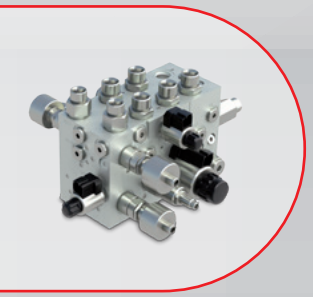
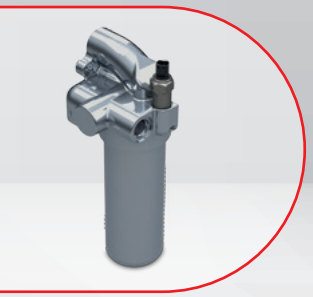
HYDAC INTERNATIONAL

Components, Systems and Service for Tractors





EN 10.120.3/11.19

Components, Systems and Service for Tractors

HYDAC Head Office in Germany

HYDAC China

HYDAC Japan

HYDAC Korea

HYDAC USA

HYDAC France

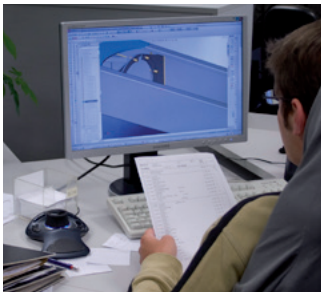
HYDAC Italy

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.

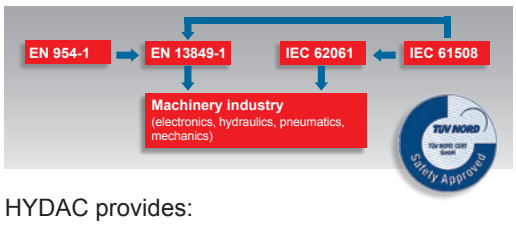
For detailed information on our products, please do not hesitate to contact us directly.
For joint project drafting and systems, please get in touch.

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.

Functional Safety (FuSa)



HYDAC provides:

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

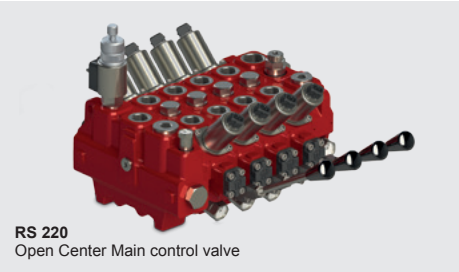
▶ *See brochure 18.700 – Functional Safety in Mobile Machines*

Networked Specialists for...

mar pi tec Engineering Support	**Animations**
MATLAB SIMULINK	**Simulations**
MATCH	**MATCH Software-Suite**
CODESYS	**Development Environments**
TELEMATICS M2M	**Telematics Solutions**
DIAGNOSE BIG DATA	**Data Analysis**
TÜV NORD Safety Approved	**Functional Safety**

Working Hydraulics

RS 160
Open Center Main control valve



RS 220
Open Center Main control valve

LX-6
Load Sensing Main control valve

If modular system of OC / LS mobile valves, customer-specific solution or a combination of both – we develop with you individual and holistic system solutions tailored to your machine. Herewith it is possbile to realize simple up to complex solutions like front-rear hitch, complete working hydraulics, simple locking functions.

Combinable with all pump systems with the basic data Q_{max} = 200 l/min; p_{max} = 350 / 420 bar

- Cylinder control functions with or without load tap
- Main actuator in parallel or series connection

Easy integration of:

- Secondary functions
- Prioritiy valves for (OC or LS) steering and brake system
- Filtration and sensorics
- Support and level control
- Fan controls, accumulator charging circuits

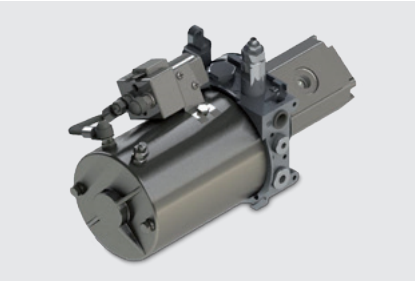
▶ *see brochure 5.254 – Mobile Valves*

Valves for piloting the working hydraulics / control units – PDRC04T30D:

- Standard cavity
- High functional reliability
- Extremely compact design

▶ *see catalogue 53.000 – Compact Hydraulics*

Machine Safety

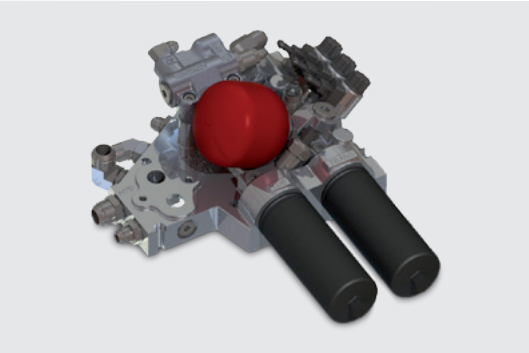


Back-up fluid power supply for the steering and braking system in the event of failure of the tractor's main pump.

