

Dividing flows appropriately

Increased comfort with higher precision flow dividers

With a deviation of just 1.5 percent, the new Bucher Hydraulics flow dividers have reached a new level of precision. The new versions complement the extensive product family of Bucher Hydraulics flow dividers. They are identified by the code “HG”, the German abbreviation for “high precision”.

The Bucher Hydraulics MTDA flow divider series has developed into a whole line of products (see Fig. 1): These automatically operating flow dividers split a volume flow into two part-flows that can be variable within certain limits. The standard division ratio is 1:1. However, other division ratios are possible, too. The new high precision flow dividers share a unified plunger axis design with Bucher Hydraulics high-pressure flow dividing valves (“HD”) and differential lock valves (“DV”).

The flow dividers are available in different sizes and designs for volume flow rates of 2 to 250 l/min. Whilst these are standard products, Bucher Hydraulics is able to provide valves with different division ratios depending on the functional specification. All versions and designs feature a division accuracy of $\pm 3\%$ of the nominal flow rate. In principle, any division ratio can be realised with these valves. It is the practical application rather than the technical feasibility which sets the limits.

More than five years ago, the product family was expanded by a high-pressure variant. Like the standard flow divider valves, this HD version is available in two nominal sizes for volume flow rates of 2 to 250 l/min. The HD version has an operating pressure of 420 bars.

Flow divider MTDA with unified plunger axis

Flow Divider MTDA^{08/16}

- Dividing and combining function
- Max. pressure at port P = 250 bar
- Max. flow range NG08 = 100 l/min, NG16 = 250 l/min
- Division accuracy in control flow range +/- 3 %



High Pressure Flow Divider MTDA^{08/16}HD

- Dividing and combining function
- Max. pressure at port P = 420 bar
- Max. flow range NG08 = 100 l/min, NG16 = 250 l/min
- Division accuracy in control flow range +/- 3 %
- Crossline relief valve and anti cavitation check valve



Differential Lock Valve MT^{08/16}DV^{0/1/2}

- MT^{08/16} DV for 2 motors
- MT^{08/16} DVD for 3 motors
- MT^{08/16} DVV for 4 motors
- Max. pressure at port P = 420 bar
- Max. flow range NG08 = 100 l/min, NG16 = 250 l/min
- Actuating hydraulics and electro-hydraulics
- Crossline relief valve and anti cavitation check valve



Flow divider with division accuracy < 1,5 %

High Accuracy Flow Divider MTDA08HG

- Dividing and combining function
- Max. pressure at port P = 250 bar
- Max. flow range 50 l/min
- Division accuracy in control flow range +/- 3 %



Internal Flow Divider QXT

- Dividing and combining function
- Outlet displacement 5 up to 250 cm³/U
- Speed 400 up to 6300 min⁻¹
- Max. pressure at port P = 250 bar
- High efficiency, no throttling losses
- 2, 3 or 4 outlet flows are available
- Can be used to produce pressure intensification



Figure 1: Presentation of product family

Differential lock valves are the third group within the MT product family using the unified plunger axis. The maximum volume flows and the maximum sustained pressure correspond to those of the high-pressure flow divider valves. These differential lock valves have become indispensable in mobile hydraulic applications. Despite its simple operating principle, the unit performs important functions in operation such as driving comfort, traction and operational readiness. Bucher Hydraulics differential lock valves are based on double-action flow dividers, which either divide the volume flow of a hydraulic system or combine two volume flows. Depending on the on-board hydraulic supply of a mobile machine, the differential lock valve can also be directly combined with a separate pilot unit. And depending on the design, the existing pilot unit of the work hydraulics may also be used instead – as is common practice with larger machines. While the number of drive motors determines which variant of differential lock valves is actually chosen, all of these variants are based on the same standard versions.

Differential lock valves are available in different sizes and designs for volume flow rates of 2 to 250 l/min. Both nominal sizes feature variants for driving two, three or four motors (Fig. 2). Bucher Hydraulics states: “Our standard valve designs offer several variant options also catering for unusual technical requirements. Thus, we seldom need to develop a completely new valve.” Such variants will, for instance, provide additional connections for sensors, should the need arise to measure pressure while driving. This can also involve specific division ratios or the adaptation to differing wheel dimensions. Depending on the application, the division ratios can be freely selected. It is common sense rather than the technical feasibility, which sets the limits. The valves’ functionalities can be expanded by adding make-up valves, anti-shock valves and anti-shock make-up valves.

To supplement systems with differential lock valves Bucher Hydraulics offers changeover valves for hydraulic motors. These valves enable the driver to switch from a quick-motion circuit such as “travel gear” to a parallel circuit with differential lock valve. For the user, solutions like these provide reliable results and fast working speeds. In addition, the hydraulic design is simple and operational safety is high.

