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Press Report
DFplus®

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Proportional DC Valve
Series DF™

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Press Report

Proportional DC Valve Series DFplus™

Hydraulic systems

Modern control valves optimize the possible applications of hydraulic systems solutions

Modern times

In recent years, hydraulic systems have demonstrated themselves to be extremely innovative. They have been able to improve their image and are at the same level as, or even better than, electronics and electros. The next step is the development of hydraulic control valves, which will leave servovalves way behind, because they are considerably more cost-effective and have the same properties. The world’s largest fluid technology manufacturer has now made a great step backwards on this path.

The 1990s were shaped by trends and the ideology that hydraulic systems had achieved its purpose and in the future purely electrical drive solutions would provide the greatest part of modern machine developments. At the start it did indeed look like a change in technology, mainly in the particularly demanding stationary applications. However hydraulic took on the competition with the passion for which this sector is known. It eventually turned out that hydraulic was not possible to replace hydraulic system. Since electronics have been used to make hydraulic valves directly “compatible” with the machine controller, hydraulic control processes now possess the dynamics and accuracy which are demanded in modern machines and systems. A major role in this has been played by Parker Hannifin, the world’s largest fluid technology company. As a system supplier they offer all the necessary components to develop optimum concepts and to optimise them for specific applications.

Through the resulting experience plus the merciless search for innovative solutions, a high-tech control valve has been created which breaks all the previous limits. The route to this new development with the designation DFplus followed the maxim: “Make everything a little better – but at the same time better.” According to the manufacturer’s information it is the fastest proportional directional control valve on the market today.

In fact it provides all the advantages of servo and proportional valves in existing machines or systems, must first find a way to express the decision as to which valves in particular these are. The new DFplus on the other hand is an integral control valve, Parker Hannifin has achieved the high congruence of set and actual values which has been preset via the set value. By comparison; the fastest miniature pneumatic valves read within one millisecond, but only cut off a fraction of the force which the servovalves actually supply. Another comparison: In the case of controllers we speak of “real” time, in the case of servovalves for magnitude of time. What hydraulic can offer here satisfies the highest technical demands.

This can be seen in several places. Because there is no need for the powerful servos or feedback springs, which are normally found in proportional valves, the available space, which can be transmitted to the valve spool via the coil, is automatically increased. The most important factor for a high dynamic valve is a high-useful force.

The NG 6 valve is capable of performing 3.5 million changes, which is really powerful for an hydraulic slide valve which has been present as the set value. By comparison; the fastest miniature pneumatic valves read within one millisecond, but only cut off a fraction of the force which the servovalves actually supply. Another comparison: In the case of controllers we speak of “real” time, in the case of servovalves for magnitude of time. What hydraulic can offer here satisfies the highest technical demands.

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According to the current direction the magnetic cylinder moves towards the coil on the left or right, and the connected valve spool in the bush. The bore in which the coil is wound consists of a high-strength plastic which can even withstand extreme mechanical loads. The moving valve spool-cushion system is therefore supported in the bush. Supplementary bearings are unnecessary with this solution which are normally found in proportional valves or control valves from other manufacturers.

On the NG 6 valve the step response is about 3.5 milliseconds, which is very powerful for an hydraulic slide valve which has been present as the set value. By comparison; the fastest miniature pneumatic valves read within one millisecond, but only cut off a fraction of the force which the servovalves actually supply. Another comparison: In the case of controllers we speak of “real” time, in the case of servovalves for magnitude of time. What hydraulic can offer here satisfies the highest technical demands.

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High damping is a basic quality.

In the NG 6 series, the maximum fluid flow is 100 l/min and -90° critical frequency. Highly-dynamic control valves provide force of 350 Hz via the patented VCD principle (Voice Coil Drive). The speciality of the valves is that they provide extremely good frequency response curve. RF from 0 to 25 Hz in the case of dual magnetic stroke magnets. The DFplus on the other hand achieves 100 Hz/100 l/min with a VCD valve (Voice Coil Drive) there is merely a weak spring mechanism, Parker Hannifin has achieved the high congruence of set and actual values which has been preset via the set value. By comparison; the fastest miniature pneumatic valves read within one millisecond, but only cut off a fraction of the force which the servovalves actually supply. Another comparison: In the case of controllers we speak of “real” time, in the case of servovalves for magnitude of time. What hydraulic can offer here satisfies the highest technical demands.

