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

1. Equal flow dividers Having decided on the separate flow ratio the sum of which will give total input flow, refer to the table "Equal Element Units" to 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.

2. Unequal flow dividers Refer to the table of individual elements to select those which will pass 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

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 (250psi).

Slip Losses Because there must be some clearance for the gears to rotate some internal leakage is inevitable and this causes some inaccuracy in flow diversion. The amount of "slip" is a function of flow and pressure drop through each section and is affected by viscosity. The losses caused by "slip" past the gears are conducted to tank via die drain line. Use of Flow Divider as a Pressure Intensifier Using an equal element unit within 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 4'/2:1 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 PI as the intensified pressure and P2, P3 as the pressure drop on the tank connections of the 'by-pass' elements.