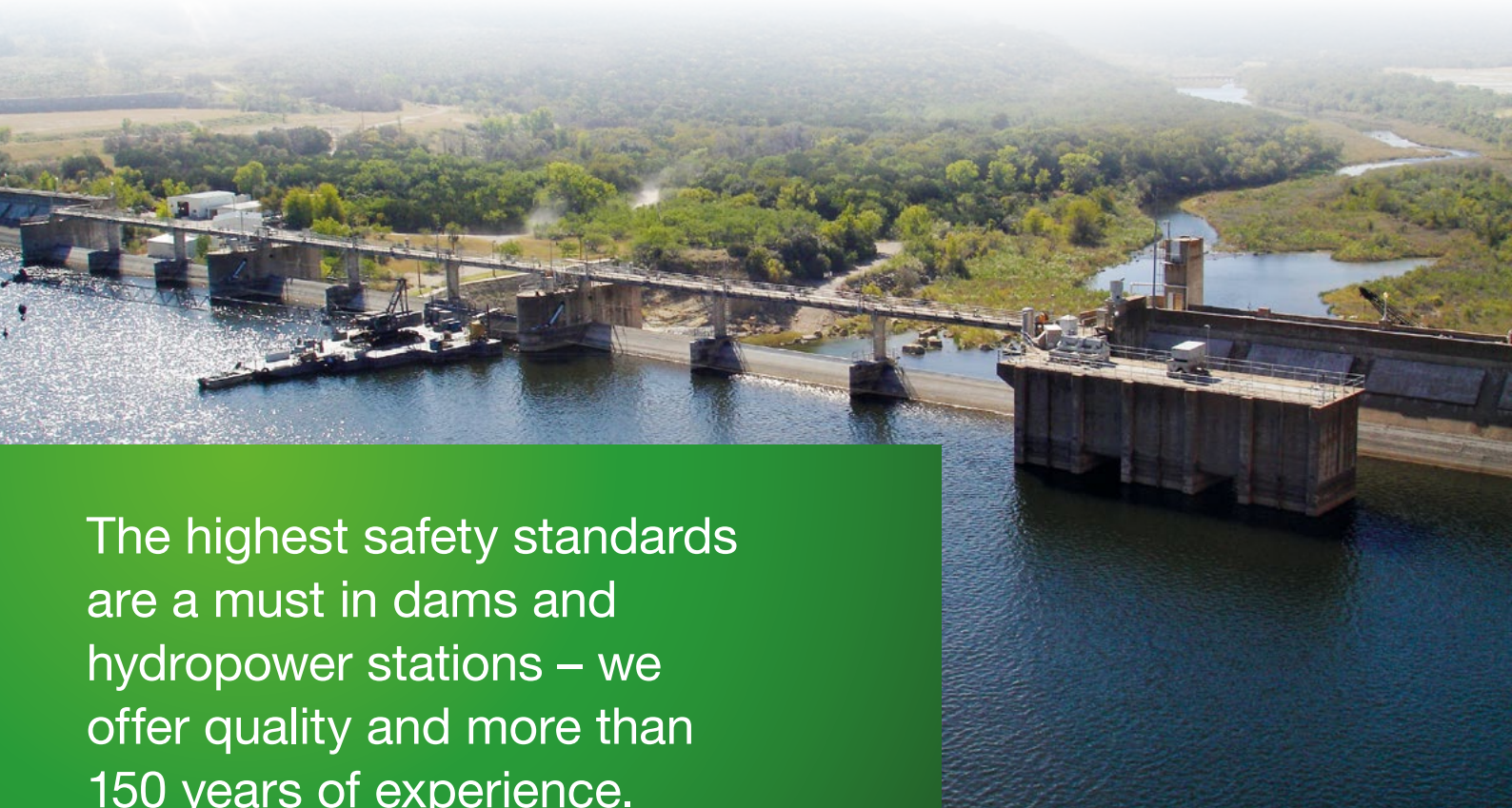


VAG valves in

# Dams and hydropower stations

More than 150 years of  
experience in hydropower  
– a tradition that combines  
innovation and sustainability.





The highest safety standards are a must in dams and hydropower stations – we offer quality and more than 150 years of experience.

# Hydropower solutions worldwide

**THERE ARE MORE THAN 50,000 LARGE DAMS AND BARRAGES WORLDWIDE. THEY ARE USED FOR FLOOD CONTROL, DRINKING WATER SUPPLY, INDUSTRIAL PROCESS WATER SUPPLY, IRRIGATION IN AGRICULTURE, GENERATION AND STORAGE OF ENERGY.**

VAG delivers tailor-made solutions for all these facilities. In hydropower stations, VAG products prevent pipe bursts and serve as turbine inlet protection. As complete systems, they ensure the trouble-free function of a turbine bypass. Autonomous systems composed of butterfly valves with hydraulic brake-and-lift units and trigger in the dam protect the intake and transportation pipes against uncontrolled discharge in the event of an incident. Sluice gates and penstocks serve as shut-off valves in intake towers, crest gates and gate valves control water levels in the upper reservoir, heavy roller gates reliably shut off dam inlets and are able to resist hundreds of tons of water pressure. At the bottom outlet, mighty hollow-jet discharge valves control the flow rate and ensure that downstream rivers and brooks are supplied with enough water – even when the power station is not in operation. Plunger valves are becoming more and more important here as a cost-efficient and reliable alternative. The practical knowledge that we have gained over many decades becomes obvious in a lot of details, such as in the correct hydraulic design of the valves, the choice of the right materi-

als for the body, sliding surfaces, seals, coating and cavitation control at high flow velocities.

VAG pays special attention to a flow-optimised, minimal-resistance design. With our special solutions such as quick-closing valves with hydraulic brake-and-lift unit for very short closing times or pressure-relief valves with a control curve specially adjusted to the turbine, we are able to meet the complex requirements of the industry.

VAG valves are known to be reliable, durable and easy to install and they are in service all over the world. Customers value the extraordinary quality of VAG's products; service lives of more than 80 years are not uncommon. VAG valves and the company's production processes meet the requirements of common bodies of rules and international standards. They are designed and optimised with state-of-the-art methods such as FEA and CFD (Computational Fluid Dynamics) in combination with laboratory tests and the experience gained from many existing plants in order to provide excellent and reliable service for a long time.

# Convincing results

VAG VALVES PERFORM. WORLDWIDE. WITH TAILOR-MADE SOLUTIONS MEETING THE SPECIFIC PROJECT REQUIREMENTS, VAG VALVES ARE IN RELIABLE AND LONG-TERM SERVICE WORLDWIDE.