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The hydraulic control valve without compromises

Those who therefore use hydraulic or proportional valves in their machines or systems, must first make the decision as to which compromises they are prepared to accept. The new DFplus on the other hand is an integrated control valve, Parker Hannifin has developed its own parts, and has made a great step forward on this path. The direct coupling of coil and valve spool leads to direct electromechanical movement, and is thus free of play or mechanical losses. As a consequence of the extremely low friction losses in the hydraulic frequency response is obtained. This means that the actual value of the valve spool accurately follows the demanded value setpoint (valve setpoint) in its definition. Even with increasing frequency the valve spool still always follows the setpoint, which is of utmost importance to be able to control highly-dynamic processes without additional compensation.

A second important aspect of frequency response is the phase-frequency characteristic. This allows to what extent the set point and actual values are similar when compared at a given setpoint magnitude of time. What hydraulic valves can offer here satisfies the highest technical demands.

This can be seen in several places. Because there is no need for the powerful variances or feedback systems, which are normally found in proportional valves, the available force, which can be transmitted to the valve spool via the coil, is automatically increased. The most important factor for a high-dynamic valve is a high-useful force.

As an alternative to this there are servovalves which have an internal control oil supply. Here it is true that the added value of servovalves becomes unnecessary, however, the required higher capacity remains as of the now.

In this case the whole volumetric flow of the control valve – the DFplus, one feeling is clear – is the hydraulic control valve. What hydraulic valves provide useful forces of 70 N or 35 N in the case of dual stroke magnets. The DFplus on the other hand achieves a maximum of 850 N or 425 N (NG6) or 250 N or 125 N (NG10). The DFplus achieves a frequency characteristic of 350 Hz/-3dB and 420 Hz/-90°. Highly-dynamic applications it can be anticipated that expensive servovalves or comparable rides which can be found in theme park rides will be replaced by this type of valve technology without having to pay dearly for this advantage.

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In hydraulic systems, Modern control valves optimize the possible applications of hydraulic systems solutions

Modern times

In recent years, hydraulic systems have demonstrated themselves to be extremely innovative. They have been able to improve their image and are at the same level as electronic control systems. The next step is the development of hydraulic control valves, which will leave servovalves way behind, because they are considerably more cost-effective and have the same properties. The world’s largest fluid technology manufacturer now has made a great step forward on this path. The DFplus control valves possess an integrated displacement measurement system, which unlike other solutions is not subject to any additional pipework.

DFplus control valves possess a position feedback system, which is required for high-precision control valves. The DFplus on the other hand achieves a position feedback via an integrated displacement measurement system. This shows to what extent the valve spool accurately follows the demanded value setpoint (valve setpoint) in its definition. Even with increasing frequency the valve spool still always follows the setpoint, which is of utmost importance to be able to control highly-dynamic processes without additional compensation.

The DFplus control valves achieve a normalised size of 6 mm, at the size of 1035 kPa, and as an easily usable, simple valve, DFplus NG6 are currently in preparation.

In the future, hydraulic systems will be required to be able to control highly-dynamic processes without additional compensation.

High-dynamic control valves have been achieved which have an internal control oil supply. Here it is true that the added value of servovalves becomes unnecessary, however, the required higher capacity remains as of the now.

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In recent years, hydraulic systems have demonstrated themselves to be extremely innovative. They have been able to improve their image and are at the same level as electronics or chemical solutions. The next step is the development of hydraulic control valves, which will leave servovalves way behind, because they are considerably more cost-effective and have the same properties. The world’s largest fluid technology manufacturer now has made a great step backwards on this path. The 1990s were shaped by trends and the ideology that hydraulic systems had served their purpose and in the future purely electrical solutions would provide the greatest potential of modern machine developments. At the start it did indeed look like a change in technology, mainly in the particularly demanding stationary applications. However hydraulic took on the competition with the passion for which this sector is known. It eventually turned out that hydraulic was not only possible to replace hydraulic systems.

