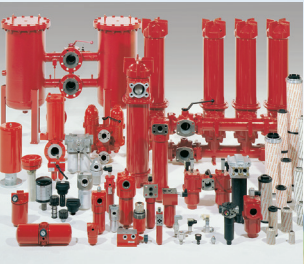




Accumulator Technology 30.000



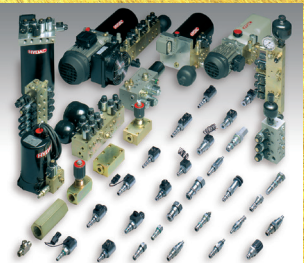
Filter Technology 70.000



Process Technology 77.000



Filter Systems 79.000



Compact Hydraulics 53.000



Accessories 61.000



Electronics 180.000



Cooling Systems 57.000

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Local Expertise.
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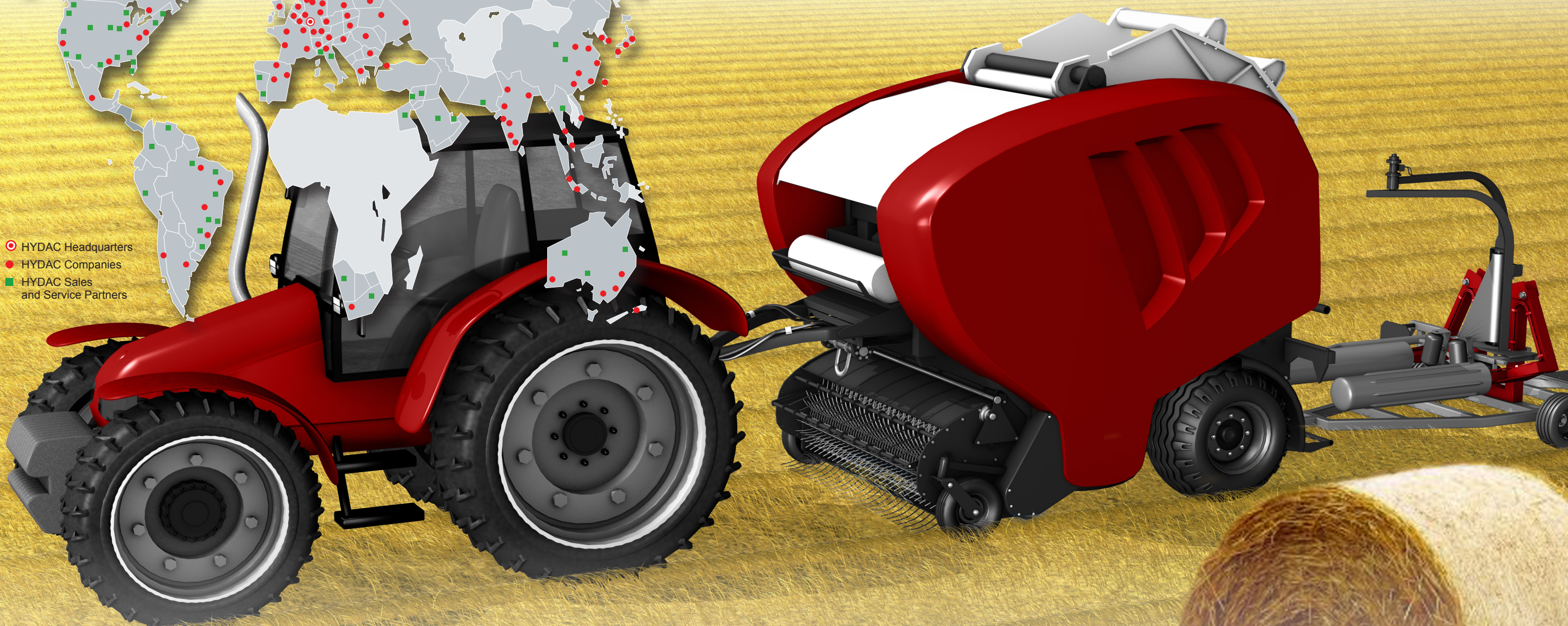
HYDAC

INTERNATIONAL

**Hydraulics
for balers
and wrappers**



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



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Hydraulics for balers and wrappers

