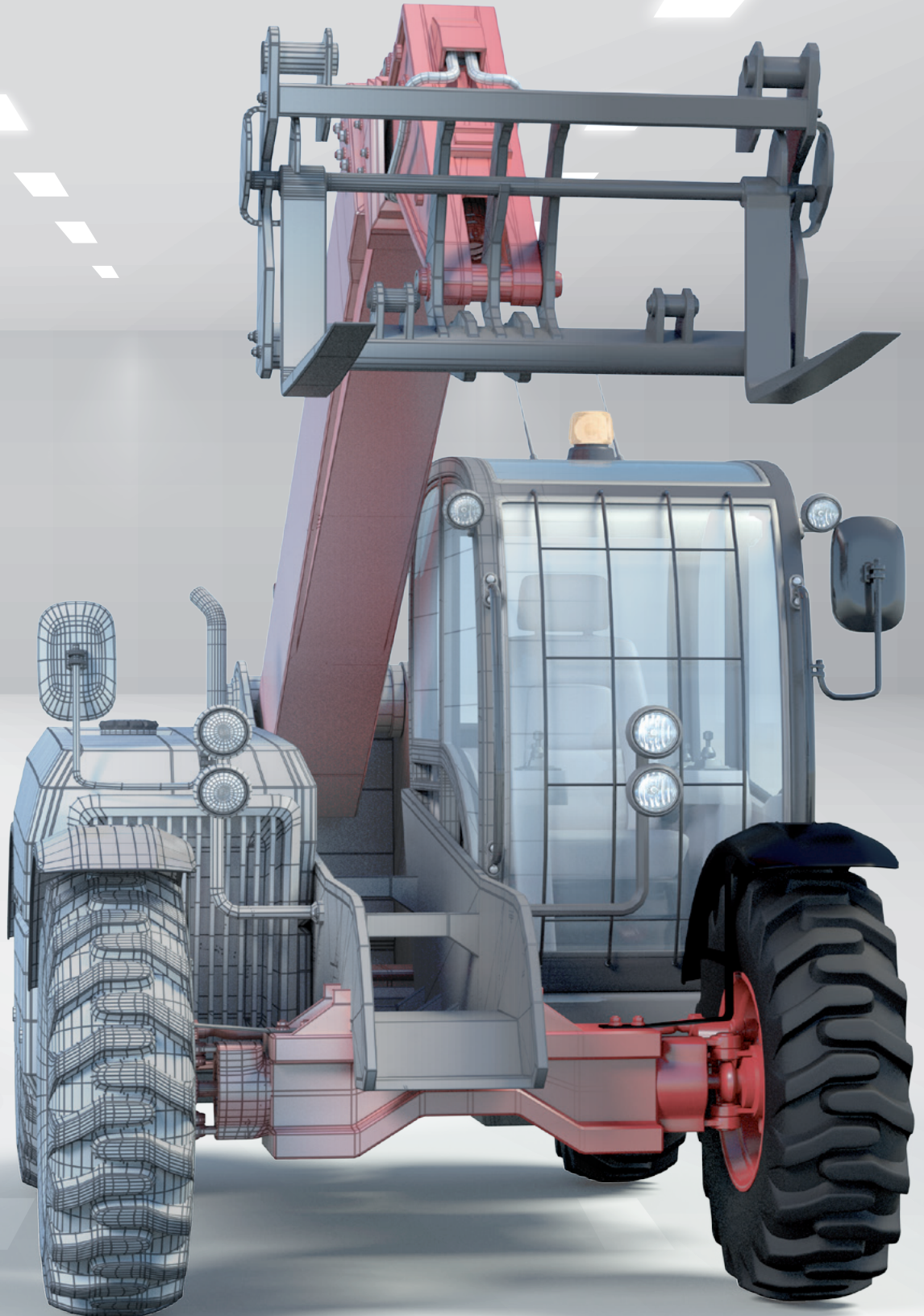
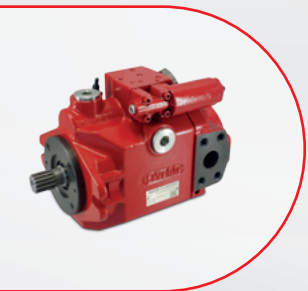
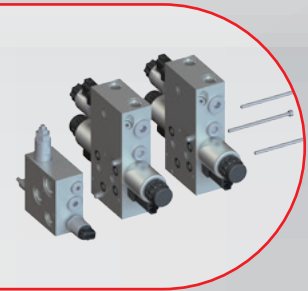


