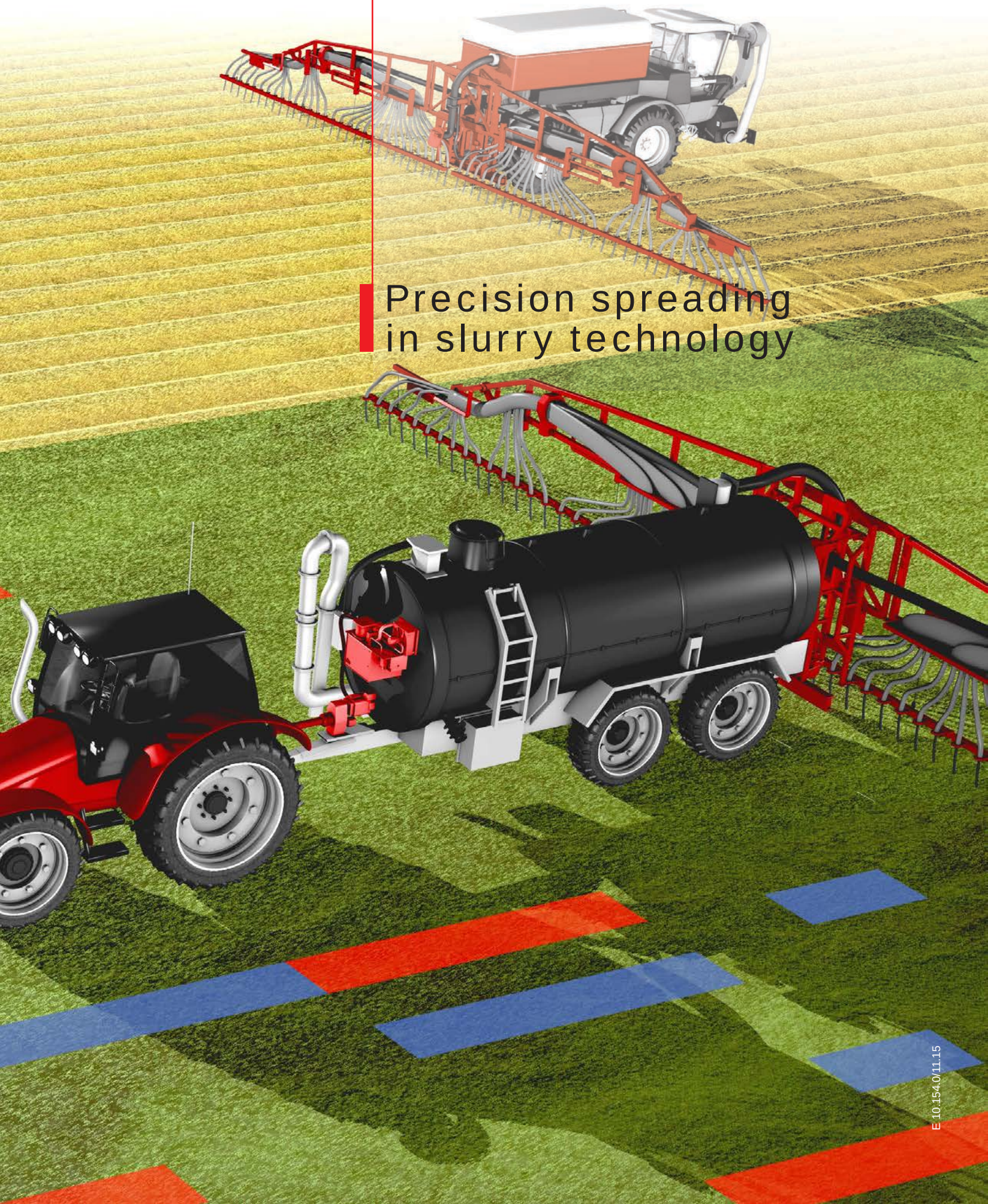


HYDAC INTERNATIONAL

Precision spreading
in slurry technology



Precision spreading in slurry technology

System overview

System intelligence

Legal concerns

Slurry tanker overview 1–9

Slurry tankers in detail 1–4

Slurry tankers in detail 5–9

Hydraulic controllers & additional solutions

System intelligence

Hardware

- Electro-hydraulic control technology

Software & service

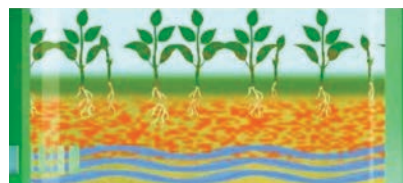
- System development
- "MATCH" development environment
- Software development
- Simulation technology
- System development support



Legal concerns

Precision farming

Using environmentally friendly plant fertilisers reduces pollution to drinking water



Spreading methods

The aim is to produce a consistent flow of slurry to ensure optimum distribution and homogeneous spreading of the liquid nutrients over the soil, directly to the plants.



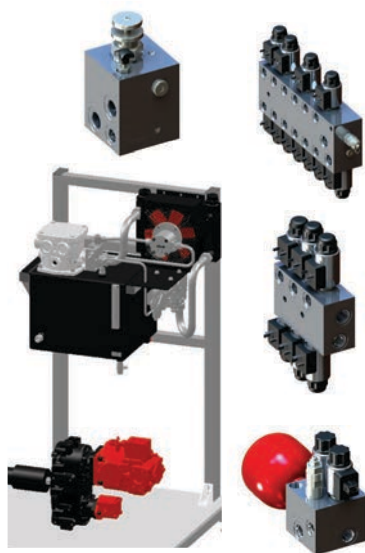
Slurry tanker overview 1–9

Equipping the vehicle with hydraulically powered functions

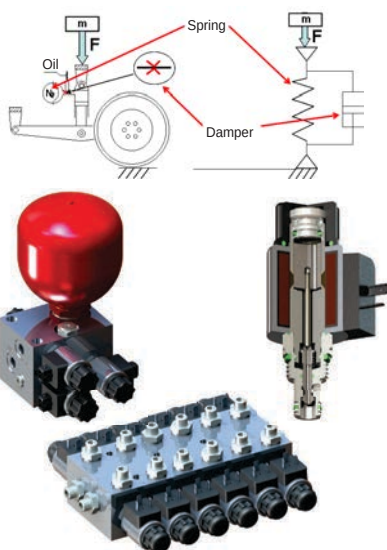
Using hydraulic components and systems for efficient spreading of the slurry



- Hydraulically powered slurry pump
- Input power in block
- Hydraulic boom control
- Hydraulic motor drives



- Hydraulic valves, actuating functionality
- Hydraulic docking arm
- Hydro-pneumatic axle/drawbar suspension
- Electro-hydraulic steering
- Top cylinder



Slurry tanker hydraulics

HX1 modular manifold system one unit for (almost) all needs!

Additional solutions

Filtration. Accessories. Hydraulic accumulators.

