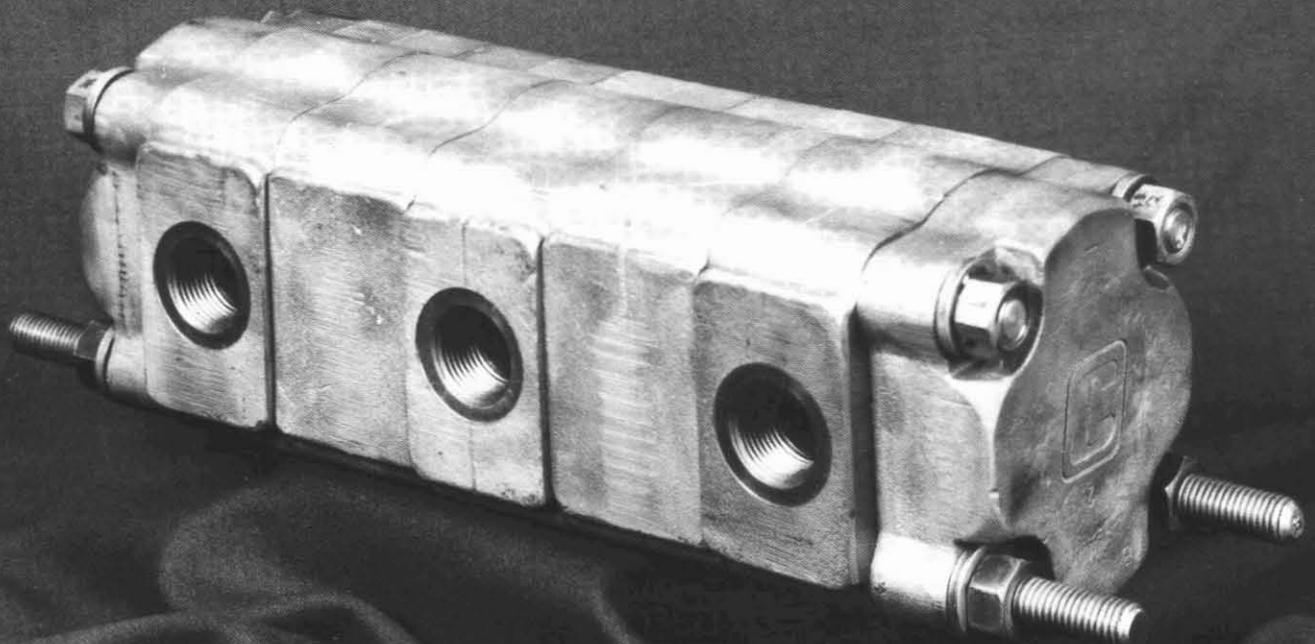


Oil Hydraulic Rotary Flow Dividers and Pressure Intensifiers

Models FD30™ • FD50™ • FD75™

 **Commercial Intertech**



a unique component that works when required and only to the extent necessary

Commercial's rotary flow dividers/pressure intensifiers are extremely versatile components which, when properly applied, will save on installation and operating costs, increase circuit versatility, offer convenience, and improve pump life. This catalog describes the FD30, 50, and 75 models which are assembled from standard heavy-duty gear pump components available throughout the world. Ideal applications are:

1. As flow equalizers to synchronize the operation of multiple cylinders or motors.
2. As flow dividers to distribute the pump flow according to the requirements of each system.
3. As pressure intensifiers to increase the pressure available to a particular system beyond the pump's relief valve setting or to reduce the time at which the pump must operate at maximum pressure.

Rotary flow dividers/pressure intensifiers offer advantages often overlooked when designing a hydraulic circuit. They are unique components which can be considered to "float" in the hydraulic circuit, working only when required, and then, only to the extent necessary. Unlike variable orifice types, rotary flow dividers operate on the principle that fluid horsepower input equals fluid horsepower output, less, of course, the small efficiency loss of the unit. If the pressure at an outlet port is lower than the inlet pressure, the low pressure section of the rotary flow divider acts as a motor. The energy expended

across the motor is not wasted in generating heat but is applied through the interconnecting shaft to do work in the other sections.

The total output flow is equal to the input flow. Each section's output is in proportion to the gear width of the section. As a flow equalizer, each section has equal gear widths.