# HYDAC

# INTERNATIONAL

## Components, Systems and Service for Telescopic Handlers



## Components, Systems and Service...



HYDAC Head Office in Germany



HYDAC China



HYDAC Japan



HYDAC Korea



HYDAC USA



HYDAC France



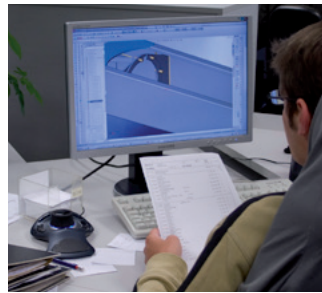
HYDAC Italy

Since it was founded in 1963, HYDAC's constant innovative development has helped it to become a company group with some 9,500 employees, with a presence in almost all industries.

In addition to existing components, HYDAC can provide system solutions customised to suit your specific fluid power and electronics requirements.

To help us with this, we have established a mobile hydraulics engineering team that can use our company's expertise to assist you.

This enables HYDAC to provide you with worldwide, comprehensive engineering services in consulting, joint development and trials which will both aid the realisation of your projects and support the services you provide.



All of this is based on our extensively tried-and-tested, top-quality hydraulics and electronics range. We also perform work to DIN ISO 9001 as a matter of course.

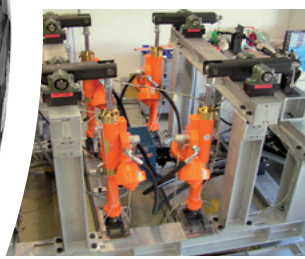
For detailed information on our products, please do not hesitate to contact us directly. For joint project drafting and systems, please get in touch.



### Note

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

# Electro-hydraulic Solutions for Telescopic Handlers



## Your Tasks

Telescopic handlers need to be able to cope with various operating modes and situations: although they need to be fast and agile, they also need to load and transport goods safely and carefully.

Loading and manoeuvring in confined spaces is nerve-racking for the user: the load must not only be gripped and held securely, but also be lifted and then put back down with precision.

## Our Solutions

We supply hydraulics with appropriately sensitive reactions that also implement all control commands from the in-house electric control with fast response times.

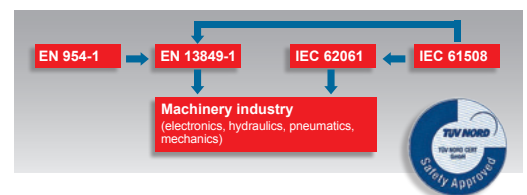
Operational safety and user safety are always top priority and are realised in accordance with functional safety standards.

This is partly achieved through the use of hydraulic controls, such as the boom suspension and the telescopic arm control which prevents overload and tipping.

For rapid transport, the "Ride Control" system is used to secure the load and provide safe suspension for the vehicle and its telescopic arm.

For all basic functions, whether it be pump supply, cooling, filtration, steering, braking, suspension, working hydraulics or electronics, HYDAC can provide you with solutions developed by its wide range of departments.

## Functional Safety (FuSa)



HYDAC provides:

- Controllers and I/O modules certified to IEC 61508, SIL2(3) and EN 13849, Pl d(c)
- Sensors and valves with enhanced FuSa
- Support provided throughout, from risk analysis to certified machine function

► See brochure 18.700 – *Functional Safety in Mobile Machines*

## Filtration and Tank Systems for Telescopic Handlers



In addition to classic breather filters, inline filters, return line filters and return line suction filters, our extensive range of filters includes **special return line filters for optimised air removal** in multiple variants (RFB, RFT, RKB, RKT). Their special geometry and innovative technology ensure that the oil flow is well distributed in the tank. This enables high air removal and therefore a reduction in the hydraulic tank size. Enormous cost savings are therefore possible for the owner and OEM (significant reduction in the amount of oil and material used).

- ▶ See brochure 7.422 – Return Line Filter
- ▶ See catalogue 70.000 – Fluid Filters

In the fight against electrostatic discharges in the system, we support our customers and increase their system's functional safety with our innovative filter media **Stat-Free®** and **Stat-X®**.

