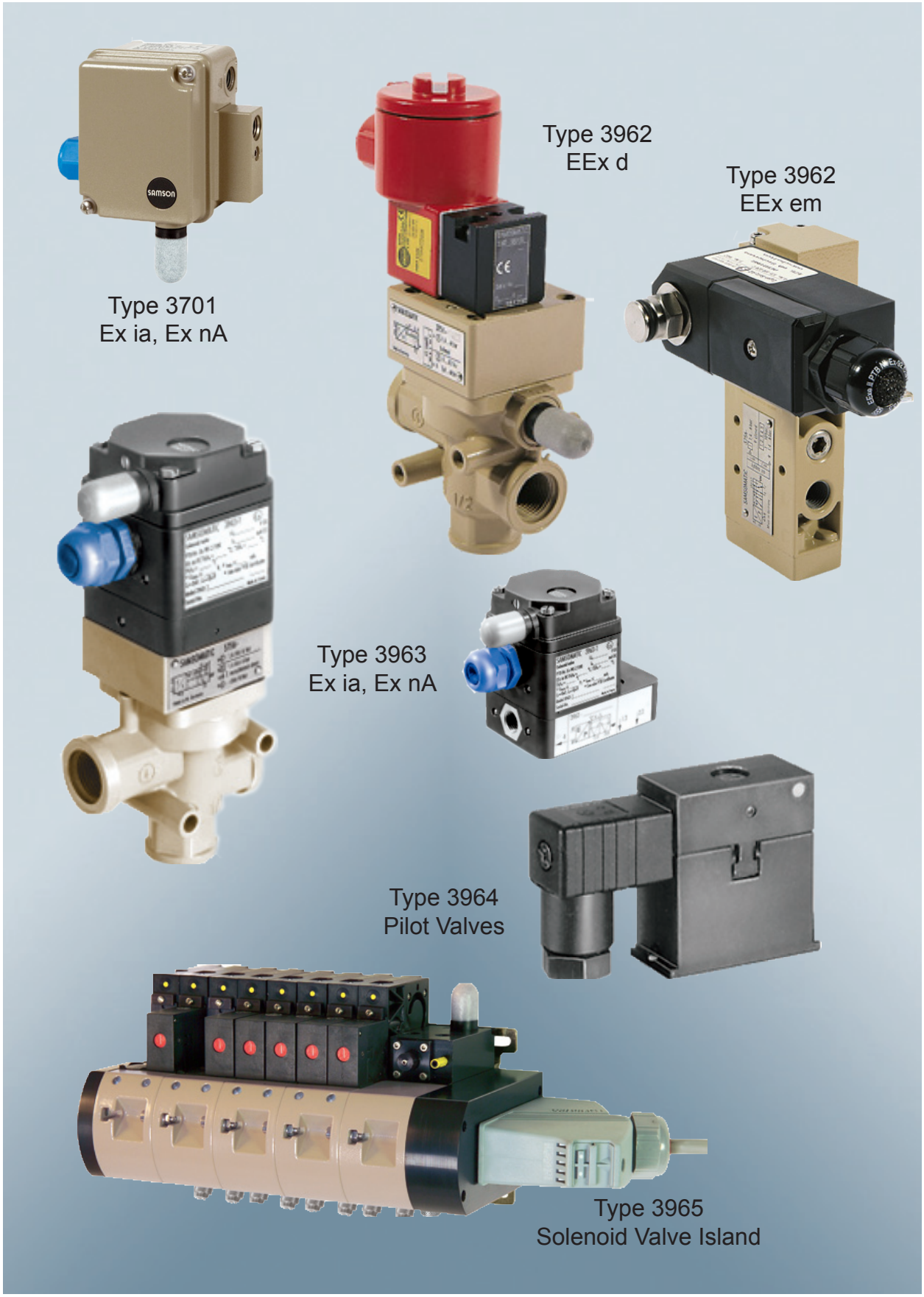
10.6 Solenoid valves



Solenoid valves are among the most frequently used control valve accessories. They are integrated into the fitted pipes of the pneumatic actuator and fulfill versatile tasks depending on required procedures, safety regulations or other factors. The solenoid valve often represents the only interface between the pneumatically operated control valve and the electric control system where as other devices, as e.g. positioner or signal transducer might be completely omitted. This is, above all, the case in discontinuous operations (batch-processes), where the control valve is for part of the time either open or closed. Intermediate valve positions are usually not required for these applications.

Safety aspects and so-called **override functions** play a special role in the application of solenoid valves. The control philosophy of gas burners, for instance, must ensure that the control valve is closed in a very short time if the flame safeguard system detects that the flame has extinguished, otherwise the danger of an explosion exists should there be a subsequent ignition. This special task, for instance, cannot be handled by an electro-pneumatic positioner.