System Overview

System intelligence

Baler types

Combined baler-wrappers

Hydraulic controllers & additional solutions

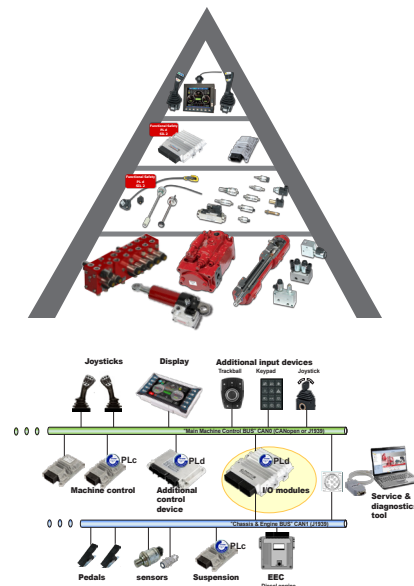
System intelligence

Hardware

- Electro-hydraulic control technology

Software & Service

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



Baler types

Round balers

- Fixed chamber balers
- With variable pressing chamber

Square balers

- Large bales
- Small bales



Combined baler-wrappers

Combined baler-wrappers

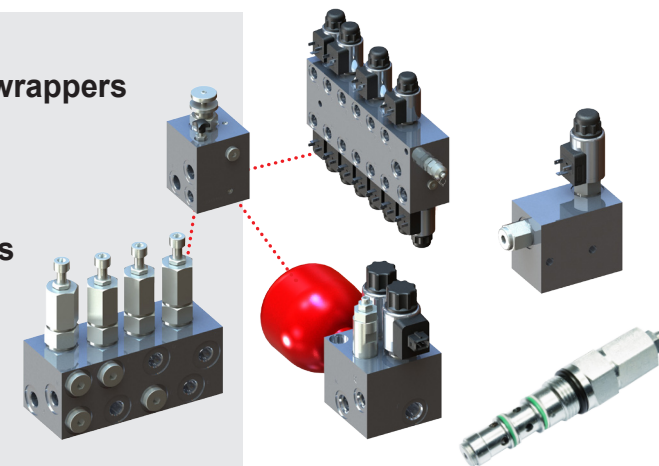
- Monomachine
- Baler with inline wrapper

Wrapping process

- Rotary table wrapper
- Satellite wrapper

Bale ejection

- Normal ejection
- Front



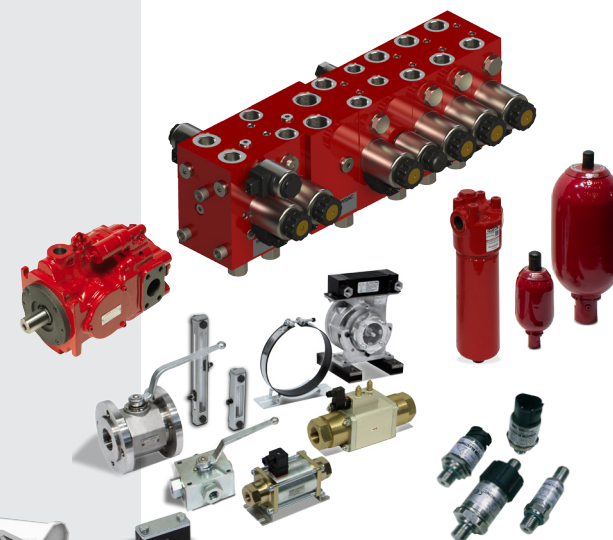
Hydraulic controllers & additional solutions

Hydraulics for the baler

- HX1 modular manifold system one unit for (almost) all needs!
- Special control blocks

