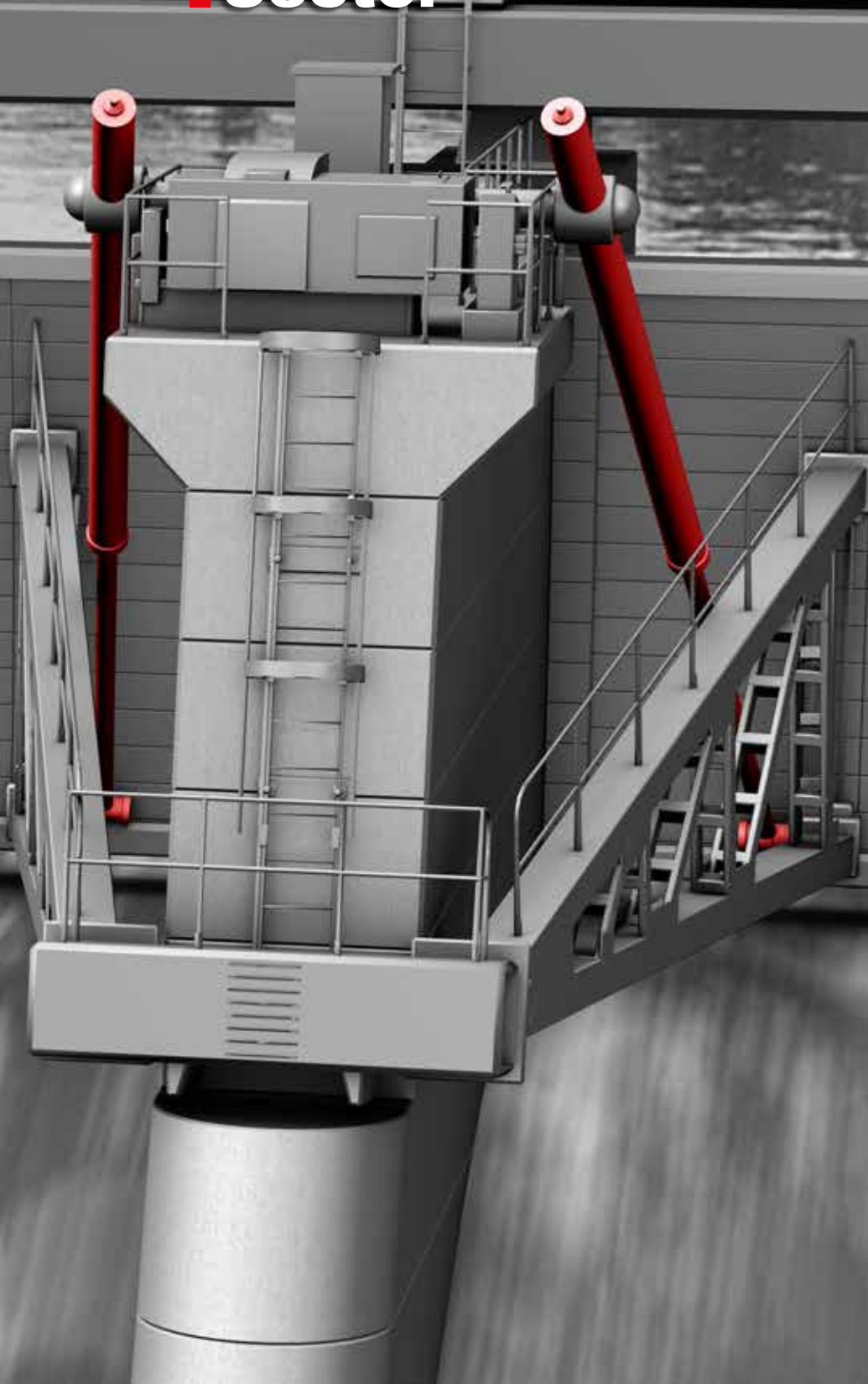


Hydraulic Cylinders in the Hydro Energy Sector





HYDROSAAR Head Office

HYDROPOWER USA

HYCOM Netherlands

KRAEFT Systemtechnik

HYDAC India

HYDAC China

HYDAC Switzerland

HYDAC Norway



Your Partner for Hydraulic Cylinders in the Hydro Energy Sector

With over 7,500 employees worldwide, HYDAC is one of the leading suppliers of fluid technology, hydraulics, process technology and electronic equipment.

