

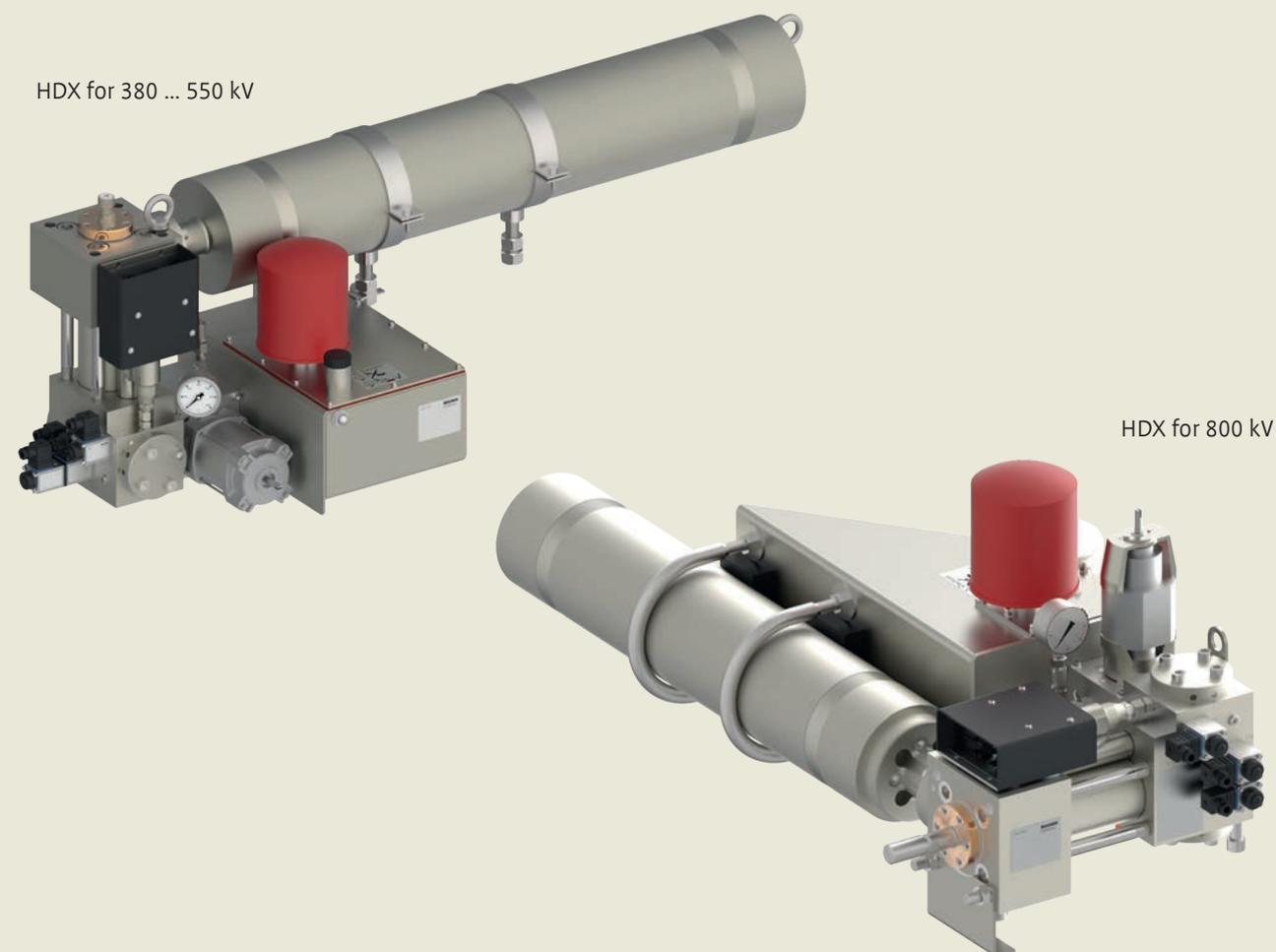


Hydraulic Drives and Valves for

HVSG – High Voltage Switch Gear

Solutions for reliable high voltage circuit breakers

Hydraulic Drives



Technical data

Hydraulic drive systems are used as “plug-and-run” mechanisms to actuate high voltage circuit breakers. Each drive system is designed, manufactured and tested according to customer requirements.