KÜHTAI PUMPED STORAGE HYDROPOWER STATION  
AUSTRIA



THE SKALKA DAM  
CZECH REPUBLIC



TREVALLYN HYDROPOWER STATION  
AUSTRALIA



THE CUTZAMALA DAM  
MEXICO



VANCOUVER ISLAND HYDROPOWER STATION  
CANADA



**CURIOUS?  
WOULD YOU LIKE TO KNOW MORE?**

On our website you can find a lot of exciting projects and examples for a great variety of applications worldwide.

# Bottom outlets

**HOLLOW-JET DISCHARGE VALVES ENSURE A RELIABLE AND PRECISE CONTROL OF THE BOTTOM OUTLET – EVEN AT HIGH PRESSURES AND LARGE AMOUNTS OF WATER.**

The VAG *KSSplus* Hollow-Jet Discharge Valve is a regulating and outlet valve optimised for high flow rates in bottom outlets and discharge pipelines of large reservoirs. It is able to discharge and control large amounts of water without cavitation and vibrations despite very high discharge velocities.

The valve is subject to stress caused by extreme pressures and discharge rates at the bottom outlet and water containing sand and mud. VAG *KSSplus* Hollow-Jet Discharge Valves discharge the water as a hollow jet, thus releasing it in a controlled way and with little kinetic energy into the lower reservoir.

With nominal diameters of up to DN 3000, the valves are available in several jet guiding varieties and with various types of actuators. Welded-on seat and sliding surfaces made of stainless steel minimise wear and tear. Even after a long interruption of operation, the valve functions reliably and closes drop-tight. The seat geometry and stiffness of the body make VAG *KSSplus* Hollow-Jet Discharge Valves function reliably and ideally suited for permanent operation under extreme conditions, such as those present in the Asahan Dam in Indonesia with a dynamic pressure of 240 m WC and a discharge rate of 68 m<sup>3</sup>/s in a single valve with a nominal diameter of DN 1600.

Various types, solutions for submerged outlets, special materials and special coatings provide flexibility in almost all kinds of applications. Our experience goes back to the beginnings of the hollow-jet discharge valves in the 1930s. Our customers benefit from this knowledge as regards the

design, calculation of the flow rate, sizing of actuators, integration into the structure, inclusion of the controller or automation system up to the integrated SCADA system and as regards monitoring of the installation and putting a unit into service.

We cooperate with renowned universities in research projects in which the submerged operation and the ventilation behaviour of VAG *KSSplus* Hollow-Jet Discharge Valves are simulated and tested. In this way, we keep increasing our technological edge.



**VAG HAS SERVICE POINTS ALL OVER THE WORLD AND AN INTERNATIONAL NETWORK OF PARTNER COMPANIES AT ITS DISPOSAL**

Wherever a valve is located – we are close to you with our know-how and modern equipment. VAG's experts are at your disposal any time where and whenever you need support in questions around valves.



# Plunger valves as a cost-efficient alternative

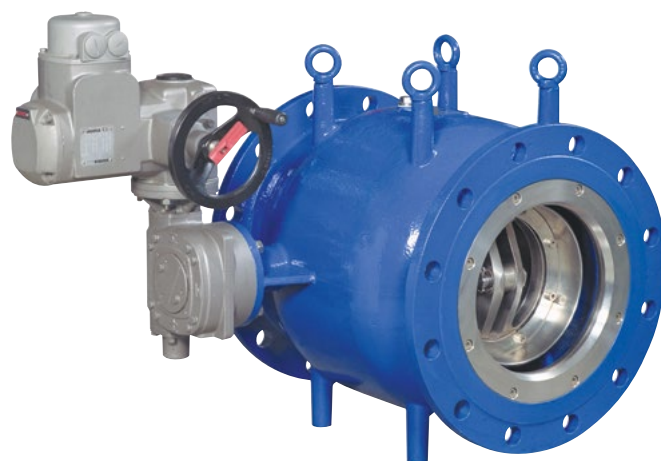
**THE VAG RIKO® PLUNGER VALVE CONTROLS THE PRESSURE AND VOLUMETRIC FLOW AND ENSURES PRECISE AND VIBRATION-FREE FLOW CONTROL.**

Besides hollow-jet discharge valves, VAG RIKO® Plunger Valves are gaining increasing importance in bottom outlets and bypass pipes. With nominal diameters ranging from DN 100 to DN 2500, they are a cost-efficient and reliable alternative ensuring precise control of small and medium discharge volumes. Their one-piece cast body, the weld-overlay sliding surfaces and the hydraulically relieved control cylinder make the plunger valve a robust and durable valve.

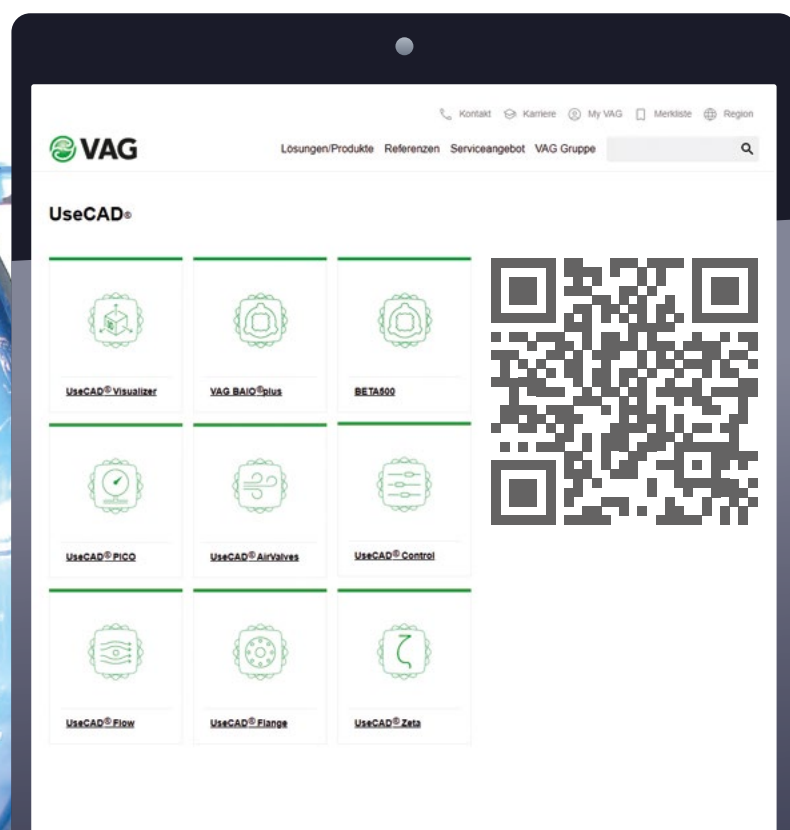
Another advantage is their easy installation in the valve chamber and their trouble-free use as submerged outlets – also with integrated venting unit, if required. The compact control valves fit into the protected area of the valve chamber even if space is an issue and are easily accessible for maintenance.

