

Reliability from the modular system

Bucher Hydraulics offers customised cartridge-type directional seat valves featuring monitoring of the operating position

Bucher Hydraulics knows that identifying future technologies at an early stage and then pressing ahead with the right developments is one of the core tasks of a hydraulic supplier. Based on the tried and tested cartridge-type directional seat valves, a comprehensive modular valve system has been designed, featuring a very reliable energy-efficient system for monitoring the operating position. The modular design allows to create individual solutions using high-performance valves that meet even the most extreme requirements in mobile and industrial hydraulics.

„The whole is greater than the sum of its parts.“ Just as the often shortened quote from Aristotle draw attention to the whole picture, Bucher Hydraulics also understands the diverse interrelationships and backgrounds that are important in selecting the right components and using them successfully. Energy efficiency, power density, intelligence or even just the ability to meet the requirements of industry 4.0 increasingly require an individual approach to the respective application. This is the only way to ensure that these features are not related to individual components alone, but rather that the overall concept represents a future-proof investment.



Energy as required

A good example of this is the idea of providing energy as and when it is needed. Processes with high repeat accuracy, such as those found in injection moulding machines or presses, often achieve their desired performance peaks in an energy-efficient manner by using a combination of valve-controlled accumulator operation and variable pump control. If there is also a safety device in these machines, to ensure that interconnected tasks can only be carried out in accordance with the if-then principle, the complexity of the system increases. The status of hydraulic valves must therefore be registered and evaluated by means of a system for monitoring their operating position in order to guarantee the safety of the operator and the machine.

Bucher Hydraulics has for decades been manufacturing cartridge valves for applications with exacting safety requirements. This well-thought-out concept centred on using proven components is also the foundation of a reliable operating-position monitoring system. The clear dividing line between the individual elements and the wide range of possible combinations of functions forms the basis for a modular construction kit that offers a high degree of flexibility for application-specific solutions.

End-to-end precision

Precision is one of the most important criteria for directional seat valves, and it starts right back with the production of the parts. Top priority is given to an efficient and at the same time stable manufacturing process to ensure precision and thus sustainable product quality. This begins with the selection of the machines and includes consistent monitoring of the complete manufacturing process including the finishing stages. The degree of precision in machining attains the extremely high level that Bucher Hydraulics has been achieving for years.

In the case of the WR / WS series of valves, this accuracy has a direct effect on their power density, and it ensures the best possible values, particularly in the relationship between switching capacity and delta P. Even with a large stroke, the valve gives reliable switching over a long period of time, and the pressure losses are kept to a minimum. The Bucher engineers succeeded in designing the switching performance envelope in such a way that the directional seat valve still functions reliably despite undervoltage, increased temperature and maximum pressure.

Thanks to these technical advantages, Bucher Hydraulics has positioned itself in numerous applications as a very capable partner for directional seat valves. Investments in the company's own development, close cooperation with customers and knowledge of their specific problems has led to the constant implementation of new product and system solutions. The company is regarded as a pioneer in the field of monitoring the operating position of cartridge-type two-stage directional seat valves.



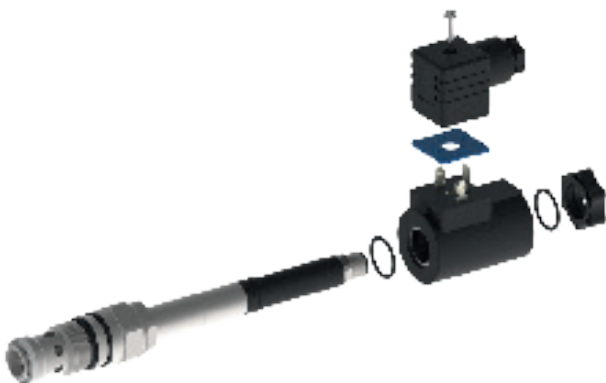
Series WR / WS directional seat valves from Bucher Hydraulics are characterised by their high power density. This ensures the best possible values, particularly in the relationship between switching capacity and delta P. These cartridge valves work reliably even with undervoltage, increased temperature and maximum pressure.