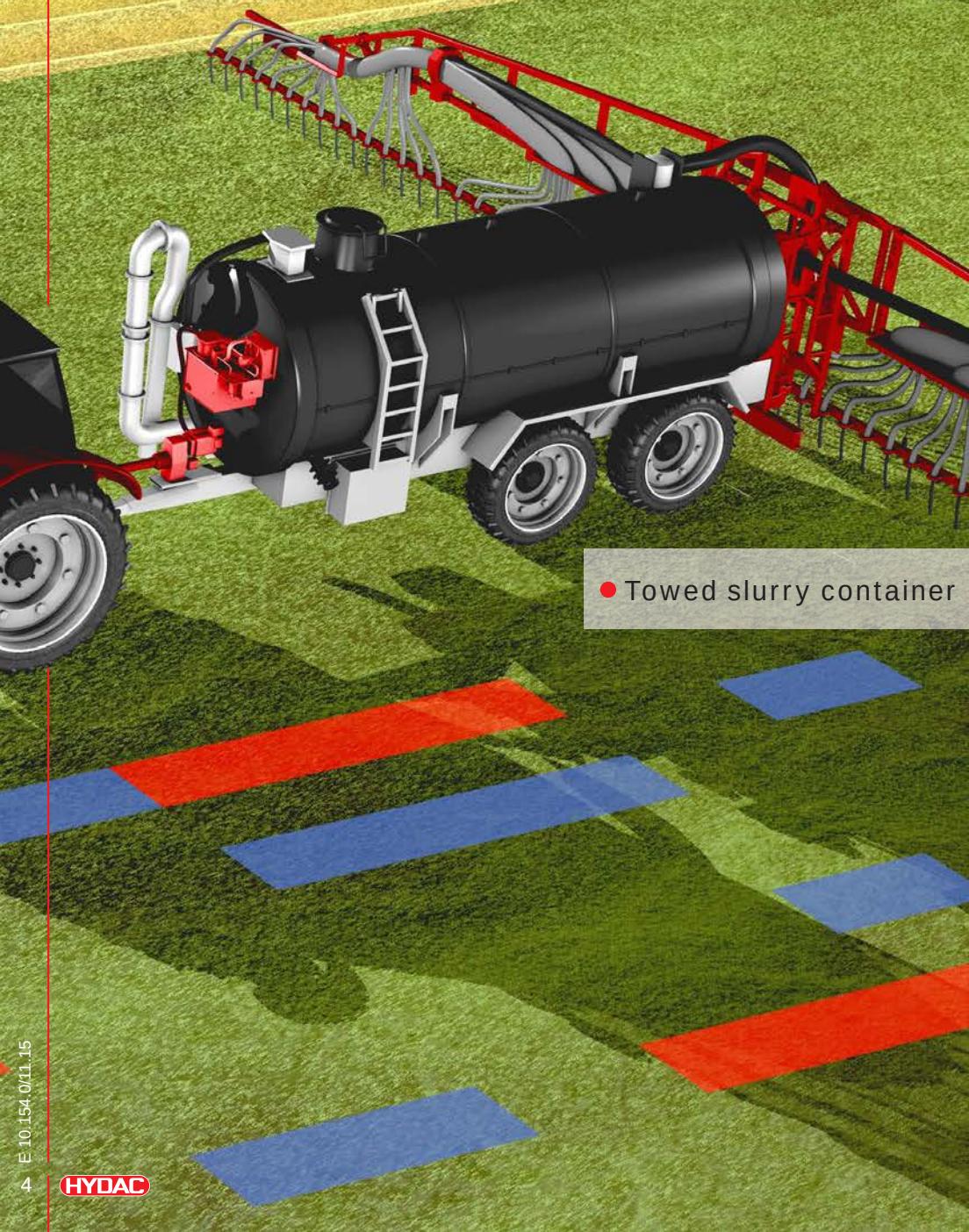
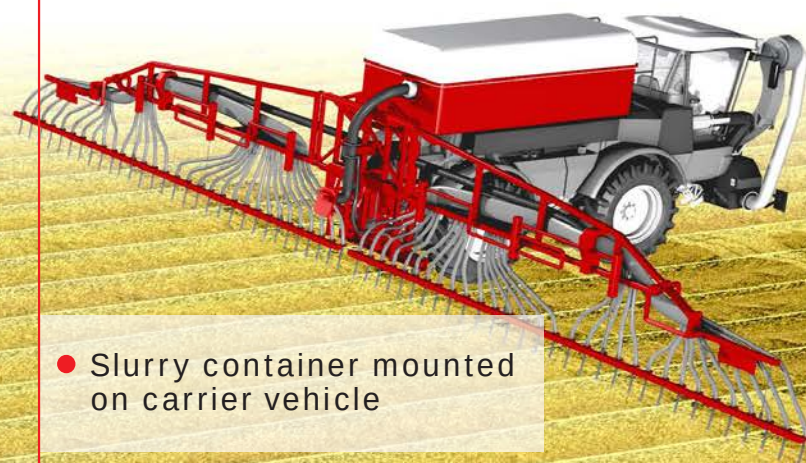


Various vehicles and technologies ...

... based on individual requirements.

- Slurry container mounted on carrier vehicle

- Towed slurry container



Energy efficient, safe, comfortable.

Challenges in modern slurry tankers

The aim of the modern slurry tanker is to produce a cost-effective increase in agricultural yield with minimum resource waste. The main objectives are larger working widths, pressure supplied continuously to provide consistent slurry distribution and slurry being spread with precise quantities, exactly as needed.

Nevertheless, the technology and appearance of today's working machines are also determined by legal and social factors such as safety and emission directives and requirements relating to comfort and health and safety.

HYDAC's contribution

HYDAC offers a variety of components and systems that meet these requirements and fulfil your demands. In addition to standard components, HYDAC offers a comprehensive modular system designed for slurry tanker applications. HYDAC will also work with you to develop an individual solution for your machine.

HYDAC's key issues

Our development team and application engineers are working continuously to further develop our products.

The focus of these developments is on the following key topics:

Our technology

Optimum positioning of the slurry distribution head in the working position with sensitive control.

Distance from ground is maintained through the use of fast-acting proportional valves in the distance control.

● Increases in:

- ⇒ Travelling speed
- ⇒ Corrosion resistance owing to surface coating and special materials

● Reductions in:

- Material stress thanks to boom suspension and damping
- ⇒ Piping and installation expenditure due to combined hydraulic function units
- ⇒ Mechanical stress due to axle and drawbar suspension
- ⇒ Noise emissions and power requirements thanks to controlled fan and pump speeds
- ⇒ Driver vibration load due to hydro-pneumatic cab suspension in self-propelled vehicles
- ⇒ Driver's exposure to aerosols due to cabin ventilation systems
- ⇒ Hydraulic oil tank sizes by simulating and optimising air separation in hydraulic oil
- ⇒ Installation space, component weight and electrical power requirement by reducing solenoid valve sizes

● Extension of:

- ⇒ Maintenance intervals by monitoring the hydraulic oil quality

● Reduction in:

- ⇒ Software development time by using tested and certified software libraries

Your benefits

● Energy efficiency

- ⇒ Reduced fuel consumption
- ⇒ Lower hydraulic losses
- ⇒ Energy saving
- ⇒ Precise cooling-requirement temperature control
- ⇒ Reduced electrical power requirement



● Reliability

- ⇒ Certified software modules
- ⇒ Service life increased by protecting materials



● Noise reduction

- ⇒ Lower noise level in partial-load range of fan control



● Health & safety

- ⇒ Reduced vibrations for the driver
- ⇒ Reduced aerosol exposure for the driver



● Takes up less space

- ⇒ Combined functional units
- ⇒ Integrated tank and filter systems



● Function integration

- ⇒ Reduced number of components
- ⇒ Reduced weight
- ⇒ Reduced joints and leakage points



● Comfort

- ⇒ Improved working environment for the driver
- ⇒ Sustained driver performance on longer jobs



● NOx

- ⇒ Compliance with the Emissions Directive
- ⇒ Reduced nitrogen oxide and CO₂ emissions





System intelligence

Electro-hydraulic system solutions as the interface between actuators and sensors.



HARDWARE

Electro-hydraulic control technology

From component to intelligent drive solution.

HYDAC offers everything from all kinds of hydraulic and electronic components and subsystems to finished functional solutions that can also include the corresponding application software.

See Product Catalogue 18.500
– Control Technology for
Mobile Machinery

Functional Safety
PL d
SIL 2

Functional Safety
PL d
SIL 2





USER LEVEL

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

CONTROL LEVEL

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

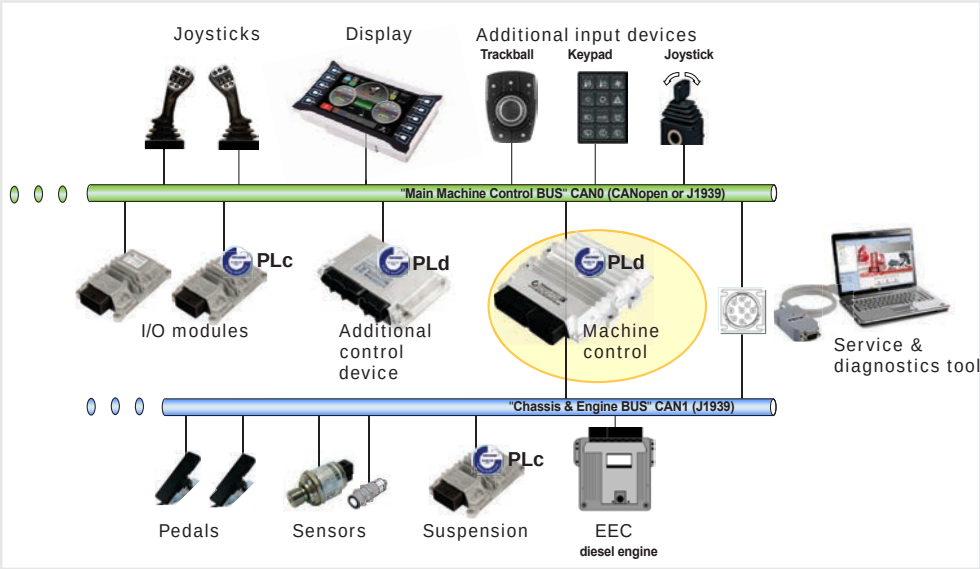
SENSOR LEVEL

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

ACTUATOR LEVEL

- Pilot-controlled and direct-acting valves
- Control blocks (monoblock/sandwich)
- Pilot and primary control systems
- Intelligent axles
- Cylinders and pumps

System development



Example of control architecture

Based on the customer's requirements, HYDAC offers across-the-board support in developing electro-hydraulic control systems for mobile machinery. The scope of development is determined together with the customer according to the task.

