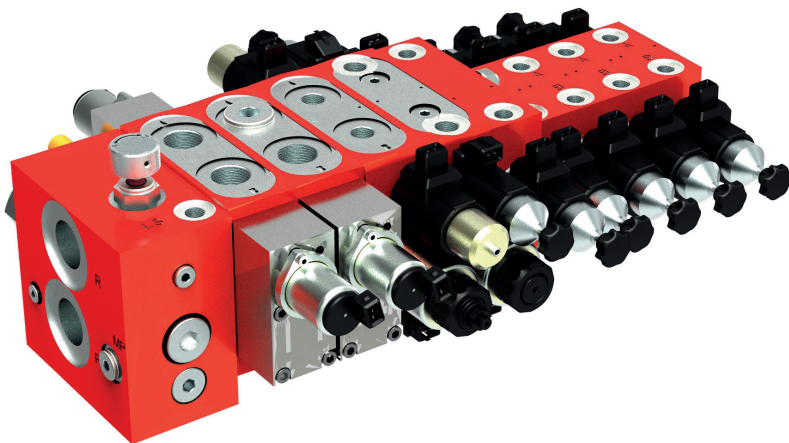


# Optimized Without Compromise

## The comprehensive functionality of the LVS valve series from Bucher Hydraulics increases the efficiency of towed and self-propelled machines

Hydraulic drives in agricultural machinery need to demonstrate the highest precision, reliability and flexibility under the most adverse conditions. In achieving this high system performance, a vital feature is valves that can be adapted without compromise and exactly as required for the specific requirements. With the extensive range of valve functions that Bucher Hydraulics offers with its LVS series, every manufacturer of agricultural machinery has future-proof solutions at its disposal. The new expansion sections are aimed at delivering higher energy efficiency, reduced installation costs and significantly lower pressure losses in towed and self-propelled machines.

10 percent increase in production – according to the VDMA, this was the positive result recorded by manufacturers of agricultural machinery and tractors in Germany in 2018. The renewed growth is based on significant innovations in agricultural engineering. Hydraulics is one of the important foundations for this. Valves are often decisive here and influence key success factors such as high energy efficiency and machine availability, reduced installation costs, lower weight and less space, and minimized power loss together with resource conservation. To obtain these advantages, manufacturers of agricultural machinery need a wide range of valves and functionalities so that application-optimized solutions can be implemented without any compromises.

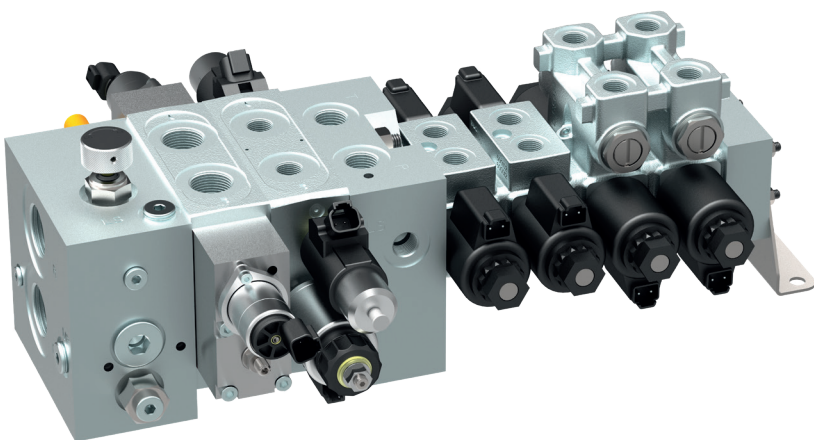


Valve block – LVS directional valve system with SVH directional seat valves

The LVS directional control valve system from Bucher Hydraulics can also be used to implement mobile-machine control systems that were previously difficult to achieve. Thanks to its high level of functionality, such as integrated actuator functions, and the high power density, the LVS is both flexible and extremely compact.