- ▶ See brochure 7.017 – Innovative Element Technology Stat-Free®

For smooth operation in diesel filtration, we recommend our Diesel PreCare filter system range. Smart additional functions, such as an integrated electric pump or our new filter medium (Biomicon®), which protects against contamination (diesel bug) in the filter, ensure safe machine operation and low service costs.

- ▶ See brochure 7.125 – HYDAC Diesel PreCare

Our smart sensor Virtual Fluid Lab (VFL) makes it possible to determine the filter's remaining service life so that filters can be changed only as needed. This enables the filtration capacity to be exploited fully. The benefits of this are maximised service intervals, predictable service and increased availability.

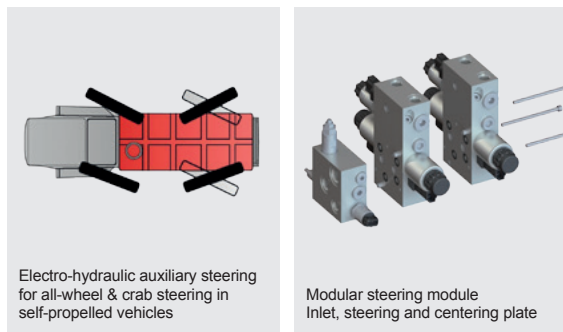
### Diesel fuel pump kit

Enables the fuel tank on the vehicle to be filled independently of stationary tank systems.



- Certified operating voltage: 12 / 24 V DC
- Flow rate: 5 – 50 l/min
- Integrated temperature switch
- Completely sealed non-return valve, leak-tight

## Steering



Electro-hydraulic auxiliary steering for all-wheel & crab steering in self-propelled vehicles

Modular steering module Inlet, steering and centering plate

HYDAC electro-hydraulic primary and auxiliary steering systems allow various types of steering to be realised in telescopic handlers. In addition to standard driving modes, other possibilities include four-wheel drive and crab steering. In combination with the hydraulic steering systems on the front axle, electro-hydraulic superimposed steering systems and auxiliary steering systems for the rear axles are possible.

The steering valve module from the EHZ series has a modular structure and can be used in two or multi-axle self-propelled vehicles. Different inlet modules enable connection to all types of hydraulic systems. The proportional valves used are specially  $\Delta p$  optimised for use in steering systems. The basic module is designed for one steering axle and a second module for a two-axle vehicle. Other modules can be added for free-wheeling, locking or centering the steering cylinders.

Shock valve modules are also available to protect the steering cylinders against external factors.

- ▶ See brochure 10.116.9 – HY-STEER Electro-hydraulic Steering Systems

## Conditioning of Hydraulic Oils, Lubrication Oils and Diesel Fuels



Dust, water and internal wear lead to increased valve and pump failures, leakage and loss of efficiency. HYDAC supplies the device technology for safe fluid handling. Measures to remove solid particle contamination, water and gases keep the machine hydraulics in good condition, increase the efficiency and reduce costs for spare parts. Mobile and stationary oil conditioning devices for initial start-up rinsing, filling and transfer filtration, filling and venting of hydrostatic drives.

- ▶ See brochure 7.673 – MFU-10 / MFU-15

## Monitoring of Fluids and Components



On-board sensors for machine status monitoring in terms of solid particle contamination, oil condition, pressure, and temperature.

- Portable & mobile service instruments for fluid monitoring (service)
- Analysis instruments for determining the technical cleanliness of components

- ▶ See brochure 7.607 – FCU 1000
- ▶ See brochure 7.959 – CTU 1000

## Suspension Systems for Axle, Boom and Cab



Intelligent axle suspension system



Boom suspension



Cab suspension system

To meet increased demands for comfort and traction stability.

Hydro-pneumatic chassis suspension, irrespective of load, with level control, axle lift, isolating function, roll stabilisation and automatic error indication.