Stored energy open	up to 16 kJ
Operating sequence	up to O-CO-CO-120 s- O-CO-CO
Stroke cylinder	depending on requirement
Speed cylinder	up to 14 m/s
Force cylinder	up to 370 kN

These are values for orientation, the specifications as agreed in the individual sales contract are relevant only.

The crucial core of each hydraulic drive, tailored to customer requirements

Hydraulic Valves

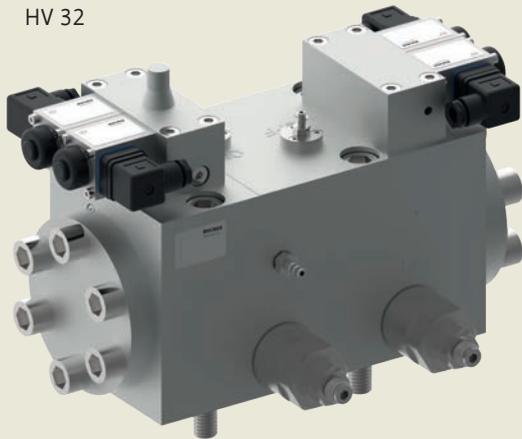
HV 12



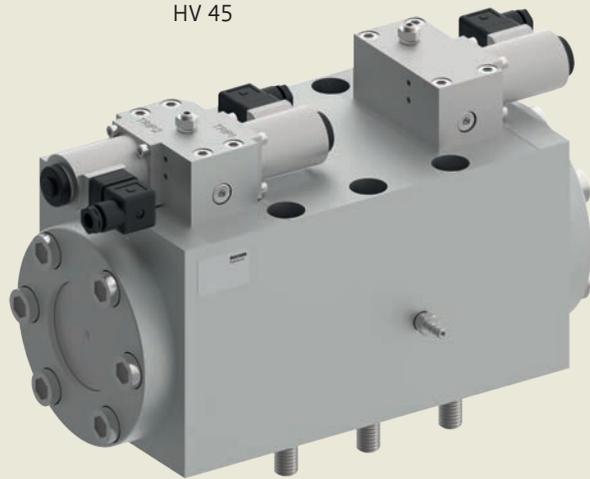
HV 22



HV 32



HV 45



Technical data

Control modules are electro-hydraulic valves used to control the oil flow in hydraulic drive systems for actuating high-voltage circuit breakers. Therefore, a control module is the crucial core of each hydraulic drive system or mechanism. Control modules consist of 3-way / 2-position directional valves with detent function in both positions, typically two OFF-solenoids, one ON-solenoid and the corresponding pilot valves. Depending on the requirements the control modules may contain as well: throttle valves, amplifier valves and adjustments for the response time ON and OFF.

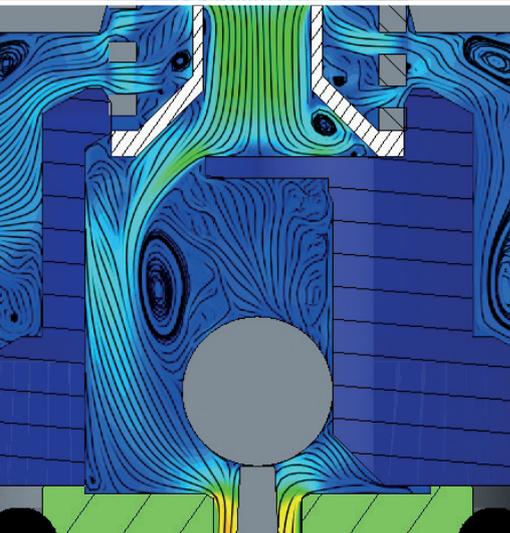
	HV 12	HV 22	HV 32	HV 45
Nominal flow	180 l/min	800 l/min	1500 l/min	2600 l/min
Working pressure	300 ... 600 bar			
Reaction time	down to 6 ms, repeat accuracy down to ± 0.1 ms			
Temperature range	-40° C ... +70° C			