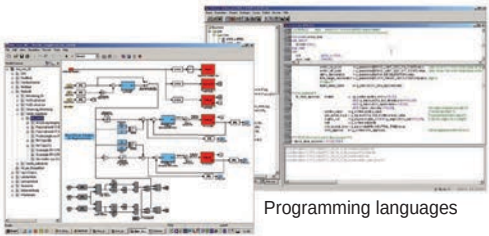
Services can include:

- Creating customer-specific application software (according to specification)
- Integrating intelligent subsystems into the customer's machine (e.g., suspension systems, secondary steering systems, fan controls)
- Complete control solutions for mobile machinery (safety functions, electrical/electronic control architecture, application software)

Software development

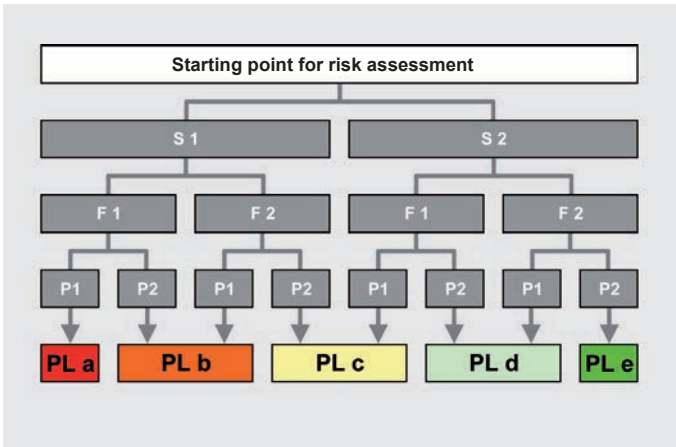
Depending on the hardware, the following programming languages can be used to program the application software:

- CoDeSys 2.3 / 3.5 / 3.5 SIL2
- C
- MATLAB/SIMULINK



Programming languages

System development support

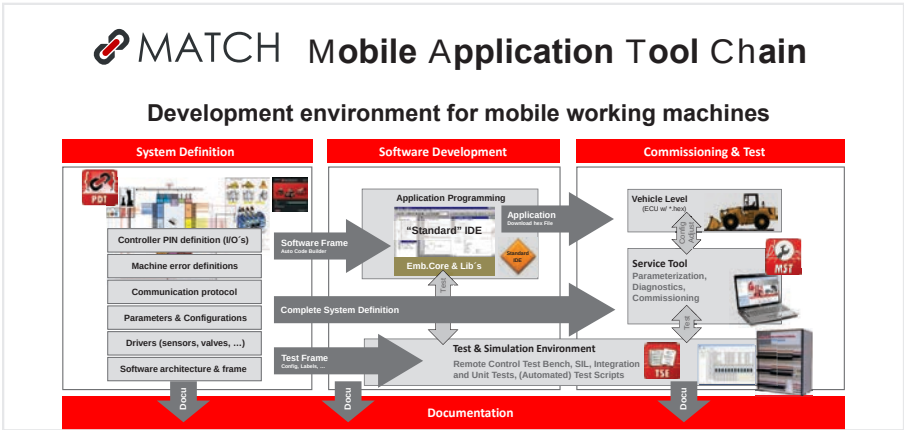


- Severity of injury**
- S1 Minor, reversible injury
 - S2 Severe, irreversible injury including death
- Frequency/duration of exposure to hazard**
- F1 Rare or brief exposure to hazard
 - F2 Frequent to continuous exposure to hazard
- Possibility of avoiding the hazard or limiting the damage**
- P1 Possible under certain circumstances
 - P2 Practically impossible

HYDAC offers extensive consultation and support for customer projects with regard to:

- Hazard and risk (H&R) analysis
- Definition and description of safety functions
- Drafting safe system architectures and user interfaces (HMIs)

"MATCH" development environment



Mobile Application Tool Chain

With the "MATCH" (Mobile Application Tool Chain) development environment, HYDAC offers a tool chain for system-level software development performed by the customer that is specially suited to the requirements of mobile machinery. "MATCH" supports development from defining the system at the vehicle level and creating the application software to start-up, testing, and documentation.

"MATCH" offers modules for:

- Defining the system at the vehicle level
- Starting up and servicing the machine
- Testing software
- Documentation

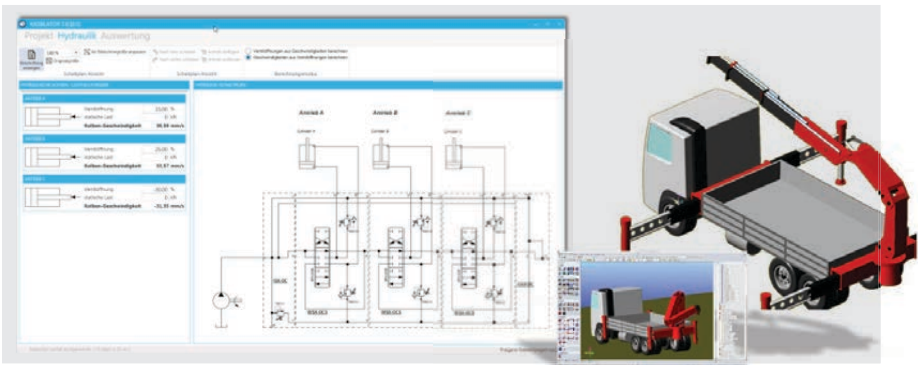
Furthermore, an "embedded Middle Ware" is offered which permits a hardware-independent programming of the application and which contains a multitude of basic functions. A comprehensive selection of library modules (e.g. for sensor and valve drives) is also available for an efficient development of the application software.

Functional safety

"MATCH" can also write application software with increased functional safety according to the following safety standards:

- "SIL 2" to IEC 61508
- "PL d" to EN ISO 13849
- "AgPL d" to ISO 25119 or EN 16590

Simulation technology



The quality of a hydraulic system is determined by a well-coordinated interplay of a number of single components, often very many, such as 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.

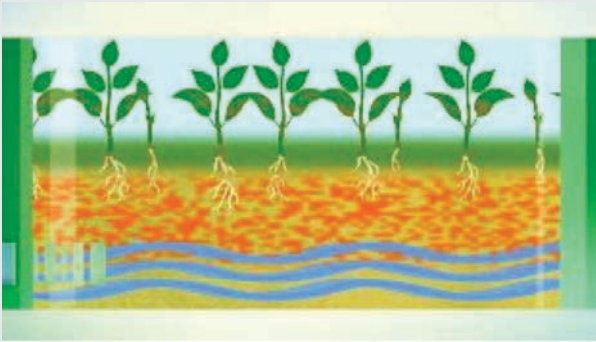
Hydraulic simulation makes it possible to perform extensive analyses and optimisations of the systems in early development phases, minimising time-consuming and costly adjustment work and work in the trial field.

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.