A DC power unit performs the supply of the braking cylinder and the hydraulic steering system with priority if the tractor's hydraulic pump malfunctions.

- Permanent pressure monitoring of the system to ensure functional efficiency
- "Coming home" function – in addition to the emergency brake, the tractor can be manoeuvred to the next service station even in towing mode

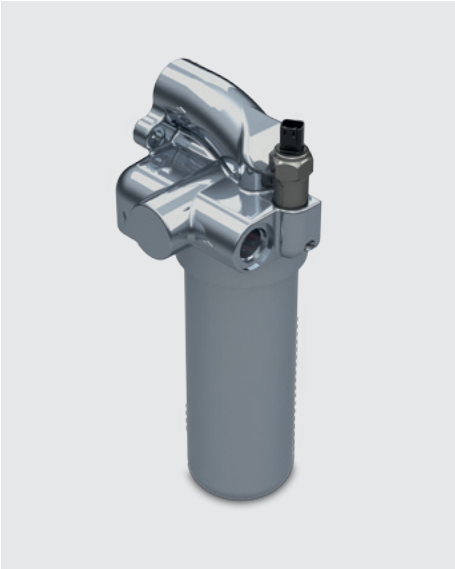
Gear Controls



With the specially developed kit consisting of proportional pressure reducing valves, HYDAC meets the most stringent requirements for transmission applications.

For optimum utilisation of installation spaces, additional functions can be integrated into the transmission control, such as cooling, lubrication, filtration and fluid power supply.

- Optimised pressure loss
- Rapid switching characteristics even in highly viscous oil
- High dirt resistance

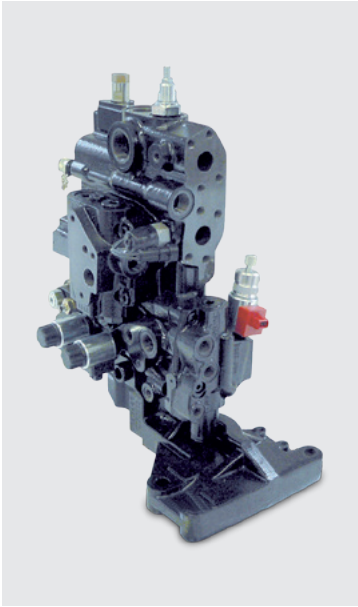


Filtration

Flange-mounted pressure filter for gear lubrication and supply of working hydraulics. By the integrated temperature controlled thermo bypass valve a part of the volume flow is led to the cooler – demand orientated.

- Reliable protection of the cooling circuit against overpressure by integrated cooler bypass valve
- Enormous space savings by compact design by integration of the valves
- Cost savings, as additional piping is omitted
- Lower risk of leakage, because less susceptible components and connections are used

Prioritised Distribution / Central Hydraulics



In customised central manifolds, variable and fixed displacement pump flows are distributed to actuators such as steering, brakes, suspension and control valves with optimised performance and with the required prioritisation.

The integration of filters and hydraulic accumulators increases the functional range using minimal space requirements.

STEER-by-Wire

System for electronic superposition of the main steering by means of electro-proportional steering valve with integrated position monitoring – for joystick or GPS-based steering in off-road operation.

Increased Safety and more Convenience

Axle suspension

Load-dependent control of the hydro-pneumatic front axle suspension is provided in conjunction with the level control of the front axle. This involves two different pressures on the rod side of the suspension cylinders being adjusted hydraulically in accordance with the front axle load.

- Consistent driving comfort independent of load
- Vehicle-specific adjustment

Active roll stabilisation

The hydraulic active roll stabilisation reduces the tractor's rolling movements during rapid cornering and sudden lane changes.