Upon special customer request, plunger valves made of stainless steel or welded versions are also available.

Their control characteristic is excellent; the control curve can be adapted to the operating conditions. All in all, VAG plunger valves can be ideally adapted to structural requirements, pressures and flow rates and can be equipped with various types of actuators. Besides hydraulic and electric actuators, the low operating torques also allow the use of pneumatic actuators.



Very short opening and closing times can easily be realised with brake-and-lift units and make the valve extremely flexible. As special versions the valves are suitable for submerged operation and thanks to a great variety of control inserts, they can reduce high pressures to minimal downstream pressures.



## MyVAG

**STRONG TOOLS FOR STRONG IDEAS**

For the design of your valves, the free VAG UseCAD® program collection is available to you upon request at MyVAG: 3D and 2D planning data & programs for technical design.

[www.vag-group.com/myvag](http://www.vag-group.com/myvag)

# Hydropower stations

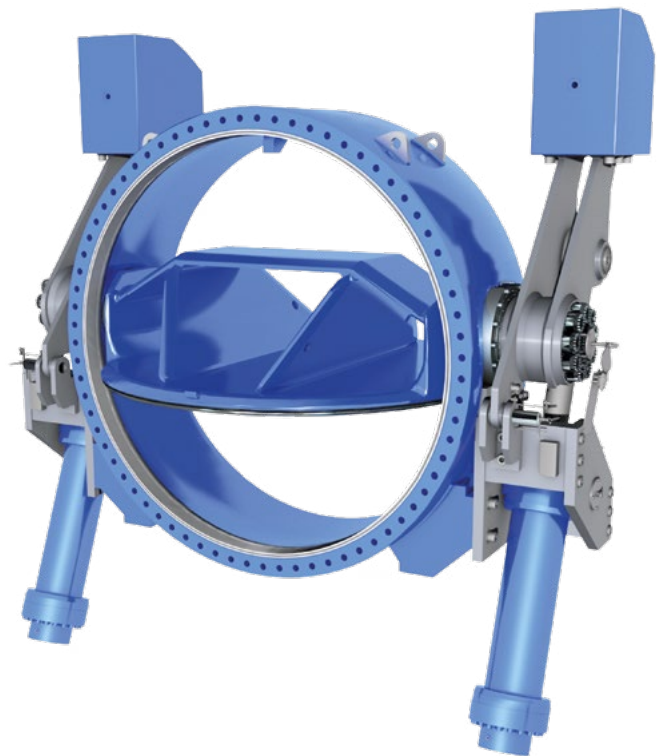
**A COMPACT AND VERSATILE SOLUTION FOR RELIABLE AND EFFICIENT CONTROL AT THE TURBINE INLET OF HYDROPOWER STATIONS.**

VAG solutions are used in many areas of hydropower stations that are critical in terms of safety:

- Pipe burst safety device
- Turbine inlet
- Turbine bypass
- Pressure surge relief
- Water level regulation
- Bottom outlet

The VAG EKN® Butterfly Valve with HYsec Hydraulic Brake and Lift Unit offers the ideal solution for hydropower stations: It serves as a shut-off device and a safety valve, for example as a pipe burst safety device in the turbine inlet or for the turbine bypass. The brake-and-lift unit is directly mounted on the valve and does not need a ground support.

The entire unit is mounted and tested at VAG's factory; a time-consuming installation with routing and testing of hydraulic lines at the construction site is not necessary. The streamlined design, the sealing seat made of stainless steel and an all-over epoxy coating ensure reliable corrosion protection. Special coating systems are available upon the customer's request.



## **VAG EKN® S BUTTERFLY VALVE WITH VAG HYSEC HYDRAULIC BRAKE AND LIFT UNIT**

The double-offset butterfly valve with optimised zeta value has a sealing seat made of stainless steel, fully encapsulated bearings and pressure-supported seals: ideal for high flow velocities and sandy water.

Valves in hydropower stations

Valves in intake pipes

Valves in bottom outlets

## **WE OFFER PRODUCTS AND SOLUTIONS FOR ALMOST ANY APPLICATION**

With our extensive portfolio – especially in the dams and hydropower area – we offer tailor-made solutions that nobody else can provide: from the inlet and safety valve, the air valve up to the control valve and overflow device.

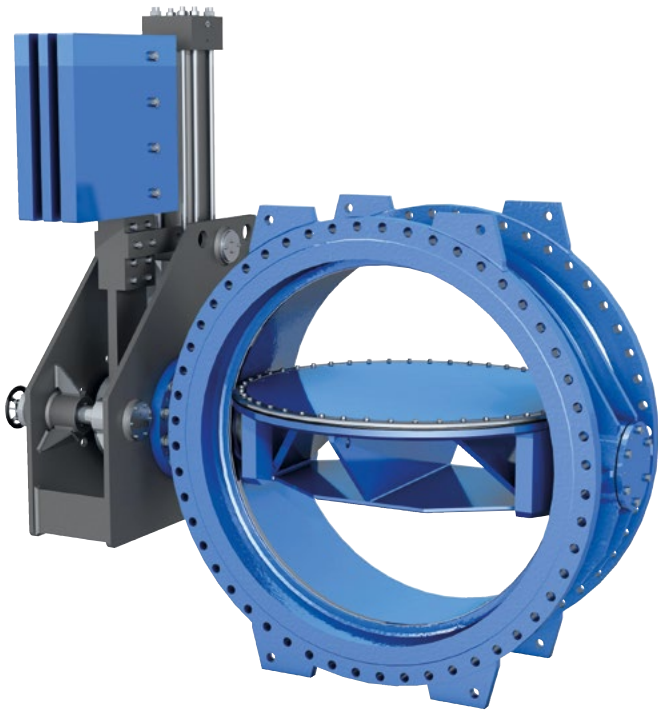
Also available as a special solution or customised product, perfectly tailored to your requirements and your project.