Legal concerns

Precision farming

Using environmentally friendly plant fertilisers reduces pollution to drinking water



Clean groundwater



“**Precision farming**” and “**strip-till**” – these modern terms are gaining ground in one of the oldest human pursuits: agriculture. And they are accompanied by a constant acceleration in the development of methods for optimising the use of available resources and increasing yields while minimising harm to the environment.

As corresponding legislation (Fertiliser Ordinance) keeps on imposing restrictions to protect the environment, the uncertainty of farmers and contractors continues to grow. They are constantly in doubt as to whether they are still competitive when working their fields with their existing machinery, and whether they are still within the bounds of the law.

The same applies to the manufacturers of these machines: they also have to keep their machines in line with the latest technological advances to meet the requirements of the law and of modern agriculture and to compete successfully in the market.

We can help you by providing and refining the corresponding technology and by representing its functions transparently.

Slurry injection – a European trend

For some time, spreading slurry close to the soil surface has been the best available technological method – the use of baffle plates is prohibited in Germany. An advanced method for such applications is injecting the slurry into the soil directly – a method not only prescribed in various European laws but also a trend and a forward-thinking technology. The practical advantages of this technique include an optimum and controlled injection of slurry into the soil. The turf is also given a good airing. This fertilising technique also prevents the plant from being smeared with slurry, which improves quality, taste and plant growth.

Applying the fertiliser to the root area reduces the amount of fertiliser that is required, as the nutrients have little chance to disperse.

This results in a considerable reduction in costs as little fertiliser is needed for a large effect.

Odour impact is also reduced, as is the pollution of groundwater and surface water.

A new, environmentally friendly way to fertilise.

Understanding the application

With 50 years of experience in hydraulics in the agricultural machinery sector and intensive discussions with manufacturers and users, we are about to satisfy customer wishes and cope with market changes and changes to national and international legislation.

With the latest technologies and developments in slurry applications, HYDAC is always a trendsetter.

Various factors play a role when it comes to selecting the right spreading technology: type of soil, variety of plant, landscape, slurry tank, tractor and fertilising regulations.

Spreading methods

The aim is to produce a consistent flow of slurry to ensure optimum distribution and homogeneous spreading. There are a wide range of devices that can be used for this, most of them hydraulically controlled, such as slurry pump drive, folding boom, drawbar adjustment and slot distribution head. To provide guaranteed distribution of both thick and thin slurry, extra hydraulically controlled blades can be mounted in the shredder or slot distribution head. Double-acting shoe caps can be attached to all slurry spreaders to reliably prevent dripping on paths and headland.

- 1** Feeder container
Self-contained tanker truck or just container
Feeder for transport between slurry container/yard and field



- 2** Trailing hose system
Slurry is spread close to the soil via hoses
 - Low ammonia emissions
 - No sensitivity to cross-winds
 - Working widths of up to roughly 36 m possible
 - Shredder-distributor with integrated cutting unit
 - For universal application
 - Suitable for grassland and cropland, even growing stock



- 3** Trailing shoe system (working width low)
Slurry is spread close to the soil via slashing trailing shoes
 - Lower ammonia emissions
 - No sensitivity to cross-winds, in some cases integrated slope compensation systems
 - Exacut distributor with integrated cutting unit
 - Closely positioned drainage hoses enable complete fertiliser coverage
 - Working widths of up to roughly 24 m possible
 - For universal application
 - Particularly suitable for grassland, also for growing stock
 - Faster nutrient uptake and reduced soiling of foliage



- 4** Cropland injector (medium working depth)
Disc harrow, connected to main frame via parallelogram
Slurry is inserted into slot and injected directly to the roots with no significant soiling of plants
 - Significantly lower ammonia emissions
 - No sensitivity to cross-winds
 - Closely positioned drainage hoses enable complete fertiliser coverage
 - Very low net weight
 - Working widths of up to roughly 12 m possible
 - For soft base surface with no stones
 - Particularly suitable for grassland
 - The individual elements adjust to suit the soil effectively, via a hydraulic pressure system



- 5** Slurry cultivator (high working depth)
Slurry is worked into the soil directly via cultivator tines
 - Working depth 5-15 cm
 - Very low ammonia emissions – optimum nutrient utilisation
 - No sensitivity to cross-winds
 - Working widths of up to roughly 6 m possible
 - Can be used on cropland – not on growing stock
 - Good soil tilling
 - Con: very heavy device (1.3 to 2 t)



- 6** Swivel distributor system
Slurry is sprayed over the soil via baffle plates
 - now prohibited in many countries





Slurry tanker overview

Equipping the vehicle with hydraulically powered functions

1

Hydraulically powered slurry pump with variable speed control

- 3-way ball valve for recirculation
- Rinsing stirrer: Rinses the container during movement
- Turbo-boost function: increases pump capacity



6

1

9

2

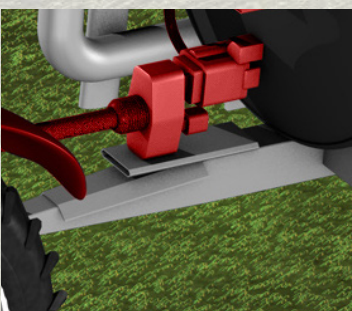
7

8

9

Top cylinder

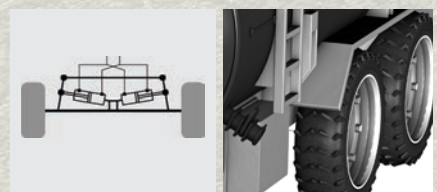
Displacement-controlled or pressure-controlled cylinder to increase traction, dampen vibrations and compensate for negative loads



8

Electro-hydraulic steering

e.g. for tandem and tridem chassis



2

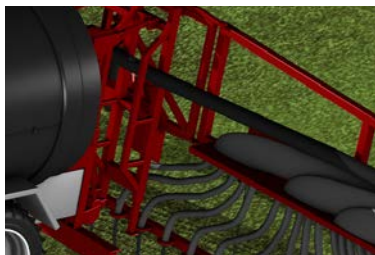
Input block

Incl. prioritised steering supply and headland management

4

Hydraulic motor drives

For shredder, distributor, compressor of the central tyre inflation system



3

Boom

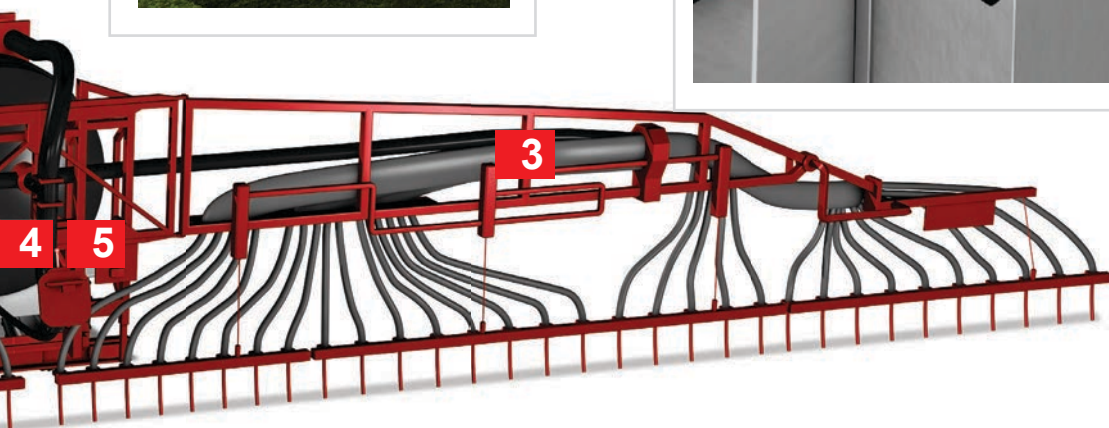
- Lifting/lowering
- Boom suspension at 3-point
- Support regulation (injector)
- Folding
- Segment control with gate valve to shut off the hoses of the segment
- Transport lock