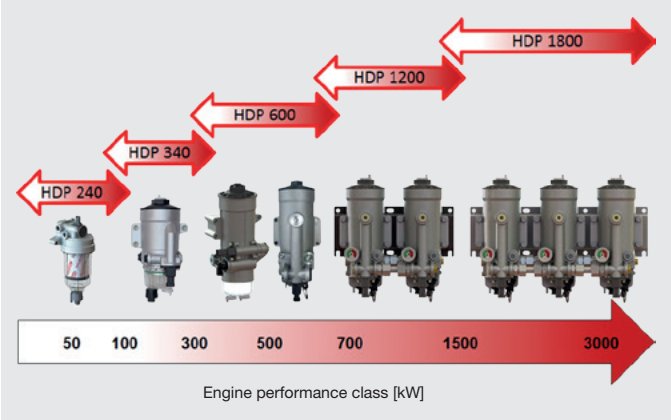
- Vehicle-specific adjustment of the stabilisation and damping characteristics
- Reduction of pressure peaks due to additional accumulator volume
- Integrated shock valves to protect the suspension system in the event of overload

Cab suspension

The cabin is supported by suspension struts on two or four points.

- Reduction of whole-body vibration stress for driver
- Increase in driving comfort
- Suspension and regulation of the cabin according to driving mode
- Available with fixed, switchable and proportional damping

Diesel Filtration



Suction-side pre-filter and water separator for diesel engines up to >3,000 kW with fully synthetic filter materials for protection of all components in the fuel system.

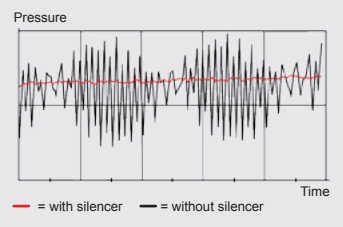
- Best water separation
- Long service life
- High dirt holding capacity
- Optionally with innovative filter material, Biomicron®, for protection against bacterial Pollution (Dieselpest) in the filter

Noise Reduction

Damping of noises with HYDAC Silencers for increase in comfort and reduction of the load for the machine operator (legal regulations for occupational safety).

Advantages of the Silencer:

- Universal broadband versions: easy selection, no design efforts
- Customized versions: individual calculation, different types



Switching Manifold for Front Hitch

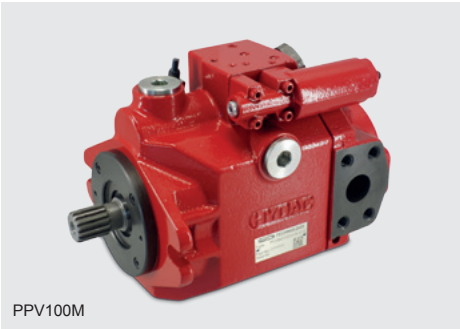
The manifold is used to switch a tractor front hitch from double-acting to single-acting. In double-acting operation the ball valve is open.

The tractor front hitch can lift attachments and also press equipment to the ground.

If this is not required and the front hitch should only be single-acting, the ball valve is closed.

- Fully integrated
- Space-optimised design with elongated switching shaft
- High level of functional safety

Supply



PPV100M

The main drive pump for the working hydraulics in tractors, 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.

PGE

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 tractors, 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.

MGE

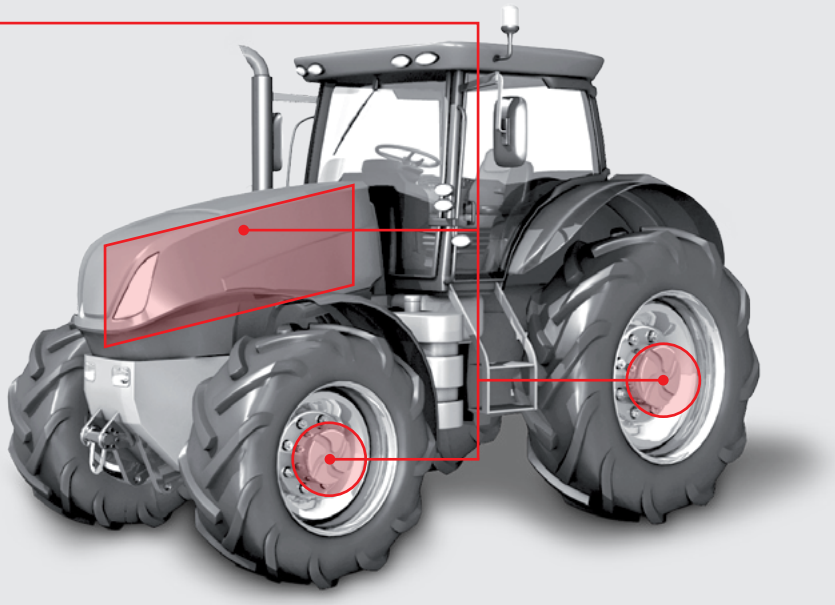
The reversible gear motors in the MGE series are designed for 2- or 4-quadrant operation and are available in three sizes from 1 to 90 ccm/rev. They are very often used as reversible drives for fans and blowers in mobile machinery.
The MGE gear motors boast optimised start-up characteristics and high pressure and speed reserves.