# Intake pipes

**AUTONOMOUS, ENERGY-INDEPENDENT SYSTEM SERVING AS A RELIABLE PIPE-BURST SAFETY DEVICE IN INTAKE PIPES – FOR MAXIMUM PROTECTION EVEN IN REMOTE AREAS OR EARTHQUAKE-PRONE REGIONS.**

Intake pipes take the impounded water to treatment plants and irrigation systems. The connected transport or pressure pipes can be both just a few hundred metres and many kilometres long. Without a functioning pipe-burst safety system, the flow out of the dam could not be stopped in the event of a leakage – a flood could be the consequence. Pipe-burst safety devices are a must especially in earthquake-prone regions.



As pipelines and intake locations are often hard to access, VAG offers maximum safety with an autonomous self-releasing system that does not need external energy. The core of this solution is the VAG EKN® Butterfly Valve with VAG HYsec Hydraulic Brake and Lift Unit.

Via a mechanical flow sensor, the valve can detect excessive flow velocities and close the safety valve automatically. A mechanical paddle trip serves as a trigger, the drop weight closes the valve also without electric power. Early warning alarms of an earthquake or an emergency closing signal from the controller can be events that activate the drop weight.

During normal operation, the valve is controlled via its integrated hydraulic actuator. Used as special vacuum-breaking valves, VAG spring-loaded air valves protect the pipeline from underpressure when the water flows out, thus preventing a vacuum within the system.

They are designed for handling precisely the amount of air that depends on the underpressure and the amount of water present in the event of an emergency closure. The complete solution consists of VAG EKN® Butterfly Valves with VAG HYsec Hydraulic Brake and Lift Unit, sensors and air valves. Upon request they are adapted to the structural conditions.

## HIGH PERFORMANCE EVEN WITH AIR

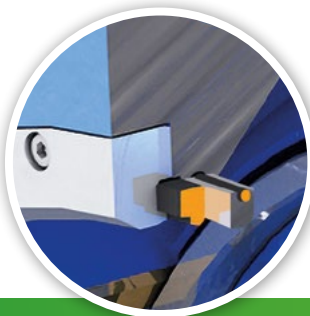
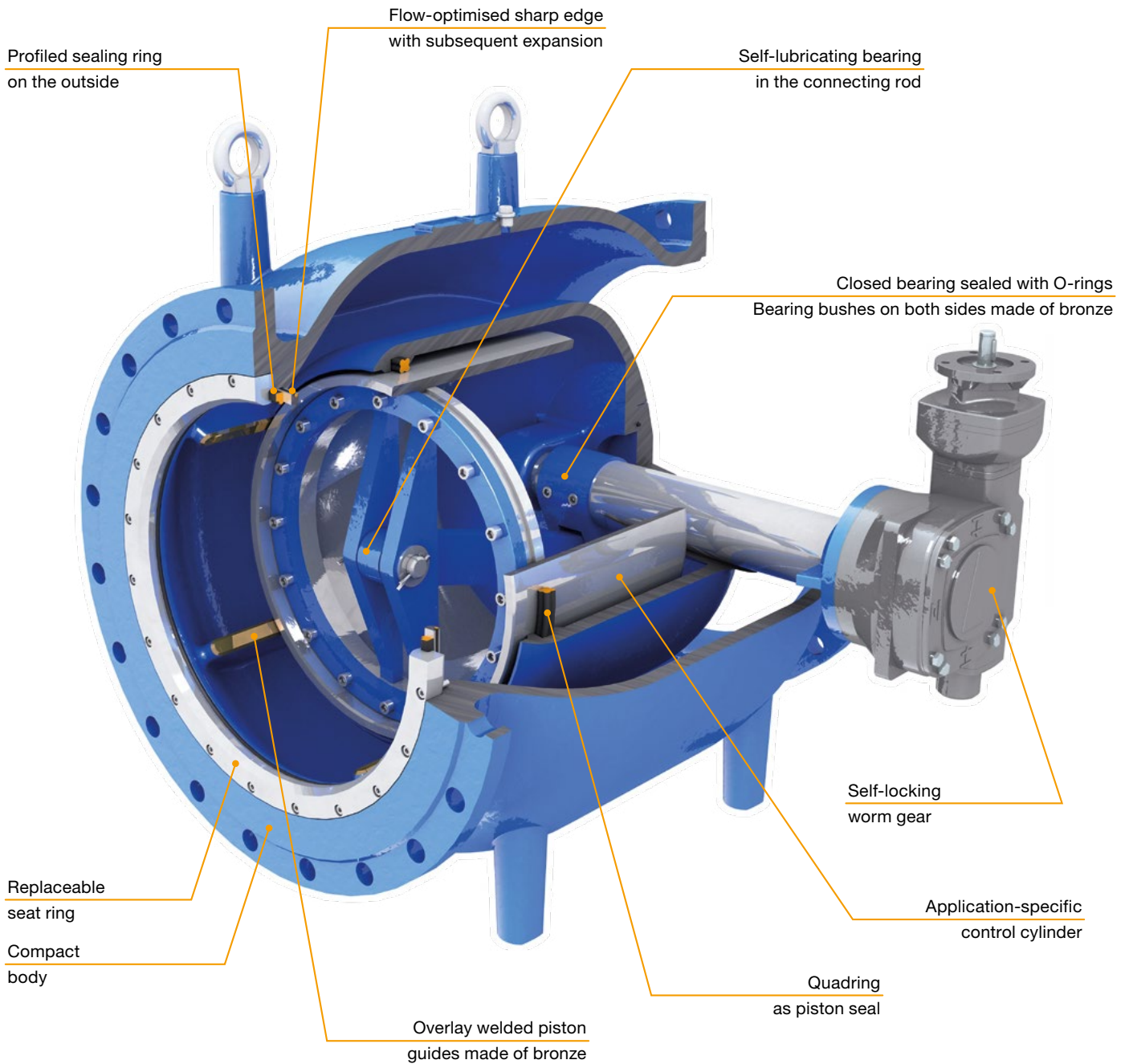
Spring-loaded air valves are used to supply very large amounts of air for the quick discharge of the medium present in the pipeline, to release air while the pipeline is being filled and during its operation. They are especially used in pipelines with large cross-sections to supply large amounts of air in the event of quick shut-downs or pipe bursts and in the bottom outlets of dams, long-distance pipelines or downstream of large butterfly valves.

In the event of a shutdown, quick drainage or pipe burst, it supplies even very large amounts of air quickly and reliably in connection with the VAG DUOJET® Automatic Air Valve even during normal operation of the system.