5

Hydraulic valve

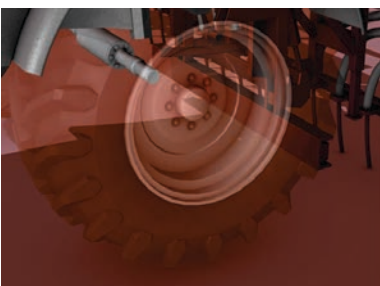
3-way ball valve, actuating functions



7

Hydropneumatic suspension

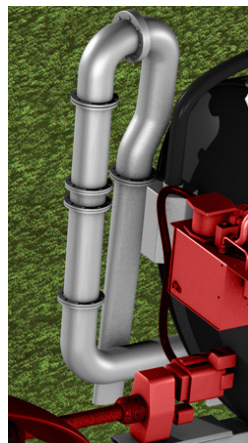
- Axle suspension
- Level control
- Lift axle
- Drawbar suspension/adjustment



6

Hydraulic docking arm

with filling aid
Lifting, lowering,
pivoting





1

Hydraulically powered slurry pump with variable speed control

Variable speed control for the slurry pump independent from the PTO speed means precise control of the quantity of slurry spread

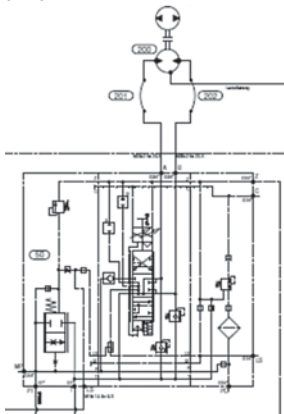
The tractor's PTO powers an axial-piston variable displacement pump via an upstream gearbox. The pump then configures the hydraulic flow rate to allow the rotary pump to rotate faster or slower in line with the travelling speed, spreading the desired amount of slurry.

Only the required slurry quantity is conveyed to the distributor system; unlike standard solutions, no unneeded residual quantity is pumped in the circuit.

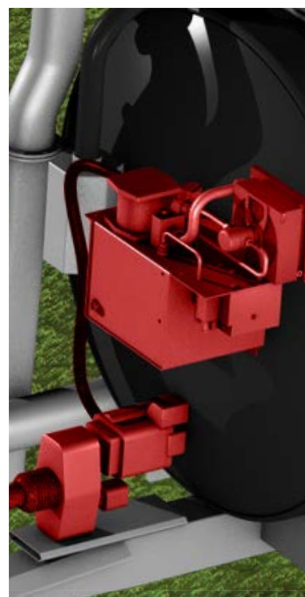
Customer benefits:

- ⇒ Variable speed control for the slurry pump/independent from the PTO speed
- ⇒ Energy-saving and precise control of the slurry spread rate
- ⇒ Eliminates need for 3-way ball valve to regulate slurry return
- ⇒ Regulating the hydraulic feed flow to the pump via a proportional valve provides the following additional benefits:
 - ⇒ Smooth start-up and cut-off for the rotary pump protects the material, increasing service life
 - ⇒ Intake can almost reach the cavitation limit, as the pump speed is set via rotary potentiometer
 - ⇒ Output – pump speed in line with power for drainage, with no damage to the pump caused by exceeding the pressure limit

Maximum speed at slurry pump motor: 600 l/min

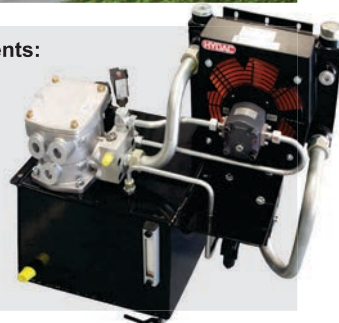


Output 198 l/min
Power roughly 75 kW
Pressure 220 bar
Tank size 50 l



Includes the HYDAC components:

- ⇒ Axial piston pump PPV100S-71
- ⇒ Gear pump PGE102-820
- ⇒ Oil cooler OK-ELH3
- ⇒ Return line suction boost filter RKM 400
- ⇒ Load-sensing valve LX6-1
- ⇒ Tank filler/breather filter ELF
- ⇒ Level display FAT



See Brochures PPV 2.907, PGE 2.910, OK-ELH 5.808, RKM 7.124

2

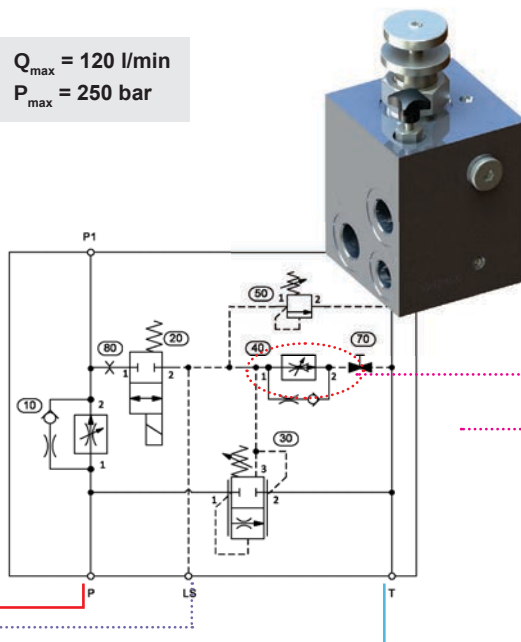
Input power in block with prioritisation

The input block represents the interface between the tractor and the attachment unit and its functions. It can be arranged individually or in the HX1 module system. Its main task is to distribute the oil flow to the various functions with the ability to influence the pump directly. A prioritisation that can be integrated for a steering system, for example.

$Q_{max} = 120 \text{ l/min}$
 $P_{max} = 250 \text{ bar}$

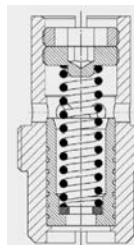
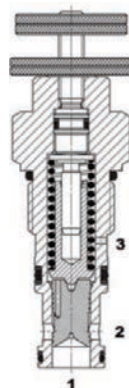
Additional functions:

- ⇒ Filter integration in the block
- ⇒ Accumulator charging switch
- PB/KS pump operation (handwheel)
- Switch-on and switch-off valve
- Controlled oil quantity (20 lpm)
- Pressure limit P_{max}
- LS-relief via flow control valve



Upstream pressure compensator DWM12121ZB/D

- ⇒ Handwheel
- ⇒ LS-relief in piston
- ⇒ Hydro.dyn. damping
- ⇒ PR function



Flow control valve SRE 1-3

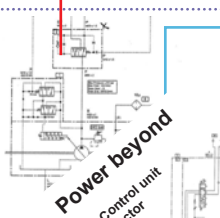
For greater system intelligence: Prop. pressure control valve PDR 3 in 1:

- ⇒ Electrical LS
- ⇒ LS-reinforcement
- ⇒ Consistent pressure connection



Pressure-compensated relief

- ⇒ Can be switched on and off



HYDAC

See Brochures HX1 5.256, SRE 5.118, DWM 5.191, PDR08 5.990

Hydraulic boom control

Precise boom control means a reduction in vertical and horizontal vibrations and high stability, along with exact height adjustment over the crops. A range of actuating functions provide segment control but also switch off the particular segments and hoses on the working device.

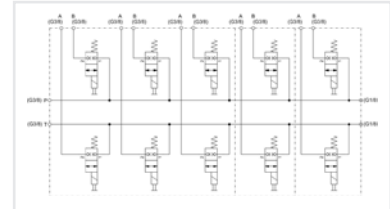


An overview of functions:

- Boom:
 - Folding
 - Segment control with gate valve to shut off the hoses of the segment
 - Lifting/lowering
 - Coulter pressure support regulation
 - Boom suspension on parallelogram
 - Transport lock

Extending & retracting

From the hydraulic pressure sequencing manifold for smaller working widths to the deluxe version with solenoid valves that also allow for partial retraction. A meter-out flow control or counterbalance valve can be added to the modules for advancing loads.

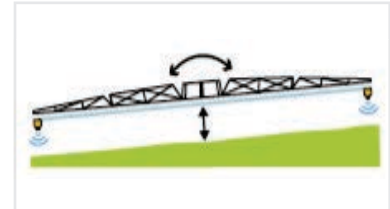


Actuating function modules with leak-free directional poppet valve technology

Slope and distance control

Optional active tracking systems are available to maintain consistent distance between the distributor boom and the crop, even on slopes and uneven terrain. The distance is measured and readjusted as necessary by actuating solenoid valves. This places great demands on the valve technology. The PWSM 06020 W proportional poppet valve has been specially developed for this application. Given the standardised installation space, an on/off valve can also be used.