▶ *see catalogue 2.902 – Pumps*

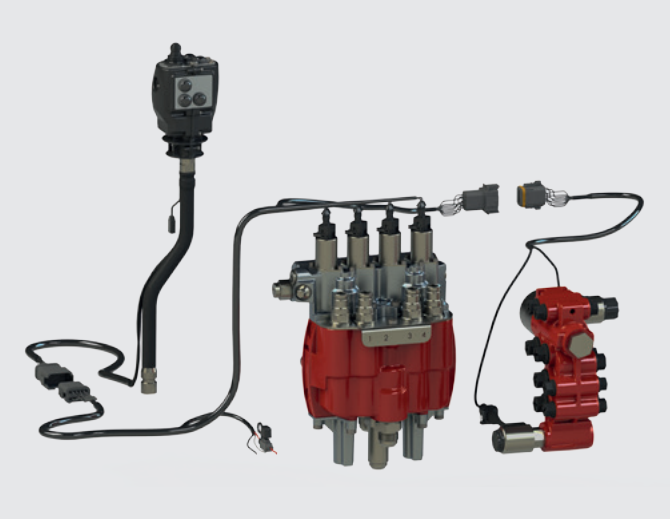
Solutions for Electromobility

Fields of application

- Cooling systems for inverter cooling, electric motor cooling, battery cooling and heating
- Sensor technology
- Fluid care
- Accumulator technology for energy recovery
- Control technology
- Silencer – Reduction of noises appearing more present by using an electro-motor



Front- and Working Hydraulics of Compact Tractors



In addition to the actual working hydraulics / or rear hitch of classic and large tractors other functions with individual requirements are available.

This results in autonomous ECUs and subsystems, which meet the specific requirements.

Strong performance and controllability

- From single valve to modular kits up to subsystems with performance level for front loaders, front hitch or working hydraulics of compact tractors
- Typical loader configurations with minimal spool leakage for safe load holding
- High control quality with low pressure losses for sensitive working and highest efficiency in drive mode

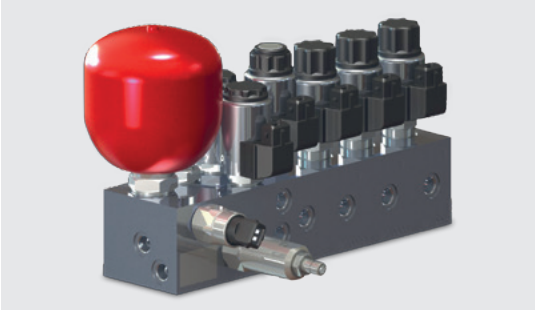
Cooling

Powerful and installation-optimized cooling systems to meet the legal requirements for noise, emissions and fuel economy.

- Oil-air coolers
- Combination coolers
- Tank filter integration
- Optionally with integrated thermo bypass valve
- Electric / hydraulic fan drives with proportional speed control and reverse direction
- Plate heat exchanger, e.g. for transmission or axle cooling

▶ *see catalogue 57.000 – Cooling*
▶ *see brochure 5.812 – Mobile Coolers*

Clutch and Transmission Shift Control



3/2-directional spool valve

3-way directional proportional pressure reducing valve, slip-in version

3-way directional pressure relief valve

3-way directional proportional pressure reducing valve

With the specially developed valve kit concept made of proportional pressure control valves HYDAC meets the highest demands for transmission applications.

For optimal use of installation space, other functions such as cooling, lubrication, filtration or pressure supply could be integrated in the transmission control.

Pilot operated and direct acting valves in cartridge and slip-in design.

- Fast switching even in highly viscous oil
- Optimized pressure losses when unloading the clutch
- Special switching currents for safe switching at low voltages
- Good behavior in high-viscosity oil
- Pilot operated valves with almost no pilot oil loss
- High resistance to silting

▶ *see brochure 10.151 – Valve technology and special solutions for mobile transmissions*

Monitoring of Fluids and Components

Onboard sensors for condition monitoring of the machine concerning solid particle contamination, oil condition, pressure and temperature.

- Portable & mobile service devices for monitoring fluids (service)
- Analyzers for determination of the technical cleanliness of components

▶ *see brochure 7.607 – FCU 1000*
▶ *see brochure 7.959 – CTU 1000*

Filtration and Tank Systems for Tractors

RFM

LFM

ELF / BF

Return line filter series for optimized air separation

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 a good distribution of the oil flow in the tank. Thus, a high air separation thereby allows a reduction of the hydraulic tank.