Instead of the positioner a three-way solenoid valve is used. This solenoid valve changes over within a few milliseconds. In such a case, the solenoid valve shuts off the air to the positioner and ejects the compressed air inside the actuator housing, via an enlarged outlet fitting, into the atmosphere. This enables the final control element to close in less than a second (Figure 10.6.-1).

Legend

1 p/p positioner
2 Limit switch
3 3/2-way solenoid valve
4 Supply pressure regulator
5 Air supply
w Reference variable
x Controlled variable
y Output variable

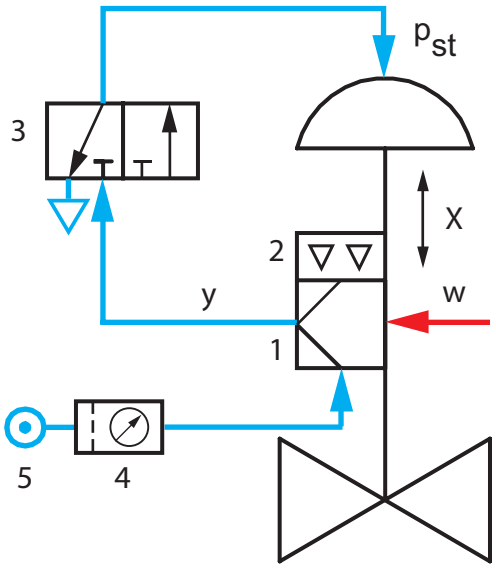


Figure 10.6.-1: Example of a piping plan for a control valve with a three-way solenoid valve

In addition to a precise description of the desired functions of the solenoid valve, a further series of features of interest are to be noted, as expressed in the unique control valve data sheet in accordance with IEC 60534, part 7. Air connections and free cross-sectional area are key for the air supply volume of the device. A specific time for closing or opening of the control valve is often required. This can only be guaranteed if a correctly calculated solenoid valve is chosen. The filter-regulator, the connecting tubes and of course the selected adapter fittings play an important role. Electrical data such as supply voltage, power consumption, frequency and the type of explosion protection have to be specified. These data often depend on the requirements of the user and/or local regulations and approval authorities.

10.6.1. Function

Solenoid valves are the interfaces between the electric control level and the pneumatic actuator. SAMSOMATIC solenoid valves provide high reliability at a low power consumption. Due to their minimal power consumption, they can even be controlled using intrinsically safe fieldbus systems. Our proven product line offers a wide variety of tailor-made versions for any application.

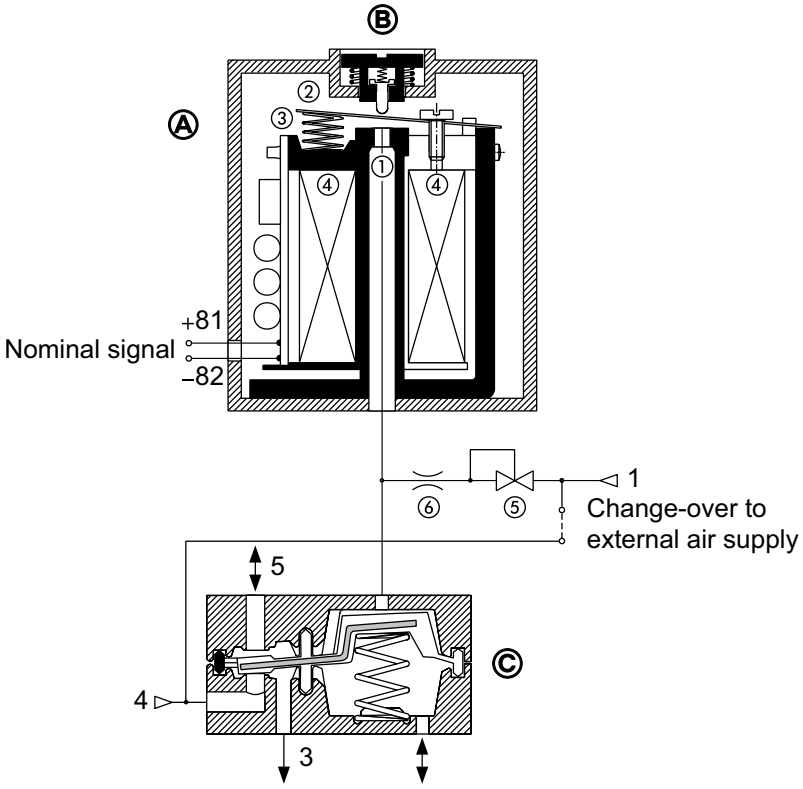


Figure 10.6.1.-1: Solenoid valve with diaphragm element as booster valve (K_{VS} 0.16)