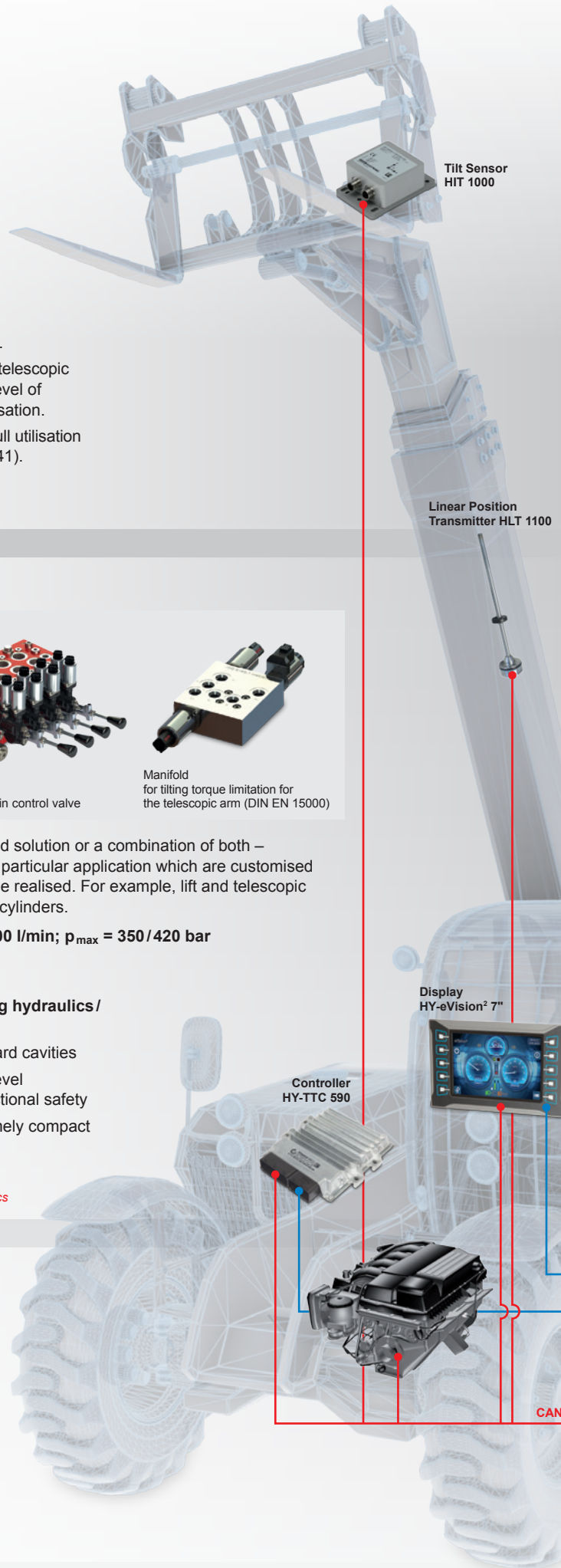
Optimum adjustment of the chassis to the load condition through level control.

Hydro-pneumatic suspension system with HYDAC piston accumulators for the telescopic lifting gear. To cushion the pitching motions that occur during driving. A high level of operating safety is achieved in the work cycle due to active pressure compensation.

Hydro-pneumatic cab suspension with adaptive damping and level control for full utilisation of the piston stroke of the cab (Human response to vibration directive ISO 8041).

► See brochure 10.116.6 – Cab Suspension

► See brochure 10.166.4 – Hydropneumatic Suspension System



## Working Hydraulics



RS 160  
Open centre main control valve



RS 220  
Open centre main control valve



LX-6  
Load-sensing main control valve



Manifold  
for tilting torque limitation  
for the telescopic arm (DIN EN 15000)

Whether it's a modular system made up of OC/LS mobile valves, a customised solution or a combination of both – we work with you to develop individual, all-inclusive system solutions for your particular application which are customised to suit your device. As a result, both simple and complex controls can easily be realised. For example, lift and telescopic arm control, support, front-rear hydraulics and shut-off functions for the tilting cylinders.

**Can be combined with any pump systems with the parameters  $Q_{max} = 200 \text{ l/min}$ ;  $p_{max} = 350/420 \text{ bar}$**

- Cylinder position functions with or without load sensing
- Main consumer connected in parallel or in series

**Simple integration of:**

- Secondary functions
- Priority valves for (OC or LS) steering systems and the braking system
- Filtration and sensor systems
- Support and level control
- Fan controls, accumulator charging functions

► See brochure 5.254 – Mobile Valves

**Valves for the control of working hydraulics/ controllers – PDR04T30D:**



- Standard cavities
- High level of functional safety
- Extremely compact design

► See catalogue 53.000 – Compact Hydraulics

## Noise Reduction

Damping of noise with HYDAC silencers to increase comfort and reduce stress for the machine operator (in compliance with legal occupational health and safety regulations).