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Bucher Hydraulics has aligned its processes to meet customer expectations

Added Value in Every Step

- **Engineering** Depending on the requested specifications devices are designed to ensure not only high Swiss quality but also a competitive cost/performance ratio. Bucher Hydraulics uses sophisticated calculation programs which are specially developed for the design of hydraulic drives. By using the latest 3D-CAD and simulation software, we assure high efficiency and best reliability of our products.
- **Manufacturing** Our production is highly automated and enables us to produce best quality and high precision at competitive costs.
- **Quality assurance** Features relevant to function are measured in-house with first class measuring equipment, to ensure all manufactured and incoming parts as well as sub-assemblies comply with specification.
- **Assembly** Whole assembly process is done in-house including 100 % functional test of control modules and systems.
- **Testing** Prior to delivery, every single product gets tested thoroughly by our state-of-the-art test equipment, which is our in-house design to ensure Bucher Hydraulics products are reliable, precise and long lasting.
- **After sales support** We ensure the supply of spare parts over decades and thus protect our customers' investments.



Bucher Hydraulics – always a good address

Success Factors

As the only independent supplier, we offer a wide range of customized hydraulic solutions for high-voltage circuit breaker applications up to 1'100 kV.

Bucher Hydraulics solutions are based on well proven technology, which has been in operation in high-voltage circuit breakers for 40 years all over the world.

The wide range of valves and cylinders in our portfolio allows us to customize solutions, tailored to your needs. Lean processes and procedures result in a long lifetime and best cost/performance ratio.

Development and manufacturing are focused on usability and performance in order to fulfil customer requirements. The design of complete systems is focused to improve on the overall application performance.

Compact design of our hydraulic control modules and hydraulic drive systems ensures reliable and space saving solutions. Our highly integrated design with internal oil channels allows eliminating leak-prone pipe-work.

All HVSG products are made in Switzerland and fulfil high quality standards.

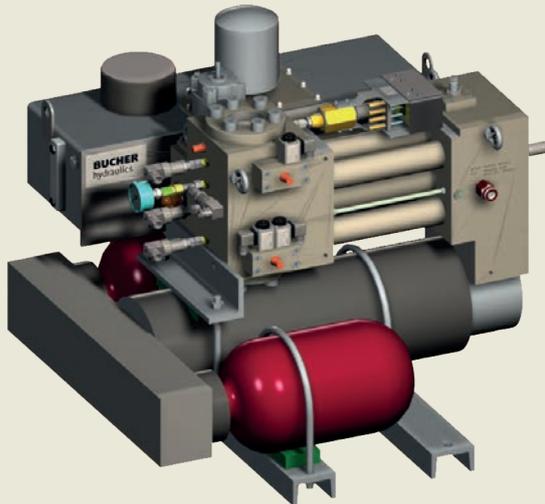
Each valve is tested on sophisticated final hydraulic testing benches before delivery. Units are retraceable thanks individual series number.

Your success is our goal!