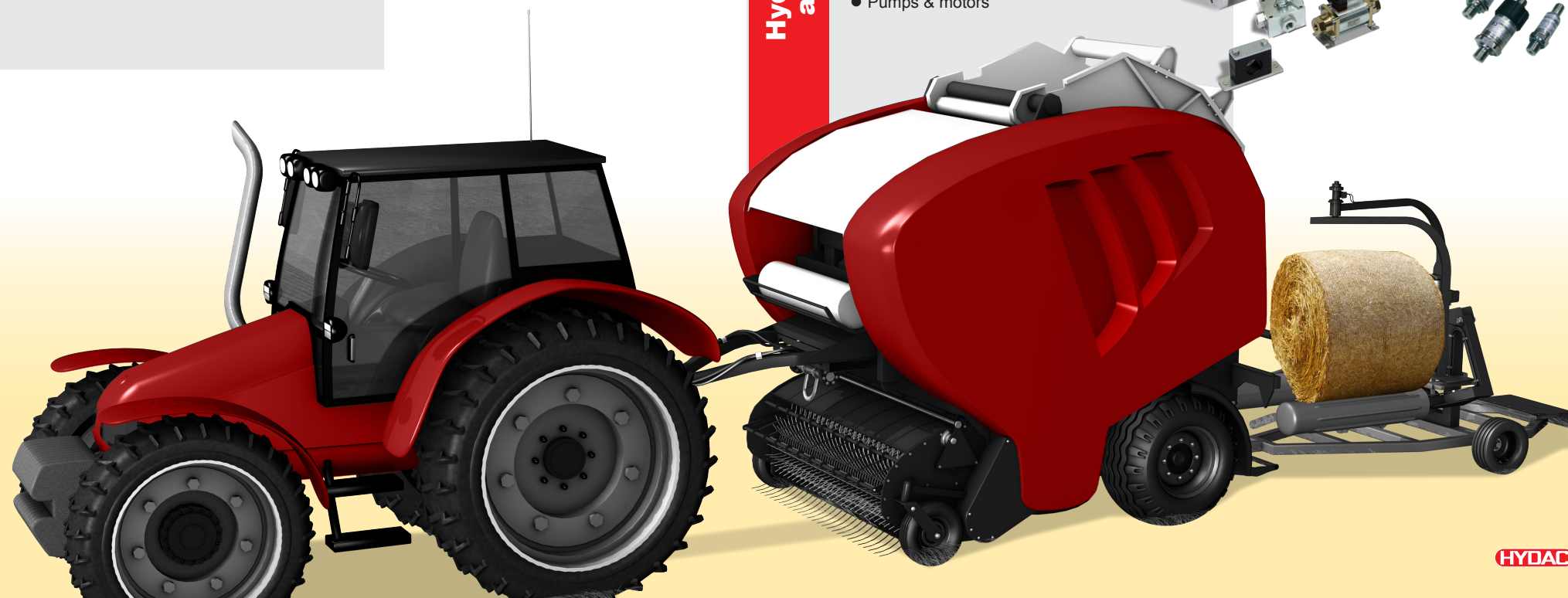
Additional solutions

- Filtration
- Accessories
- Hydraulic accumulators
- Pumps & motors



Note

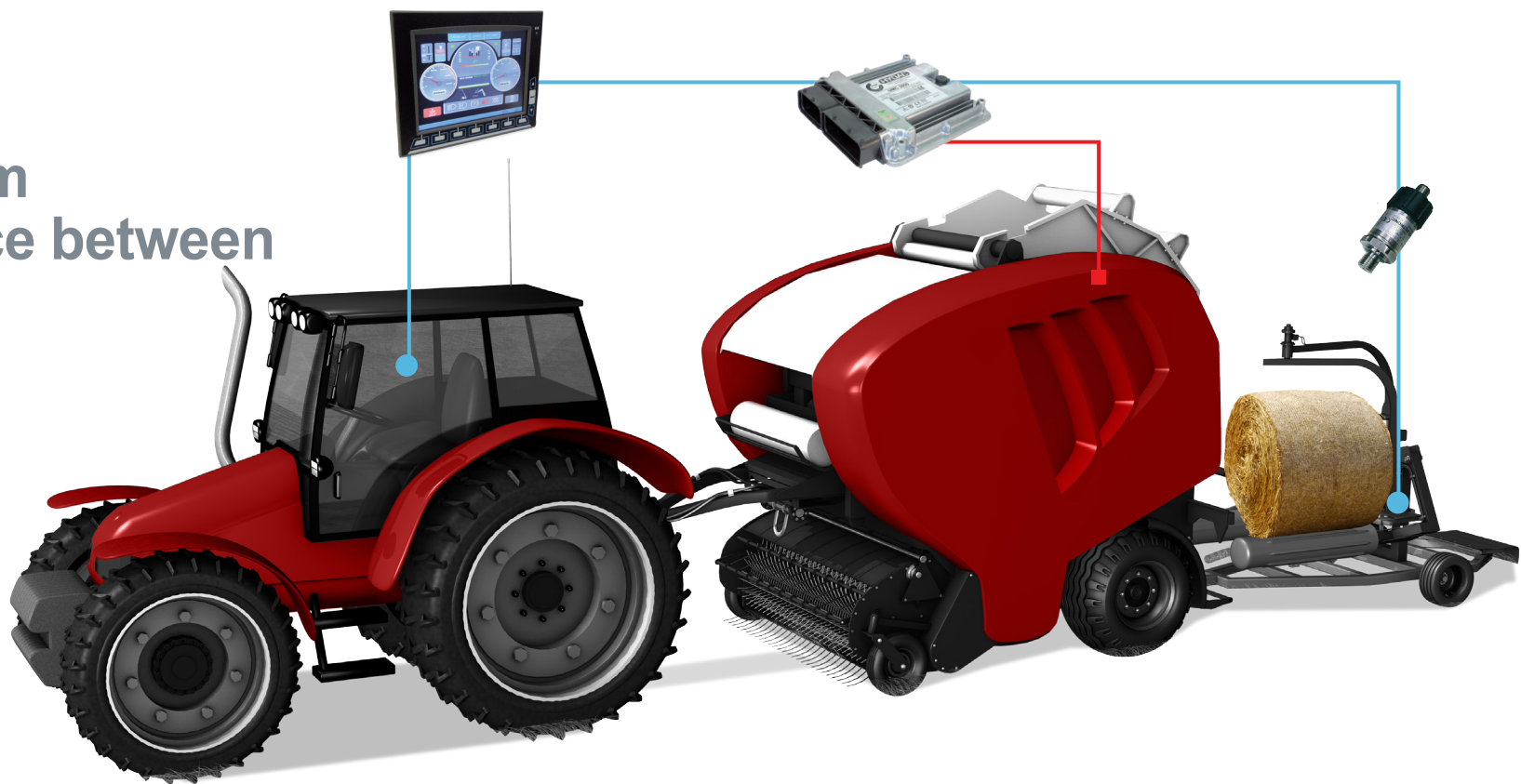
The information in this brochure relates to the operating conditions and applications described.
For applications and operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.