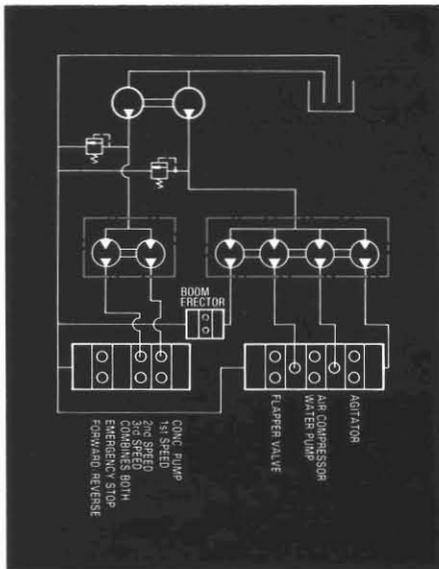
Rotary flow dividers operate automatically. No pilot signals or other devices are necessary to initiate their operation.

The economic advantages of rotary flow dividers/pressure intensifiers is best illustrated by the components they eliminate. Expensive multi-drive gear boxes, multiple pumps, and extensive plumbing and fittings can be replaced by a single pump and a flow divider remotely mounted in any convenient location. Problems, common in feeding multiple pumps, are eliminated because flow dividers are pressure-charged. Rotary flow dividers can be mounted in any position and, because they are self-lubricating, require no maintenance. No external drain lines or shafts are required. Extended studs are provided for easy mounting.

porting

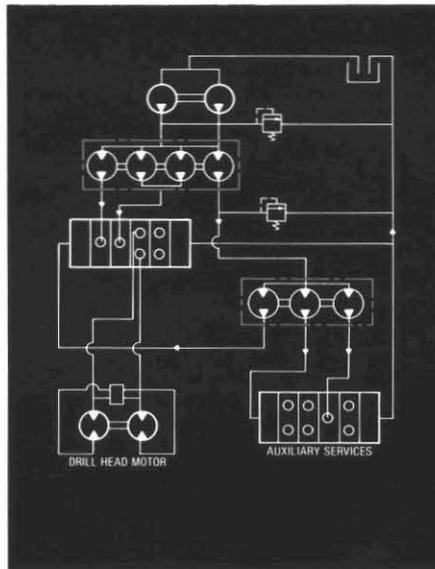
Standard porting of the FD30, 50, and 75 flow dividers is through the gear housing or bearing carrier. Porting through the port end covers is available on special request.

Two studs extend from each end of the flow divider for easy mounting.



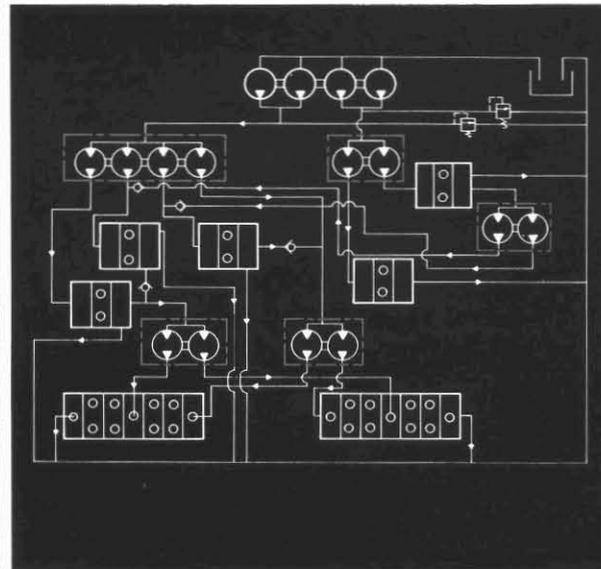
Concrete Pump

Concrete circuit pump providing intermittent high pressure and some speed variation. The two-section flow divider works in pressure intensification and speed control mode, the four-section flow divider simply splits flow to machine services.



Drill Rig (Fire Resistant Fluid)

Flow division is combined with a variable speed drill operation. Two primary flows go to the drill motor, third flow feeds auxiliary services, fourth flow is further divided to supply additional machine services including drill rod screwing and unscrewing.



