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ROTARY GEARED FLOW DIVIDER Selection Guide - FDR

Hydraulics
Rotary geared flow dividers

General Information - See Website for Dimensions

ORDER CODE	NO. OF ELEMENTS/ OUTLETS	ELEMENT CAPACITY	INPUT FLOW		
			MINIMUM @ 750 RPM	STANDARD @ 1500 RPM	MAXIMUM @ 3000 RPM
		CC/REV	LPM	LPM	LPM
FDR 2/2	2	2	3	6	12
FDR 2/4	2	4	6	12	24
FDR 2/6	2	6	9	18	36
FDR 2/9	2	9	13.5	27	54
FDR 3/2	3	2	4.5	9	18
FDR 3/4	3	4	9	18	36
FDR 3/6	3	6	13.5	27	54
FDR 3/9	3	9	20.2	40.5	81
FDR 4/2	4	2	6	12	24
FDR 4/4	4	4	12	24	48
FDR 4/6	4	6	18	36	72
FDR 4/9	4	9	27	54	108
FDR 5/2	5	2	7.5	15	30
FDR 5/4	5	4	15	30	60
FDR 5/6	5	5	22.5	45	90
FDR 5/9	5	9	33.7	67.5	135
FDR 6/2	6	2	9	18	36
FDR 6/4	6	4	18	36	72
FDR 6/6	6	6	27	54	108
FDR 6/9	6	9	40.5	81	162

Operating Information

Rotary Flow Dividers split the input flow from a single supply into 2 or more outputs of equal or unequal flows.

They are used for synchronisation of rams to ensure level lifting or to operate two or more hydraulic actuators at different speeds, each with integral relief valve.

See notes that follow on ‘selecting a Flow Divider’

Rotary Flow Dividers can also be used for pressure intensifications by dumping one or more outlets to tank.

All units are reversible therefore only one divider is necessary to synchronise actuators in both directions of movement.

Equal and unequal outputs are available by selecting the appropriate units, banked together.

The range of Flow Dividers is a modular construction therefore the number of outlet elements is only restricted by maximum input of 90LPM per section, a minimum speed of 750 rpm and a maximum speed of 3000rpm. In designing a system incorporating a Rotary Flow Divider allowance must be made for the pressure required to cause it to rotate.

Selecting a Flow Divider

Selecting a Flow Divider - Although speed of rotation can be as low as 750 rpm and the maximum is 3000 rpm, for maximum efficiency a Flow Divider should be selected which will pass the required flows in the range 1000 to 2000 rpm.

Equal Flow Dividers - Having decided on the separate flow ratio the sum of which will give total input flow, select a Divider which will pass these flow rates at or near to 1500 rpm. If the flow is variable, calculate speed of rotation which will occur at both maximum and minimum input and ensure that these speeds fall within 750 to 3000 rpm.

Unequal Flow Dividers - Select the desired flows at or near to 1500 rpm, bearing in mind that all the elements in a Flow Divider rotate at the same speed. Thus having calculated the speed of one of the elements according to its flow rate, select the other elements to provide their required flows at that speed. If this proves impractical repeat the process, starting with another of the required outputs. It is not always possible to obtain precisely all the required outputs as this would call for an infinite number of element sizes so some compromise is often required.
However, in practical terms, any combination of outputs from 9 LPM up to a total input of 90 LPM per section can be provided for.

Calculation of Inlet Pressure - The product of inlet pressure and flow is equal to the sum of the products of outlet pressures and flows plus the pressure required to cause the Flow Divider to rotate.

i.e. PQ = P1Q1 + P2Q2 + P3Q3 + PR

when P= inlet pressure
Q = inlet flow
P1,P2,P3 etc. are outlet pressures
Q1,Q2,Q3 etc. are the respective outlet flows
PR is the pressure required to rotate the flow divider
Tests have shown that PR varies slightly according to the size and number of elements, but for practical purposes it can be assumed to be 17 bar (247 psi) for standard ISO VG 32 Hydraulic Fluid at 40°c.

Use of Flow Divider as a Pressure Intensifier - Using an equal element unit with two sections, pressure at one of the outlets can be approximately 2 x the inlet pressure, if the second outlet is piped to the tank. In the same way an "unequal" unit can be used to obtain higher intensification. The ratio of the displacements of the Flow Divider sections is a measure of the amount of intensification achieved. If a ratio of more than 2½:1 is required (i.e. a higher ration than can be obtained with an FD 2/12.30), one or more extra sections can be added to increase the flow to tank and thereby the ratio of intensified pressure to inlet pressure. Pressure at the intensified pressure outlet is given by:-

$$Po = Pi \times \frac{E1 + E2 + E3 \text{ etc.}}{E1}$$

Where
Po = Intensified Pressure
Pi = Inlet Pressure
E1 = Element capacity of high pressure element
E2,E3 etc. = Element capacities of low pressure elements
The inlet pressure can be calculated as for any other Flow Divider, (see formula under ‘Calculation of Inlet Pressure’) taking P1 as the intensified pressure and P2, P3 as the pressure drop on the tank connections of the 'by-pass' elements.

Maximum pressure 345 bar

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