An enormous cost saving for operators and OEMs can therefore be achieved (significant reduction of the used oil quantity and material).

▶ *see brochure 7.422 – Return Line Filters*
▶ *see catalogue 70.000 – Fluid Filters*

In the fight against electrostatic discharges in the system we support our customers with our innovative Filter media **Stat-Free®** and **Stat-X®** and increase thus the reliability of the system.

▶ *see brochure 7.017 – Innovative Element Technology Stat-Free®*

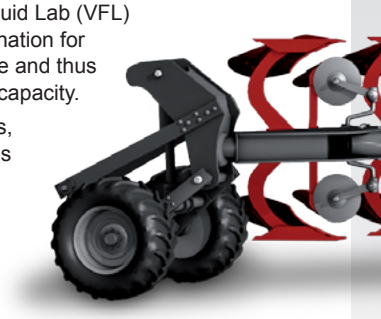
Stat-Free® filter elements

Stat-X® filter element

Virtual Fluid Lab (VFL)

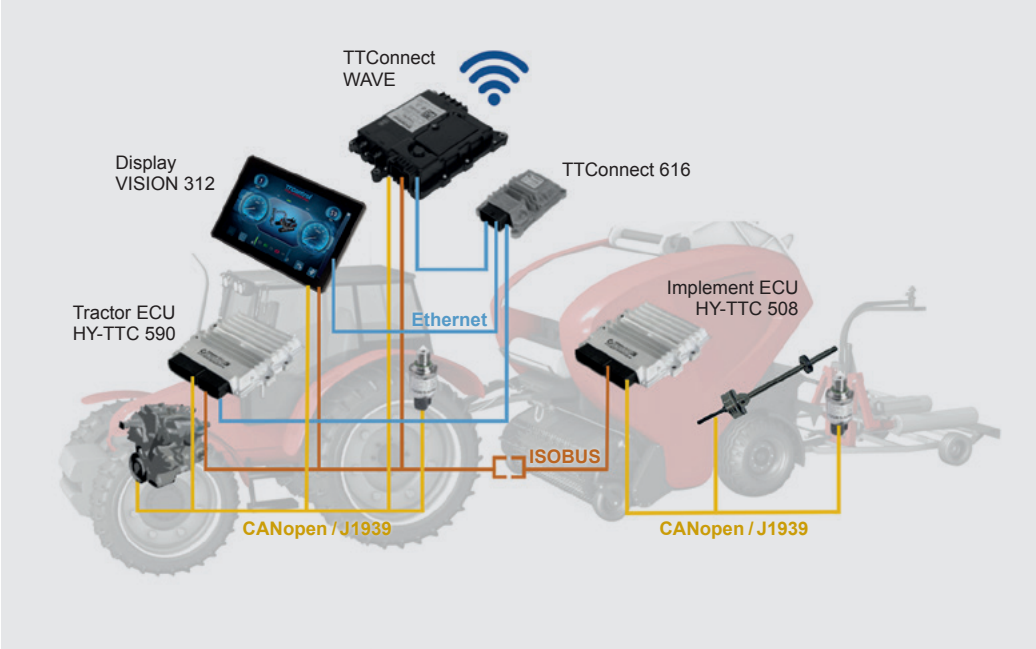
Our smart sensor Virtual Fluid Lab (VFL) allows residual life determination for a needs-based filter change and thus a full utilization of the filter capacity.

Maximized service intervals, plannable service as well as an increased availability are the advantages.



Electronic System Architecture

For the internal and external communication of digital data
there is an extensive product range with appropriate interfaces available.



ISOBUS communication:
- HY-TTC 590
- HY-TTC 508
- VISION 312

CAN communication:
- Sensors
- Controllers and displays

Internal data management
(CAN-Ethernet Gateway):
- TTConnect 616

External data communication:
- TTConnect WAVE

Controllers

Displays

Connectivity

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, inclination, angle, level, flow rate, speed, contamination and oil condition.

