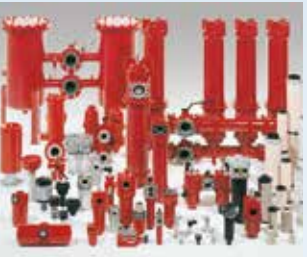




Accumulator Technology 30.000



Filter Technology 70.000



Process Technology 77.000



Filter Systems 79.000



Compact Hydraulics 53.000



Accessories 61.000

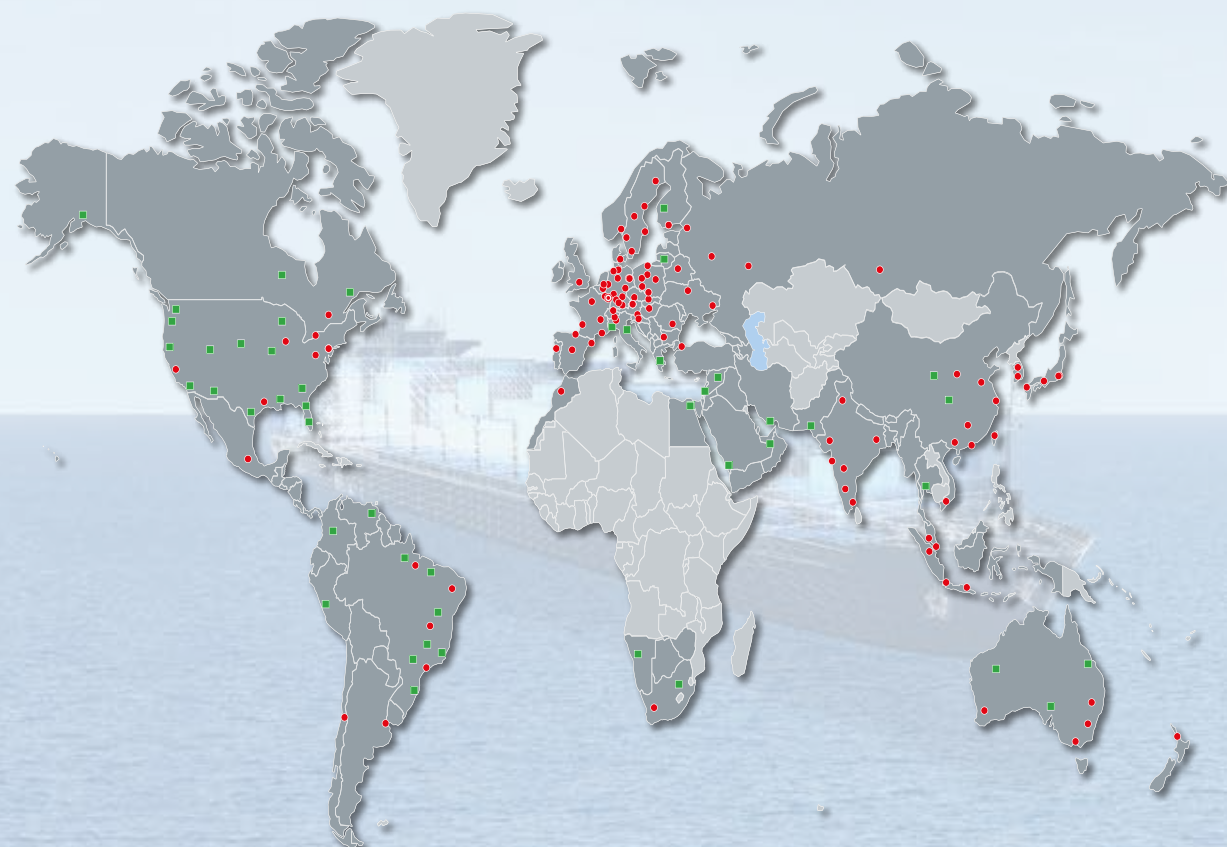


Electronics 180.000



Cooling Systems 57.000

**Global Presence.
Local Expertise.
www.hydac.com**



- HYDAC Headquarters
- HYDAC Companies
- HYDAC Sales and Service Partners

HYDAC INTERNATIONAL

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Internet: www.hydac.com

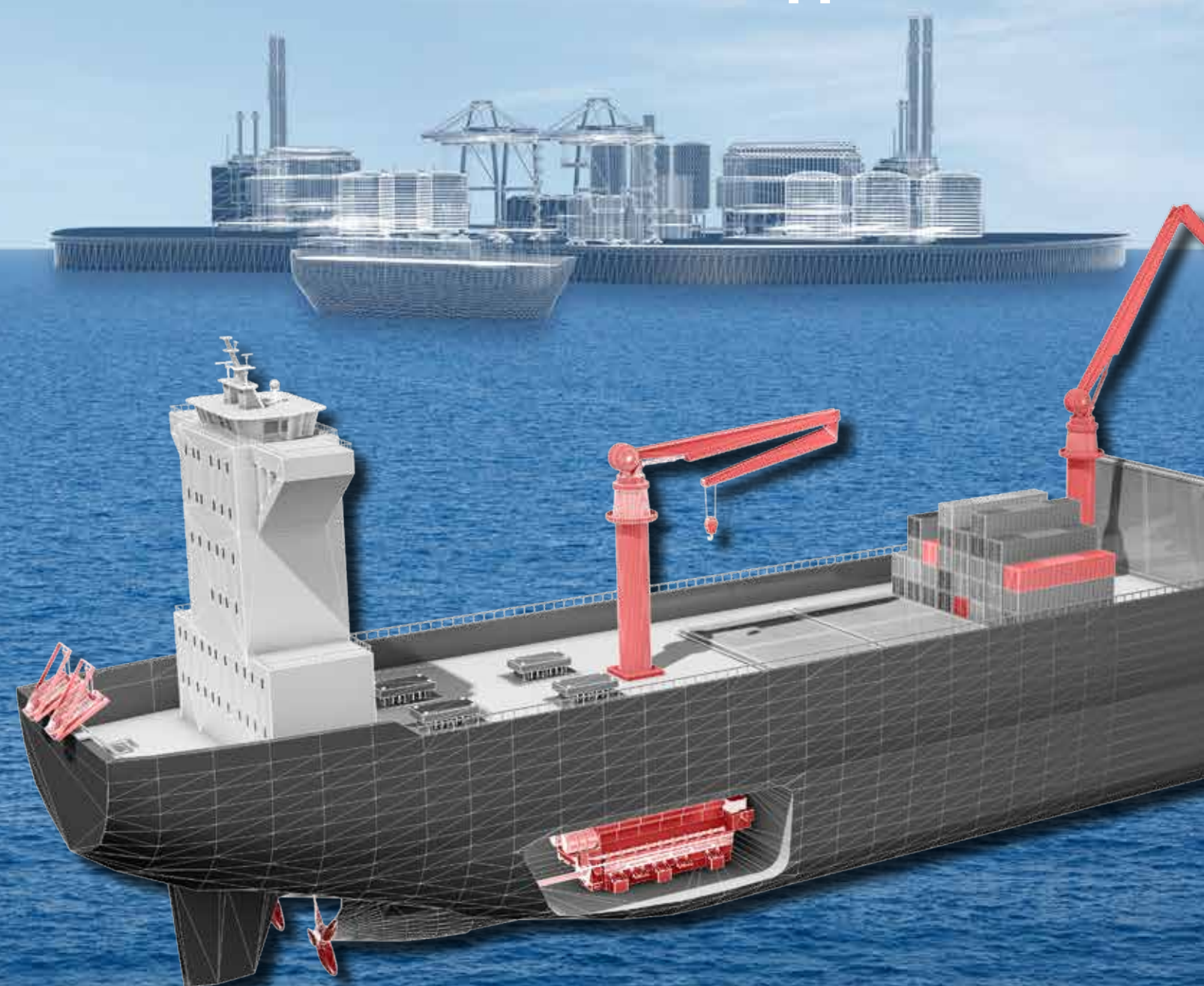
NOTE

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.
All technical details are subject to change.

EN 10.129.3/08.17

HYDAC INTERNATIONAL

**Components,
systems and service
for maritime applications**



EN 10.129.3/08.17

Your partner for expertise in all maritime applications

Overview

- Maritime applications
- Deck and deck machinery
- Direction and thrust control
- Motor: fuel and lubrication
- Water treatment + condition monitoring + specials
- Expertise and service

Our wide range of products, combined with our expertise in development, production, sales and service enables us to meet the diverse requirements of the maritime and the shipping industry – worldwide.

Our components and systems are specially adapted to suit these applications and provide maximum availability. Our solutions reliably get the job done in extreme offshore environmental conditions, in potentially explosive atmospheres and even under water.

We support system manufacturers, shipyards and shipping companies throughout the entire life cycle of the ship, with our condition monitoring and fluid care products ensuring smooth operation, low operating costs and maximum availability. All leading classification societies have confirmed this by certifying our solutions.

