

PRECISE REGULATION  
OF FLOW AND PRESSURE

Expect... **AVR**



# CONTROL AND REGULATE WATER FLOW AND PRESSURE

Needle valves, sometimes referred to as plunger valves, are regulating valves and enable engineers to finely control and regulate water flow and pressure.



## Precise regulation

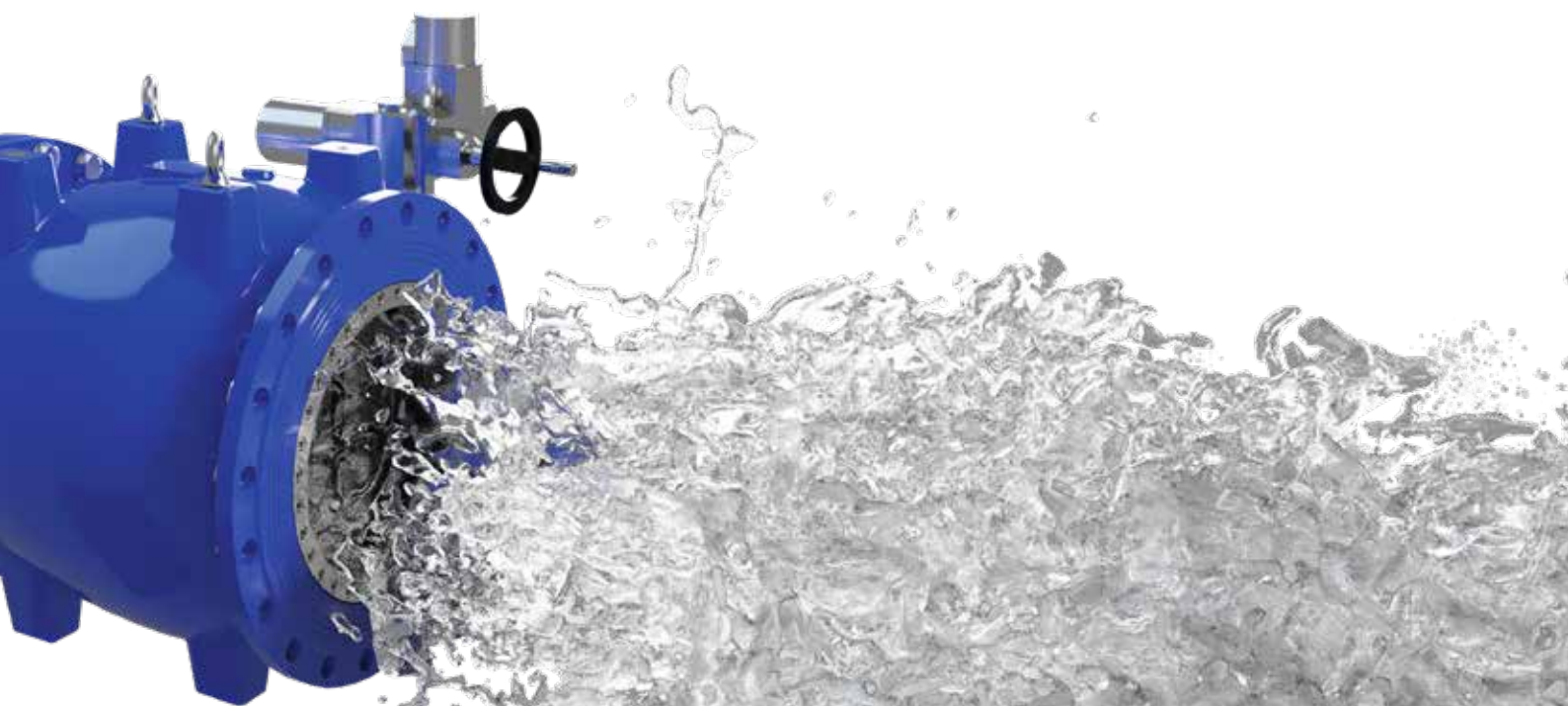
The precision of the needle valve is achieved through the fine movement of the shaft, which enables the gearbox to move the piston tube in sliding motion towards opening or closing position, depending on the requirements from the control system.