Advantages of the silencer:

- Universal, widely applicable versions: straightforward selection, no configuration required
- Customer-specific versions: individual configuration, various designs

► See catalogue 30.000 – Accumulator Technology

► Detailed product information on request, no.: 10000808841



## Safeguarding of Emergency Functions



DC1 emergency steering unit



In the event of power failure, secure power supply to the vehicle's steering and braking system needs to be guaranteed until the vehicle has come to a standstill.

- DC1 emergency steering unit

Flow rate: 2 – 10 l/min, pressure setting range: 50 – 250 bar  
Support of emergency braking function with diaphragm accumulators for secure functioning.

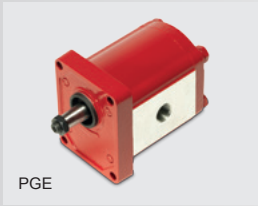
Advantages of diaphragm accumulators:

- Space-optimised standard sizes
- Application-based adjustment of the accumulator design
- Pressure and weight-optimised versions

## Supply



PPV100M



PGE



MGE

As the main drive pump for the working hydraulics in the telescopic handler, the mobile axial piston pump PPV100M is designed for a pressure of up to 315 bar (continuous) / 350 bar (peak). It achieves high rotational speeds during operation and is therefore perfectly suited to the requirements of modern mobile machinery. A finely graduated range of sizes is available, from 18 to 100 ccm/rev. The PPV100M's very good efficiency level provides high efficiency in the hydraulic drive.

Depending on the requirements, the PGE external gear pumps can be mounted either directly at the power take-off or as a secondary pump at the main drive pump for the working hydraulics. In telescopic handlers, they are often used as a drive for low- and medium-pressure applications (bypass filtration, bypass cooling, separate functions in working hydraulics etc.). For the design of multiple-pump combinations, the PGE's individual stages of 0.25 ccm/rev to 60 ccm/rev can be combined.

The reversible gear motors in the MGE series are designed for 2 or 4-quadrant operation and are available in three sizes from 1 to 90 ccm/rev.

They are very often used as reversible drives for fans and blowers in mobile machinery. The MGE gear motors boast optimised start-up characteristics and high pressure and speed reserves.

► See catalogue 2.902 – Pumps

## Cooling

Cooling systems in telescopic handlers are subject to varied requirements. The confined installation space in particular calls for compact cooling solutions, which nevertheless need to work powerfully and with energy efficiency.



**HYDAC mobile coolers CMS** combine various cooling circuits and are perfectly designed for the available installation space:

- Charge air cooling (CAC)
- Coolant cooling (RAD)
- Oil-cooling: gearbox, hydraulics
- Fuel cooling

Other functions can also be integrated, such as filter, tank and fan control.



**In the cooler-filter-tank unit (CFT)**, all components are selected according to the specific project. The CFT is a fully functional, integrated and patented solution with many benefits:

- Increased cooling capacity thanks to improved cooling air flow
- Oil tank optimisation with reduction of oil volume by up to 50 %
- Reduced installation time on the production line
- Integrated suction filter
- Particularly service and maintenance friendly

The cooler dimensioning software KULI, which is also used in automotive applications, allows complex cooling systems to be modelled and calculated. Installation resistances and additional heat sources can therefore also be taken into account in the cooler system calculation.

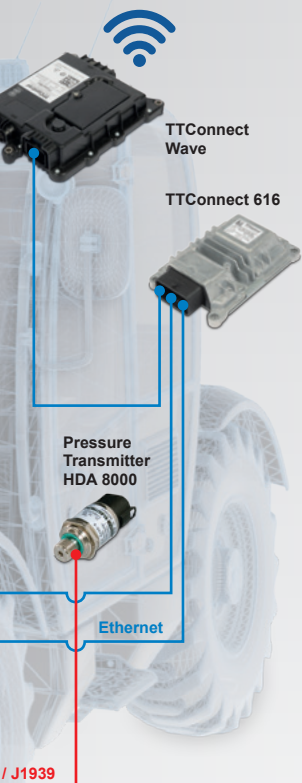


The efficiency of a cooler also depends largely on the **fan control**. HYDAC offers various solutions for electrically and hydraulically powered fans. The fan speed is controlled in accordance with the fluid temperature. High speeds are only requested in the event of severe load. This lowers the average power consumption as well as the noise generated at the fan.

