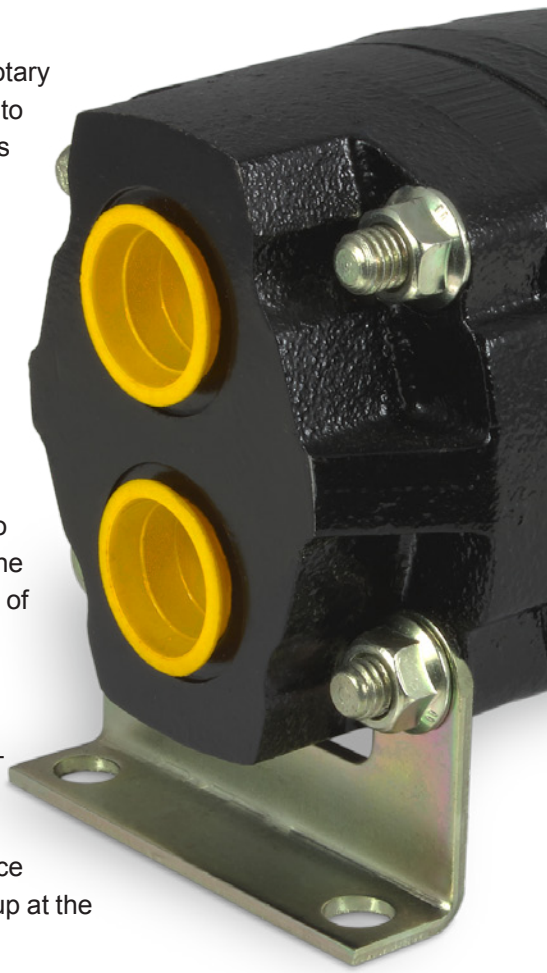
P Series rotary geared flow dividers have been designed to accurately divide flow from a single hydraulic source into two or more separate output flows.

Flow Divider and Combiner

Unlike most valve type flow dividers “P” Series rotary geared flow dividers will also combine return flows to allow the synchronising of actuators in both directions of movement.



Equal, Mixed and Multi-Section

Dependant on the type of unit flows from 2 to 600 litres can be divided exactly in two or up to a maximum of eight equal or proportionately mixed flows.

A Flow Divider as an Intensifier

By off-loading one output from a 2-section flow divider to tank enables service output pressure to be intensified. The ratio of the displacements of the flow divider sections is a measure of the amount of intensification obtained.

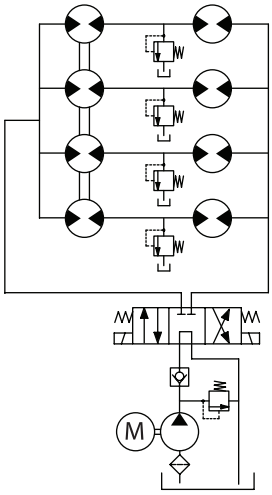
Flow Dividers with Integral Reliefs

To allow a “lagging” cylinder to catch up during mid-stroke. “P” Series flow dividers can be supplied with integral differential reliefs which relieve back into the inlet gallery of the unit. This differs from service line reliefs relieving to tank to allow cylinders to catch up at the end of stroke.

Construction

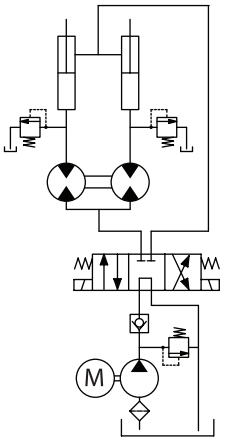
• Proven design, stable material selection and precise machining are the keys to quiet reliable performance in a variety of applications.
• High strength permanent mould cast iron housing.
• Precision needle bearings.
• Hardened shafts joined by internally hardened round keys and keyways to eliminate stress concentrations and wear.
• Precise machined trapping relief grooves provide constant filling and discharging to assure quiet operation and maximum bearing life.
• O-ring seals between sections.
• Precision dowel pin alignment between sections.

Related Fluid Power Ltd. T: 0044 (0)1334 655600 F: 0044 (0)1334 650006 E: sales@relatedfluidpower.com www.relatedfluidpower.com



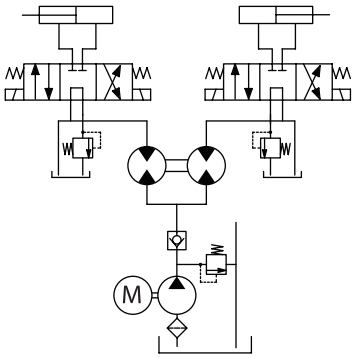
Multiple Motor Control

Where one pump operates a number of hydraulic motors: car wash systems, lubrication systems (multiple point), hydraulic driven machines – harvesting machines, earth moving machines, etc.