Our operations include:

- Hydraulic and hybrid drive solutions
- Open-loop and closed-loop control of movement processes
- Conditioning of operating media and fuel
- Energy storage (e.g. for emergency functions)
- Automotive pre-filtration for ballast water treatment systems
- Cooling of electrical drives and servo motors
- Sensor systems and condition monitoring
- Installation material, saltwater-resistant mounting systems
- Special materials and coatings
- Start-up and repair of hydraulic systems
- Rinse-cleaning (flushing) according to customer requirements
- International approvals and types
- Collaboration with development partners and institutes



All from one supplier. HYDAC Fluid Engineering in your application

Energy efficiency

- Hybrid drive solutions
- Energy storage
- Filtration solutions with low pressure loss
- Consideration of entire machine cycle

Process reliability

- Functional safety assessment of entire system
- Components with increased functional safety
- Certified components and systems
- Extensive knowledge of class rules

Conservation of resources

- Sector-specific filtration solutions
- Preventive maintenance
- Status monitoring
- Prevention and separation of water in operating medium/fuel

System availability

- Worldwide service and spare parts
- Customised service solutions
- Rapid and reliable on-site support
- Integrated system approach increases system availability
- Status monitoring of entire system

We can help you.

HYDAC 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 components to a complete system.

Worldwide approvals.



Global and yet local.



With 9,000 employees worldwide, HYDAC is one of the leading suppliers of fluid technology, hydraulic and electronic equipment.

Our wide range of products, combined with our expertise in development, production, sales and service, enables the diverse requirements of the shipping industry to be met worldwide.

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

Maritime applications

On deck

- Winches
- Lifting equipment
- Hatches
- Ramps, doors, RoRo
- Side doors
- and much more

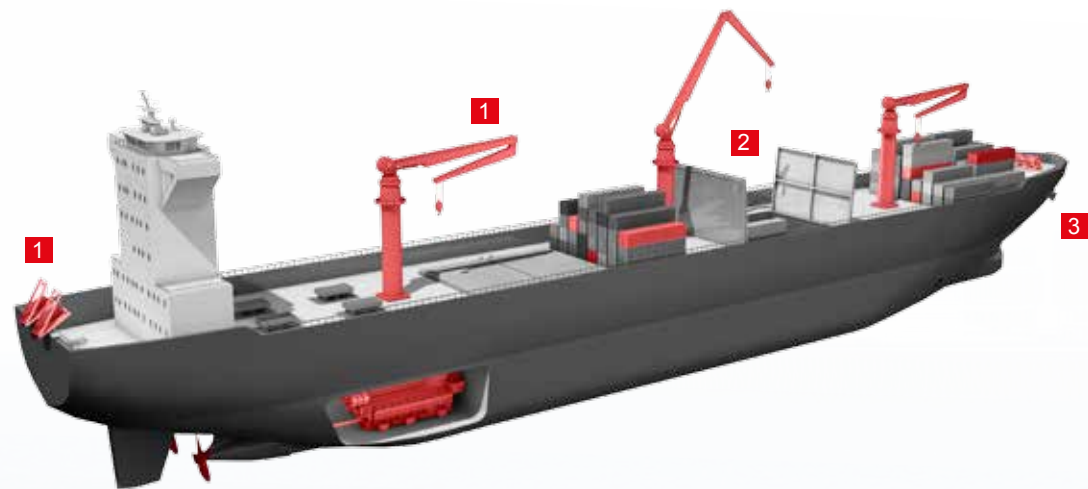


Below deck

- Main drive
- Direction and thrust control
- Stabilisers
- Loading and unloading pumps
- Fire protection systems
- Ship engine
- Ballast water
- and much more