Expertise in high-volume production

The know-how gained from very demanding applications such as wind energy, where the valves have been used for years to control the pitch angle of turbine blades, has resulted in an exceptionally adaptable modular system yielding the most high-performance and reliable valves.

The technology for industry 4.0 is in volume production today, and intelligent valves (the iValve family) are already being supplied to the lift/elevator industry. Thanks to sensors and self-learning algorithms, these valves can control and adjust themselves. Some of the resulting knowledge and experience has already been transferred to the modular cartridge valve system, where it supports the user in creating intelligent controls as understood for Industry 4.0.

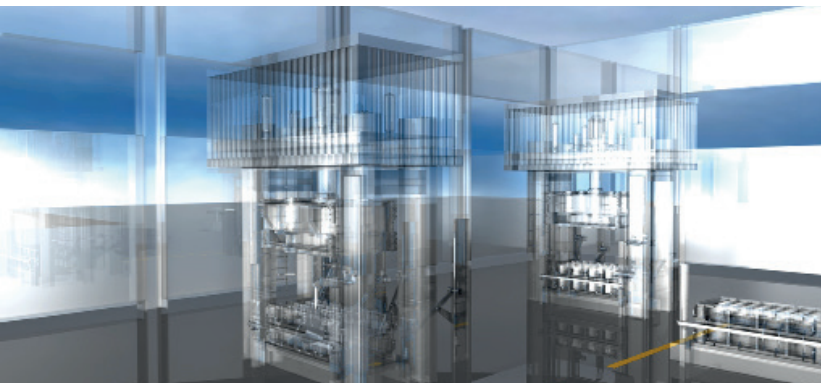
In directional seat valves of the WR / WS series, there is a clear-cut separation between the hydraulic part and sensor on one side, and the actuating solenoid coil on the other. In terms of application tasks and functions, all aspects of the flexibility of the modular solenoid coil system are preserved, and it can therefore meet the requirements of numerous applications. The focus is on the WR / WS valves, which for years have proven themselves by their service life, leak tightness, high working pressure, closing speed, stability, and reserves of switching capacity, and which have passed extensive EMC, shock and vibration tests. Together with Bucher Hydraulics' in-house precision machining, the valve's design scores with its small footprint combined with high performance, which often allows an even smaller nominal size to be used. For example, a size 10 valve with an M24 thread has a rated flow of 140 litres per minute, and even with operating-position monitoring, the size 10 can achieve 80 litres per minute. The size 5 valve is in no way inferior, but given its smaller size, it is rated at 30 to 40 litres per minute, depending on the version.



In Bucher Hydraulics series WR / WS directional seat valves with operating-position monitoring, there is a clear-cut separation between the hydraulic part and sensor on one side, and the actuating solenoid coil on the other. In terms of application tasks and functions, all aspects of the flexibility of the modular solenoid coil system are preserved, and it therefore meets the requirements of numerous applications.



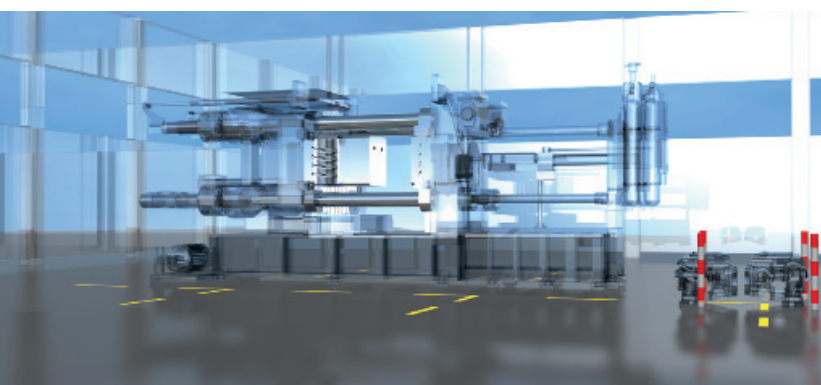
Mobile equipment often contains interdependent functions. For example, a crane boom cannot be operated until the crane is reliably stabilised. For this application, Bucher Hydraulics offers directional seat valves with operating-position monitoring and fail-safe sensor with PNP output (normally closed).