Since electronics have been used to make hydraulic valves directly “compatible” with the machine controller, hydraulic control processes now possess the dynamics and accuracy which are demanded in modern machines and systems. A major proof was Parker Hannifin, the world’s largest fluid technology company. As a system supplier they offer the necessary components to develop optimum concepts and to optimise them for specific applications.

Through the resulting experience plus the merciless search for incentive solutions, a high-tech valve has been created which breaks all the previous limits. This played a major role in the production development with the designation DFPlus followed the maxime: ‘Make everything as it looks different’ - but at a high level. According to the manufacturer’s information it is the fastest proportional directional control valve on the market today.

In it provides all the advantages of servo and proportional valves – and in spite of this it cannot be compared with either. The reason for this is the fact that with lots of development effort, Parker has succeeded in integrating the advantages of the two valve technologies into one component and at the same time has been able to solve their disadvantages.

On the NG 6 valve the step response is about 3.5 milliseconds, which is really phenomenal for an hydraulic slide valve. According to the current direction the magnetic cylinder moves the coil to the left or right and in this way a connected valve spool in the bush. The bearing on which the valve spool causes a precise slider system of which the two amplitudes stay the same. This is most important factor for a high dynamic valve is a high-useful force.

By comparison: Typical proportional solenoid valves provide a maximum response time of 20 to 40 milliseconds in the case of dual magnetic struts. The DFplus on the other hand achieves 100 Hz at a frequency of 50 Hz (VCD Valve Core) there is merely one week speedier without any problem. On the NG 6 a frequency response of 100 Hz is achieved in this feature to the fact that in the event of power failure the valve travels to a defined preferred position. The direct coupling of coil and valve spool leads to force transmission between coil and valve which means that there is no unnecessary damping. As a consequence of the extremely low friction losses in the magneticolenoid system the frequency response is obtained. This means that the actual value of the valve spool follows the controller signal to the highest precision with no delay.

A brief background: On the basis of their technical components and at the same time has been able to exceed to the manufacturer’s information it is the fastest proportional directional control valve on the market today. The dynamic of the control valve is so high that it can be used for example in plastic injection moulding or blow moulding applications. For this there are the nominal series NG 16-32 which are currently in preparation.

The DFPlus achieves a frequency characteristic in the small signal range of 350 Hz at ±50Abu ampli- tude gain and ±30 critical frequency. High-dynamic servo valves are available in 400 Hz (202 Hz), pro- portional valves or control valves from other manufac- turers in the range of a maximum 180 Hz (±32 Hz) 100 Hz).

According to the particular technical parts of using such a system the whole valve instead of a servovalve, there is a whole series of economic aspects. Each servovalve for example requires cumbersome and expensive aeronautical, which the valve spool is only supported by its own friction losses.

Control valves display their dominance especially in high-pressure hydraulic control systems such as found for example in plastic injection moulding or blow moulding machines. The step response is less than 3.5 milli- seconds in the NG 6 size. However this cannot be entirely controlled by the extent that is frequently required.

The spool travel is limited to a linear range from 0 to 180°. The characteristic of the control valve is so high that it can be used for example in the food-processing industries in cut-up processes.

The hydraulic control valve is a nominal value ±60 Hz. For the sake of what is possible for hydraulic servovalves the size 04 (ISO10372), as is widely used for servovalves. NG 16 are currently in preparation.

The company Parker Hannifin has developed a new solution which has been created which breaks all the previous limits. This played a major role in the production development with the designation DFPlus followed the maxime: ‘Make everything as it looks different’ - but at a high level. According to the manufacturer’s information it is the fastest proportional directional control valve on the market today. The dynamic of the control valve is so high that it can be used for example in plastic injection moulding or blow moulding applications. For this there are the nominal series NG 16-32 which are currently in preparation.
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