System intelligence

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

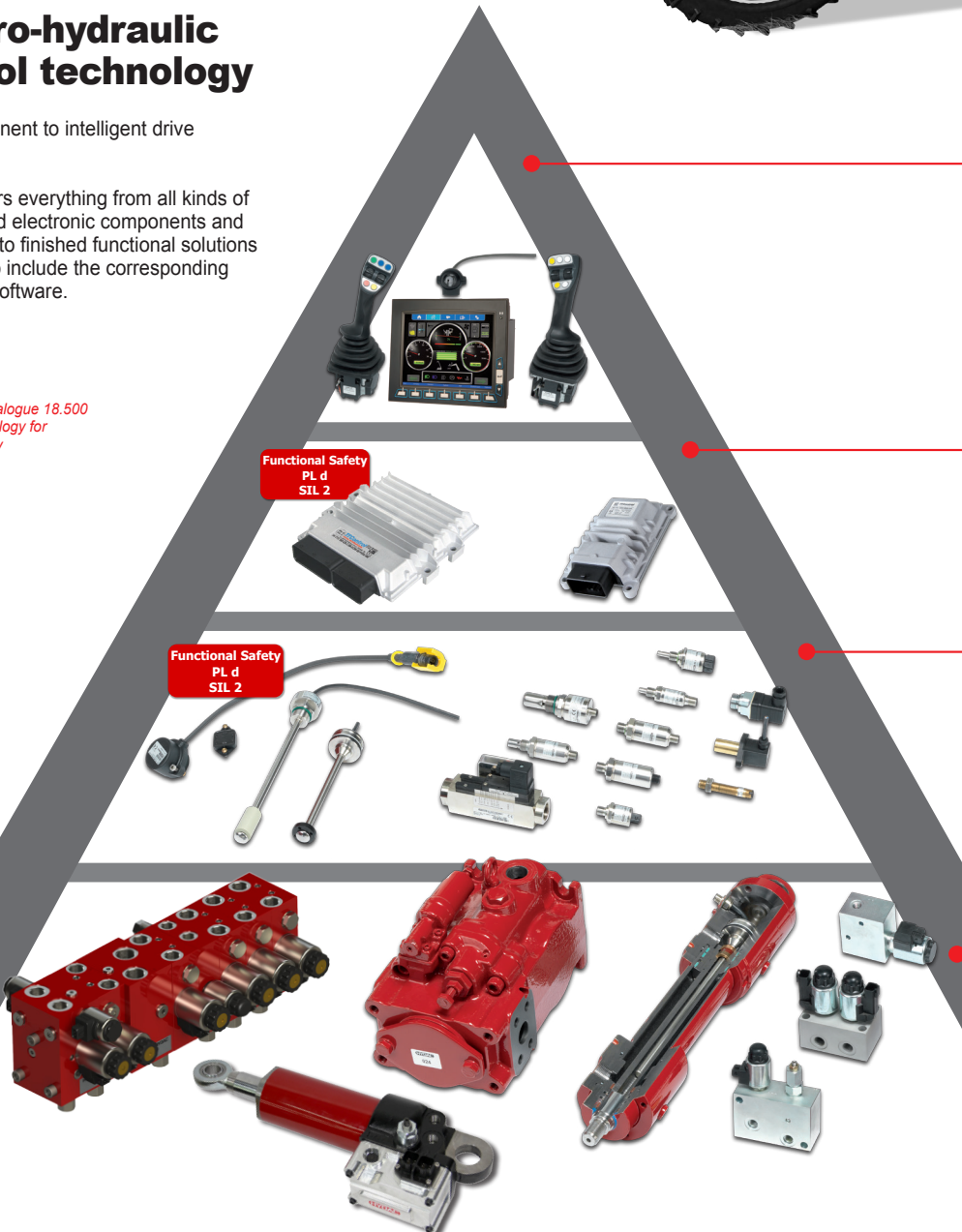


Electro-hydraulic control technology

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



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

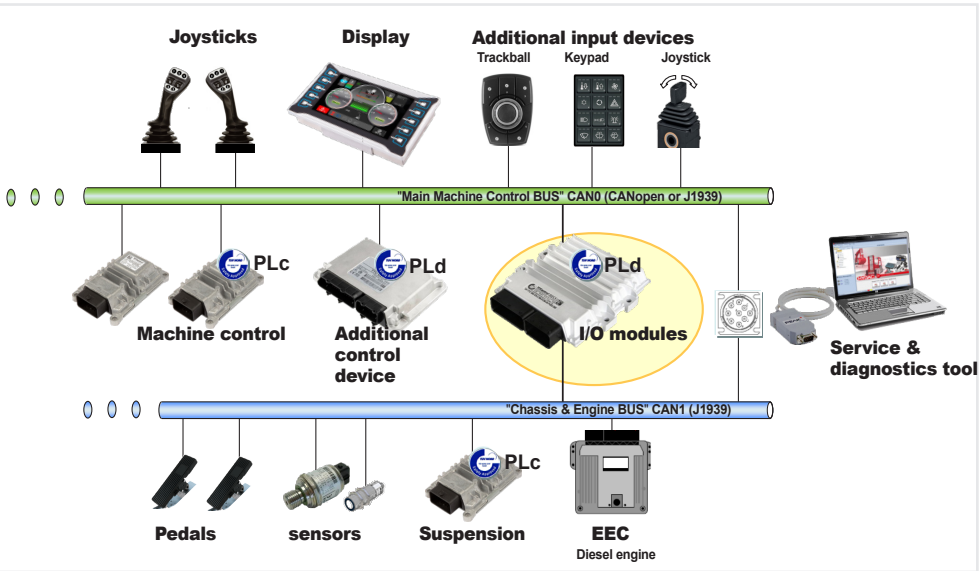
- Pressure, temperature, and level
- Distance, position, angle, inclination, and speed
- Flow and oil level
- Standard version and versions with diagnostics and increased functional safety available

ACTUATOR LEVEL

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

SOFTWARE & SERVICE

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:

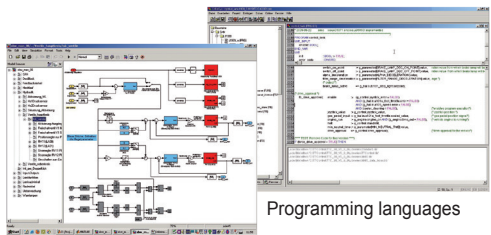
- Creating customer-specific application software (according to specification)
- Integrating intelligent subsystems into the customer's machine (e.g., suspension systems, secondary steering systems, fan controls)
- Complete control solutions for mobile machinery (safety functions, electrical/electronic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

SOFTWARE & SERVICE

Software development

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

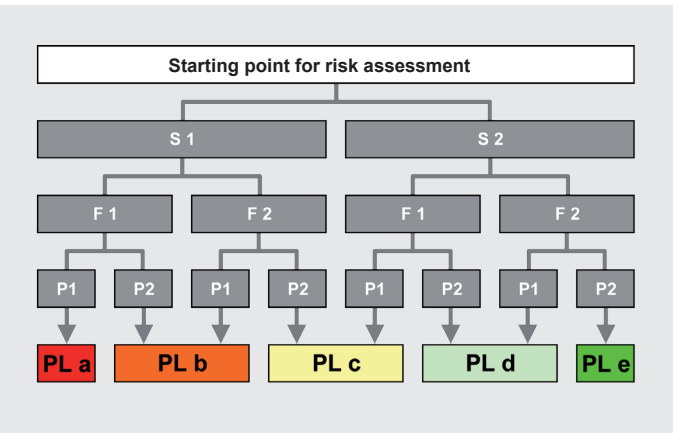
- CoDeSys 2.3 / 3.5 / 3.5 SIL2
- C
- MATLAB/SIMULINK



Programming languages

SOFTWARE & SERVICE

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

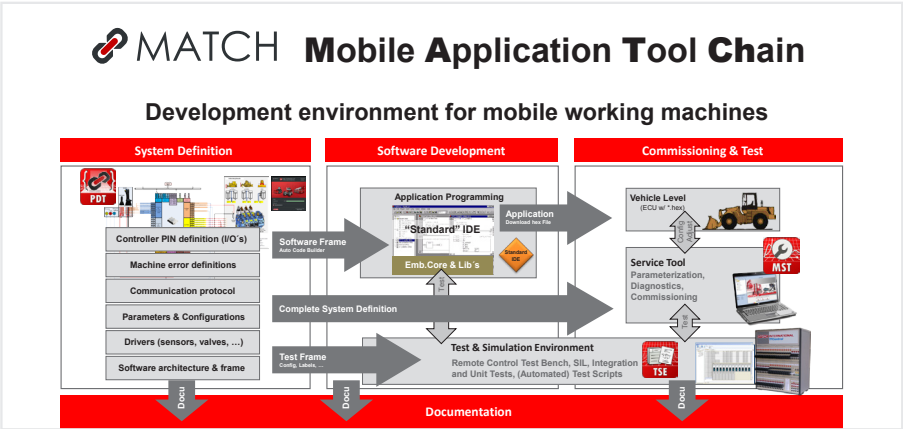
Possibility of avoiding the hazard or limiting the damage

- 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 (HMI)

"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 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

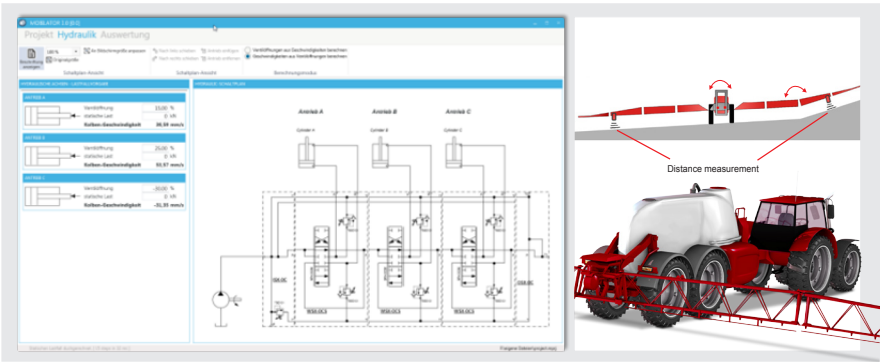
Furthermore, an "embedded Middle Ware" is offered which permits a hardware-independent programming of the application and which contains a multitude of basic functions. A comprehensive selection of library modules (e.g. for sensor and valve drives) is also available for an efficient development of the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

Functional safety

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

- "SIL 2" as per IEC 61508
- "PL d" as per EN ISO 13849
- "AgPL d" as per 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.

See Product Catalogue 10.133 - Control Technology for Mobile Machinery

Round or square: HYDAC hydraulics gets it done. All from one supplier.



Round balers

Two types of round balers have become established:

- **Fixed chamber balers**
- **Balers with variable pressing chambers**

The fixed chamber baler forms a bale with a fixed diameter, normally by means of a bar chain.

