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NOTE
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
It is not only Germany’s switch to renewable energy that is presenting new challenges for the operators of power plants. Increasing competition, cost pressure and not least the changes in power plant operation demand high levels of flexibility in the planning of maintenance, service and modernisation processes.

HYDAC would like to support you with a cost-optimised and individual assessment of all necessary processes in power generation, periodic maintenance and modernisation.

Our extensive product range, which includes customer-specific components and system solutions, can help to ensure efficient and reliable plant operation in the long term.

**Energy efficiency**

- HYDAC energy check: we can perform an analysis of the thermal and energy load of plants and hydraulic systems used, with a view to reducing this load
- To modernise your plants, HYDAC can overhaul your hydraulic systems and fluid-power function groups by retrofitting them with energy-optimised components and systems
- Modernisation and renovation of hydraulic function groups, systems and plants in the main power plant areas, such as the turbine and the generator

**Process and plant reliability**

- Efficient implementation of statutory safety regulations and health and safety at work in the operation of your plants
- Analysis and optimisation of plants and systems with regard to “functional safety”
- Analysis and modernisation of plants by using functionally safe, SIL-compliant components, subsystems and hydraulic plants (up to SIL 3)

**Conservation of resources**

- Reducing contamination of operating fluids in the plants and increase of service life e.g. (hydraulic fluids, lubricants, process water, gases etc.)
- Application-optimised filtration/conditioning and preparation of operating fluids in and main flow and bypass flow
- Use of oil-conditioning and oil-regenerating service units (even during operation) to prevent and reduce varnish in the hydraulic and lubrication oils
- Cost-optimised conditioning of process media as part of plant maintenance (process water, sealing oils, fuel gases, fuel oils, coolants, etc.)
- Reduction of fluid quantities, and thus active conservation of resources, by using OXiStop fluid engineering products
- Cost reduction thanks to extended fluid service life

**Plant availability**

Optimisation of plant availability thanks to:

- Online monitoring of the main influential parameters of the operating fluids in your plant, resulting in faster response times for corrective action
- Targeted optimisation of the components and function groups used in hydraulic and lubrication circuits
- Servicing and maintenance strategies adjusted to suit the operator’s usage profiles, along with specially optimised “tools”
- Worldwide service for our own systems and components and individual spare parts management
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Fluid engineering for power plant operators and energy suppliers

HYDAC is one of the leading suppliers for fluid power, hydraulics and electronics. With its extensive product range and its expertise in development, production, sales and service, HYDAC is a valued partner for all its customers in the power plant sector, with a global presence.

Our quality and environment certification to ISO 9001/2000 and ISO 14001 denote first class quality and responsible management of our resources.

HYDAC is a long-standing system provider for leading power plant equipment suppliers Application expertise in the provision of power plant equipment

Examples of key figures used in the assessment and decision-making to modernise your plants and increase efficiency

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In thermal power plants
The use of HYDAC hydraulic, lubrication and cooling systems with HYDAC optimised components is widespread in thermal power plants.

- Fuel supply and residue disposal
  - Hydraulic systems for unloading, settling and feed plants
  - Fuel conditioning
- Heat generation
  - Bunker, allocator, pulverizing plants
  - Hydraulic systems for fans and flues of the main burner, burn-out grates
  - Water filtration used in NOₓ conditioning in flue gas extraction
  - Filtration to steam, water and gas circuits

- Main Machine Set (Turbine, generator)
  - Steam and gas turbine control
  - Generator lubrication, gearbox lubrication, gearbox cooling
  - Cooling systems (water and gas)
  - Feed water systems, feed water filtration systems

- Balance of Plant, “BoP”
  - Retrofitting cooling systems, fire protection devices (water filtration)
  - Dewatering units and fluid-handling devices for on-site service

In hydroelectric power plants
In all types of hydroelectric power plants and in hydraulic steel structures, hydraulic, lubrication and cooling systems are equipped with HYDAC optimised components as original equipment and retrofits.

- Hydro mechanical/main inlet valves
  - Hydraulic systems and hydraulic drives for doors, valves and flaps

- Main Machine Set
  - Hydraulic systems and lubrication and cooling plants for turbines and generators
  - Seal water filtration and water-lubricated bearing systems

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Energy efficiency

Generating power often involves a lot of energy being wasted unnecessarily. When fluid power components are used or set incorrectly or worn, they have greater energy consumption or work beyond the ideal operating point. This causes them to produce excessive heat and extra measures must be taken to cool them down.

The HYDAC energy check can help you to identify weak spots in your processes and restore maximum energy efficiency in your plants.