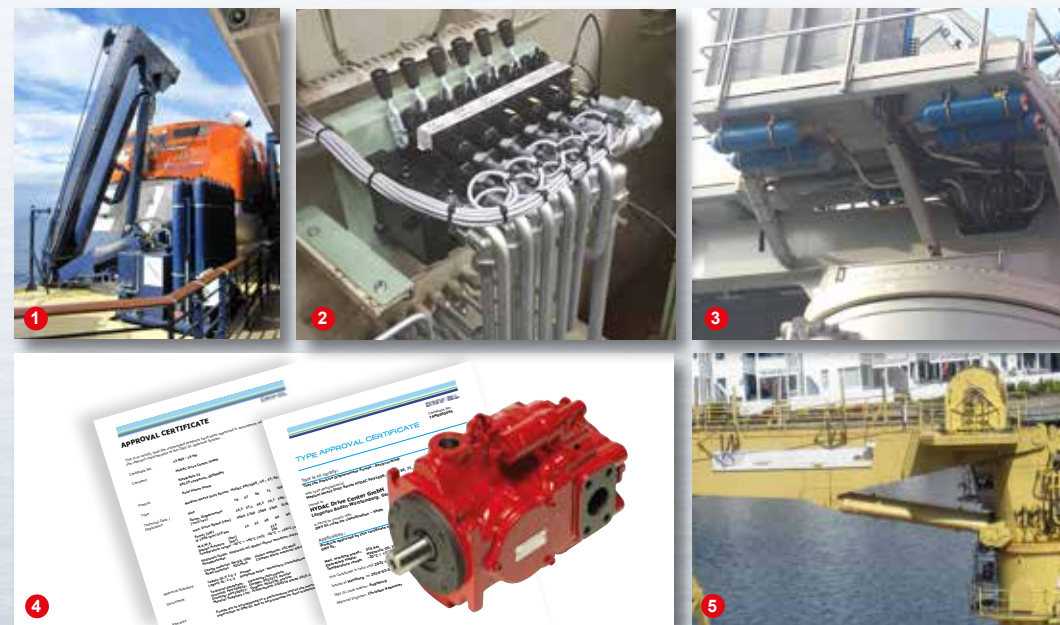
Deck and deck machinery

HYDAC supplies components for the diverse requirements of deck machinery. Whether it involves safe and precise loading and unloading of ships, A-frames, ramps, bow, side, stern or loading hatches, winches, anchors or mast superstructures, we can find a solution.



1 Cranes and other lifting equipment

For hydraulic cranes, HYDAC supplies complete drive units including valve control **1**. The fluid power supply in the open circuit is provided by our axial piston displacement pump PPV100S. It has type approval from DNV GL **4**. The compact and energy-efficient load-sensing sectional control block LX-6 is perfect for crane applications thanks to its sensitive response characteristics **2**. Hydro-accumulators are responsible for energy storage in wave-compensation and safety systems **3**. Hydraulic cylinders with special corrosion protection move the boom **5**.



In electrical cranes and lifting equipment, asynchronous motors usually serve as the drive unit. More dynamic systems with heave compensation also require servo motors. HYDAC has an extensive range of cooling systems for cooling motors and frequency converters in its portfolio. Passive cooling systems work with air or water as coolant, and active ones with a compressor.



2 Loading hatches, RoRo equipment

Bulk carriers almost always have folding or sideways-rolling hatch covers to protect the load from weather damage. Ferries need fold-out ramps, bow and stern doors and other RoRo equipment. For these applications, HYDAC supplies an almost exhaustive hydraulic range, from complete drive units, valve control and sensors to hydraulic cylinders.



Further information on hydraulic cylinders or maritime applications is available on our website www.hydac.com / brochure 10.103



3 Winches

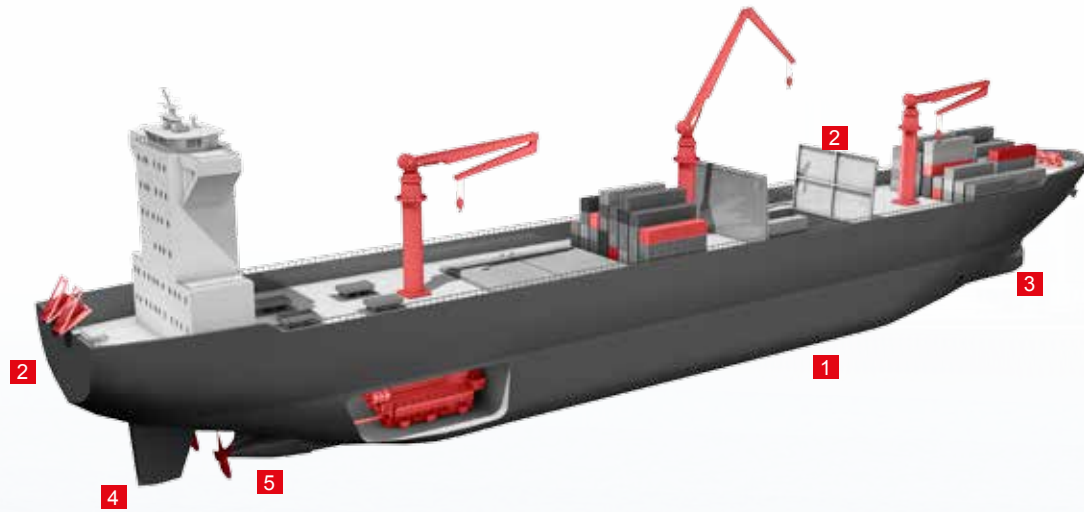
All ships have several nautical winches for anchoring and warping. Some are also equipped with a mooring function **1**. Offshore ships have special, sometimes very large, winches in addition to the nautical winches. While the nautical winches are mainly driven electrically, most offshore winches are still hydraulic. The same applies to the control of band and disc brakes. For electrical winches, HYDAC produces compact drive units that control the brake with either on/off or proportional control **2 + 3**. The advantages of hydraulics can still be used, for example to store the energy released during active heave compensation and to dispense it at a later point in time. HYDAC has developed special hydro-accumulators for these applications that combine high and low pressure in one device, reducing the size, weight and pipework requirements **4**. The HYDAC pressure sensors and switches required to measure the accumulator pressure have type approval in accordance with all leading classification societies. **5**



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Direction and thrust control, ship stabilisation



1 Fin stabilisers

Stabilisers are used mainly in cruise ships, but also in ferries and other passenger ships, to minimise the ship's rolling movements for the comfort of the passengers. Stabilisers are divided up into retractable and non-retractable stabilisers. The latter are used more often in the navy and in superyachts. Both types are driven hydraulically, either via a pair of cylinders or a rotary vane motor. HYDAC supplies ready-to-install hydraulic power units with accumulator support and condition monitoring.