Bucher Hydraulics WR / WS directional seat valves deliver impressive operation in numerous applications that are powered by accumulators, and they can also be reliably applied as safety devices. For example, presses and deep-drawing presses require precision performance with simultaneous protection of the operator, which is made possible by the safe and reliable design of the directional seat valves with operating-position monitoring.



Injection moulding machines are synonymous with maximum loads, high repeatability, and energy efficiency. They also demand a high level of safety. To meet these criteria, Bucher Hydraulics has for decades been manufacturing cartridge-type directional seat valves for valve-controlled accumulator operation. The well-thought out concept centred on using proven components is the foundation of the operating-position monitoring system.



In demanding applications such as a die-casting machine, the status of hydraulic valves must often be registered and evaluated for safety reasons. Bucher Hydraulics directional seat valves with operating-position monitoring perform this function, offering not only high reliability but also high switching accuracy.

Efficiency and reliability in the overall concept

The combination of high performance, small installation space, cartridge design and leak tightness is unique in the market. Details make the difference. Optimised machines for forming the seats and seat surfaces, coupled with high-quality manufacturing processes create the basis for a reliable design, so that even valves with just a unidirectional seat-type shut-off maintain their position reliably at a low load pressure.

This seat technology means that the WR directional seat valves are very reliable components where stringent safety requirements have to be met. Alternatively, the WS version with bi-directional seat-type shut-off is available. With this version, users can achieve efficiency and safety with just one valve, because even low-loss circuits working in accumulator mode require no additional valves.

For Bucher Hydraulics, there is no question that reliable design is based on both the detail design of individual components as well as an examination of the overall system. These considerations led to the design of a special spool for the WR / WS valves. It has a small spool clearance, and its particular geometry enables a positive overlap with minimal spool-type leakage. As a result, the system that monitors the operating position of the spool can also be used as a safety device. Apart from its high reliability, the valve also offers high switching accuracy and low leakage.

Electrical interface influences safety

In addition to the valve, the right choice of electrical interface is an important aspect of safety. Bucher Hydraulics offers a fail-safe sensor with PNP output (normally closed), which sends a positive signal to the control line. These valves can therefore also be used in mobile hydraulics. The modular system also allows for NPN and/or normally open outputs instead of normally closed ones. However, the question of if and when this is advisable can only be clarified in close cooperation with the user and by considering all the safety aspects in the overall context.

As the third component of the modular valve system, the high-pressure wet armature solenoid system is also specifically tailored to the needs of users. The special design differs significantly from other systems for monitoring the operating position, however. The solenoid coil can be easily rotated and replaced, even during operation in the field. Since the solenoid coils are fitted onto the cartridges and operate independently of the internal valve technology, replacing them has no influence on the oil circuit and the operating-position monitoring, and intricate dismantling of the electronics is not necessary. The Bucher Hydraulics modular system includes various voltages and connectors for the solenoid coil.

In general, users can build custom safety circuits using the three components of valve, sensor and solenoid coil. Flexibility and modularity allow the choice of cavity type, switching capacity, flow rate, delta P, leak tightness, sensor function and signal type, number of flow paths as well as the selection of nominal size from 5 to 16. In addition, connectors featuring IP67 protection class, and a special surface coating, allow use in applications with not just extreme hydraulic loads but also aggressive environmental conditions. For this purpose, all external parts are protected against corrosion by a zinc-nickel finish, which has been tested to withstand a 720-hour salt spray test.

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