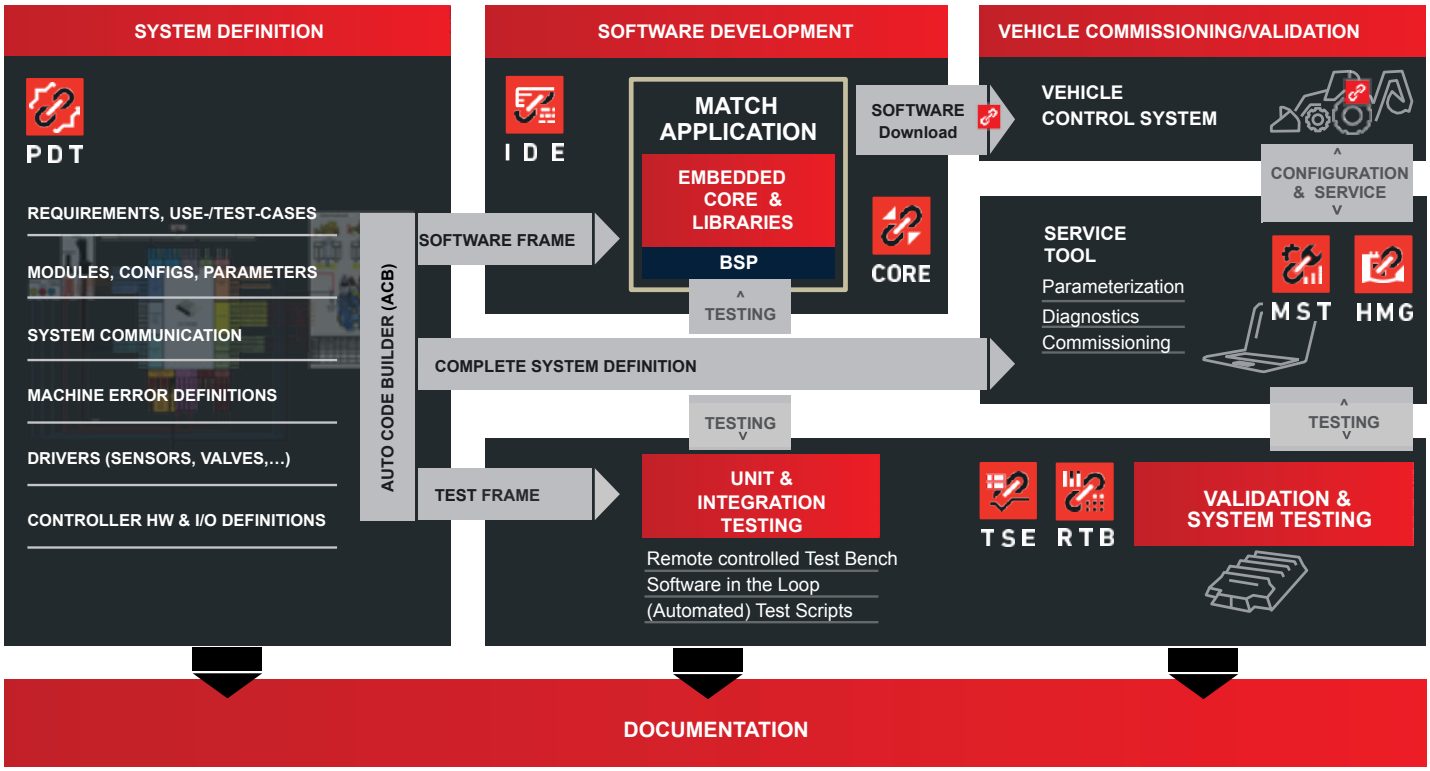
SMART sensors
with internal measurement data analysis.

▶ *see catalogue 18.500.3 –*
Control Technology for Mobile Machines

Development Environment

MATCH BY HYDAC MACHINE APPLICATION TOOL CHAIN

The Basis for Mobile Automation



With the software suite “MATCH” HYDAC offers a tool chain for customer software development which is specially adapted to the requirements of mobile machines at system level.

“MATCH” supports the development, starting at the system definition on vehicle level, on the creation of the application software up to commissioning, testing and documentation.

“MATCH” offers modules for:

- The system definition at the vehicle level
- Commissioning and service on the machine
- The software test (e.g. via HYDAC Software RTB-Box)
- The documentation