2 Trim tabs

For fast motorboats and yachts, HYDAC has developed special control blocks and compact units that move the trim tabs to the correct position. The boat can thus be made to glide more easily, saving fuel. Heeling and pitching are also reduced, making the ship travel more smoothly.



3 Bow thrusters and rudder propellers

Bow thrusters make it easier to manoeuvre the ship in very tight spaces and are vital for docking the ship. They are not meant to function as the ship's main drive, but as an auxiliary drive. Nowadays almost all ships are equipped with such bow thrusters, and many even have one or more at the bow and stern. This is not the case for rudder propellers, however. While the rudder propeller can also be used for highly sensitive manoeuvring, it serves as the ship's main drive. For both drive types, HYDAC always has the perfect drive solution. Our cooling and lubrication systems ensure that the mechanical components run smoothly. The monitoring of the lubricant, as recommended by DNV GL, is performed by our condition monitoring products, including water sensors from the AS series and particle counters from the CS and CMS series.



4 Rudder gear



In its vane or its cylinder version, the rudder gear is always an essential part of the ship. HYDAC drive units therefore always have redundant motor pump groups and the pumps have a 3.2 certificate from the required classification society. The cylinders – either in plunger or differential design – are also always designed in accordance with the class specifications and supplied with the corresponding material certificates and approvals. Sensor systems with type approval from the major classes are also used here.



5 Variable pitch propellers

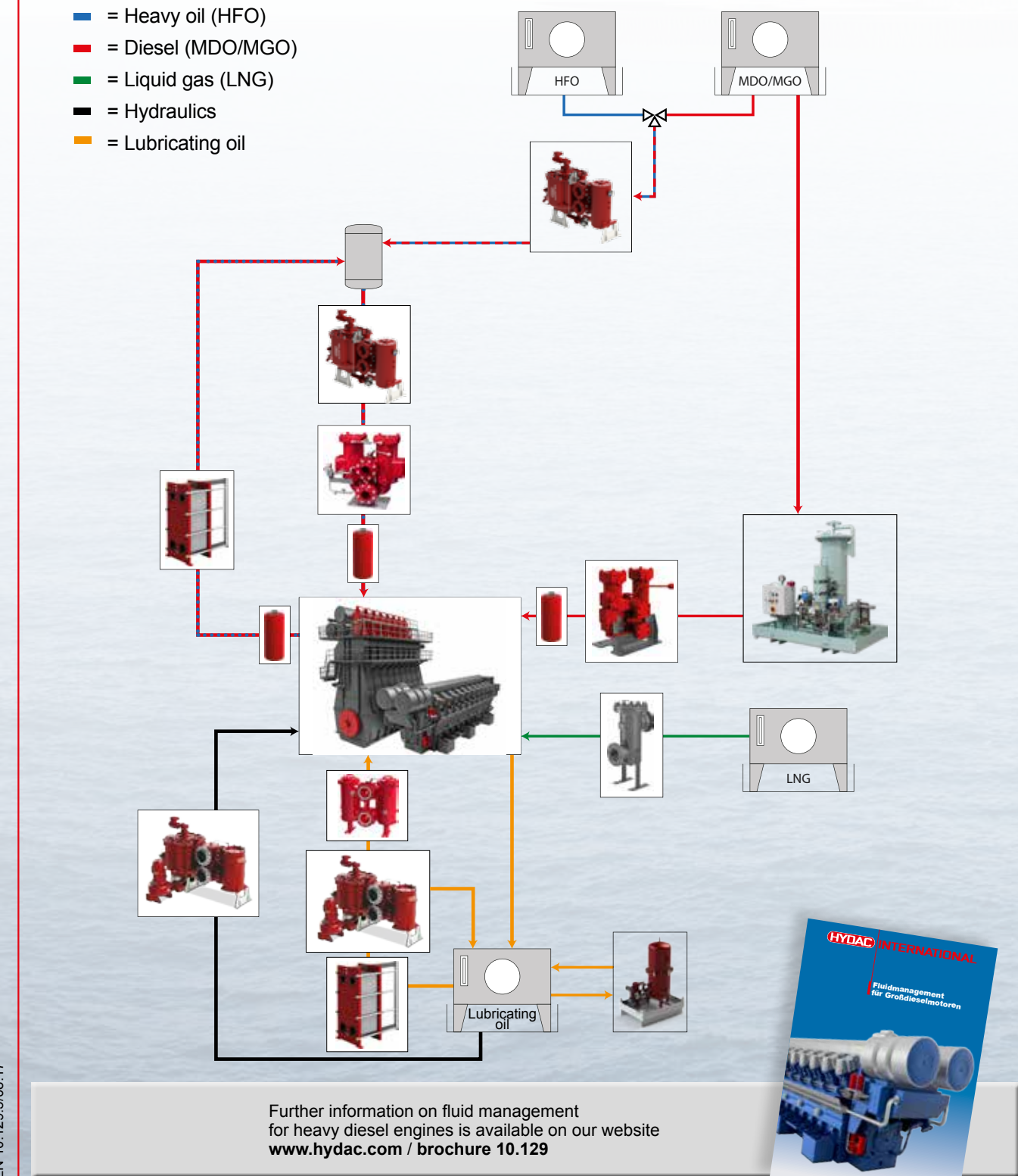
If present, the variable pitch propeller, like the rudder gear, is an essential part of the ship's equipment, ensuring the correct size and direction for the thrust. HYDAC drive units, in redundant design, and the matching valve technology make sure that the correct thrust is always available.