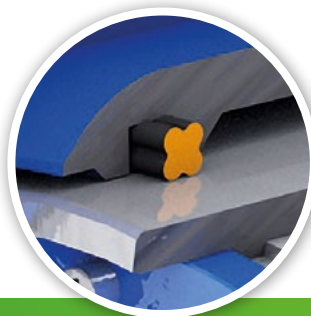


# VAG RIKO® Plunger Valve

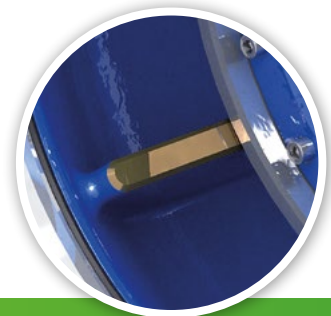
DN 100 ... 2500 / PN 10 ... 100



The flow-optimised sharp edge protects the sealing ring from the water jet and improves the cavitation resistance of the valve.



The quadrang seal prevents twisting and ensures the sealing between the body and the plunger.



Very low torques due to guides with bronze-weld overlay in the body.

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## TECHNICAL DETAILS

- **Standard version:** Body made of ductile cast iron EN-GJS-400-15 (GGG-40), piston rod and control cylinder made of stainless steel 1.4301, guides with bronze-weld overlay, bearings made of bronze, seals made of EPDM
- A variety of special materials for the valve body and inner parts as well as diverse coating systems are available upon request.
- Operation via electric actuator, hydraulic actuator or hydraulic brake-and-lift unit

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## PRODUCT FEATURES

- **100% protection of the piston rod:** For maximum corrosion protection, the stainless-steel piston is completely separated from the medium by O-rings and encapsulated, self-lubricating bearing bushes.
- **High-end seat:** The wear-resistant, corrosion- and infiltration-proof sealing seat in the body outlet with its optimised geometry and high-precision finish ensures the durability of the entire sealing system.
- **Reliable sealing system:** The operating pressure supports the sealing effect – irrespective of the flow direction. Thanks to its perfectly shaped sealing profile there is no risk of the profiled seal being pulled out even at high flow velocities.
- **Breakaway edge:** The new design on the outlet improves the anti-cavitation properties of the valve due to the properties of its surface material and the flow-optimised geometry.
- **Sealing system:** The sealing rings have different shapes in order to ensure optimum function in a specific place. The profiled sealing ring located in the no-flow zone has no direct contact with the water jet, which considerably increases its service life.

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## GOOD TO KNOW

- Maintenance and disassembly of the valve in man-accessible pipelines possible at any time without dismantling the valve from the pipeline.
- The control inserts are always designed according to the project and the operating data of the respective application:
  - **Slotted cylinder:** high pressure differences in water with a high content of solids
  - **Multiple-orifice cylinder:** high pressure differences
  - **Double cylinder:** extraordinarily high pressure differences
  - **Triple cylinder:** special applications
  - **Tear-off edge:** low differential pressures
  - **Special cylinder:** individually adapted to customer requirements
- Should the operating data of the plant change, the control insert can simply be exchanged.
- The bronze guides of the piston are directly welded to the body, which prevents electro-chemical corrosion. Unlike bolted guide rails, welded-on guide rails prevent the torsion of the plunger during operation.



### CUSTOMISED VALVE DESIGN FOR YOUR PROJECT REQUIREMENTS

With over 1,600 cylinder combinations and various accessories, the valve can be adapted to even the most demanding requirements.

# VAG KSSplus Hollow-Jet Discharge valve

DN 200 ... 3000



The water discharged is concentrated into a single jet by a pipe hood that is available upon request.



Optionally available venting equipment prevents the development of cavitation at high pressure differences.



VAG develops solutions for the most diverse customer requirements worldwide.

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## TECHNICAL DETAILS

- **Nominal pressure:**
  - Standard version for max. 100 m WC (10 bar) in combination with various connecting flanges
  - Higher nominal pressures available as special construction upon request
- **Standard version:** Body in fabricated steel design, sliding rails at front and back, retaining ring and jacket pipe of the cylindrical sleeve made of stainless steel
- Upon request various special materials for the valve body and internal parts as well as diverse coating systems are available.
- Operation via electric actuator or hydraulic actuator.

---

## PRODUCT FEATURES

- Reliable function and long-term operation due to cavitation-free discharge in all control positions.
- Intensive energy dissipation due to the hollow jet.
- Very large discharge rate and precise control with largely linear control characteristic.
- The cylindrical sleeve with readjustable sliding shoe guides ensures better adjustment of the cylindrical sleeve in order to prevent sluggishness. The readjustable sliding shoe guides also restrain vibrations, which has a positive effect on the service life.
- Reliable and robust sealing system with primary elastic and secondary metallic sealing, thus particularly durable.
- No clamping forces inhibiting movement; unrestricted opening movement due to long guide and external lead screws.

---

## GOOD TO KNOW

- No risk for the structure caused by vibrations as the flow does not break away before the front edge and thus there is no partial break-away inside the hollow-jet discharge valve.
- Maintenance-friendly because:
  - The seal can be replaced without disassembly of the valve
  - The external actuation components are easy to maintain and to replace
- Minimal actuation forces and low power consumption due to low operating torques (largely pressure-balanced).
- The version with pipe hood is available for a concentrated discharge of water.
- Optional venting equipment is available for high pressure differences.