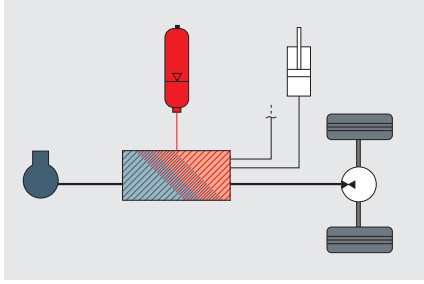
An optional reversal of the fan rotation also makes it possible to easily blow out contamination that is blocking the cooling element.

► See brochure 5.812 – Mobile Coolers

► See brochure 5.315 – A Breath of Fresh Air in Electro-Hydraulic Cooling Control



## Hybrid Concepts



Hybrid drive structures can be used to achieve significant fuel savings thanks to energy recovery and/or downsizing of the diesel engine. We mainly focus on the stresses (or loads) of the transmission drive and the working hydraulics in the hybrid configuration, building on our wide experience in mobile hydraulics and our decades of expertise in the use of hydraulic accumulators.

► See brochure 10.140 – Hydraulic Accumulators

## Maintenance



The depressurisation of hydraulic components for maintenance is performed by a banjo bolt ball valve that is installed directly next to the cylinder, saving space and eliminating the need for bolt connections. The banjo bolt also performs the function of a swivel banjo coupling

- Compact design saves material and installation time
- Minimisation of leakage points
- High-strength banjo bolt, with soft seal

► See catalogue 61.000 – Accessories

## Installation Assistance



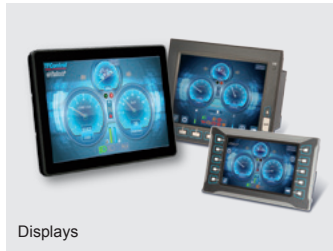
The combination of the swivel bolt clamping band, prism clamp and standard clamp to DIN 3015 means that there are many ways to mount pipelines, accumulators and other cylindrical components on hydraulic cylinders reliably, durably and temporarily.

- Variable positioning of fastening system (>180°)
- Surface protection thanks to PE insert
- Rapid radial mounting thanks to hinged quick release fastening

## Electronic System Architecture



Controllers



Displays



Connectivity



Functional Safety  
PL d  
SIL 2

Sensors

To complement the hydraulic control technology, we supply sensors, controllers, IO modules, display solutions and components for communication on the machine and with the outside world.

Sensors for the following variables: pressure, temperature, linear position, position, tilt, angle, level, flow rate, speed, contamination and oil condition. SMART sensors with internal measurement data analysis.

► See catalogue 18.500.3 – Control Technology for Mobile Machines

## MATCH BY HYDAC



Time savings of up to 50%



Development according to the V-model. Testing included



Robust and hardware-independent



Safety ready. SIL2, PLd, AgPLd (SRL2)



Multi-controller capable

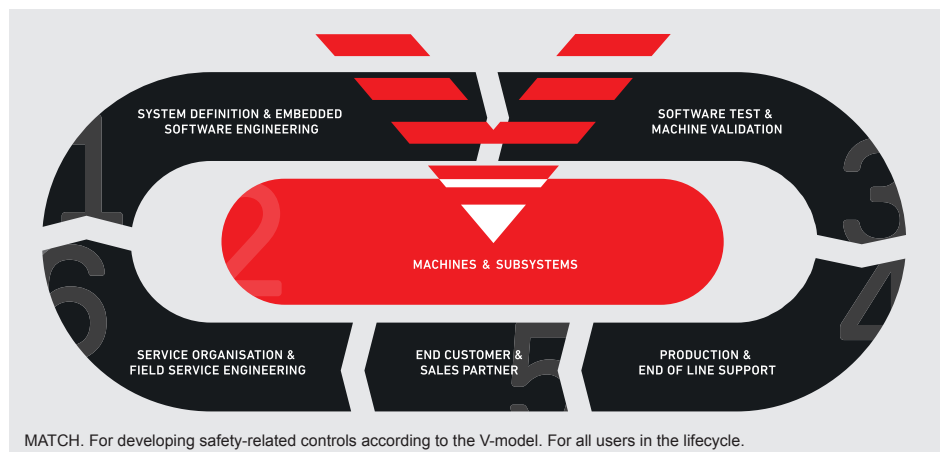


Open standard IDE

## Documentation, Test, Commissioning, Diagnosis –

The comprehensive solution for the complete lifecycle of mobile machines

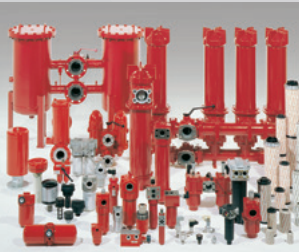
The MATCH Software Suite is the perfect foundation for all mobile machine software requirements: from system definition and hardware-independent embedded software development right up to documentation, testing, vehicle commissioning and optimisation, on-site diagnosis and service. Applications for complex vehicle or machine controls and display and telematics connections can be implemented in a short space of time with MATCH. Functional safety is taken into account from the outset. All safety-relevant modules are TÜV-certified.