Our wide range of products, combined with our expertise in development, manufacturing, sales and service, caters to the wide ranging requirements of hydro-electric power stations worldwide. The quality and environment certification to ISO 9001/2000 and ISO 14001 denotes the first class quality and responsible management of our resources.

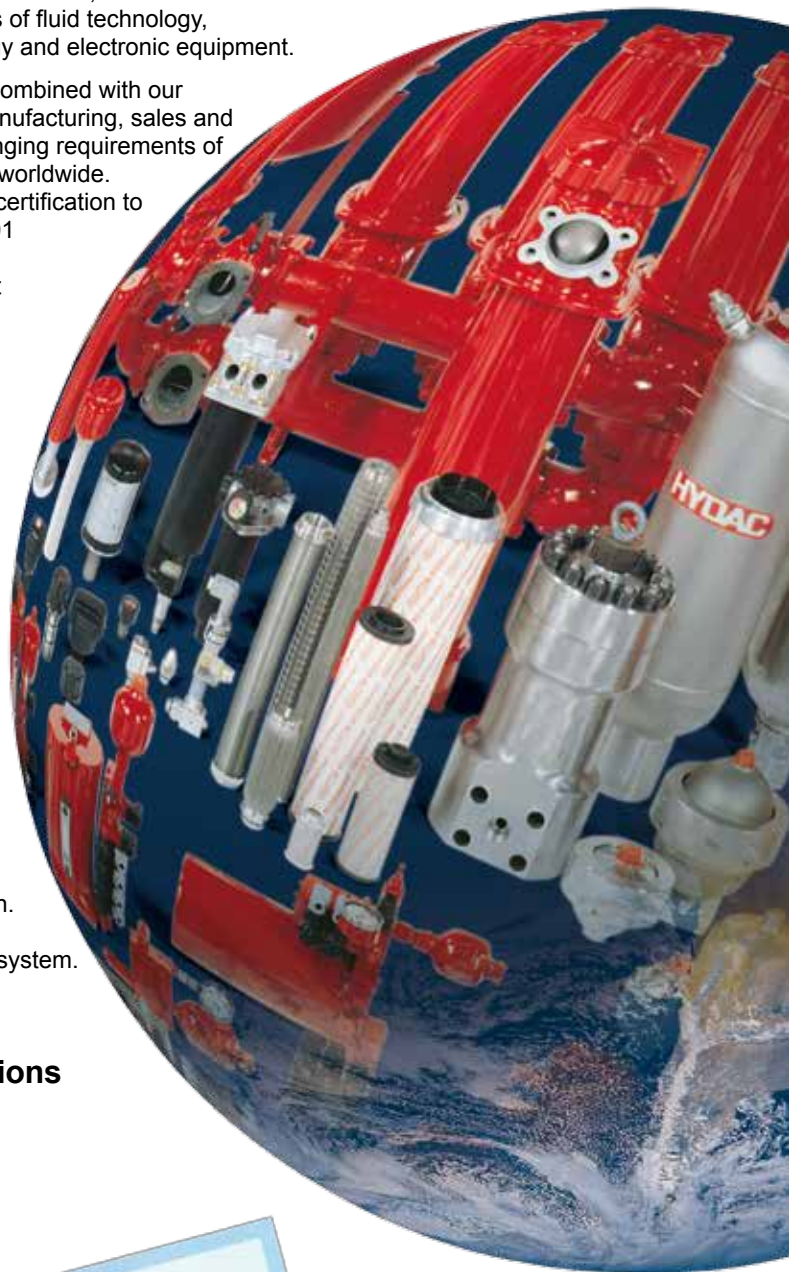
Global and yet local.

With 48 overseas companies, and more than 500 sales and service partners, HYDAC is your reliable partner worldwide.

System solutions. One supplier. One contact.

Wherever you need us, we are there to help you find the most effective solution. For every application – from component to complete system.

Worldwide specifications and approvals.



Hydraulic Cylinders in the Hydro Energy Sector.

Hydropower plants today make a vital contribution to the world's sustainable energy supply. HYDAC/HYDROSAAR makes a vital contribution to ensuring that the hydro power is utilized in the best possible way.

In opening and closing flood gates and intake gates, in controlling and protecting hydro turbines and generators efficiently, Hydac/Hydrosaar demonstrates its expertise using hydraulics, hydraulic cylinders and servo motor solutions in all industries worldwide.

Drawing on our knowledge base, we develop the most appropriate hydraulic cylinder solution for your application. For example, innovative distance measurement can be installed or special surface coatings supplied for the cylinder piston rods. Our expertise in cylinder engineering, including calculations of the structural durability according to international regulations and FE simulations, are fundamental to our design standard.