In balers with variable pressure chambers, the pressing chamber diameter is altered by means of belts combined with clamping arms. The belt forms the bale from the smallest diameter to the desired final diameter. This enables higher compressed densities to be achieved in the core of the bale than is possible with the fixed chamber. In both types, the rear flap is opened at the end, after the bale has been wrapped up in a net or in a film, and the bale is ejected from the baler. The rear flap should be opened and closed as quickly as possible, as the baling procedure is paused during this time. Control blocks with integrated load-holding valves from the RSM series are ideal for providing optimum control of this function.

Load-holding valves

Counter balance valves allow loads to be moved in a controlled way at all times, as they prevent negative loads from slipping forwards, which is connected with wear-promoting cavitation in the hydraulic system. HYDAC counter balance valves have a compact form combined with high functional density. Accordingly, the valves also have a maximum pressure limit to counteract overload and hold loads in position when lines break.

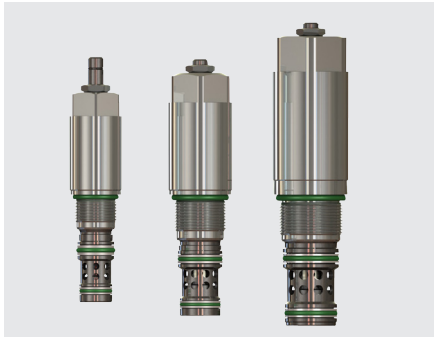
The RSM series which are available in 3 sizes for 60, 120 or 240 l/min offers the following features:

- Load pressures up to 420 bar
- Different pilot ratios
- Zero leakage
- Fine control sleeve for optimising the cylinder movement
- Internal venting, either to atmosphere or separately to tank
- Pressure loss-optimised check function
- Cavity to ISO 7789
- Increased corrosion protection due to ZnNi coating 720 h
- Comprehensive range of housings available as accessories

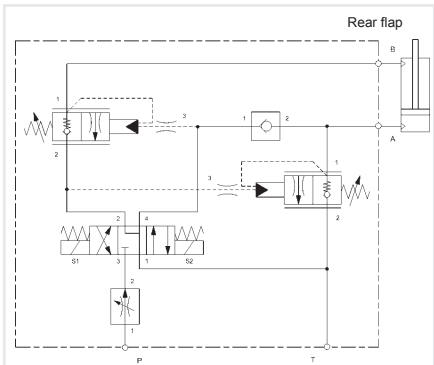
Optional:

- Load pressure-independent version
- Hysteresis-optimised version
- Spring chamber relief

See Brochure RSM 5.933



RSM range



Rear flap open/closed



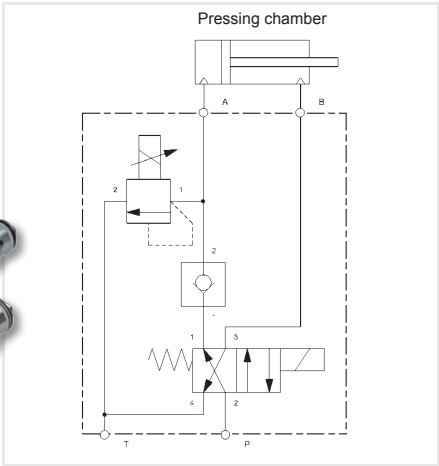
Square balers

Baling technology actually originated in square balers. The major benefit of such balers is that the baling process does not need to be paused when the bale is ejected. This provides a continuously high work performance and handling is easier in the case of small bales.

The size of the bale can be adjusted, in terms of thickness and length. HYDAC supplies a variety of control blocks for these applications, to control the required functions hydraulically as required.

Baling pressure control

The central function for balers is the baling pressure control, which determines the quality of the final bale. Bales of various densities are produced, depending on the baling material. HYDAC can provide various valve solutions in the control block at the customer's request.



Pressure relief valves

For the basic design, the DB4E is available as the mechanically adjustable version and the PDBM proportional valve as the convenience version. Both valve types are designed as zero-leakage poppet valves and they ensure that the mechanically set chamber baling pressure is maintained even when the surface of the field is just one bump after another. This ensures that the density of the baled material is not compromised throughout transport and the bale quality is maintained.

Pressure control valves – hydraulic and proportional

For hydraulic control circuits with pressure control valves, there are also two versions available: mechanically adjustable variants and proportional valves. The PDR proportional pressure control valves exhibit a highly dynamic response and can be adjusted very sensitively across the entire control range.

See Brochures PDR08 5.990, PDB08P 5.991



Pressure control valve PDR

A well-rounded unit: baling and wrapping in one.