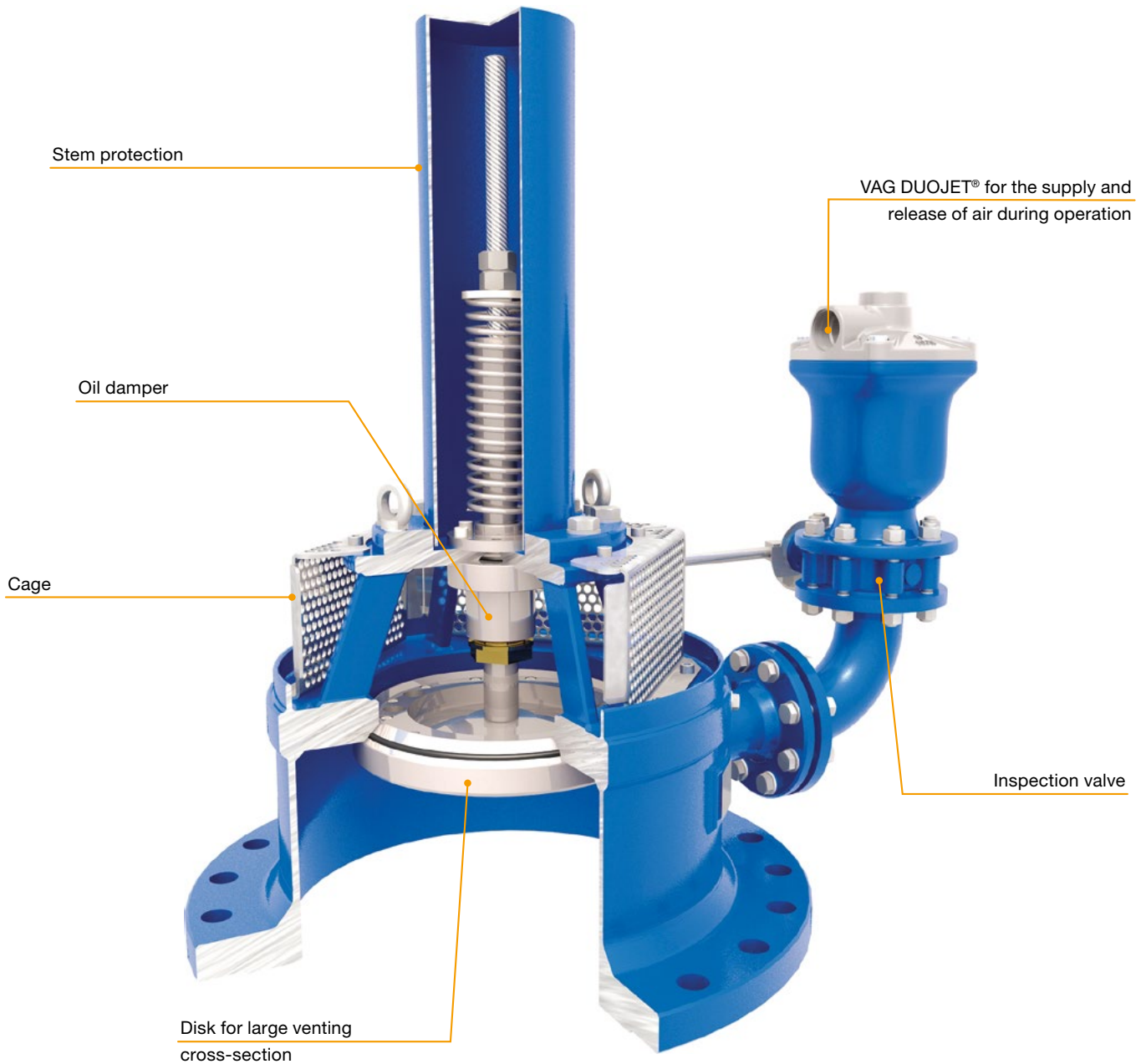


### CAVITATION-FREE DISCHARGE IN ALL CONTROL POSITIONS

Bottom-outlet valve as end-of-line valve for very high discharge rates at a largely linear control characteristic.

# VAG Spring-Loaded Air Valve

DN 300 ... 1000 / PN 10 ... 25



Oil damper to dampen the closing movement, thus reducing pressure surges.



The cage prevents the penetration of foreign matter into the valve.



An outlet at the bonnet of the VAG DUOJET® allows the discharge of residual water.

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## TECHNICAL DETAILS

- **Standard version:** Body and bonnet made of welded steel, inner parts and stem made of stainless steel 1.4301, body of the VAG DUOJET® Automatic Air Valve and the inspection valve made of ductile cast iron EN-GJS-400-15 (GGG-40)
- **Minimum pressure required to seal the air release opening:** 0.3 bar; also available as special version for 0.1 bar.
- Upon request various special materials for the valve body and internal parts as well as diverse coating systems are available.

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## PRODUCT FEATURES

- Automatic air valve with triple function:
  - Large cross-section of the disk to supply large amounts of air for quick shut-down, quick drainage or in the event of a pipe burst
  - Medium-sized venting cross-section to release air during the filling of the pipeline (VAG DUOJET® Automatic Air Valve)
  - Small venting cross-section to release small amounts of air during operation (VAG DUOJET® Automatic Air Valve)
- Very high venting rate for large amounts of air with mounted VAG DUOJET® Automatic Air Valve for venting under operation.

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## GOOD TO KNOW

- With a VAG DUOJET® Automatic Air Valve arranged on the side and an upstream inspection valve (VAG CEREX® 300 Butterfly Valve).
- The spring is enclosed by a stem guard protecting it from mechanical blocking caused by foreign matter and from external influences.

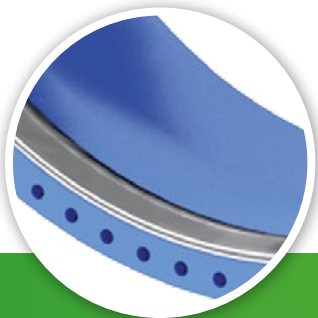
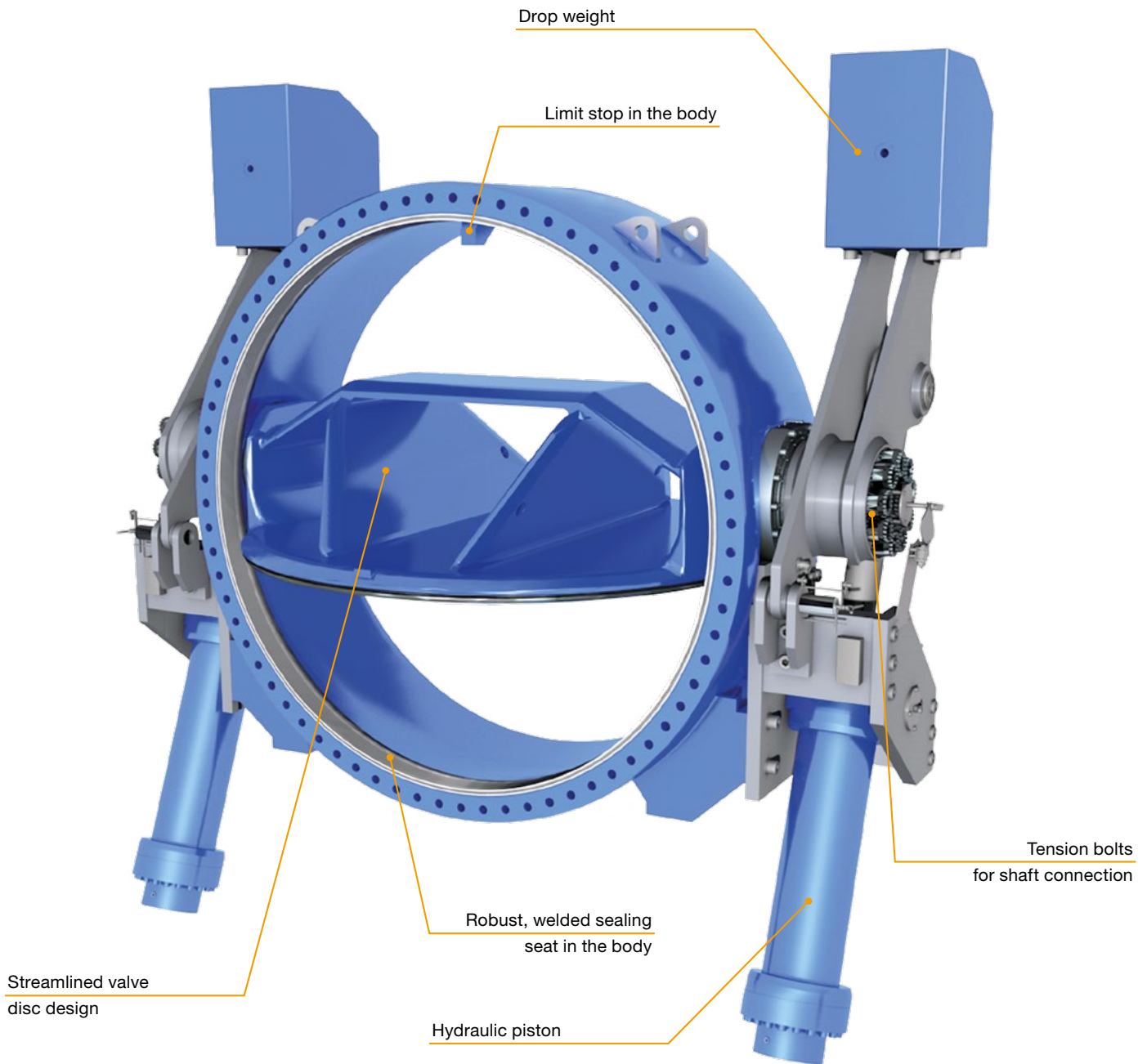