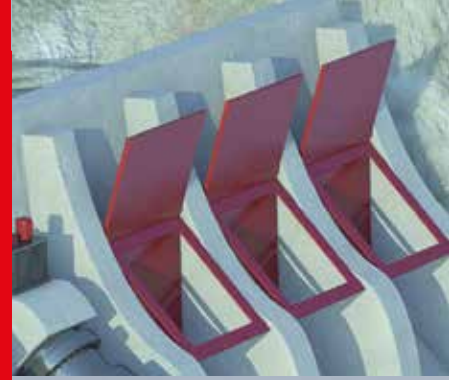
HYDAC/HYDROSAAR hydraulic cylinders and servo motors used in modern hydraulic systems in drive technology guarantee a high level of operational safety and power density. The compact construction of the cylinders combined with the ability to control and monitor their performance mean they are ideally suited for use in hydropower stations.

We offer:

Global presence and service covering all aspects of power plant hydraulics, project-specific design and the development of customized hydraulic systems using hydraulic cylinder solutions in compliance with worldwide standards and regulations relating to power plants:

(Pressure Equipment Directive 97/23/EC, Machinery Directive 2006/42/EC, Hydraulic Steel Structures standard DIN 19704, General Hydraulic Systems DIN 24346).

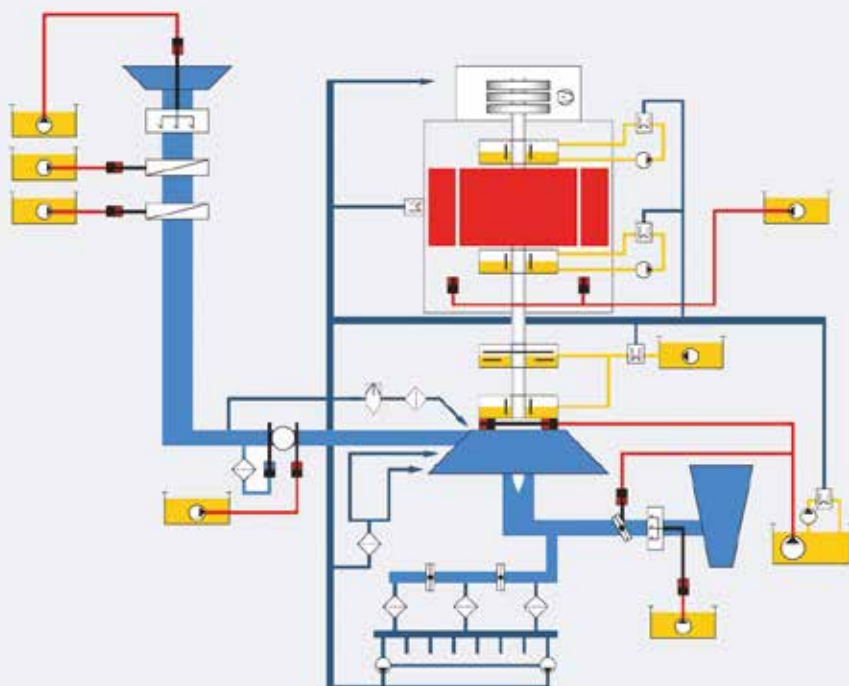
- Costs are optimized through the use of customised system solutions
- **Extensive product range for the conditioning and condition monitoring of hydraulic cylinders and operating media (water, hydraulic fluids and lubricants)**
- **Full service of hydraulic components and systems for:**
 - Hydraulic steel structures / hydromechanical: hydraulic cylinders, valve manifolds, pipework, hydraulic power packs
 - Hydro turbines: cylinders for the wicket gate (stay vanes) and runner blade adjustment, injector control, etc.
 - Hydro generator: Brake and lift cylinder
 - Secondary functions in the power station/Balance of Plant (BoP): throttle valve cylinder, trash rack cleaning cylinder, etc.