To meet existing and future requirements, the valve specialists from Bucher Hydraulics have developed numerous new functions for the LVS series of proportional directional control valves. Working in close cooperation with manufacturers of towed and self-propelled machines, further applications for these fast-switching valves are now emerging. Utilizing their precision, responsiveness and dynamic characteristics, they are designed to permanently reduce operating costs. These extremely compact valves, with a nominal flow rate up to 180 l/min and pressure ranges up to 350 bar, have been proving themselves in the market for years. The comprehensive system expansion, featuring two-stage valves with electrohydraulic operation, direct-operated solenoid valves and seat-valve combinations, facilitates application-oriented solutions that meet increasing demands and growing functional segmentation.

In the agricultural engineering sector, users now have access to new system solutions that are coordinated with one another for configuration within a valve block and thus work in harmony. Particular functionalities are selected for the respective application without any need for compromise and can be expanded at a later date, so at any time machine manufacturers can install the exact configuration required at that time.



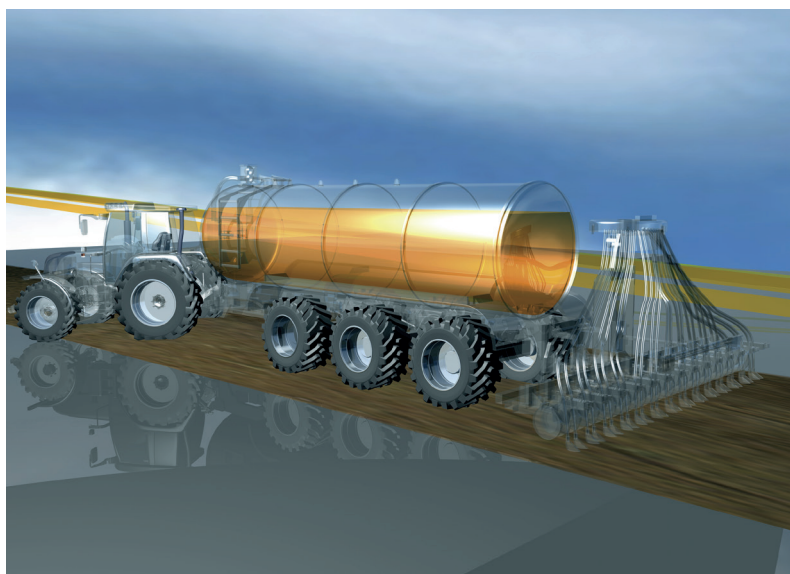
Valve block – LVS directional valve system with valves for actuator functions

Supplementing the well-known SVH04 directional valve that features bidirectional seat-type shut-off, a cost-optimized modular system of directional spool valves, series D-DS06, was developed. These can be extended with hydraulically actuated or electrically switchable seat valves.

### Special functions for towed machines

For more than 40 years, Bucher Hydraulics has been contributing solutions for optimized harvesting performance by supplying valve blocks for a very wide range of towed machines. An example of such application experience at work is in self-loading feed wagons: a single block with just one valve section is sufficient to control the scraper floor. For very fast unloading, the integrated boost function makes it possible to deliver the whole oil flow at one actuator outlet on demand.

The product range extends right to the valve block itself, where up to 35 functions for controlling highly complex machines can be integrated. As a further variant of the single-acting hitch control (available for towed and self-propelled machines), a double-acting hitch control is also available for towed machines such as slurry wagons with trailing-shoe applicators. With the help of the double-acting LVS hitch-control valve, the trailing shoes can always be kept on the ground with the right contact pressure, regardless of hard or soft ground. This optimizes the ground pressure distribution for careful working as well as the depth control.



Towed machine > Slurry wagon

As towed machines, slurry wagons can contain up to 35 functions. Starting with docking at the slurry bunker with automatic positioning, right up to sucking the liquid manure at a rate of several thousand liters in just a few minutes, Bucher Hydraulics offers specialized valve functionalities.

### Simple ON/OFF actuator functions integrated in the block

Complementing the technically demanding functions that are controlled proportionally via LVS valves, Bucher Hydraulics now offers additional components for integration into the LVS modular control block system: valves for simple ON/OFF actuator functions requiring only low flow rates are available as spool or seat versions. On an as-needed basis, these expansion units are incorporated in a control block together with the premium LVS valves. Supplementing the well-known SVH04 directional valve that features bidirectional seat-type shut-off, new directional spool valves have been developed, which can be complemented by hydraulically actuated or electrically switchable seat valves. This enables machine manufacturers to create simple ON/OFF functions very cost-effectively.