### HIGH PERFORMANCE AND CUSTOM-MADE

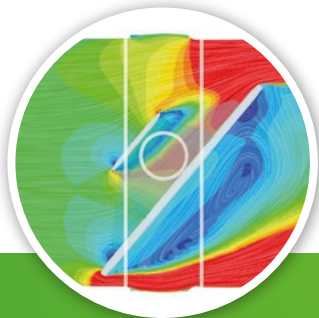
High-precision VAG spring-loaded air valves have a very high venting rate and regulate air volumes in entire systems.

# VAG EKN<sup>®</sup> S Butterfly Valve

DN 800 ... 5000 / PN 6 ... 25



Body featuring high stiffness and an optimised sealing seat, for minimal pressure losses and lowest zeta values.



Low flow resistance at high flow velocities through innovative valve disc, optimised for hydropower applications.



Flow-optimised slim shaft-to-hub connection without stems.

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## TECHNICAL DETAILS

- **Temperature range:** Water +1 to +40 °C
- **Ambient temperature:** -25 to +45 °C (standard)
- **Standard version:** Body and disc made of steel, disc shafts made of 1.4057 or 1.4313 as required, seat ring made of 1.4313 or according to requirement, retaining ring made of stainless steel, profiled disc seal made of NBR or PUR

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## PRODUCT FEATURES

- **Specially developed:** Butterfly valve as special version for hydropower stations and used as pipe-burst safety or turbine shut-off valve, customised according to the application and the station.
- **Perfectly actuated:** Operation with hydraulic emergency closing actuator.
- **Double eccentric:** The double-eccentric position of the valve disc ensures high sealing force with low operating torques. A significant reduction of the shearing forces acting on the profile sealing ring and its complete relief when the valve is in open position increases its service life.
- **Optimised for top performance:** Highly stiff body for extremely low pressure losses ensured by flow-optimised discs and a flow-optimised seat. Developed for very high flow velocities.
- **Premium-quality sealing seat in the body:** wear-resistant, corrosion- and infiltration-proof seat with optimised geometry and high-precision finish.
- **Protected shaft:** Dry shafts completely isolated from the medium by a special shaft seal with dirt and sand scraper. Shaft-to-disc connection without stems. Corrosion-free stem bearing bush.
- **Connection possibilities:** Body with threaded holes or flanges.

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## ADVANTAGES

- Special version as turbine inlet valve for high flow velocities.
- Steel-fabricated version and flow-optimised valve disc.
- Optimised for use in dams / hydropower applications.
- Extremely durable and corrosion-optimised design.
- Internal and external corrosion protection system for hydropower stations according to the plant and customer specifications.

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## GOOD TO KNOW

- Developed for the highest flow velocities.
- Low flow resistance thanks to a specially designed valve disc.
- VAG HYsec Hydraulic Brake and Lift Unit with drop weight and/or special hydraulic cylinder, heated hydraulic equipment for use in low temperatures.

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## TESTS AND CALCULATIONS

- Materials tests for essential pressure-bearing parts according to EN 10204-3.1.
- Final acceptance test according to EN 12266-1+2.
- Calculation notes available by arrangement.
- FEM and CFD calculations available by arrangement.
- Further tests possible by arrangement.

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## VARIETIES

- Pipe burst safety valve with brake-and-lift unit or turbine inlet valve with brake-and-lift unit.
- Self-opening for pump operation in pumped storage hydropower stations.
- With double-acting hydraulic actuator.
- Special stainless-steel versions, various face-to-face lengths and flange connections available upon request.

# Fast, safe, reliable – we protect your system

**ROBUST AND RELIABLE VALVES ARE NEEDED FOR THE START-UP AND SHUT-DOWN OF TURBINES AND PUMPS, AS PLANT COMPONENTS CAN BE DAMAGED OR EVEN DESTROYED BY UNCONTROLLED BACKFLOW OR UNCONTROLLED CLOSING. FOR THIS REASON, CONTROLLED SHUT-DOWN IS IMPERATIVE. DOUBLE OFFSET BUTTERFLY VALVES WITH HYDRAULIC BRAKE-AND-LIFT UNITS ARE USUALLY USED FOR THIS PURPOSE.**

The VAG HYsec Hydraulic Brake and Lift Unit meets all the requirements for safe and reliable operation. Combined with a VAG EKN® Butterfly Valve or a VAG RIKO® Plunger Valve, it serves as a quick-action safety shut-off valve in the turbine inlet, as a pipe-burst safety device with hydromechanic activation or as a quick-opening valve in the turbine bypass.