▶ *see catalogue 18.500.1.0 – MATCH Software Product Catalogue*

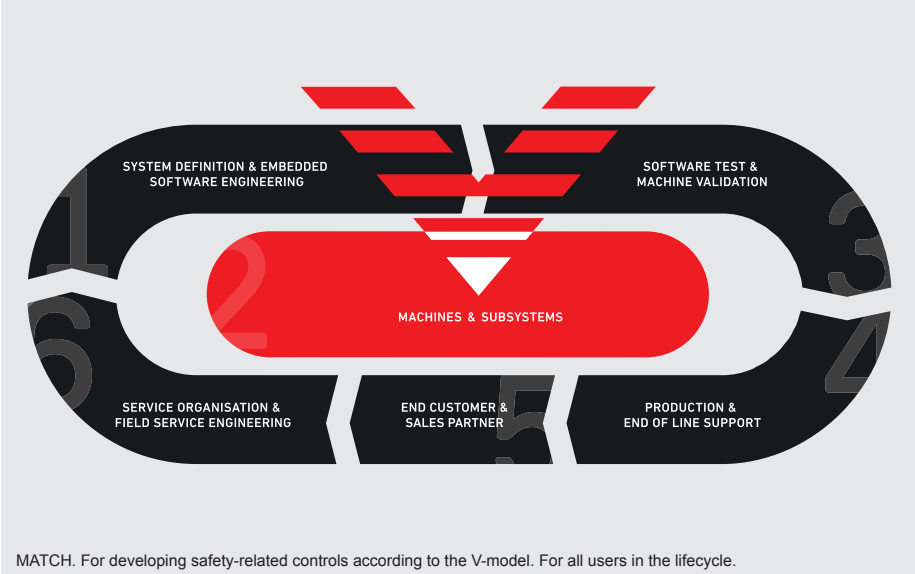
In addition, an “embedded middleware” is offered, which allows hardware-independent programming of the application and includes a variety of basic functions.

An extensive selection of library modules (e.g. for sensor and valve controls) is available for an efficient development of the application software.

Functional Safety

“MATCH” incorporates a creation of application software with increased functional safety according to the following safety standards with TÜV certification:

- SIL 2 to IEC 61508
- PLd to EN ISO 13849
- AgPL to ISO 25119 / DIN EN 16590

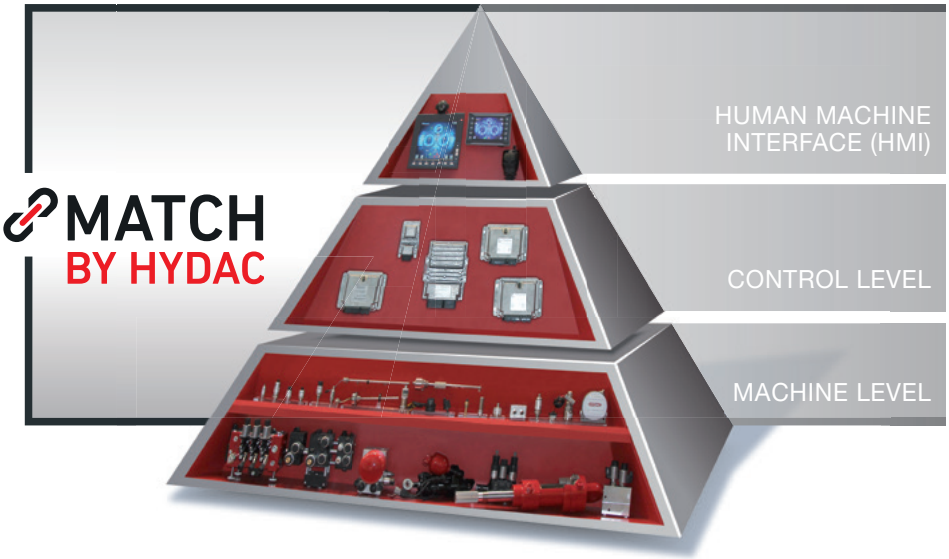


MATCH. For developing safety-related controls according to the V-model. For all users in the lifecycle.

System Intelligence

Electrohydraulic system solutions as interface between actuators and sensors.

The demands of modern agricultural machinery are leading to ever-increasing complexity of control systems. Modern machines require a variety of assistance and control systems wherever simpler operating concepts and a better overview and controllability of the machine functions become necessary.



- Displays for the most demanding visual requirements
- Peripherals, e.g. joysticks

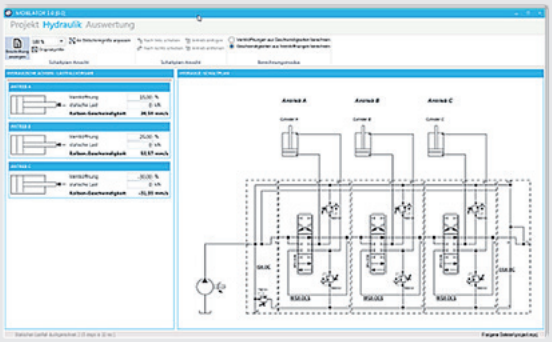
- Controllers in various classes
- I/O expansion modules
- Standard version and versions with increased functional safety available

Sensor level
- Pressure and temperature
- Distance, position, angle, inclination and level
- Drive speed
- Flow and oil level
- Standard version and versions with diagnostics and increased functional safety available

Actuator level
- Pilot-controlled and direct-acting valves
- Manifolds (monoblock / sandwich)
- Pilot and main controls
- Intelligent axles
- Cylinders, pumps and motors

▶ *see catalogue 18.500.1.0 – MATCH Software Product Catalogue*
▶ *see catalogue 18.500.3 – Control Technology for Mobile Machines*
▶ *see catalogue 180.000 – Electronics*

Simulation Technology by mar pi tec Engineering Support



The quality of a hydraulic system is determined by a wellcoordinated interplay of a number of single components, like pumps, cylinders, motors, valves, accumulators, line systems and electronic components.

