Improve the safety features of the pneumatically operated music machine

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Aim of the Project

The Aim of the project was to conduct a DFMEA on the existing design and biased on these result research & implement the researched safety features. Then another DFMEA will be conducted to show the improvement in safety.

Background

A dump valve releases the pressure from the system when the access door is opened or in an emergency situation, so the operator can work safely on a depressurized system.

Figure 1: 3/2 way dump valve

A micro switch, also called a microscopic snap action switch, is defined as a small, extremely sensitive switch that requires very little physical force to operate.

A micro switch operates on the idea that contacts will shift positions as soon as it comes into contact with an object.

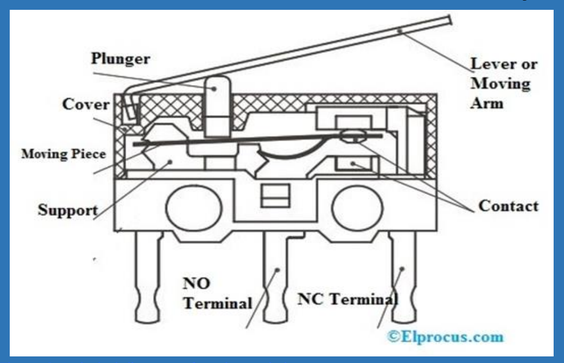

Figure 2: Labeled diagram of a microswitch

Safety standards

Venting is a common precautionary technique. When the cylinders are depressurized and pose no threat, it is utilized. Nonetheless, consideration must be given to the mass at the cylinders as well as the appropriate mounting location. There is no risk if there is no compressed air or power.

Application in conjunction with a light beam device or two-hand circuit provides another reason for ensuring that the design of a pneumatic circuit is thorough and correct. . In accordance with DIN EN ISO 13855 “Positioning of safeguards with respect to the approach speeds of parts of the human body”. The speed of a pneumatic cylinder depends not only on the operating pressure, mass and mounting position, but above all on the screw joints, hoses and valves that are used, along with their flow rates.

Safety devices used

This is installed between the impute pressure and the valve bank so that the operator can manually shut off the pressure to the system in the event of the valve bank failing.

Safety devices used

This it the dump valve which is installed before the valve bank but after the inlet pressure. This releases the pressure of the system when the access food is opened making it safe to work on.

Figure 6: Magnetic catch

This it the magnetic catch which keeps the door in the closed position when the system is running. This is one if two mechanisms that insures that the system is closed off to and onlooker during operation.

This is the E-stop which is installed and mounted to the Frame. It is hardwired into the system to stop all power from entering the system when pressed, this will also trigger the dump valve to vent the system.

Conclusion

In conclusion the possible safety features suited to this Particular design were researched. The chosen safety parts were installed, and a DFMEA was conducted clearly displaying that the safety was improved to an acceptable level. This shows that the design is now fit for purpose.

References

- MHE3-MS1H-3/2G-1/8 | Festo 3/2 Closed, Monostable Solenoid Valve - Electrical G 1/8 MHE3 Series, 525147 | RS (rs-online.com)
- Micro Switch : Construction, Circuit, Working, Types & Its Applications (elprocus.com)