Engine

Expertise in every system

Filtration has a key role to play in developing and optimising heavy engine technology. The quality of the fuel has a direct effect on engine emissions. In addition, these particles damage the enhanced fuel systems required to comply with the emissions standard. The tendency in engine technology development towards optimising consumption, exhaust gas and costs while increasing the performance characteristics continues unabated. The increasingly complex injection systems of the heavy engines work on the premise that the fuel will be virtually free of contamination particles.



Fuel

Modern diesel engines have greater treatment requirements for the diesel fuel. In addition to main filtration and pre-filtration, fuel filters need to be used on the engine side. HYDAC supplies various (duplex) filters for this purpose, such as HDMD and HDPD 1 for pre-filtration and main filtration of the fuel. These filters can be equipped with filter elements suitable for the particular application. From filter element mats made of wire mesh (nominal filtration) to super-fine multi-layer glass fibre or synthetic fleeces like the new Optimicron® FuelFine filter elements 2, HYDAC has the perfect solution for every application. Of course, HYDAC also provides additional options for the fuel filters 3 such as trace heating, cover securing, clogging indicators, and stands available with ship approvals.

Ultrafine filtration for diesel fuel

The new Optimicron® FuelFine filter elements with special element design have been developed specifically to meet these high demands. Ultra-fine glass fibre media ensure an efficient and highly effective filtration of the diesel fuel, enabling the required cleanliness classes to be reached.



Further information on HYDAC AutoFilt® automatic filters is available on our website www.hydac.com / brochure 7.814



In response to the Tier III standard that came into effect in 2016, the International Maritime Organization (IMO) is setting tighter limits for climate-relevant ship exhaust gases such as nitrogen oxides and sulphur oxides. The ship engine builders use common rail systems to reduce fuel consumption and exhaust gases.

To meet the resulting demand for cleanliness in marine fuels and lubricants, HYDAC presents the new automatic filter AutoFilt® RF9 4 + 5.

What sets the AutoFilt® RF9 apart is its patented hydropneumatic back-flushing technology, and secure media separation.



In newer engines, sensitive injection systems are being used more and more. To ensure that they can function correctly and to protect them from wear, strict requirements must be complied with. The owner's requirements for the cleanliness of the fuel used and the length of the filter service life are particularly demanding. To meet the requirements for the injection system, an efficient filtration strategy is vital.

For such applications, HYDAC has developed a pilot oil filter module 6 that contains several filtration units.



Lubricant

The lubrication system of a diesel engine is a sensitive system. On the one hand, it needs to ensure oil flow to the lubrication points. On the other, the lubricant needs to have sufficient cleanliness to minimise wear and extend the service life of the engine.

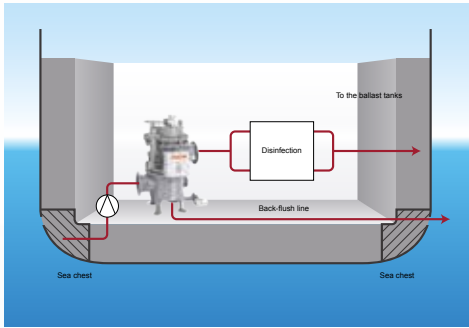
HYDAC has the perfect filter for every situation, in the form of duplex/indicator filters (type RFLD) and automatic filters (type RF) and protective filtration in the main flow directly to the engine and/or the filter unit for engine oil treatment (type HVU – 7) in the bypass flow by the tank.