The suitably adapted characteristic curve allows for sensitive angling and quick adjustment.



Boom tracking for slopes

Suspension

To provide vertical and horizontal suspension in the boom, SBO type diaphragm accumulators, appropriate for the positioning cylinder and with integrated pressure relief valve and shut-off valves, are included in the control block.

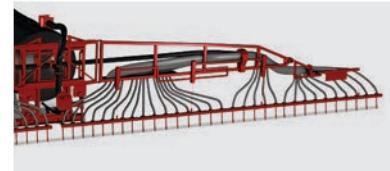


Boom suspension with diaphragm accumulator

Automatic boom control

Makes work easier for the driver and lengthens the service life of the trailing hose boom.

Rotation-angle sensors positioned at the pivot points of the trailing hose system determine the start and end position speeds of the individual folding functions on the boom. Additionally, the next folding procedure of a boom segment is initiated before the end position (90°) is reached.



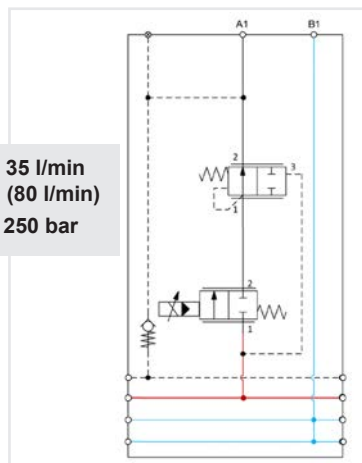
Automatisation in boom folding makes handling easier

See Brochure HX1 5.256

Hydraulic motor drives for: shredder, distributor, compressor of the central tyre inflation system

Hydraulic motors are often used to shred and distribute the slurry and for the compressor of the central tyre inflation system. The motor is controlled by an HX1 modular control block with load-compensated flow control for fixed and proportionally variable flow rates. A downstream pressure compensator increases stability when various actuators are operated simultaneously. For motors that are to be operated in both directions proportionally, we recommend our new 4/3 gate valve module from the HX1 system, which can operate up to a rate of 70 l/min.

$Q_{\max} = 35 \text{ l/min}$
(80 l/min)
 $P_{\max} = 250 \text{ bar}$



Sample diagram of 2-way flow control with PWK10120W + downstream pressure compensator DWM12130R (stability, speed precision)



3-way proportional flow control valve PSRPM

See Brochures HX1 5.256, PWK 5.911, DWM 5.191, PSRPM 5.131



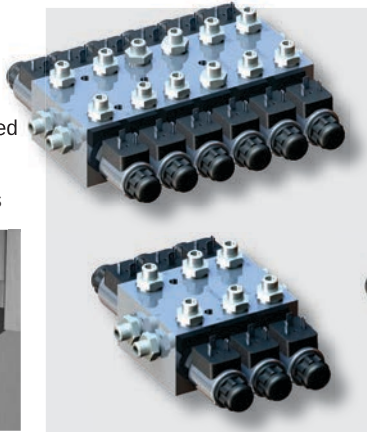
5

Hydraulic valves, actuating functionality

Actuating functions are generally auxiliary functions that are required additionally for the control of the overall system and are operated either fully on or fully off. For a slurry container, the actuating functions are gate valves that switch segments or hose assemblies on and off when the boom is folded, or do the same for shut-off valves and spreader valves, etc.

For such purposes, HYDAC provides double-sealed, zero-leakage poppet valves from the WSM series in cartridge design. For agricultural applications, the nominal sizes 08 and 10 are normally used. As an alternative, HYDAC offers "mini-valves" that have half the space requirements and half the weight up to a flow rate of 15 l/min. And this naturally also applies for the control blocks made from them.

See Brochure HX1 5.256



HX1 actuating function modules S02, S06, S12



Shut-off valves RV06A/RV08A + unlocking piston

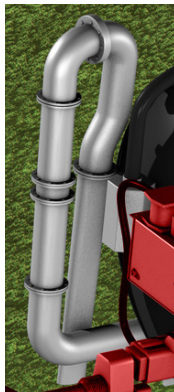


6

Hydraulic docking arm

The docking arm used to fill the slurry container is a heavy and cumbersome component that is normally hydraulically controlled. It performs the functions lifting, lowering and pivoting. These functions can be performed by HYDAC zero-leakage poppet valve technology in conjunction with directional control valves and check valves, or with suitable RSM counterbalance valves.

See Brochures WSM06020W 5.949, WS08W 5.924, RV06 5.143, RV08 5.912



2/2 directional control popper valve (W valve) WS08W, WSM06020W ...



Counterbalance valve RSM

7

Hydro-pneumatic axle/drawbar suspension



Hydro-pneumatic axis suspension

HYDAC hydropneumatic axle suspension enables higher working and transport speeds combined with improved driving safety and driving stability.

LCS/HCU level regulator: the same inward and outward suspension path regardless of load.

Lift axle: first axle lifted to displace centre of gravity and to reduce tyre wear.

HYDAC realises this function as a single control block placed directly on the suspension. Expansion block with axle suspension with special circuit.

Hydro-pneumatic drawbar suspension

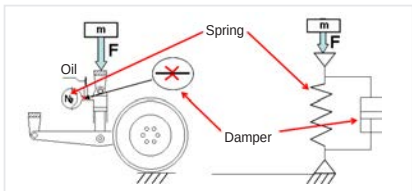
Hydraulic drawbar suspension for increased driving safety and comfort

Solutions for positive and negative loads with/without load compensation

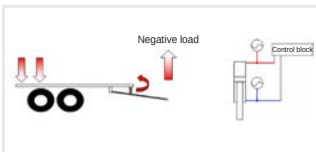
Different drawbar suspensions, with and without drawbar adjustment, allows them to be used with positive and negative loads on trailed slurry containers.



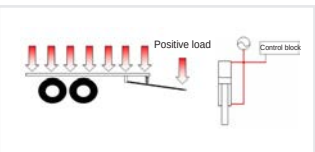
LCS/HCU series of intelligent hydro-pneumatic axle suspension systems for self-propelled machinery and trailed slurry tankers with fixed and variable spring characteristics. Additional, modular equipment available for lock the suspension functions.



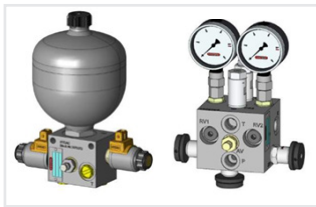
See Brochure 10.105.1 - Systems/Components for Agricultural Machinery



Drawbar suspension with load compensation



Drawbar suspension without load compensation



Variant 1 Electro-hydraulic switching

Variant 2 Negative loads - manually adjustable

Customer benefits:

- ⇒ Reduced rocking of tractor at high speed
- ⇒ Optimum braking performance for transporters
- ⇒ Reduced mechanical stress on drawbar

Electro-hydraulic steering

$Q_{\max} = 20 \text{ l/min}$

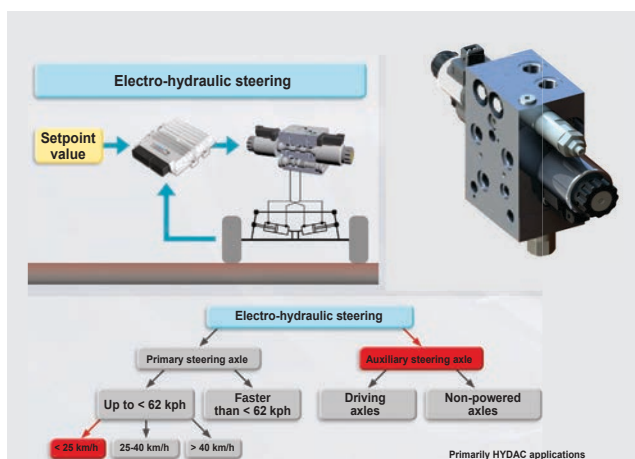
$P_{\max} = 350 \text{ bar}$

Electro-hydraulic steering,

e.g. for tandem and tridem axles

Electro-hydraulic steering systems enable various types of steering to be realised in trailed and self-propelled slurry containers. For self-propelled vehicles, various special types of driving (such as all-wheel and crab steering) are possible in addition to the normal driving varieties. In combination with the hydraulic steering systems of the front axles, electro-hydraulic superimposed steering systems and additional steering systems for the rear axles are possible. For trailed slurry containers, we can use our modular steering valves to meet the various steering requirements for auxiliary steering in one or more axles with optional free-wheel or lock-out circuits of the steering cylinder.