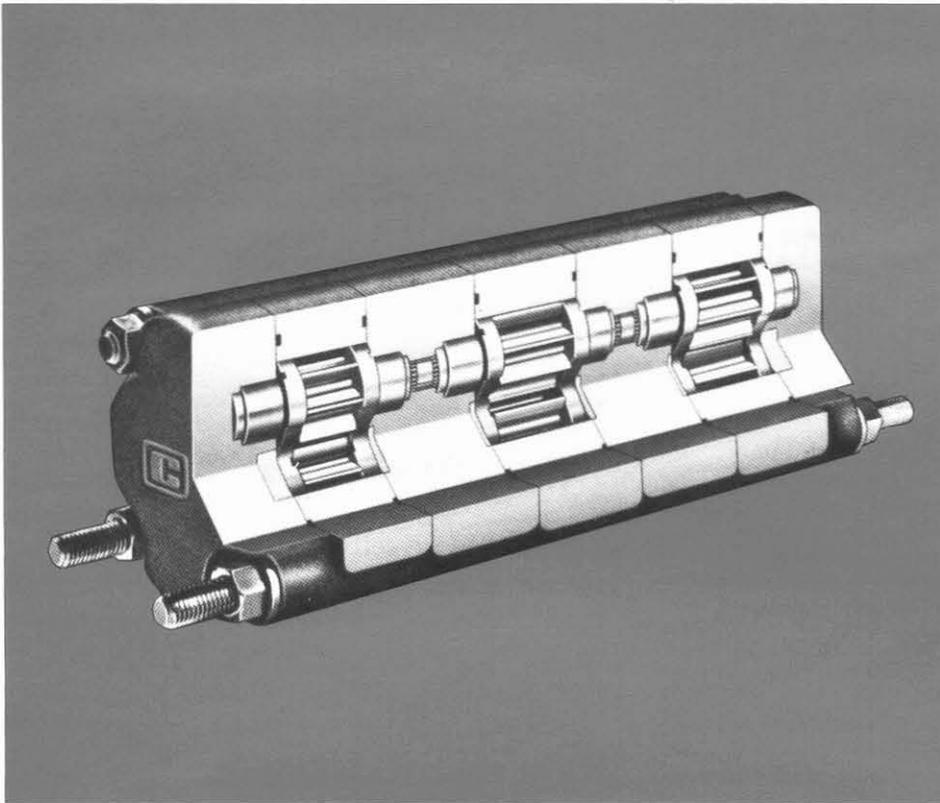
Mining Machine

Use of flow dividers and mid-inlet valves on this mining machine circuit give maximum utilization of power as well as eliminating the need for a complex and costly gearbox driven, multiple pump unit.

NOTE: In accordance with our policy of continuing product development, we reserve the right to change specifications shown in this catalog without notice.

Commercial's FD30™, FD50™, and FD75™ flow dividers are manufactured under one or more of the following patents: United States, 3,421,769; Great Britain, 1,028,735, and 1,157,170; Canada, 781,832; Australia, 401,461; German Federal Republic, 1,601,709; France, 1,428,763 and 1,521,300; Italy, 746,701; and Sweden, 320,855.

how to specify and code

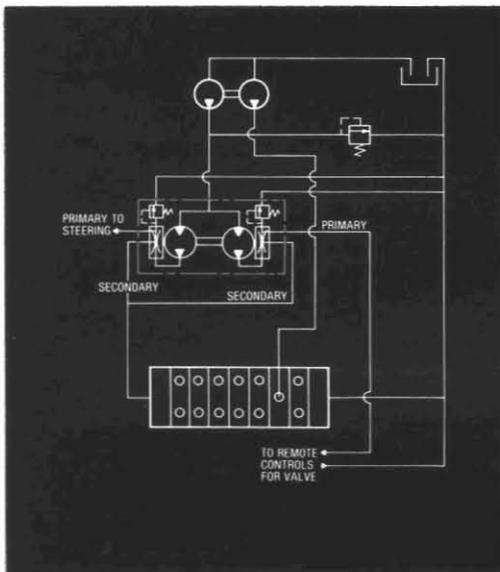


The full assembly code combines individual codes for port end covers, gear housings, and bearing carriers as selected to do the job you require. Here is an example of the procedure:

FD50B Flow Divider

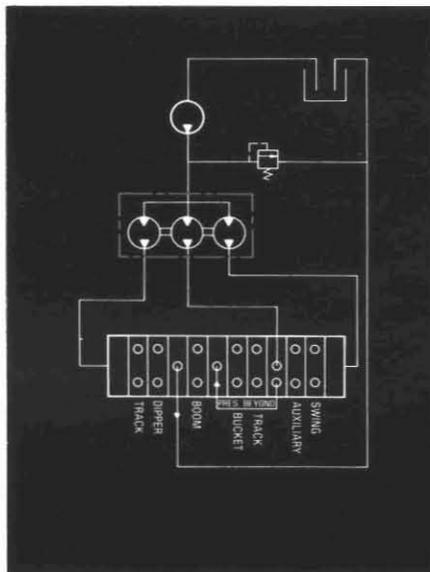
Assembly Code:
FD50B BY OD12-1E OJ25-1E UD10 BY

Flow DividerFD
 Series50
 ModelB
 1. Port End CoverBY
 2. Gear HousingOD12
 3. Connecting Shaft (Not Shown)1
 4. Bearing CarrierE
 5. Gear HousingOJ25
 6. Connecting Shaft (Not Shown)1
 7. Bearing CarrierE
 8. Gear HousingUD10
 9. Port End CoverBY



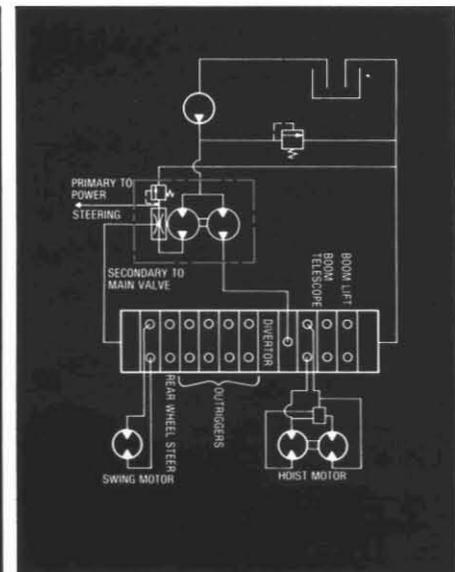
Container Handler

Flow divider with priority outlet valves assures constant, independent flow to two essential services on container sideloaders — steering and remote control circuit. Other flows supply lifting and auxiliary services.



Excavator

Excavator circuit using the special features of flow divider and mid-inlet sections in valve to give intermittent high pressures to essential machine services.



Telescopic Crane

Flow divider with a priority outlet valve combine to guarantee power to steering circuit. Second flow provides two-speed lifting. Secondary flow of priority valve helps supply auxiliary services.

Flow dividers operate most efficiently with gear sizes of 1" or larger and at speeds from 700 to 1300 rpm. Therefore, when sizing a flow divider, it is important to keep these two points in mind. It is also good practice to avoid specifying flow dividers with all 1/2" or 3/4" gears.

Whenever possible, position the inlet port nearest the largest gear unit. Normally, the largest gear section should be in the center of the unit.

Applications involving gear rotational speeds below 400 rpm, or exceeding 1300 rpm and/or 175 bar/2500 psi should be referred to Technical Service Department.

how to select the proper flow divider

First, assume your circuit requires a pump output of 55 gpm to be split into 25, 18 and 12 gpm.

From the output graphs, you will see that:

1. The 2" — FD30 gears produce about 1600 rpm at 25 gpm. This is above the recommended operating speed.
2. The 2" — FD50 gears, at 25 gpm, operate at an acceptable speed of about 1200 rpm. By checking across the 1200 rpm band on the output chart, you find that 1 1/2" and 1" gear sections will supply the other required flows of 18 and 12 gpm.

The FD75 could also be considered with 2", 1 1/2" and 1" gears operating at about 900 rpm.

The specific application requirements, along with unit size, weight and price differences, would determine whether the FD50 or 75 would be the better choice.

pressure intensification

Any rotary flow divider has the potential for pressure intensification.

Consider the following example of a pump supplying flow to a two section (equal gear width) flow divider. There is relief protection between the pump and flow divider but no relief at the output of either flow divider section.