HYDAC products for energy efficiency in the power plant

1. Service package: energy check
   - As-is assessment
   - Rectification of energy defects
   - Modernisation with energy-saving systems and components
   - Optimisation

2. Cost-optimised drive strategies
   - Stand-alone electro-hydraulic actuators for turbine control:
     The basis for the stand-alone drive strategy EHC-AA is the use of hydraulic accumulators to replace mechanical springs. The "spring characteristics" can thus be adapted to suit the particular process requirements.
   - Electro-mechanical axle:
     Electro-cylinder KineSys HEZ

3. KineSys variable-speed hydraulic power units (Kinematic Systems)
   - In the individual project planning of drive solutions, such as those used in hydropower, energy-efficient hydraulic power units are based on KineSys drive components
   - Modern simulation and system engineering tools assist with the dimensioning

4. Automatic back-flushing filter
   - AutoFilt® and inline filters
   - Conditioning of process water for turbine/generator cooling
   - Seal water filtration to increase the service life of turbine slide ring seals
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Process reliability

With the introduction of the Industrial Safety Regulations BetrSichV, the employer/operator must fulfill certain duties concerning the provision of work equipment and its use at work, safety when operating installations subject to monitoring and the organisation of industrial safety and health at work.

As a manufacturer of products governed by the Pressure Equipment Directive, HYDAC offers support in implementing the BetrSichV for hydraulic, lubrication and EX plants that require monitoring. We can compile safety strategies and perform corresponding risk assessments with safety evaluation. To ensure that hydraulic accumulators are used safely in the power plant, HYDAC can also train workers as “competent persons” in accordance with German technical rules TRBS 1203 for pressure vessels.

In connection with HYDAC fluid engineering, we can provide maintenance strategies, perform periodic leaktightness tests on pressure vessels if desired and also perform any required pressure vessel modernisation work.

We can also offer additional services to modernise your plants, such as retrofitting functionally safe components and systems (e.g. hydraulic safety blocks and drives up to Class SIL 3).

Filtration strategies for safe operation

- Filter elements: Optimicron® Power, Stat-Free® and Stat-X®: Specially developed for use in modern, low-conductivity oils and fire resistant fluids (FRF)
- Change-over inline filters RFLD/AFLD:
  - Lubricant filters
  - Fuel-oil filters
  - Also available in stainless steel acc. API614
- Oil mist separators "STENO": Units for separating oil mist with liquid-gas coalescer technology, modular made and standardized

Fluid conditioning systems:

- FluidAqua Mobil FAM, TransformerCare Unit TCU and VarnishMitigation Unit VMU

For dehydrating, degassing and removal of oil ageing products

- By using FAM dewatering and filtration units continuously during plant operation, integrated conditioning of the lubrication media is assured.
- TCU used to continuously degas, dehydrate and filter the insulation oil
- The service-friendly VMUs/VEUs are used to effectively remove oil ageing products (varnish) from mineral oils.

Electro-hydraulic drive systems EHC-A with mounted SIL-compliant hydraulic control block EHC-S

Refurbishment and modernisation of turbine control units
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Conservation of resources

The service life of the goods, materials and fluids used in the entire power generation process can only be guaranteed in the long term if they are considered as a whole, across the entire operating life. It goes without saying that this can also help to increase environmental protection while reducing the operating costs.

As a specialist in fluid engineering, HYDAC can provide continuous online monitoring of your operating fluids (lubricants, hydraulic fluids) and, as required, process-controlled conditioning of these operating media with application-optimised cooling, filtration and fluid regeneration.

Reconditioning of hydraulic and lubrication fluids
- FluidAqua Mobil (FAM) used in a steam/gas turbine’s control hydraulic circuit in a power plant
- For hydraulic oil and lubricant (bearing, gear boxes) conditioning (dehydration and filtration)

Modernisation
- Retrofitted fine-filtration systems (OLF) ensure the desired cleanliness class of hydraulic and lubrication fluids is reached and extend maintenance intervals
- "Smart filtration" upgrades with integrated particle sensors (optional)

Renovation
- Combining the process water circuits (cooling water, seal water, extinguishing water) in modernisation tasks in the power plant
- Ensuring the cleanliness class is reached via process water filter systems in skid design

Cost optimisation
- Plate heat exchangers used in generator lubrication systems, turbine control hydraulics etc. also for retrofitting as cooler-filter skids
- Plate heat exchangers with protective filtration (coolant) to ensure consistent cooling capacity

Conservation of resources

Dewatering unit FluidAqua Mobil FAM
Undesirably high levels of process steam and process water enter the oil circuit, particularly in the lubrication oil systems of steam and water turbines.
This results in a rapid acceleration in fluid ageing and limited lubricity.
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OffLine Filter OLF
The OLF 15/30/45/60 series of filtration units are robust off-line filters for industrial applications in hydraulic and lubrication systems with a large fluid volume.
The Dimicron elements used in these filters are noted for their particularly high contamination retention capacity and an environmentally safe method of disposal (incinerable).

Varnish Mitigating Unit VMU / Varnish Elimination Unit VEU and Ion eXchange Unit IXU
The VMUs/VEUs are used to condition mineral oils. They are particularly effective at removing oil ageing products (varnish) from mineral oils. The removal of varnish is based on adsorption on an active surface.
The IXU series of ion exchange units is designed to condition fire-resistant hydraulic and lubrication fluids based on phosphate esters (HFD-R) and polyol esters (HFD-U).
They are effective in removing the acidic products of degradation resulting from hydrolysis and/or oxidation of the fluid as well as metal soaps present in the fluid.