The steering valve modules from the EHZ series can be used in both slurry container variants. By using different inlet modules, they can be connected to all types of hydraulic system. The proportional valves are specially optimised for use in steering systems. The basic version is intended to be used on a steering axle. Adding a second module makes it suitable for two-axle vehicles. Other modules can be added to disconnect, lock or centre the steering cylinders. Shock valve modules are also available to protect the steering cylinders against external factors.



Electro-hydraulic steering systems in modular form



Core component proportional valve with pressure compensator, up to 25 l/min direct-acting, greater flow rates possible with pilot-operated valve



Modular steering unit Inlet, steering, and centring plate

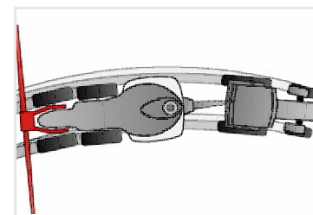
Overview of EHZ steering valve unit

Basic block with 15 l/min E-spool	MT-EHZ-GB-E15-X-X-X
Basic block with 15 l/min J-spool	MT-EHZ-GB-J15-X-X-X
Expansion block with 15 l/min E-spool	MT-EHZ-EW-E15-X-X-X
Expansion block with 15 l/min J-spool	MT-EHZ-EW-J15-X-X-X
Manifold mounted block with 250 bar pressure relief	MT-EHZ-DB 250 V
Expansion block with upstream pressure compensator	MT-EHZ-EW-DW-X-X-X
Steering cylinder lock block	MT-EHZ-ZB-X-X-X

See Hy-Steer brochure *Electro-Hydraulic Steering Systems 10.116*

Customer benefits:

- ⇒ Can be connected to all pump types
- ⇒ Unlimited number of steerable axles
- ⇒ Different safety concepts can be selected
- ⇒ Assistance systems easy to integrate
- ⇒ Hydraulics and electronics combined in a single system
- ⇒ From the component to the system – all from a single source



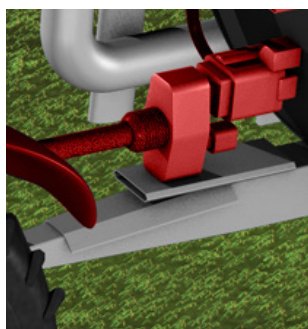
Top cylinder

Displacement-controlled or pressure-controlled cylinder for dampening of pitching vibrations and traction control

The top cylinder provides dampening of pitching vibrations during road transport and increases traction for the tractor on the field. It ensures that trailer movements are not transferred to the tractor and prevents the wheels from spinning on the field.

There are passive and active systems. The passive system is made up of the cylinder and a control block with diaphragm accumulator that absorbs and compensates the vibrations of the attached container. The active system is made up of the cylinder and a control block (e.g. HX1 FS20E-ID) with a 4/3 directional control gate valve and pressure transmitter. The forces that are generated are directly absorbed and compensated.

See Brochure HX1 5.256





Slurry tanker hydraulics

Modular control block system HX1. One unit for (almost) all needs!

Control systems and their advantages

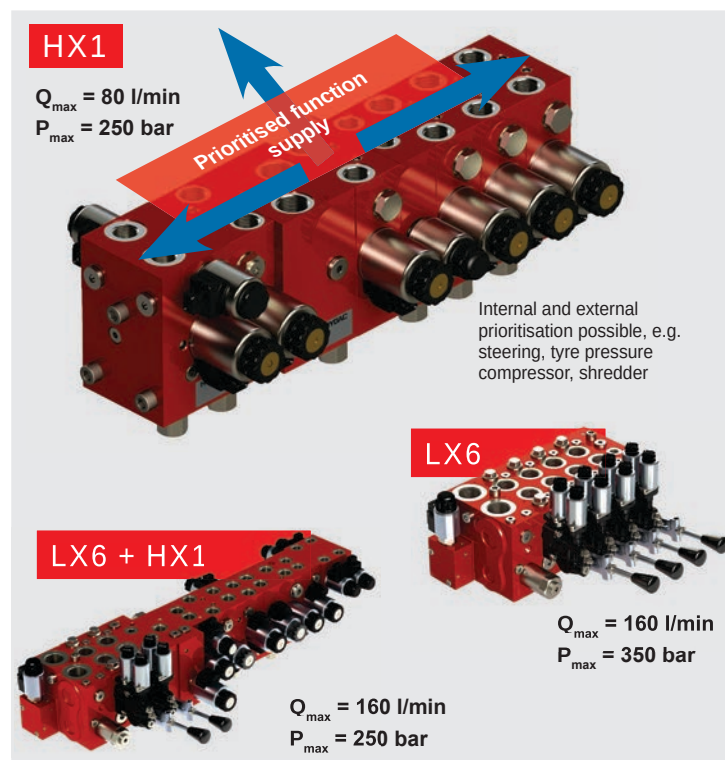
In general, you can choose between positioning the individual hydraulic functions by the slurry container in decentralised individual blocks or in one single place in a modular system as shown here. Both options are available in our product range. Both options are available in our product range.

- Very compact system compared to CETOP solutions etc. = size and weight reduction
- Hoses arranged neatly at one single point
- Centralised system means fewer leakage points around the vehicle
- Prioritisation of the various functions – up to three priorities possible
- Affordable large series technology for small producers
- Other machines can also be fitted with the same system, thanks for flexible arrangement options
- Low installation and maintenance costs on site
- Installation and maintenance staff always work with the same technology – this means less learning is required and maintenance is quicker
- Long-term supply of spare parts guaranteed as standard HYDAC installation parts are used
- Numerous hydraulic dealers have the spare parts in stock, which means warehousing is streamlined or in some cases even unnecessary
- Individual customised solutions are still possible

Modular LS systems HX1 and LX6

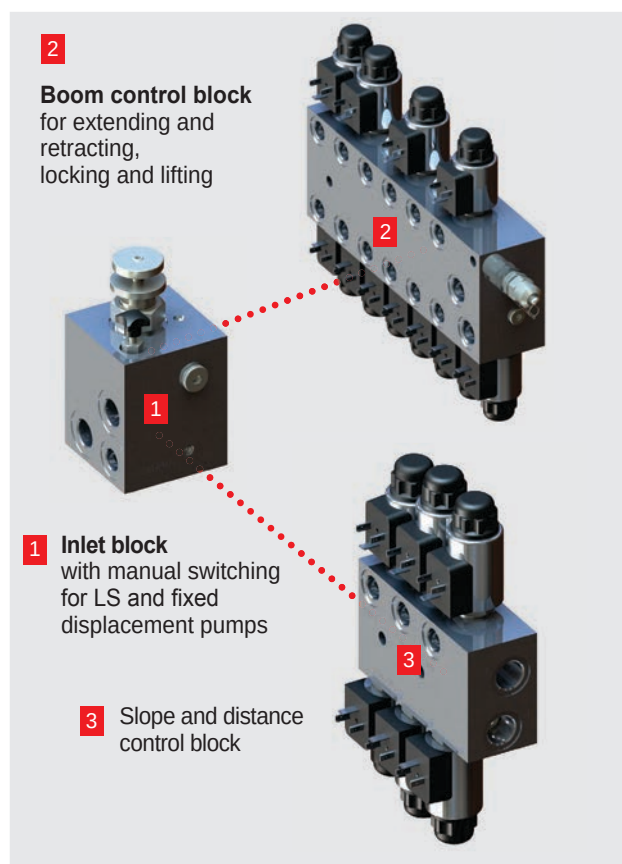
As the various slurry transport functions are arranged on corresponding modules in the HX1 system, functions can easily be added or taken away – via HYDAC directly or via the tanker manufacturer!

The module system is selected in accordance with the litre capacity (see below). If you require only one function above 80 l/min or a hand-lever combination, HX1 can be combined with LX6. Anything is possible!