### Auxiliary-function sections improve travel comfort

The full range of adaptable electrohydraulic systems that Bucher Hydraulics offers specifically for towed machines is reflected in the EPOM program (Externally Propelled Off-Highway Machines). All the hydraulic and electronic components are characterized by their high reliability in the field: they deliver optimum service even with strongly fluctuating temperatures, high mechanical loading and electromagnetic interference. With Bucher Hydraulics, users can choose between two control units for the analog-proportional control of up to 8 or 11 valve sections via toggle switches and rotary potentiometers. The package solution is completed with a wiring harness. The components have a tank-line pressure rating of 210 bar, so that no damage to the hydraulic system occurs even with a wrongly connected hose. Thanks to the low off-load and block headlosses, up to 150 l/min at the actuator ports is possible with a pressure difference of only 9 bar.

Highlights of the EPOM program include specially designed auxiliary-function sections aimed primarily at improved travel comfort: the top cylinder, undercarriage, and drawbar suspension sections facilitate increased traction, maintenance of a constant level, and the absorption of travel shocks. The use of the TÜV-approved axle-lift section reduces tire wear and diesel fuel consumption. The axle-suspension section enables weight-dependent control.



## Well-proven steering systems and changeover facility

Agricultural machinery must, of course, offer a high level of driving safety in addition to optimum in-field performance. In the case of towed machines, the systems predominantly in use are based on castor steering. These only work in forward gear and are otherwise locked by seat valves. With a special electrical additional steering system, Bucher Hydraulics offers a component to increase safety: this additional steering system is also active when reversing and is used for the speed-adjusted steering of one or two axles.

Also available are electrohydraulic steering systems from the EPOM program. With these systems, users benefit above all from the special design of the steering valves featuring a downstream pressure compensator. These steering valves can be integrated directly into the valve block without the need for the otherwise standard additional priority function, which saves cost and space. Other highly responsive valves, specialized for the harvesting process, provide automatic steering, which ensures ongoing corrections as well as row-sensing. Another special feature is that Bucher Hydraulics equips its steering valves with self-compensating spools, with the result that, after a displacement, the restoring force back to the neutral position is independent of the load.

The adaptability of Bucher Hydraulics' solutions for towed machines is also reflected in the connection to the tractor supply, where the company is a technological pioneer. The valve operation can easily be set for either fixed-displacement or load-sensing supply systems. Using an adjustable pressure compensator in the inlet section, which can be changed over from 2-way to 3-way functionality, users can employ the same valves for both open- and closed-center systems, thus ensuring that a constant flow rate is always available for the valve block in the towed machine regardless of the type of pump system in the tractor. Even when there are higher pressure drops in the lines, sufficient pressure is always available for control functions in this application, which in total saves energy costs.



Self-propelled machine > Digging/lifting unit

Designed for use in lifters, the Bucher Hydraulics hitch control ensures a constant lowering speed even with differing loads.

### Special functions for self-propelled machines

The highest possible harvesting performance is based primarily on uncompromised and reliable functionality, as found in the harmonized Bucher Hydraulics system for self-propelled machines.

In particular, savings in terms of space, weight and cost were crucial for the design of an innovative expansion section with a split spool. The special feature consist of two spools in one valve body with one spool bore. This means that two actuators can now be controlled independently of one another – and in conjunction with a flow control valve that handles 180 l/min at 350 bar. The large oil galleries reduce pressure losses, increasing energy efficiency thanks to reduced diesel fuel consumption.