Water treatment

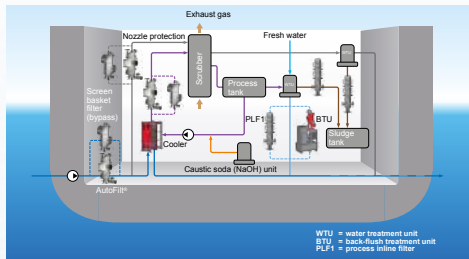
Ballast water

Water is required to provide ballast depending on the load condition of the ship. Until recently, the exchange of ballast water has posed the risk of transporting sea-life to areas where it may cause damage to the local ecosystem. For this reason, ballast water treatment systems need to be installed on ships. Systems are used to render hazardous microorganisms and viruses harmless, mostly in the form of two-stage systems with pre-filtration followed by disinfection (achieved by electrolysis, UV systems or ozonisation, for example). The automatic back-flushing filter from the AutoFilt® series is ideally suited to pre-filtration and already has a proven track-record in numerous installations.



Exhaust gas cleaning system (exhaust gas treatment system EGTS or scrubber)

Wet scrubbers for removing sulphur oxides from ship exhaust gases operate either in an open or a closed circuit – or even in both circuits, as hybrid systems. In both cases, filtration and cooling is required and HYDAC has the perfect products for this in its portfolio. Applications include nozzle protection, protection for the cooling circuit and even general reduction of solids to protect components and extend service life. Automatic back-flushing filters of the AutoFilt® series are used, or also HYDAC process inline filters, which have proved to be a valuable addition in wash water treatment.



Process Filter Test-Cube

The test rig is located on the premises of Kraeft GmbH Systemtechnik in Bremerhaven, part of the HYDAC company group and a sector and service partner in marine equipment, hydraulic steel structures, system engineering and much more. With its favourable location at the Weser estuary, the site provides ideal test conditions with low tide influence.



Further information on the topic "showroom for marine applications" is available on our website www.hydac.com



Water desalination plants and sprinkler systems

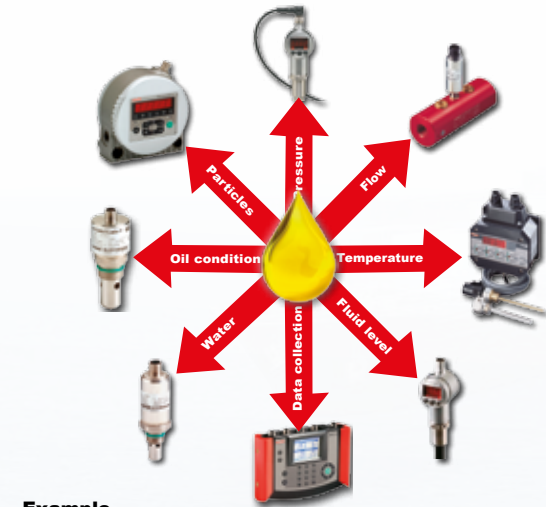
Diaphragm accumulators to level out pulsations in the filtration flow for water desalination/bladder accumulators for noise damping in a sprinkler system.



Condition monitoring

Preventive maintenance to increase fluid service life.

One of HYDAC's essential unique selling propositions is the wide-ranging programme of sensors for acquiring both process data (pressure, temperature, flow rate, etc.) and fluid data (oil condition, contamination, water content, etc.). The combined evaluation of the process data (load situation of the machine) and the fluid data (fingerprint of the fluid) enables a remarkably expanded diagnostics depth which goes far beyond conventional threshold monitoring. Additional added value is generated if the machine data available from the systems operator, e.g. start/stop trigger, cycle times and energy consumption, is incorporated into the data analysis. To reach this goal HYDAC offers an extensive product programme of components and systems as well as application specific service activities. The product portfolio thus includes solutions for all areas of condition monitoring systems.

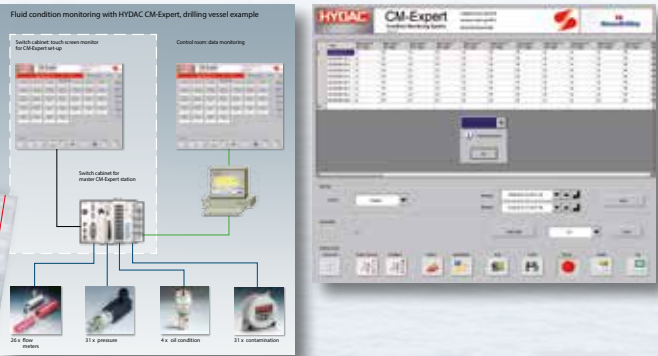


- Example**
- Data collection: HYDACLab® (oil condition sensor), CS1000 (contamination sensor), VL-GW (DirtController), AS1000 (AquaSensor)
 - Interpretation: CMU1000 (Condition Monitoring Unit), FCU1000 (FluidControl Unit) MDE6070 (measurement data collection)
 - Control and monitoring: CM-Expert

HYDAC CM-Expert: With a network of sensors and software, at the core of your ship

CM-Expert monitors and stores the data recorded by sensors and detects changes emerging in the system of machines and within systems. With experience garnered from decades of completed projects, analyses and forecasts can be made and evaluated for production-relevant parameters, such as remaining service life, service intervals and risks – in good time and long before a standstill threatens.