Combined baler-wrappers

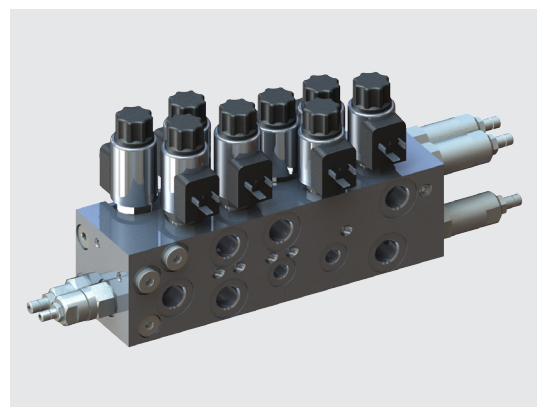
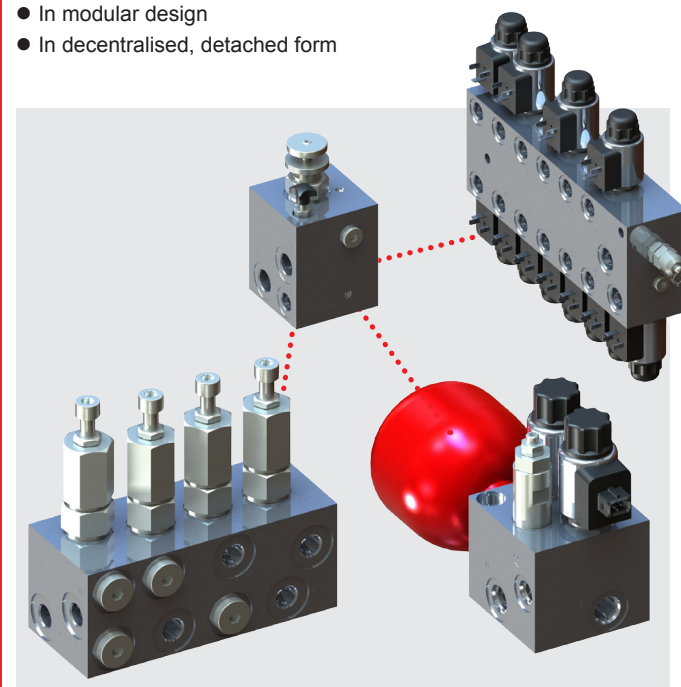
- Monomachine
- Baler with inline wrapper

A combined baler-wrapper is a baler with an additional bale wrapper. After the baling process, the bale is tied up and not directly ejected but instead sent to the wrapping unit. There are basically two types: balers with wrappers as a combined unit and balers with a wrapper attached inline.

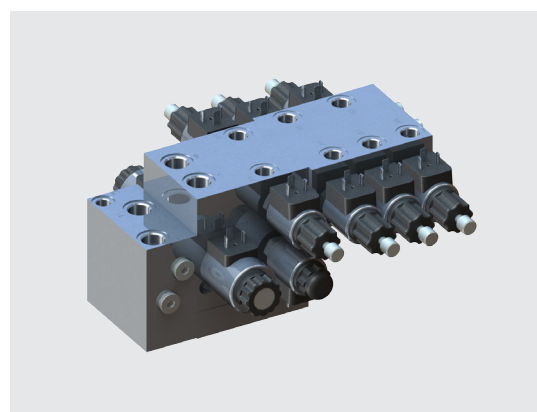
Inline wrappers are mostly designed as a rotary table or a satellite wrapper. The high-performance wrappers wrap the bales with stretch film while a new bale is being created in the baler.

To control the coordinated main functions, HYDAC can provide the following block designs:

- Monoblock
- In modular design
- In decentralised, detached form



Customised monoblock with complete working hydraulics

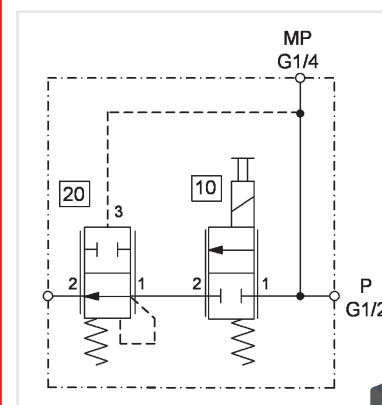


HX1 modular control block system for the complete working hydraulics with or without prioritisation of functions

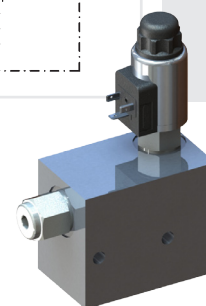
Wrapping process

- Rotary table wrapper
- Satellite wrapper

In the wrapping process, a sufficiently compact film covering with 4 to 8 layers is vital for air to be excluded effectively, which is important when the bales are stored outdoors and for high-quality siloing. HYDAC proportional throttles and flow control valves have proved to be effective in practice for the optimum control of the wrapping speed.

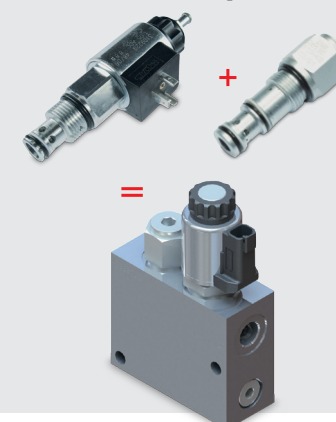


See Brochure PSRPM 5.131

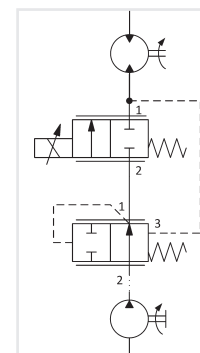


Proportional flow control valve with downstream pressure compensator

Flow regulation as tailored and compact solutions



Flow regulation with two cartridge valves: Throttle and pressure compensator B-BM-STRZ...



Bale ejection

- Normal ejection
- Front

For ejection of the bale onto the field or to the downstream bale wrapper, the rear flap is opened and the bale is transferred. To increase the opening and closing speed and to provide damping in the end position, counter balance valves from the SBVE and RS series can be used in the corresponding control block.