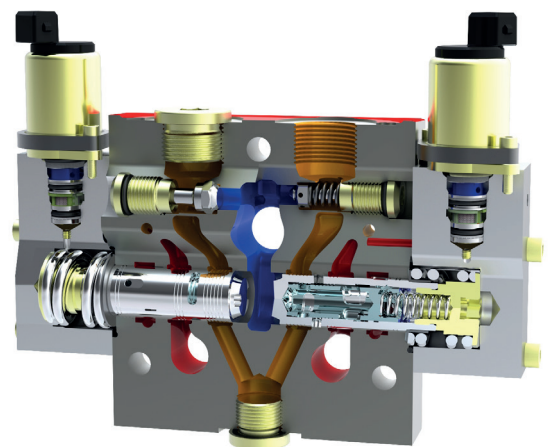
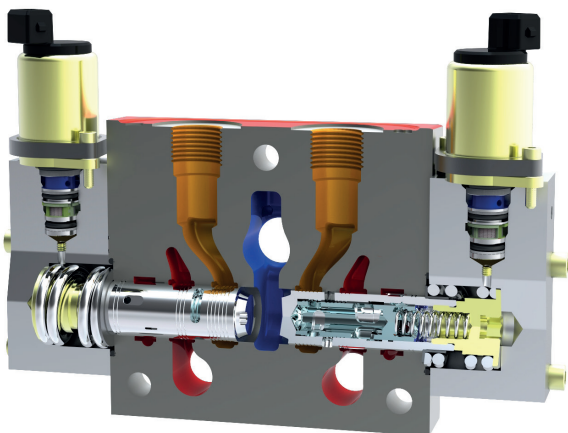
The split-spool technology enables a wide range of functions such as dual-flow control functions, lift/lower module in flow/return or return/return. The dual-flow control feature saves installation space and weight and is suitable for pressure-independent, parallel operation of two single-acting motor drives, for example.

LVS12 dual-flow control valve for two single-acting actuators

The LVS12 dual-flow control valve is used for pressure-independent, parallel operation of two single-acting actuators and saves both installation space and weight.

LVS12 flow/return valve

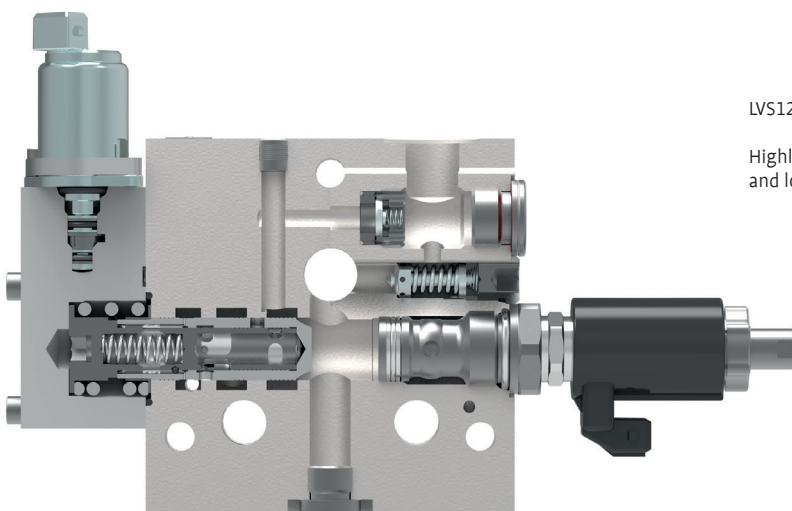
The flow and return function of the LVS12 corresponds to an adjustable pressure support, in that the flow and return spools can be actuated and positioned independently of each other. By varying the ratio of the flow and return openings, any required pressure can be created at the actuator outlet.



**The details guarantee unique solutions**

The lift/lower module impresses with load-compensated lifting and lowering. To ensure the stability of such a system, Bucher Hydraulics uses highly dynamic valves that can accurately implement control signals even at a high command frequency with signal durations of just ten milliseconds. The flow and return function corresponds to an adjustable pressure support, in that the flow and return spools can be actuated and positioned independently of each other. By varying the ratio of the flow and return openings, any required pressure can be created at the actuator outlet.

All in all, with its broad-based concept Bucher Hydraulics offers all the functionalities required for a wide variety of applications. With the LVS platform, manufacturers of towed and self-propelled machines can systematically design customized solutions that deliver 100% on the required benefits, and significantly reduce costs through the use of innovative technologies.



LVS12 hitch-control valve

Highly dynamic lift/lower module for load-compensated lifting and lowering up to 150l/min and 350 bar.

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