1

Steel hydraulic structures cylinder at the intake

- Intake gate
- Segment gate
- Trash rack cleaners
- Bottom outlet
- Overflow sluice gate
- Water control sluice gate

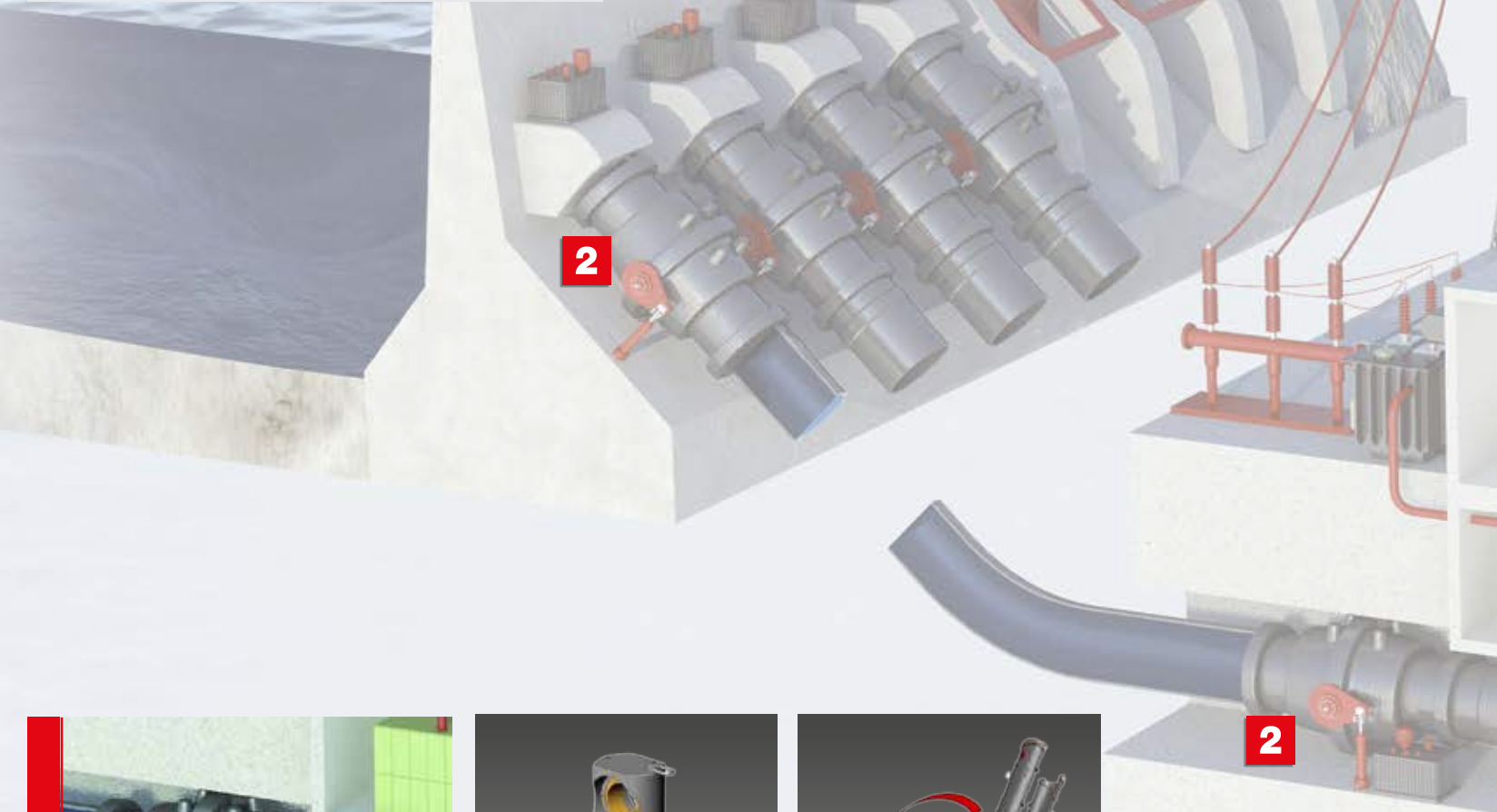


Key:

- Water
- Control oil
- Bearing oil
- Control oil tank
- Bearing oil tank
- Support / Thrust bearing
- Thrust bearing
- Support bearing
- Trash rack
- Filter
- Cooler
- Hydraulic servo
- Hydraulic servo (water)
- Fan
- Hydro cyclone
- Suction pipe / Butterfly valve



Cylinder for water control sluice gate



2 Shut-off valve

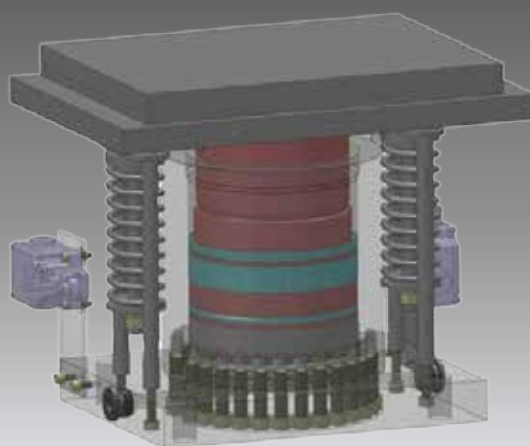
Cylinder for opening and closing the shut-off valves (spherical valve, throttle valve, butterfly valve)