## **QUICK-ACTION SAFETY SHUT-OFF VALVE**

As quick-action devices, hydraulic brake-and-lift units made by VAG protect e.g. the pump in the event of a blackout by preventing excessive speed that may result from an uncontrolled backflow of water and/or from hydraulic pressure surges during which the pressure increases exceed the design limits and may thus destroy parts of the plant.

## **PIPE-BURST SAFETY DEVICE**

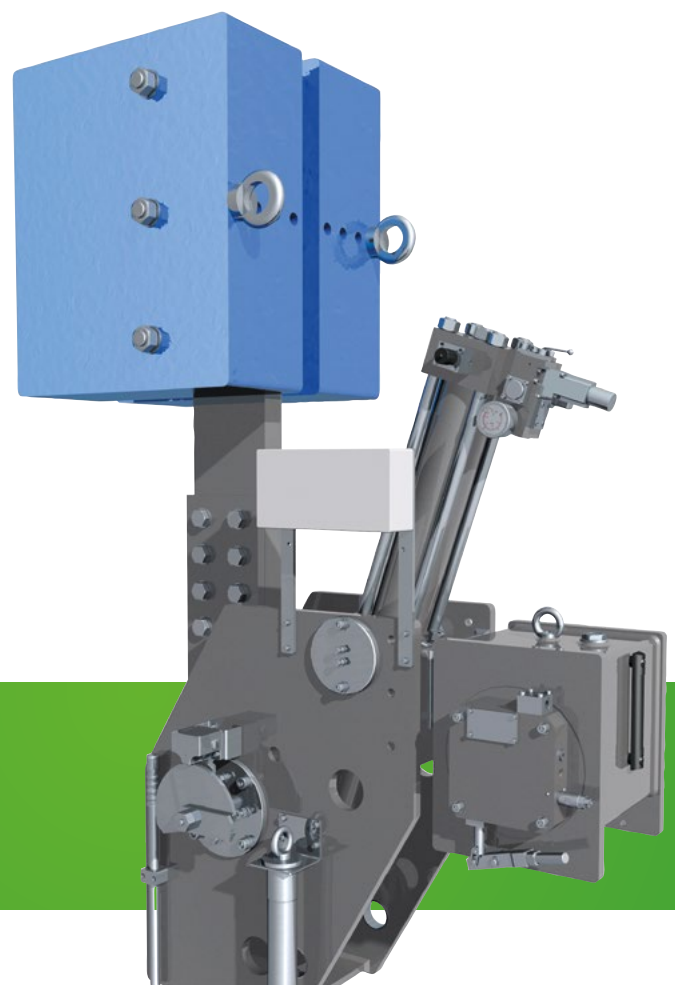
Designed as a pipe-burst safety device, the VAG HYsec brake-and-lift unit combined with a VAG EKN® Butterfly Valve prevents reservoirs from running dry and/or the underwashing of roads and railway lines in the event of a pipe burst.

## **QUICK-OPENING VALVE IN THE TURBINE BYPASS**

Bypass pipelines usually take the flow of water around the turbine and discharge it into the open air. In this way, the energy that was turned into electric power via the turbine and generator is dissipated and/or destroyed. This means that in the event of a turbine failure the bypass must be opened quickly in order to prevent a pressure increase exceeding the design limits in the pipeline system.

VAG HYsec hydraulic brake-and-lift units are suitable for all applications ranging from the smallest waterworks up to the service in dams or power plants. The valve is always opened and closed according to the principles described below:

- **Closing of the valve:** The closing movement is activated either via a solenoid valve in the brake-and-lift unit or hydromechanically, so that the valve is closed by way of the drop weight. The closing time must be neither too short nor too long and always be adapted to the system.
- **Opening of the valve:** The valve is opened by way of the hydraulic cylinder. The hydraulic cylinder has a positive connection with the valve shaft and the drop-weight lever, so that the valve opens hydraulically controlled when the cylinder rises. The oil is supplied either from the hydraulic power unit of the brake-and-lift unit or the turbine.



VAG HYsec Hydraulic  
Brake and Lift Unit

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## TECHNICAL DETAILS

### VAG HYsec Hydraulic Brake and Lift Unit

- The VAG HYsec is available as a compact unit with mounted VAG EKN® Butterfly Valve or mounted VAG RIKO® Plunger Valve in the following varieties:
  - **VAG HYsec F:**  
With external oil supply via an external hydraulic power unit.
  - **VAG HYsec E:**  
With internal oil supply via the integrated power unit as a factory-mounted unit ready for operation. Optionally also available with throttle valve for the adjustment of the closing time.
- The VAG HYsec is available for all applications in the following range of nominal pressures / nominal diameters:
  - **VAG EKN® Butterfly Valves:**  
DN 100 ... 1400 / PN 6 ... 40
  - **VAG RIKO® Plunger Valves:**  
DN 150 ... 1200 / PN 10 ... 40

### VAG HYsec PRO Hydraulic Brake and Lift Unit

- The VAG HYsec PRO version of our hydraulic brake-and-lift unit is available for larger nominal valve diameters or individual customer requirements:
  - **VAG EKN® Butterfly Valves:**  
Nominal diameters of up to DN 5000
  - **VAG RIKO® Plunger Valves:**  
Nominal diameters of up to DN 2500
- Special versions equipped according to the customer's requirements are no problem either with the VAG HYsec PRO. Our PRO series offers all possibilities of customisation:
  - Smaller or larger nominal diameters possible upon request
  - Arrangement of the actuator and drop direction selectable

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## PRODUCT FEATURES

- The drop-weight lever running on double bearings prevents the transmission of drop-weight forces to the valve bearing – on the one hand with angular contact spherical plain bearing and on the other with a bearing ring made of PTFE sliding sheet material
- Easy transport and assembly due to removable drop-weight lever
- Drop weights in modular design for individual adjustment to the operating conditions
- VAG HYsec F with hydraulic cylinder with external oil supply for control pressures of 80 to 200 bar
- Limit switch to indicate the open or closed position and additional safety switch with VAG HYsec E (for keeping the valve open automatically).

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## APPLICATION

- Combined with a VAG EKN® Butterfly Valve or a VAG RIKO® Plunger Valve it serves as a quick-action safety shut-off valve in the turbine inlet, as a pipe-burst safety device (also with hydromechanical activation) or as a quick-opening valve in the turbine bypass.

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## VARIETIES

- A great variety of versions:
  - As quick-opening device
  - With control cabinet for on-site control
  - With oil-temperature switch
  - With oil-level switch
  - External activation (pipe-burst safety device / float-operated switch)
  - Further accessories and versions available upon request



# The Valve Experts

## Die Armaturen-Experten