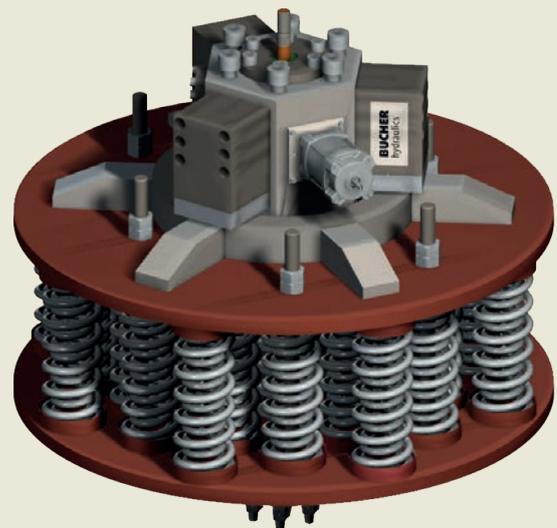


The future has already started

Further Technology Developments



Compact high power drive



Hybrid drive

Bucher Hydraulics continues to develop the HVSG portfolio to improve customer value and meet new requirements

- Alternative energy storage as a supplement to the hydraulic N2 piston accumulator
- Operating pressure up to 600 bar enables more compact design
- Smart technology to reduce accumulator size
- High functional integration leads to more cost-effective and more compact drives
- New pressure switch for up to 600 bar expands our application range

CIGRE studies prove high quality level of modern hydraulic mechanisms

Hydraulic Drives: Reliable and Long Lasting

Old hydraulic control modules and drive systems had external leak-prone piping. Bucher Hydraulic consequently avoids this weak spots with a compact design, allowing to eliminate external piping completely.

CIGRE ¹ shows, that hydraulic mechanisms of latest generation beat spring operating mechanisms in terms of reliability (major failure frequency).

CIGRE ² investigated ageing phenomenas and found for spring operating mechanism following effects:
Wear, fatigue, relaxation, loosening and corrosion of springs. Further loss of lubrication caused by grease degradation.

What makes latest hydraulic mechanisms from Bucher Hydraulics so reliable and almost maintenance free?

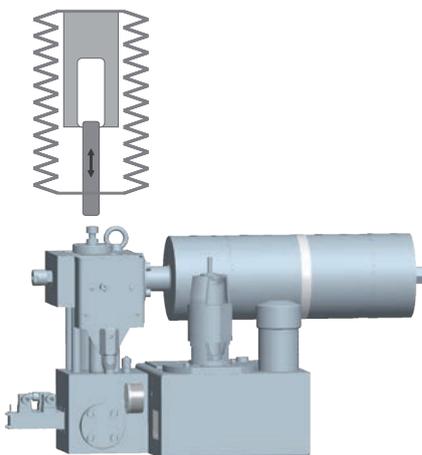
Hydraulic mechanisms consist of a very few moving parts only and most of them are self-lubricated. Energy transmission is achieved by a virtually wear-free hydraulic cylinder in which also the wear-free damping is integrated. The mechanism's damping is customized to the circuit breaker what leads to a smooth operation and may even reduce wear on moving parts of circuit breaker.

Hydraulic drives provide high timing consistency over total lifetime.
They reach a life-time of more than 10'000 CO cycles.

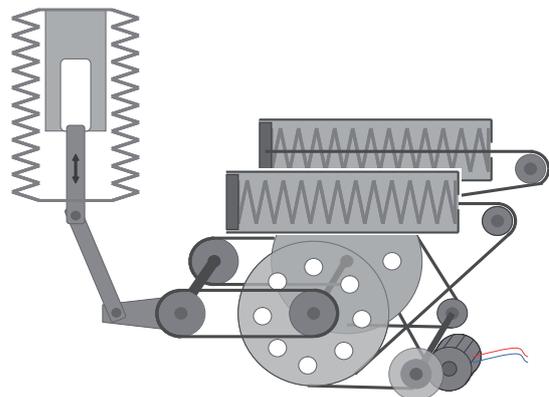
¹ CIGRE WG A3.06, final report of the 2004-2007 international enquiry on reliability of high voltage equipment, part 2 – "Reliability of SF6 high voltage circuit breakers", october 2012.

² CIGRE WG A3.29, technical brochure 725, "Ageing high voltage substation equipment and possible mitigation techniques" may 2018

Hydraulic mechanism



Spring mechanism





Smart Solutions. Superior Support.

For further information please do not hesitate to contact us.

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