

## Pneumatic free valve actuators

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Large cryogenic systems as projected for FCC need a large number of cryogenic and warm valves. Most of these valves are control or metering valves guided by a PLC generated signal. Furthermore also, actuated shut-off valves are needed. Today such valves are driven by pneumatic actuators with electro-pneumatic control. The supply pneumatic system and electric signal cabling increases with the number of valves, is energy intensive, needs space and continuous servicing. Not at least operation and capital costs for such an electro-pneumatic system are quite high.

One can observe new developments in in the refrigeration, natural gas and energy industries which use pneumatic free electric driven control and shut-off valves.

Based on the positive experiences in these industries, innovative cryogenic and warm valves, actuated by an electrical stepper motor were developed. Together with the control module the full functionality including fail open or fail closed positions as well as many further control advantages are available. Using this type of valves allows a highly simplified installation. These advantages open a potential to reduce operation and capital costs remarkably.

Presently, available are valves driven by an electrical stepper motor up to size DN40 depending on the requested shut-off pressure. For bigger valves and higher shut-off pressure, actuators with their own electro-hydraulic drive control system are available.

Examples of such valves will be shown and described. Future development perspectives as well as problems for application in accelerator cryogenic systems like radiation proof request will be discussed.

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