Needle valves can be used in many different applications with a need for flow or pressure regulation. In water treatment and distribution, dams, reservoirs, power plants and industry needle valves are e.g. used for:

- Flow control
- Pressure regulation
- Pump start
- Turbine by-pass
- Discharge
- Reservoir inlets
- Air regulation

## When to use needle valves?

Compared to diaphragm control valves, the needle valves can be used with higher differential pressure, and our needle valve standard range covers a pressure range up to PN40, and on request up to PN100. Our standard size range covers DN80 to DN1600, and on request up to DN2400. Our needle valves are therefore also recommended for regulation in large diameter pipelines and at high pressures.



# FEATURES AND BENEFITS

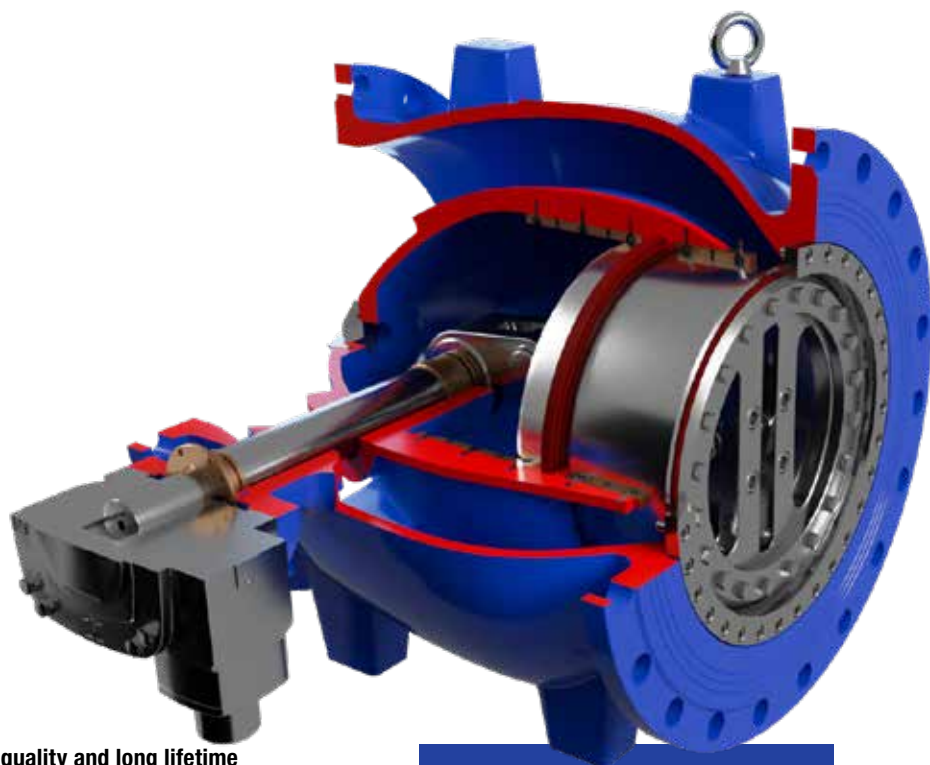
AVK needle valves are straight-way type control valves and are designed with a one-piece body construction and an innovative design for flow optimisation to ensure a reduced pressure loss in open valve position.

## State-of-the-art design

Our needle valves require very low operating torques, as the piston is always in hydraulic balance with equal force on both sides at all valve positions. This feature facilitates the operations of all actuators and significantly reduces actuator and gearbox costs.

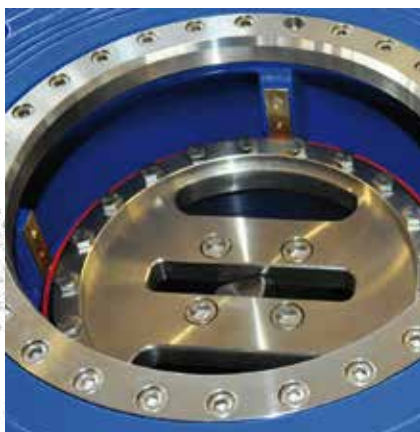
## High quality and long lifetime

All main internal parts are in stainless steel and the body is completely protected with fusion bonded epoxy coating to ensure long life. The high performance seal is easily replaceable and is located on the piston as opposed to on the seat preventing abrasion when fitted with anti-cavitation trim. In addition, the compact piston has 4-6 guides to ensure very low vibration.