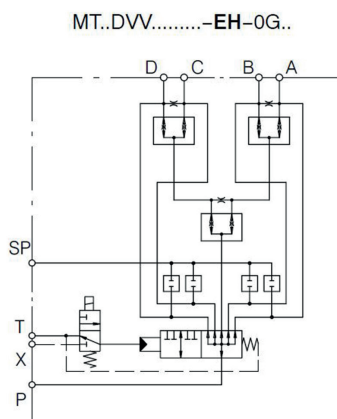


Figure 2: Differential lock valves are available in different sizes and designs for volume flow rates of 2 to 250 l/min and variants for driving 2, 3 or 4 motors.

New: At least twice as precise

Bucher now offers new flow dividers with a design principle offering much higher division accuracy. The volume flow can now be divided with an accuracy of $\pm 1,5\%$ (Fig. 3). Even standard flow dividers offer an impressive division accuracy of $\pm 3\%$. For conventional flow dividers, this is based on the nominal flow rate. For high precision flow dividers, the tolerance applies to the pumped oil volume. “We are not only more precise across the entire range, we also reach this accuracy class at a much lower pumping capacity,” the Bucher Hydraulics Product Manager pointed out. This allows for designs requiring a reduced mechanical expenditure to ensure synchronous operation.

The range of high-precision flow dividers carries the designation “HG”. Because the volume flow has a significant influence on the precision, the HG flow dividers are available in four different control flow ranges between 16 and 50 l/min, all for a maximum operating pressure of 250 bars. We built the first high-precision flow dividers several years ago for a client project. Since then, they have developed into a product family of their own.

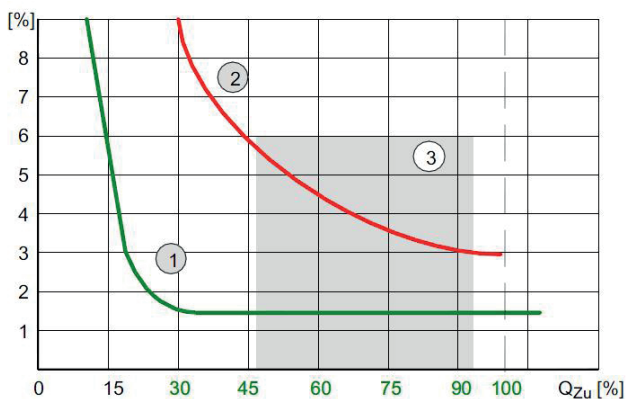


Figure 3: Division accuracy of high-precision flow divider compared with standard version

- 1 MTDA08HG (high-precision) based on operating flow range
- 2 MTDA08 standard based on operating flow range
- 3 MTDA08 standard, $\pm 3\%$ based on nominal flow range

Which applications require these precision flow dividers? Let's illustrate this using an example: On a car carrier trailer with two loading decks, the upper deck must be lowered evenly. The cargo must not start to shift due to cylinders working asynchronously. Other applications can be found in agricultural engineering and in construction equipment. Especially with construction equipment, the high-pressure variant (up to 420 bars and at a division accuracy of $\pm 3\%$) is very popular.

With HG flow dividers Bucher Hydraulics also introduced zinc nickel coating in series production (Fig. 4). The flow dividers easily fulfil the minimum requirement of resistance during the 720-hour salt spray fog test. Thus, they meet the high reliability targets set for Bucher Hydraulics components.

The QXT range (Fig. 5) of internal gear units completes the flow divider product portfolio. These units are available with division volumes of 5 to 250 cm³/U for 2, 3 or 4 part-flows and pressures up to 320 bars. These internal gear flow dividers feature very high division accuracy, exceptionally smooth operation and reduced pressure pulses as well as a long service life.

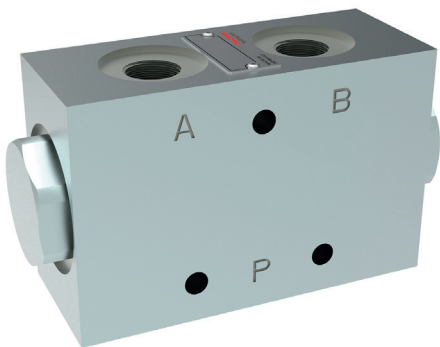


Figure 4: MTD A08HG high-precision flow dividers are available with four different control flow ranges and with zinc nickel coating

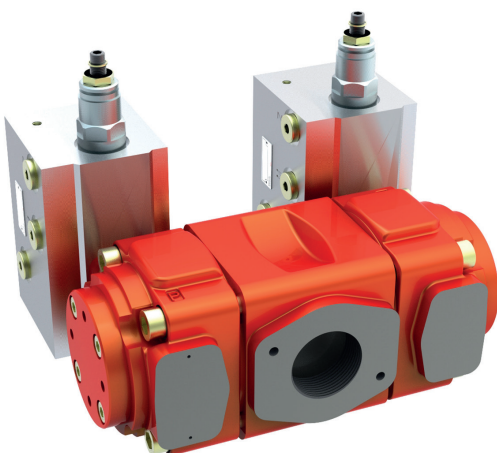


Figure 5: QXT internal gear flow dividers divide volume flows in up to 4 part-flows

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