

Valve networking, monitoring and control in the food and beverage industries

In the food and beverage industries it is essential that valve position is monitored and controlled accurately and reliably in order to ensure consistent standards of product quality and safety.

Valves can be subject to wash down or sterilisation, so equipment is usually rated IP66, IP69K or NEMA 4X. Coated aluminium or stainless steel enclosures are both used in food and beverage plants but the choice depends on a careful review of the application to ensure costs are kept under control. Wash down and sterilisation can involve the application of chemicals such as chlorine and sodium hydroxide; the frequency of wash down also has to be considered. Stainless steel will perform better if wash down is carried out frequently and at high pressure.

By David Yates

Material

The grade of stainless also has to be considered in order to balance cost with performance. Plastics can also be used but the type of plastic has to be carefully selected. Plastics can contain chemicals that cannot be used in certain food plants and some can absorb water causing swelling and strength reduction. The design and surface finish of the enclosure should be appropriate. Standing water caused by the shape of the equipment and crevices that can collect unwanted material should both be avoided. Combustible dusts can be a hazard e.g. flour, custard powder, instant coffee,



316 stainless steel position monitor certified for use in Zones 21 and 22.

sugar, dried milk, potato powder and soup powder. For this reason position or control monitors may need to be supplied with Ex certification, to the very latest standards, for use in dust Zones 21 and 22.

Valves

In food factories position switches are usually fitted to the top of valve actuators and solenoid valves are located in remotely sited panels. This remote mounting of solenoid valves can lead to problems with valve identification and lags in actuator response times.

Should this be the case the solenoid can be moved to the actuator but then it needs to be protected from the environment. One way around this is to combine the pilot solenoid valves for actuator control with the position switches in the same enclosure. The result is a Control Monitor.

Not only are solenoids protected, two separate devices are replaced with a single unit that saves on space and installation cost. Switches can be mechanical, reed proximity or inductive proximity. Solenoid function can be 3/2 single acting, 5/2 double acting or 5/2 double acting stay put. If solenoid manual override



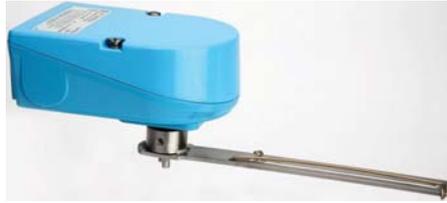
The internals of a 5/2 Double acting "stay put" (dual solenoid) Control Monitor with two inductive proximity switches is shown above.

The cover is removed by loosening two captive cover screws. The angled cover gives easy access for switch cam adjustment.

is specified it is "tamperproof" because it can only be accessed by deliberately removing the cover. A single conduit entry is all that is required because the switches and solenoid can now be connected via a single multi-core cable. This eliminates cabling, glands and local junction boxes. A wide range of waterproof multi-pin connectors can also be supplied that allow actuated valve assemblies to be quickly removed from the line for servicing.



To save space the position indicator and actuator control valve can be located in the space between pneumatic actuator and Control Monitor.



Lever drives for linear actuators are an option. The Control Monitor then replaces a banjo mounted solenoid valve and two separate switches.

AS-i or DeviceNet fieldbus systems are used in the food and beverage industries to reduce installation costs.

4-20mA position transmitters with or without HART® can be fitted in similar enclosures for use with modulating valves and also to monitor the performance of “on/off” valves over time. This can help make preventative maintenance more efficient and cost effective.

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A visual indicator can be fitted to the top of the enclosure if preferred. Drives for rotary actuators conform to the VDI/VDE 3845 standard, so mounting kits for most types and sizes of pneumatic actuator are readily available.



Position and control monitors can be provided with integral field addressable AS-i or DeviceNet circuits and M12 socket connectors.