## Main features and benefits

- One-piece body construction
- Stainless steel internal parts and fasteners for a long life of the valve
- All ductile iron parts coated with min. 250 µm fusion bonded epoxy
- Shaft sealing with double O-rings
- Main seal in the no-flow zone at the valve outlet
- 4-6 guide rails ensure very low vibration
- Gaskets in thermoplastic PUR for high resistance to abrasion
- Pressure balance in chamber inside for low operating torque
- Symmetric flow path with annular flow cross section in any open position
- Internal body shape is optimised to give a low head loss coefficient in fully open position



High performance seal, located in no-flow zone, easy replaceable without desassembling the valve from the pipeline.



Heavy duty corrosion protection with min. 250 µm fusion bonded epoxy coating.



# NEEDLE VALVE VARIANTS AND CONFIGURATIONS

We offer a wide range of high quality needle valves in different configurations and with optional extras for actuation and cavitation prevention.

## Dedicated software for precise size calculation

Each valve is specified according to relevant selection criteria for its specific application. Upon order or request it is, therefore, mandatory to provide information about hydraulic data (flow rate and pressure), installation design and requested actuation. This ensures that the valve has an optimal performance for the given installation. By using our dedicated software for sizing calculations, we provide a fluid and cavitation report under the hydraulic conditions. The report will guarantee a cavitation free valve.

## Configurations

We offer a selection of optional extras for actuation and cavitation prevention. Each valve is fitted to the actual operating data and work without cavitation even at major pressure differences.

## Actuation

Upon request we can provide needle valve solutions with custom designed actuation configurations:

- Worm gear box and handwheel
- Electric actuator
- Hydraulic
  - Hydraulic brake and lift unit
  - Double acting hydraulic piston
  - Single acting hydraulic piston
- Double or single acting pneumatic actuator

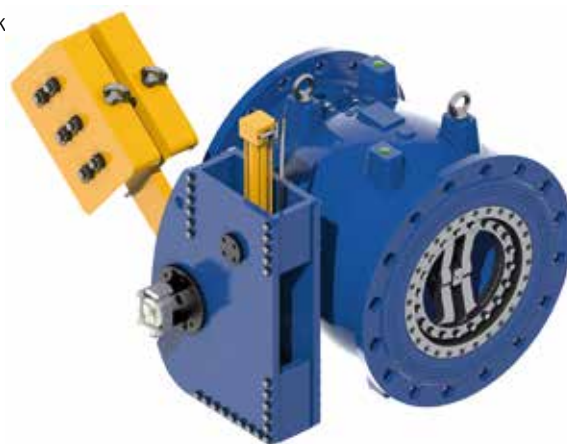
## Cavitation trim

Accessories are available for prevention of cavitation:

- Intrusive
  - Dissipating cylinder
- Non intrusive
  - Dissipating plate
  - Venting device



**Non Intrusive**  
Dissipating plate



**Hydraulic brake and lift unit**

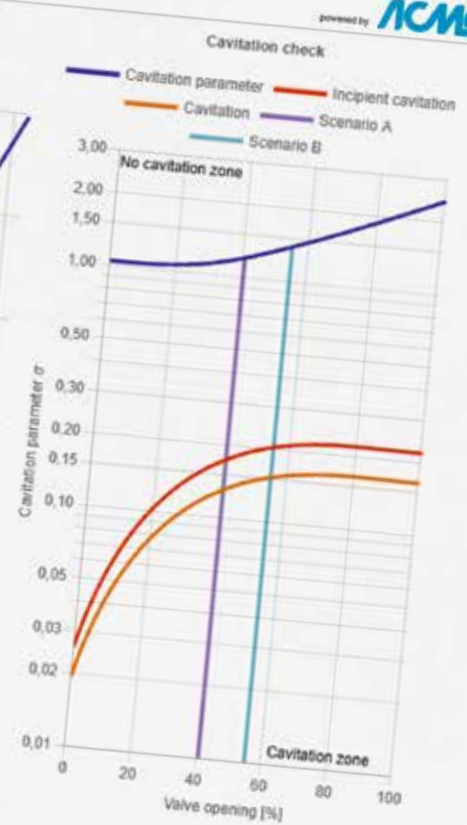
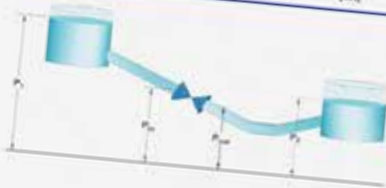