Particularly when strict requirements apply for the system dynamics, the precision of control processes and safety-relevant functions, it is vital for detailed information on expected operating behaviour to be made available as early on as possible.

Hydraulic simulation makes it possible to perform extensive analyses and optimisations of the systems in early development phases, minimising time-consuming and costly re-design and work in the trial field.

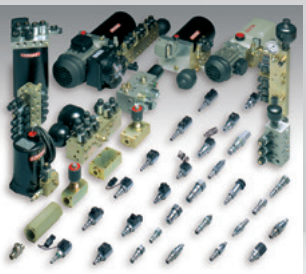
Using hydraulic simulation in conjunction with the simulation of multi-component systems also makes it possible to take into account the effect of complex kinematic structures and their retroactive effect on drive behaviour.

Accumulator Technology 30.000

Filter Technology 70.000

Control Technology 18.500

Filter Systems 79.000



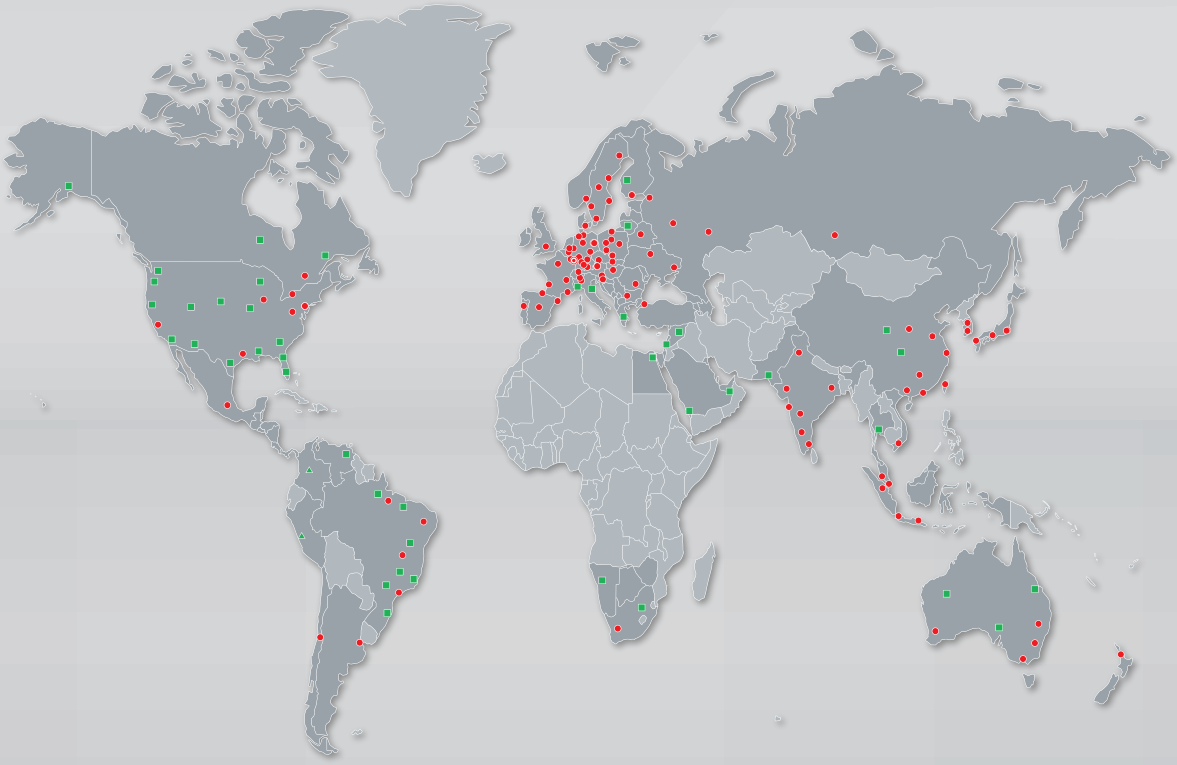
Compact Hydraulics 53.000

Accessories 61.000

Electronics 180.000

Cooling Systems 57.000

Global Presence.
Local Expertise.
www.hydac.com



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

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