Cooling systems
Influence of temperature on fluid service life (a temperature increase of 10 °C, starting from 50 °C, reduces the oil service life by one half)
In particular for generators, electrical inverters and converters the oil/air cooling systems offer a cost-efficient performance ratio
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For example, the longer service life for lubricants and hydraulic fluids in the power plant can often bring about cost savings of 30% and reduce the carbon footprint (producing just one litre of turbine oil creates roughly 700 grams CO₂).

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With our Predictive Maintenance Program, we can significantly help to keep your plants running smoothly. High plant availability, with all costs taken into account, is vital for cost-effective and safe operation. For more than 20 years, this topic has been a major priority for HYDAC and has inspired an entire range of products aimed at realising this goal. On the basis of as-is analyses performed during operation, taking your production process into account, we can find the perfect improvements for your plant. Additionally, you can use the recorded data to identify the condition of your plant and detect the level of wear or pending downtime, making it possible to perform condition-based servicing/maintenance in due time.

HYDAC products for plant availability in power plants

**Fluid sensors (Oil monitoring)**
- CS series for recording cleanliness classes to ISO 4406 in sensitive hydraulic and lubrication circuits
- AS AquaSensors for recording relative saturation level in % of water in the oil and the temperature in sensitive hydraulic and lubrication circuits
- LAB sensors for recording the oil state (temperature, water, oil ageing)

**Fluid monitoring systems**
- Stand-alone data logger with display
- Interfaces and software to incorporate the sensors into the control room

**Non-fluid sensors**
- Pressure sensors, electronic pressure switches
- Flow measuring turbines
- Distance measuring systems for electro-hydraulic drives and hydraulic cylinders e.g. servo motors

**Fluid conditioning systems**
- For separating: particles, water, varnish, acids and gases from hydraulic and lubrication circuits (e.g. gas turbine lubrication systems)

**Gas and water filter systems**
- Water filters: to protect cooler and nozzle, for the treatment of flue gas (NOx) and ash
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- **Monitoring of water ingress**
  - Installation of AquaSensors (AS) in water-sensitive lubrication and hydraulic systems (steam turbine control) in turbine bearings, generator lubricating systems and gears
  - Online data logging of the water content in lubricant or hydraulic fluid

- **Filtration strategies**
  - Redundant, switchable RFLD/AFLD filters in lubrication applications for turbine bearing oil supply and, as applicable, for the gears
  - Modernisation of hydraulic and lubrication systems – refine filters with single gaps replaced by redundant, switchable double filters

Monitoring the contamination level
- Installing ContaminationSensors (CS), ContaminationSensor Modules (CSM) in contamination-sensitive lubrication plants (turbine bearing lubrication, turbo transmission lubrication)
- Online data logging of lubricant contamination level

Monitoring of water ingress
- Installation of AquaSensors (AS) in water-sensitive lubrication and hydraulic systems (steam turbine control) in turbine bearings, generator lubricating systems and gears
- Online data logging of the water content in lubricant or hydraulic fluid

Fluid conditioning strategies
- The common formation of varnish (oil ageing deposits) in the oil of gas turbines and the resulting function problems for valves, oil filters and measurement equipment can be rectified with fluid conditioning units such as VEUs/VMUs
HYDAC services packages for power plant operators

The HYDAC Servicenter, together with its service partners, offers a complete portfolio of services. With more than 50 years of practical experience in hydraulic, lubrication and control applications in the power plant, we can offer targeted advice for pending service work. Furthermore, we can guarantee that you will be given the best service package for your application. Wherever you are, a fleet of service vehicles and a skilled service team is nearby and available at short notice for repairs, maintenance work and inspections.

HYDAC packages for service in power plants

- **Service package: modernisation service**
  - Overhaul of your fluid-power systems (upgrades)
  - Support for the commissioning of hydraulic and lubrication systems and provision of the required rinsing units, dewatering units and measurement equipment
  - Individual assessment of the applications with the aim of reducing costs and increasing plant availability
  - Spare parts management

- **Service package: energy check**
  - As-is assessment
  - Rectification of energy defects
  - Modernisation with energy-saving components and systems

- **Service package: inspection service**
  - Hydraulic accumulator service, accumulator inspections
  - Support for servicing/maintenance schedules for your plants
  - Safety strategy training - Risk assessment
  - Periodic tests for hydraulic accumulators
  - Inspection of safety devices

Worldwide service directly on location
- Commissioning of fluid power systems
- Spare parts service
- Servicing, maintenance and repair of fluid power systems
- System optimisation

Hydraulic accumulator service
- Repair of accumulator bladders
- Inspection/retrofitting of gas safety valves
- Inspection/retrofitting of oil valves
- Safety inspection before commissioning
- Risk assessment/specification of inspection intervals

Training
- Individual training modules for power plant operators and maintenance staff

Partnerships and contracts
- Framework agreements concerning the maintenance and repair of fluid-power systems
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Fluid Engineering for Power Plants

Energy efficiency
Conservation of resources
System availability
Process reliability

NOTE
The information in this brochure relates to the operating conditions and applications described.
For applications and operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.