



**Fluidsentry™**  
**Monitored Valves**

## Valve & monitoring considerations for safety applications.

With today's safety standards requirements, electrically monitored pneumatic & hydraulic valves have become a key component in machinery safety solutions, providing the interface between the fluid power operation & electrical safety circuits.

Failure of the safety related component of a fluid power control system could potentially lead to exposure of a person to risk of serious injury or death. Therefore careful selection of suitable safety product is of extreme importance. Fitting a sensor or switch to a spool or cartridge valve may provide what can be termed for automation purposes as a 'monitored valve', but does it have the integrity to provide a safety function?

Risk categories are applied to the hazards of plant so that the safety component of the control system can be suitably designed. Monitored valves required for the safety function of a fluid power control system should also meet the risk category requirements. A manufacturer's Declaration of Conformity, demonstrating third party assessment & certification to the European Machinery Directives can assist in determining suitability. To be sure the certification is safety related, look for suitable type A & B safety standards such as EN292-1, EN292-2, EN1050 & EN954-1 which indicate safety design considerations & suitability for safety related parts of control systems. Products that are only certified to type C machine specific standards, might not offer the same level of safety integrity.

Valves have a number of failure modes that need to be taken into account when designing a safety system. We need to be confident that faults such as partial operation from sticking components or contamination will be detected, thus the output of the monitoring function cannot be ambiguous.

Adjustable inductive proximity sensors are often used for spool monitoring. Their purpose being to detect the spool when within the sensor range. Although an economical solution for general automation, the sensors used are typically not a safety certified device, mostly because the devices used have unknown failure modes. If we also consider a valve failing to close by just 1mm could be charging accumulators & combine it with sensing range, & ability to adjust the sensor, ambiguity of the absolute 'off' position is foreseeable.

The pressure switch is another common monitoring method. Again we need to take caution as the switches are not typically safety certified products, & the majority of pressure switches used in industry have a minimum setting which may be well above safe operator access levels. A minimum pressure switch setting of 1 bar can allow a force of up to 47Kg in a typical 3-inch bore cylinder without detection.

As a result most electrically monitored valve products with inductive proximity sensors or pressure switches for the primary monitoring function do not carry certification to the Type A or B harmonised EU safety standards.

Recent introduction of monitored spool valves with high precision positive opening safety certified switches has enabled industry to design safety related parts of fluid power systems to be compliant with standards requirements. The positive opening mechanism of the safety switch ensures safety even if the contacts have welded. Product engineered for safety application ensures that spool travel is detected well before flow can occur & switches cannot be easily tampered with. Used in redundant configuration & in conjunction with appropriate safety monitoring relays, single component failures are detected & further system operation prevented until the fault is rectified as per the requirements of Category 4 of AS4024.1 Safeguarding of machinery. An additional advantage of the non-ambiguous interface is that should a valve fault be detected, operator access can be prevented through guards with electrically operated gate locks, offering improved safety integrity to high risk machinery.

For more information on monitored valves please contact Fluidsentry Pty Ltd.  
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