See Brochure RSM 5.933.1, SBVE 5.177



Counter balance valve SBVE08021



Counter balance valve RS08



Bale ejection: normal ejection



Bale ejection: front

Hydraulics for the baler

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

Control systems and their advantages

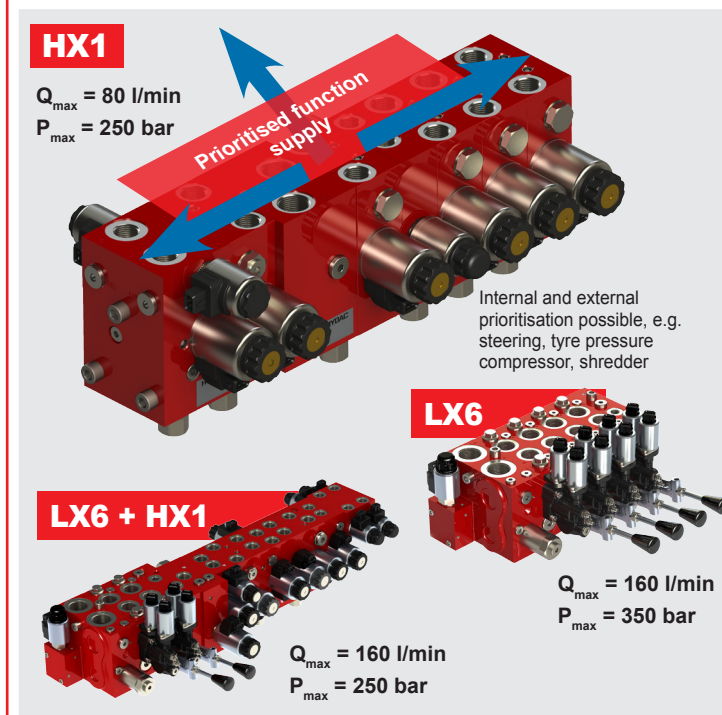
In general, you can choose between positioning the individual hydraulic functions in the balers in decentralised individual blocks or in one single place in a modular system as shown here. Both options are available in our product range. Some of the advantages of the complete modular system:

- 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, as flexible
- 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-system

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

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



See Brochures HX1 5.255, LX6 5.282

HYDAC

Sensors

The range of sensors includes products for the measurement of pressure, temperature, distance, position, level, flow volume, speed, inclination, angle as well as contamination and oil condition. In addition to products for standard applications, the product portfolio also covers special applications such as potentially explosive atmospheres or applications with increased functional safety.

Electronic sensors and controls to complement the system electronics.

- Speed limitation
- Electro-hydraulic load sensing
- Working hydraulics
- Positioning
- Controls of special equipment
- Switch-off devices

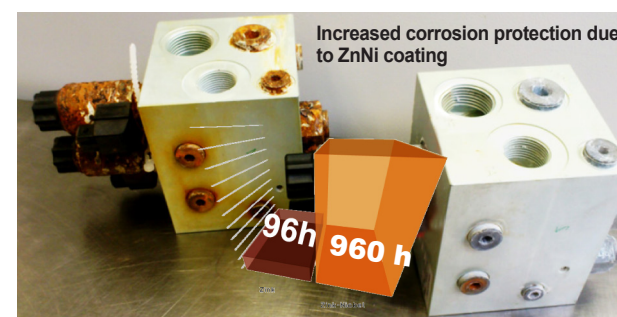
Features

- The sensors are available with a variety of output signals, connectors and fluid port connection options
- Robust design
- ECE type authorisation



Corrosion protection

Encrustation caused by dirt and moisture can result in gradual corrosion. The materials installed on the machine and their surface protection are therefore 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. Pumps.

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 balers are the MFM inline pressure filter and the RKM return line suction boost filter. An ELF tank filter/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 protecting 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 for mounting air reservoirs
- "Test point" connections
- Quick-release couplings

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, guarantees 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 range with clamps, brackets and complete accumulator sets for fastening the accumulator to the machine securely is the perfect addition to the overall range.

See brochure no. 30.000 – Accumulator Technology

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.



Axial pumps, gear pumps & gear motor

Axial piston pumps - PPV series

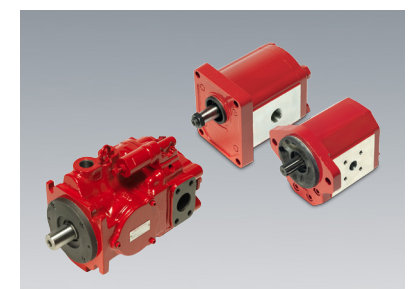
- Nom. pressure / max. pressure: 320/350 bar
- Spec. displacement: 16 – 200 cm³/rev.
- Extensive range of controllers available
- Through-drives for multiple-pump combinations
- Can be used for flame-resistant fluids (in line with specification)

External gear pump - PGE series

- Nom. pressure / max. pressure: 250/300 bar (depending on size) -
- Spec. displacement: 0.25 – 60 cm³/rev.
- Can be combined with multiple-pump combinations up to 25 kW

External gear motor MGE

- Nom. pressure / max. pressure: 200/220 bar
- Spec. displacement: 1.6 – 60 cm³/rev.



HYDAC