Cylinder with mechanical lock

3 Generator

- Brake cylinder for lifting and braking the generator



Standard brake cylinder
ø 125, 160, 200, 250, 300 mm

4 Turbine s

- Wicket gate
- Needle adjust
- Stay vane ad
- Pressure con
- Runner blade

5

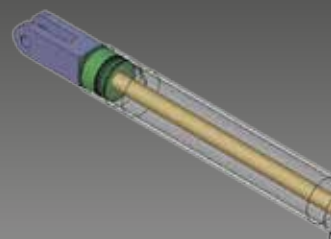
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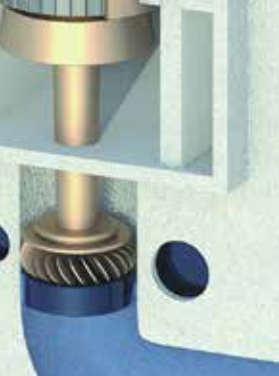
4

5

Steel hydraulic structures cylinder at the outlet

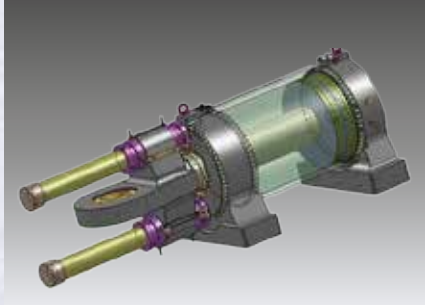
- Main outlet gate
- Slide gate
- Tilting gate
- Sluice lock gate



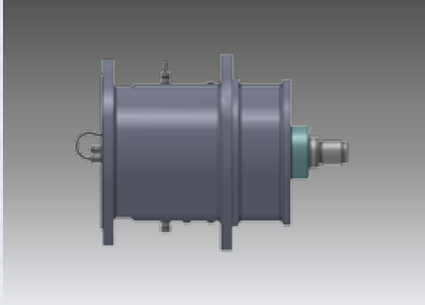


Servo motor

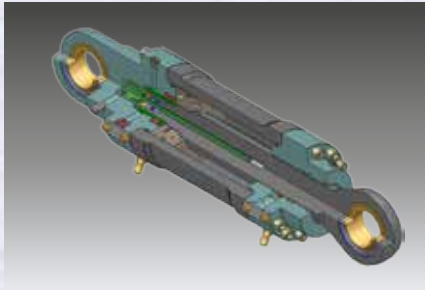
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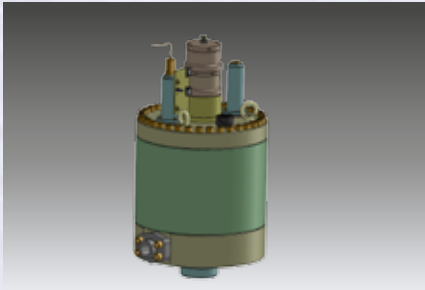
Servo motor guide ring adjustment



Servo motor needle adjustment



Servo motor - stay vane adjustment



Servo motor - pressure control

Model code

HC - T - XXX/XXX - XXXX - 0 - XXX - V

HYDAC cylinder

- T = Turbine
- G = Generator
- HM = Hydromechanical
- MIV = Main inlet valve

Piston diameter/rod diameter

XXX/XXX = mm

Stroke

XXXX = mm

End position damping

- 0 = without damping system
- 1 = with damping system
- 2 = piston side
- 3 = rod side

Operational pressure

XXX = bar

Additional components

- V = locking system
- W = stroke measuring system
- A = others



General Overhaul and Service - Worldwide.

Service and general overhaul of cylinders

Repair and general overhaul of cylinders of any make and type



Dismantling rig



Cylinders before repair



Following the overhaul

We carry out extensive repair work to cylinders, resulting in longer service life. If required, linear measurement systems or valve manifolds are installed.

All repaired cylinders undergo a thorough quality inspection and thus satisfy the highest quality requirements.

Various surface treatments

- Electro-plating
- Flame spraying
- Cladding
- High speed flame spraying
- Welding





Global Presence. Local Expertise. www.hydac.com



- HYDAC Head Office
- HYDAC Companies
- HYDAC Sales and Service Partners

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