**Electric actuator**



## Sizing of control valves s872

VALVE SPECIFICATIONS				
DN	2000			
Anti-cavitation cylinder	K100	✓		
PN	16	✓		
WORKING CONDITIONS				
Flow rate	Q	4,00	6,00	m³/s
Upstream dynamic pressure	P <sub>in</sub>	100,00	112,00	m
Downstream dynamic pressure	P <sub>out</sub>	80,00	80,00	[m]
DETERMINING PLATE				
REGULATION UNIT	YES	NO		
VALVE SIZE				
Valve pressure drop	ΔP <sub>v</sub>	50	50	[m]
Pipe speed	v	1,05	1,58	[m/s]
Approx. valve opening	θ	41	55	[°]
PRESSURE LOSS COEFFICIENTS ON THE VALVE (ISO 5175)				
Pressure drop coefficient	C <sub>kv100</sub>	100		
Flow coefficient	K <sub>vs</sub>	10,188,48		[m³/h]
Pressure loss	ΔP <sub>loss</sub>	5,64	12,7	[m]
Outlet jet speed	v <sub>out</sub>	1,77	2,85	[m/s]



**Non Intrusive**  
Venting device



**Intrusive**  
Dissipating cylinder



**Worm gear box and handwheel**



**Pneumatic actuator**



**Hydraulic piston**

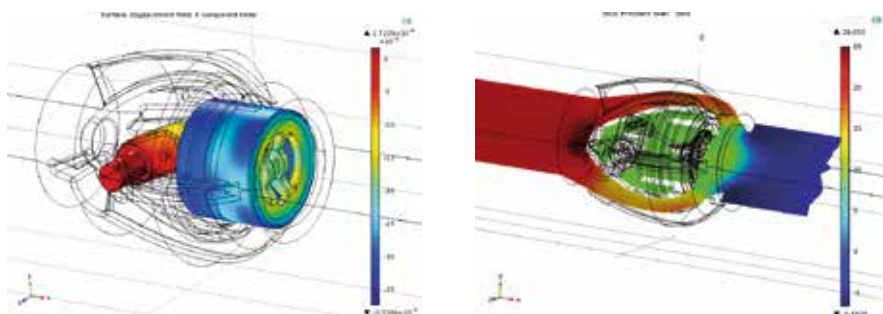


# HIGH QUALITY IN ALL PROCESSES

The process of quality assurance in the production of needle valves comprises a number of steps, e.g. R&D, manufacturing and testing. To this should be added the use of proven engineering practices for our many variants and configurations which are all customised to meet the special requirements of each installation.

## Modern tools in R&D

Solid modelling and reverse engineering enable control of critical points and feasibility design studies. The COMSOL calculation software is used for FEM and fluid dynamics and enables a simulated fluid dynamic design.



## Sophisticated test facilities

Quality control is carried out using both static and dynamic test benches, and the quality parameters are carefully checked by highly qualified staff.



# DAM BASE DRAINAGE RENEWAL

The water management association Aggerverband maintains several dams in the German state Nordrhein-Westfalen. For the renewal of the base drainage at one of these dams, AVK delivered a needle valve DN1200/PN16. The needle valve will be used as a bottom outlet for the dam in order to regulate the water level and keep it constant; even during heavy rainfall.

The executing plant engineer and the end customer went to our Italian AVK company AC.MO to inspect the production facilities as well as the quality of the equipment and a current installation with a needle valve of the requested design. Here, they were also given computational proof of the flow rates to be provided, based on predetermined operating parameters.

During the technical approval of the needle valve with AUMA actuator, the strength, layer thickness and leakage rate were tested along with a dimensional test. The accurate function of the installation as well as the achievement of the required flow rates were observed and approved when the valve was put into operation.



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