Further information on the topic CM-Expert is available on our website www.hydac.com



Specials

- Further HYDAC solutions on board with...
- Ball valves for cargo pumping systems 1
 - HYDAC Fluid Aqua Mobil for removing free water and solid particle contamination 5
 - Accumulator as safety function to prevent fires in recycling plants (waste incineration) 2
 - Shut-off valves for pump systems 4
 - Hydraulic power unit for emergency control of an observation crane with enclosure 3
 - ... and much more!



Expertise and service

High-quality hydraulic solutions for industry, offshore and dredgers

Our expertise centres in Apeldoorn and Enschede (the Netherlands) are on hand to help with engineering and various production sites. We offer a complete service package and are active worldwide. We are known for our expertise, speed and flexibility and have just the right solution for every challenge in hydraulics.



In addition to the above-mentioned applications, HYDAC also finds solutions for special ships such as passenger ships, wind turbine installation vessels 1, pipe-laying ships 2, drilling vessels and above all dredgers 3 + 4.



HYDAC supplies complete hydraulic systems for heave compensation, winches, floor hatches and spud-lifting systems. Additionally, we always have the perfect solution for watertight doors and bow doors, hatches, moving decks and many other applications. Our systems are much more than just drive unit, control blocks and cylinders. For us, the pipeline and the installation of the hydraulics on board are all part of the package. We provide support even during the initial start-up of your system.

HYDAC is the perfect service partner for your hydraulic systems!

With good and regular maintenance, performed worldwide in our fully equipped workshops, we can repair your system or a defective component and ensure that before long your system is once again fully functioning and ready for use. The HYDAC service team is available 24 hours a day, 7 days a week, even on Sundays and bank holidays.

Pumps and motors are generally major, critical parts of a hydraulic system. To enable the pumps and motors in your system to work well, you can have them tested on our specially designed pump test bench. If repair work is required, the parts will be checked carefully and replaced with original parts as necessary.

Our dedication to your project extends far beyond the delivery. From the installation to the flushing of your system and the actual start-up process, an experienced team with the appropriate equipment is available worldwide.

Rental equipment – rent our equipment just as you need it!

Renting HYDAC devices for a brief time period is a cost-effective and flexible alternative to making costly investments. Whenever you need a flushing unit, booster unit, hydraulic power unit, measurement device or mobile filter system – there's one there! All devices regularly undergo maintenance and testing and are therefore always ready for operation. Get in touch – we will ensure that your rented device is available on time!



Further information is available on our website www.hydac.com / brochure
World wide service for hydraulic systems and components



HYDAC expertise centre with Kraeft GmbH Systemtechnik

When it comes to marine equipment Kraeft Systemtechnik supplies hydraulic power units for all kinds of applications. To drive your existing systems or to extend and to operate new ones.

We perform the engineering ourselves, allowing us to adjust your power units to suit your individual needs. We use high quality components and materials and, should you wish, we can provide certificates and comply with the specifications of a certification company of your choice.

Our service includes starting up systems around the world, both our own systems and those built by other companies, and performing repair work on your premises.

With 2500 m² of floor space and its own 200 m pier system (for a draught of up to max. 7.30 m), the HYDAC expertise centre in Bremerhaven is on hand to provide advice.



Further information is available on our website www.kraeft-systemtechnik.de / brochure
Turn-Key hydraulic solutions for the maritime industry



Mobile Servicer

The HYDAC Servicer offers a systematically constructed, comprehensive range of services, with purposeful maintenance and inspection procedures that significantly help to increase the useful life of hydraulic plants, lubrication systems and electrohydraulic controls and regulators.

After in-depth consultation, you can create a service package tailored to your needs. Whether it be support of existing in-house maintenance or sub-contracting the complete package, we will always find the best solution for you.

Services:
start-up, repair, examination, fluid handling, fluid management, optimising and project planning, condition monitoring, calibration service, fluid analytics, process optimisation, technical cleanliness, rental service, helpline



Further information is available on our website www.hydac.com



Has this brochure not provided you with a solution for your application, or do you have any questions?

Wherever you need us, we are there to help you find the most effective solution.

Please contact one of our staff members or the corresponding specialist department in your area!