► See catalogue 18.500.1.0 – MATCH Software Product Catalogue



Accumulator Technology 30,000



Filter Technology 70,000



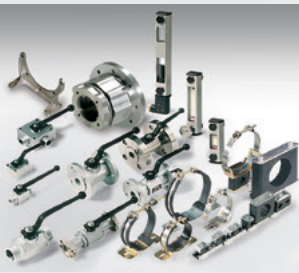
Control Technology 18,500



Filter Systems 79,000



Compact Hydraulics 53,000



Accessories 61,000

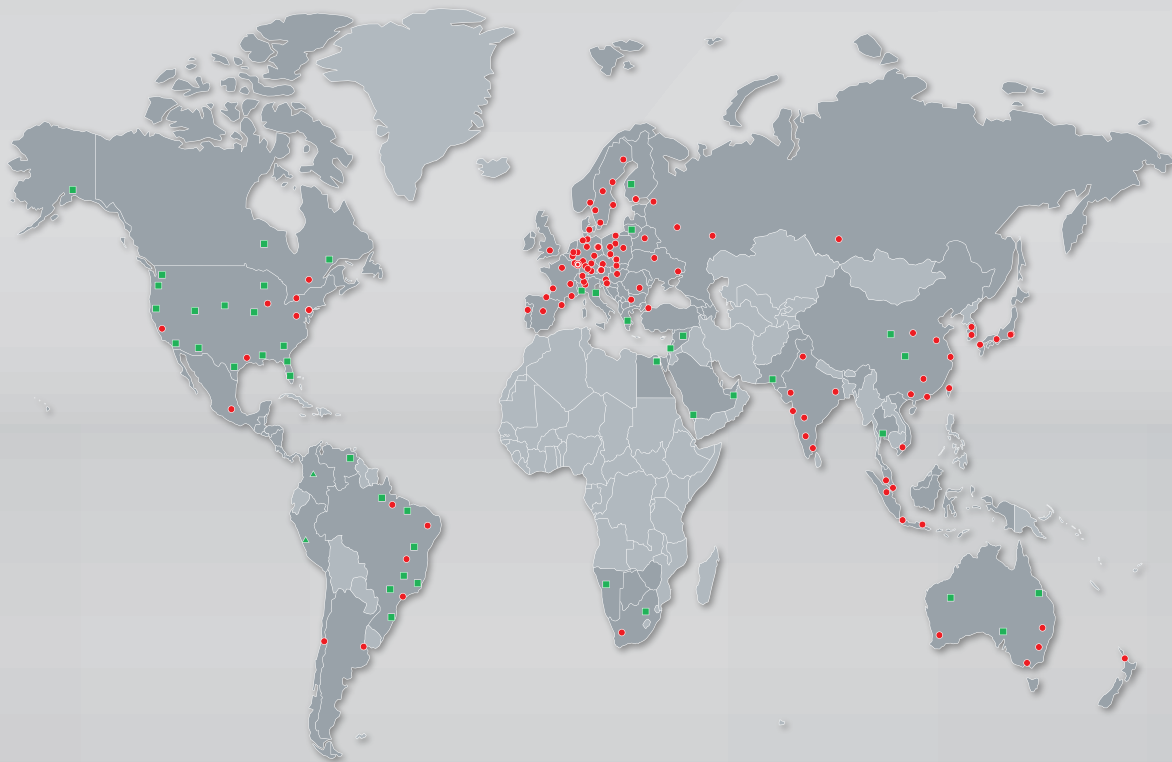


Electronics 180,000



Cooling Systems 57,000

**Global Presence.  
Local Expertise.  
[www.hydac.com](http://www.hydac.com)**



- ⊙ HYDAC Headquarters
- HYDAC Companies
- HYDAC Sales and Service Partners
- ▲ Free Sales Partners

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