







VALVOLE DI CONTROLLO E INTERCETTAZIONE, SISTEMI DI AZIONAMENTO, DISCHI DI ROTTURA E DISPOSITIVI DI SICUREZZA UTILIZZATI NELL'INDUSTRIA DI PROCESSO

Milano, 18 Aprile 2018

Auditorio TECNIMONT



# VARIABLE SPEED ACTUATORS FOR VALVES

Andrea Villa







# **Armaturen- und Maschinen- Antriebe**

AUMA Riester GmbH & Co. KG Aumastr. 1, 79379 Muellheim







# **AUMA PRODUCTION**



- 420m € turnover within the AUMA group
- 60,000 m2 manufacturing area worldwide
- 2,300 staff members worldwide
- 220,000 actuators produced per year
- One-piece-flow principle



### AUMA QUALITY AND R&D

- Certified according to EN ISO 9001, 14001 and OSHAS 18001
- 100 % quality and functional testing for all our products
- About 100 members of staff in the AUMA development network
- In-house development in mechanics, electronics, and software
- Test department with state-of-the-art test equipment





















#### High positioning accuracy for modulating actuators

Like for operation into the end position, the actuator decreases the operating speed when approaching the setpoint position proportionally down to zero speed until standstill. Operation in modulating duty is then performed at very low speed which will be automatically adapted in relation to the setpoint distance. This allows for more accurate approaching of the setpoint compared to the sudden tripping of a fixed speed actuator.

#### Valve protection by soft start and stop

 Operations out of an end position start at zero speed. By means of a ramp function, speed is increased until the predefined speed is reached. Behaviour for operations to end positions is the exact opposite: Prior to reaching the end position, the speed is linearly decreased. All mechanical components involved (valve, motor and gearbox) can be operated at considerably reduced kinetic energy. Start-up currents do no longer show any peaks.



#### Avoiding pressure surge by speed profile

Dynamic pressure changes within the pipeline (pressure surges and drops) can generally not be avoided, however, they must be within the permitted pressure value to avoid breaks and other damage. These pressure surges may occur e.g. in case of a quick change of flow speed e.g. when quickly closing of a gate valve. To prevent pressure surges, specified speed values can now be set for up to ten travel sections within the complete travel depending on the direction of operation. Thus a valve specific speed profile can be defined via travel.

#### **EMERGENCY** behaviour and failure behaviour with separate speed setpoints

 EMERGENCY behaviour and failure behaviour can as an option be executed at a predefined and frequently high speed to suit the particular event. The capability of a quick operation as response to an emergency (power failure, DCS failure, external requirement) paired with slow modulation is particularly advantageous



Steam conditioning stations for turbine by-pass systems Where processes are complex, it's desirable to achieve a proportional relationship between valve travel and flow-rate of the medium. The variable speed actuator enable this by changing the valve speed during transition from OPEN to CLOSE and vice versa. Different speeds can be specified along the length of travel with up to 10 interpolation points which becomes the speed characteristic curve.







Steam conditioning stations for turbine by-pass systems A variable speed actuator is able to follow closely a fast changing set-point, achieving a higher accuracy of regulation compared to a single speed actuator. Moreover with a low changing set-point, the "pumping" effect is avoided thus extending the expected life of the actuator







#### Process control and pump protection:

Under normal operation when a reduced flow is detected, the actuator which controls the valve is opened over a period of 80 seconds, however, if a reverse flow is detected then the valve needs to be closed in 10 seconds to protect the pump.

Different speeds are therefore required for opening, closing and emergency closure to protect the pump.







Valves with emergency close function:

Emergency power systems are often fed by UPS/Battery packs. The variable speed actuator with single phase feeding is moved by asynchronous 3-phase motor assuring a reduced load in case of UPS powered systems

UPS will ensure valve positioning in case of main power failure.







Valves in remote sites with limited power supply:

Flood defense basins are often located a considerable distance from power supplies with to long cabling trunks. To avoid problems associated with high start up currents in conventional actuators, either 'oversized' cables or soft start devices must be used.

Auma actuators are ideally suited, as they do not have a start-up current due to the integrated frequency converter technology







Avoiding water hammer in pipelines:

Fast closure of valve creates huge hydraulic forces, known as water hammer. These forces are sufficient to cause significant pipework damage and must be avoided. Actuator's variable speed closure capability avoids problems associated with water hammer generated during valve shut-off.







Linear flow control on non linear valve:

The valve/actuator system must manage water surges during pump start-up and shut-down and provide linear water flow control during normal operation. "Full port" ball valves have been used for pump control due to high flow capacities (Cv) and almost zero head loss when open. Linear flow control has been achieved using the actuator's time set capability allowing 10 different set times corresponding to 10 valve open positions



# SARVEX.2 – ACTUATOR RANGE WITH VARIABLE SPEED

#### The main requirements for the development

- Based on existing range SAEx.2 / ACEx.2
- High grade modulating duty, high accuracy
- Explosion proof
- Torque range up to 1000 Nm
- Output speed adjustable
- Soft start and soft stop
- Temperature range from -30°C to +70°C
- Low temperature version -60 °C



#### SARVEX.2 – ACTUATOR RANGE WITH VARIABLE SPEED



auma

#### SARVEX.2 – ACTUATOR RANGE WITH VARIABLE SPEED

Type of duty SAVEx

S2-15min, S2-30min, S3-25%ED

Classes A, B acc. to EN 15714-2

Type of duty SARVEx:

S4-25%, S4-50%, S9

Class C acc. to EN 15714-2

ETITIE (O)

Power Supply:

3-ph AC 380V - 480V 50/60Hz AC 220V - 240V 50/60Hz

1- ph AC 220V - 240V 50/60Hz; AC 110V - 120V 50/60Hz **Explosion Protection:** 

Ex d IIC T4/T3 Ex de IIC T4/T3

Class I, Div. 1, Groups B,C,D T4/T3

# SARV.2 – ACTUATOR RANGE WITH VARIABLE SPEED



#### Summary

- Full control of speed and rotary direction at any time
- Speed range include 6–60 rpm, 12–108 rpm and 24–116 rpm.
- Intelligent valve protection by:
  - Gentle approaching of end positions
  - Slowly and powerful operation at any position to unseat the valve
- Speed profile (for up to ten travel sections): Avoiding pressure hammers
- Optimised position control and reduced actuator movements for regulating valves. Speed is automatically reduced before reaching the set point.
- Two speed operation fast closing + accurate modulating
- All static and dynamic data are available via fieldbus at any time.





#### WWW.AUMA.IT