safe and reliable

Advanced KÜHME actuator technology

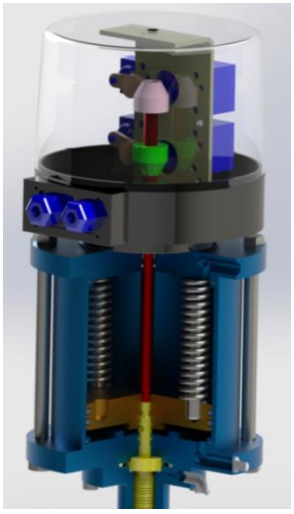
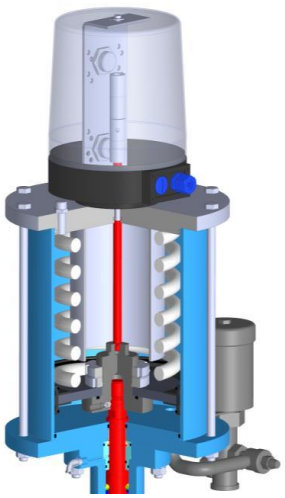
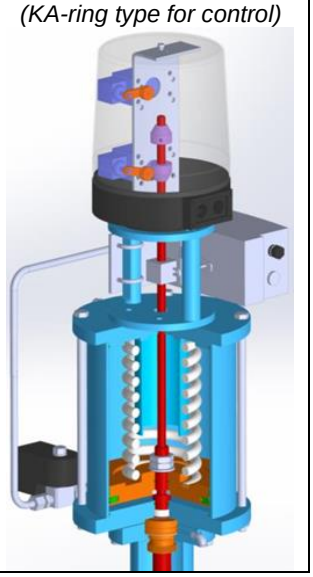
Advantageous piston type design optimized for
heavy duty application and high cycling operation

Within company's history as a leading manufacturer of safety quick closing shut-off and control valve technology the respective KÜHME equipment has been - and still is - subject to continuous product evolution processes. This constant improvement ensures highest level of safety and reliability to fulfill the requirements of most challenging applications and related sets of rules. In this regards KÜHME's actuator technology is an important aspect to verify supreme cycling function under heavy duty conditions.

From 1967 to 1970 KÜHME used actuators in diaphragm design. These types of actuators did not comply with the requirements defined in the technical standards and sets of rules which have been implemented back in those days.
Due to the high amount of cycling operations which are compulsory to achieve respective type approval turned out to be inadequate during the fixed test procedures. In this course the diaphragms constantly failed because of excessive strain of the component.

Therefore KÜHME has developed and engineered piston type actuators in 1970 which are still employed up to now in their latest state of the art variants.
This improved actuator design is not limited to be used for high amounts of cycles only but is also characterized by its overall robustness as well as reliability. As a specific core feature underlining the heavy duty applicability the piston type actuators are able to be operated even if the sealing elements of the piston are damaged. Furthermore the piston type design fully excludes the slip-stick effect when used for control valve applications.
From the beginning on the target was to develop an integral unit of valve and actuator to guarantee above average functional as well as high performance aspects which KÜHME valves are well known for nowadays.

Cross section

Diaphragm actuator (common type)	*KÜHME piston actuator (o-ring type)*	*KÜHME piston actuator (sleeve type)*	*KÜHME piston actuator (KA-ring type for control)*
			

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Comparison and advantages		
	KÜHME Piston Actuator	Common Diaphragm Actuator
Pressure range	2 to 10 bar g	1 to 6 bar g
Type of action	Single acting / double acting	Single acting
Set function - Normally closed	Yes	Yes
Set function - Normally opened	Yes	Yes
Heavy duty ambiance	Suitable	Suitable in special design only
Heavy duty operation	Suitable	Unsuitable
Actuating times	Fast due to compact design with small compressed air volume. Allows use of smaller solenoid valve as well quick exhaust valve.	Slower due to non-compact design with huge compressed air volume. Requires use of bigger solenoid valve as well quick exhaust valve.
Emergency operation security	Guaranteed, even if actuator's sealing elements are damaged the valve maintains operational function. Secures plant remains in operational condition.	Not secured in case of damaged diaphragm. The valve is out of service. Malfunction on the actuator may result in shutdown of the plant.
Resilience against soiling	High	Doubtful
Compact design	Yes - significant in comparison to diaphragm actuators, very compact interface connection to the valve. Valves in integral design - means actuator and valve is one unit allowing unique high performance features and low installation height.	No - outside diameter bigger due to diaphragm. Compared installation height is large because of the pillars used as interface for connection of the actuator with the valve.
Transmission elements	Encapsulated transmission elements (valve stem). The use in as well as under any environmental condition is possible.	Exposed transmission elements (valve stem) are vulnerable to environmental based wear. The use in harsh environmental conditions is limited.
Unified design	KÜHME's technological philosophy is that valve and integral actuator is one unit out of one hand.	Diaphragm actuator and valve have different manufacturers. Therefore actuator and valve are not attuned 100% all the time. Different manufacturers complicate the clarification on responsibility in case of failure/ defect.
Calculation/design	The actuator is exactly sized to operate the valve as both components are out of one	Actuators are not designed performance optimized for one specific valve. Oversizing of the

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	hand and designed fully compatible for each KÜHME make safety quick closing shut-off or control valve. The design considers exact parameters e.g. friction, sealing force and opening force.	actuator is possible as the manufacturers only offer fixed actuator sizes without high variance. Specific special features are not realizable.