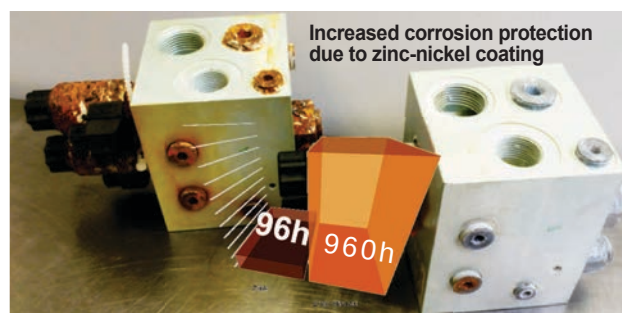
Decentralised control system

Each standardised function is built into separate control blocks and installed in the machine in various positions. Unlike a central control system, all control functions are located directly on the various consumers in the machine.



Corrosion protection

As the slurry contains various corrosive components, the materials installed on the container and their surface protection is important for guaranteeing a long service life. Accordingly, we use a zinc-nickel coating for our valves that provides a service life ten times longer than that of normal galvanising.



Additional solutions

Filtration. Accessories. Hydraulic accumulators.

Filtration for mobile machines

HYDAC filter technology's extensive range of filters includes almost all types of filter that are needed on the market. Particularly useful for mobile vehicles such as slurry containers are the MFM inline pressure filter and the RKM return line suction boost filter. An ELF tank filler/breather filter should always be mounted as standard equipment. The MFM medium pressure filter series with new filter design can be flange-mounted onto systems on one side and eliminates the need for additional pipework. The filter thus provides enormous space savings.

The RKM return line suction boost filter is the ideal filter for providing pumps with sufficient clean oil and thus protect them from cavitation. Fitted with all the necessary valves in the filter head and multiport connections, it provides everything in the smallest size.

See Brochures RKM 7.124 + 7.108, MFM 7.301, ELF 7.411

Customer benefits:

- ⇒ Low operating costs thanks to low pressure drops across the filter and filter element
- ⇒ High level of operating safety thanks to first class filtration
- ⇒ Element is easy to change and filter housing is easy to install
- ⇒ Brand labelling to protect the spare parts business
- ⇒ Complete tank/filter systems



Inline filter MFM, return line suction boost filter RKM, breather filter ELF

Accessories for every sector

To make hydraulic systems complete

- Standard fittings and ball valves (high pressure)
- Mounting clamps for hydraulic hoses and pipes, cylinders, electrical cables and accumulators
- Tamper-proof inductive proximity switch (high pressure resistance)
- Fluid level sensors
- Temperature switch TSE
- Standard clamp 3015 air/water reservoir clamping bands
- Test point connections
- Quick-release couplings
- Special clamps for particle filters

See Accessories brochure no. 61.000

Customer benefits:

HYDAC is your expert for modifications and special solutions at all times, and especially when custom jobs are required because standard parts are unsuitable. HYDAC's in-house engineering, coupled with our multidisciplinary approach and worldwide know-how, guarantee state-of-the-art technology and rapid development times.

HYDAC Accessories provide the final perfect touch to your machine with a broad range of standard and special components, also available in stainless steel.



Ball valves, clamps, coaxial valves, fluid level gauges, etc.

Accumulators

HYDAC provides accumulators and dampers for numerous hydraulic applications, from standard accumulators to customised solutions with integrated switching on/off of the hydraulic system accumulator. A matching accessories ranges with clamps, brackets and complete accumulator sets for fastening the accumulator to the machine securely are the perfect addition to the overall range.

See Brochure Accumulator Technology 30.000

Customer benefits:

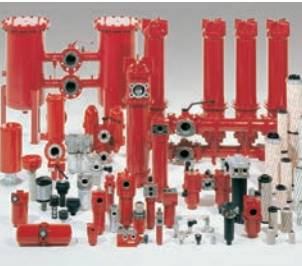
Our accumulator specialists have decades of experience in the development and design of all types of accumulator construction at their disposal. This means that they are in a position to select the type of accumulator construction that suits the application out of the comprehensive product range and to lay it out in accordance with operating conditions. The correct accumulator is still the best support for an application and HYDAC accumulators can be used worldwide with country-specific acceptances.



Bladder, piston and diaphragm accumulators for mobile applications



Accumulator Technology 30.000



Filter Technology 70.000



Process Technology 77.000



Filter Systems 79.000



Compact Hydraulics 53.000



Accessories 61.000

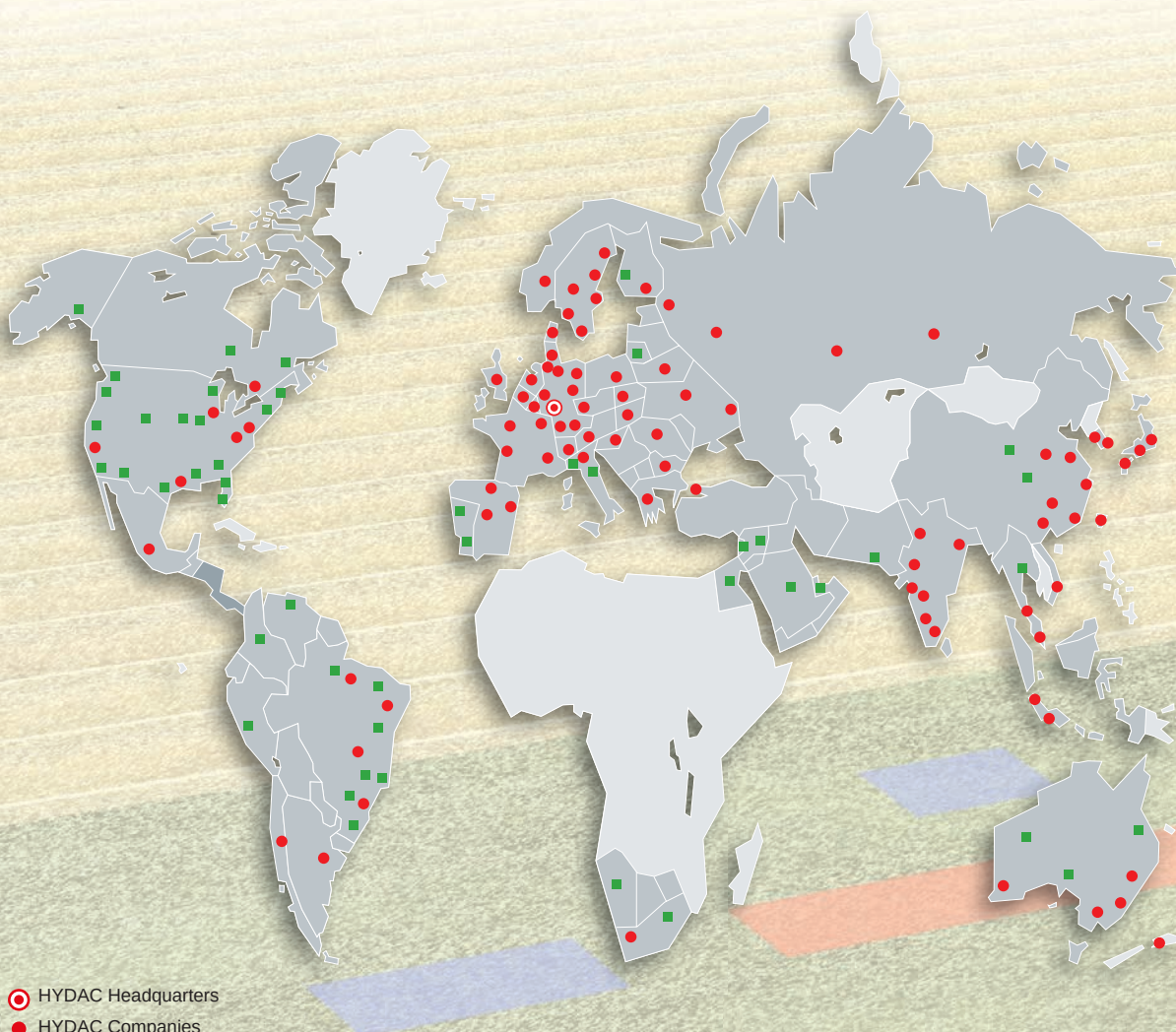


Electronics 130.000



Cooling Systems 57.000

Global Presence.
Local Expertise.
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- HYDAC Companies
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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.