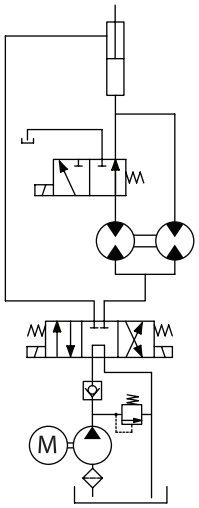
Synchronising Cylinders

Where two or more cylinders must be synchronised: lift platforms, scaffolds, presses, etc.



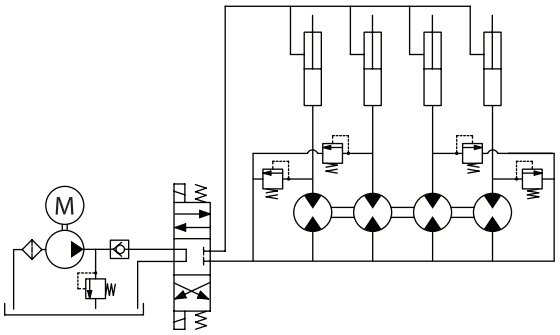
Independent Circuit Control

Where two or more circuits must be controlled independently at different pressures/flows: presses, machine tools, etc.



Pressure Intensification

Where main pump pressure must be intensified in one circuit of multiple circuit machinery, such as waste compactors and other hi-lo applications.



Synchronising Cylinders Using Integral Reliefs

Where it is important for “lagging” cylinders to “catch up” at end of stroke P Series flow dividers with integral differential reliefs can be used: demount and stabiliser control circuits, lift platforms, presses, etc.

Related Fluid Power Ltd. T: 0044 (0)1334 655600 F: 0044 (0)1334 650006 E: sales@relatedfluidpower.com www.relatedfluidpower.com

Selecting a Flow Divider

Minimum and maximum flow rates given in the tables are calculated for rotational speeds from 500 to 3500 rpm. However greatest efficiency obtains between 1500 and 2500.

Choose a unit therefore, such that total flow lies in the middle range of its rated throughput, erring on the side of faster rather than slower speed. Check the speed by referring to the displacement/rev. column. Remember that all sections in any flow divider assembly rotate at a common speed.

A flow divider will provide a fairly accurate synchronisation of cylinders whilst oil is flowing but is not a “positive hold” device and should not be expected to hold them in position when stationary.

Calculation of Slip Losses

Because there must be clearance for the gears to rotate some internal leakage is inevitable and this causes slight inaccuracy in flow division. The amount of “slip” is a function of flow and pressure drop through each section and is affected by viscosity: it must therefore be an approximation. However, for most applications the deviation from calculated figures is negligible.

It is first necessary to deduce inlet pressure.

Neglecting any losses,

$$\mathbf{PQ = P1Q1 + P2Q2 + P3Q3} \text{ etc.}$$

or

$$\mathbf{P = \frac{P1Q1 + P2Q2 + P3Q3}{Q}} \text{ etc.}$$

To this must be added the pressure drop P_D caused by the unit itself.

Or $$\mathbf{B = P1Q1 + P2Q2 + P3Q3 + P_D}$$

A close approximation to P_D may be found by

$$\mathbf{P_D = \frac{Q}{9N}\ (bar)}$$

Where
- **P** = inlet pressure (bar)
- **Q** = inlet flow (lpm)
- **P1, P2, P3** = outlet pressures (bar)
- **Q1, Q2, Q3** = outlet pressures (bar)
- **N** = No of sections
- **B** = actual inlet pressure (bar)

The pressure on each outlet is normally known and the flows will be proportional to the section displacements. Substituting these displacements for Q1, Q2, Q3, etc., and substituting the sum of these figures for Q in the formula, B may be calculated.

Thus the pressure drop across each section can be found and the slip loss calculated by multiplying these values by the slip loss figures in the table.

It will be noted that where outlet pressures differ from each other, inlet pressure will lie between them and therefore the amount of slip should be then added to flow into lower pressure and deducted from flow into higher pressure.

In practice all fluid entering must of course pass from the outlets: the sum of positive and negative slips must be zero although the aggregate of calculated slip losses will show a slight discrepancy.

If a closer approximation is needed, the balance of slip loss should be considered to pass to the higher pressure outlets in proportion to their pressures, since dynamic oil flow has a tendency to reduce negative slip.

If you need more accurate flow division than our standard product provides, we can supply special “minimum clearance” units.

NOTE: The calculations and figures in the tables are related to hydraulic oil of ISO viscosity grade 32-46 at 40°C.

Use of Service Relief Valves

As well as the main relief in a circuit it is advisable to fit a service relief valve after each outlet. These have two functions: 1. to correct positional error caused by slip or mismatching of cylinder bores, by allowing a lagging cylinder to “catch up” at the end stroke, and 2. to prevent more intensification than is required.

N.B. P Series flow dividers can be fitted with differential relief valves (relieving to inlet gallery) which allow a lagging cylinder to catch up at end of stroke. These do not prevent intensification

Related Fluid Power Ltd. T: 0044 (0)1334 655600 F: 0044 (0)1334 650006 E: sales@relatedfluidpower.com www.relatedfluidpower.com