Figure 1 shows both flow divider outputs pressurized to 2000 psi. They may be driving motors, cylinders, etc. The input pressure is also 2000 psi*. Figure 2 shows

one flow divider section taken off load for whatever reason, but the second section is still working at 2000 psi. The input pressure has dropped to 1000 psi because of the law of conservation of energy which reduces to the basic flow divider equation:

$$(TGW \times P_{in}) = (GW_1 \times P_1) + (GW_2 \times P_2)$$

$$P_{in} = \frac{(GW_1 \times P_1) + (GW_2 \times P_2)}{TGW}$$

Where TGW = Total Gear Width

Note that the pressure (Pin) on the input side of the unit (1000 psi) has now been intensified to 2000 psi at P₂. If there is no relief protection at P₂, that section potentially can go to 5000 psi, if the load demands it, because the input pressure can rise to the relief valve setting of 2500 psi. This is an undesirable situation. **Adequate relief valve protection on the discharge side of each flow divider section is necessary to keep intensification within the limits of the unit.**

*The above numbers were used for illustrative purposes only. The actual input pressure may be 100 to 200 psi higher than the theoretical values shown because of inefficiencies.

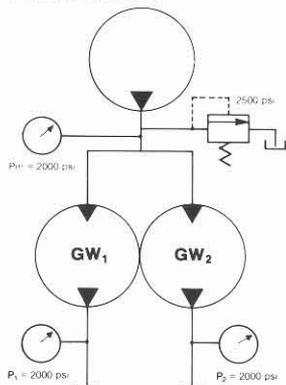


Figure 1

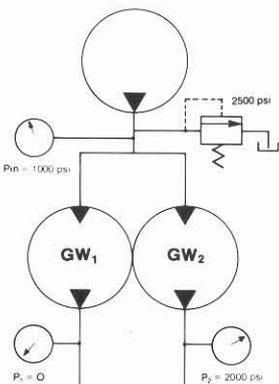
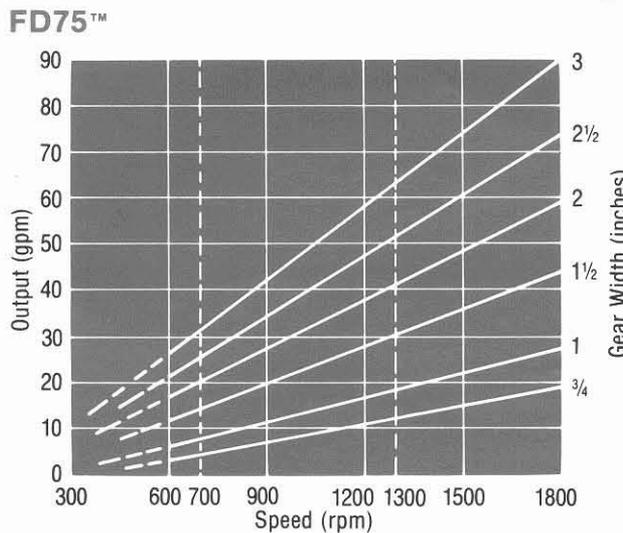
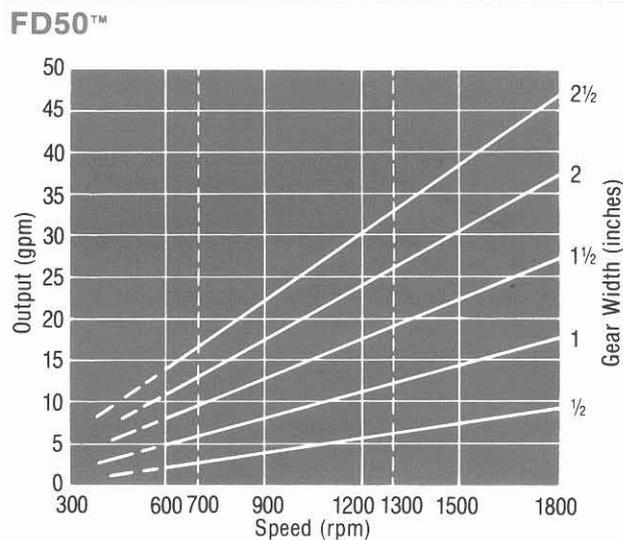
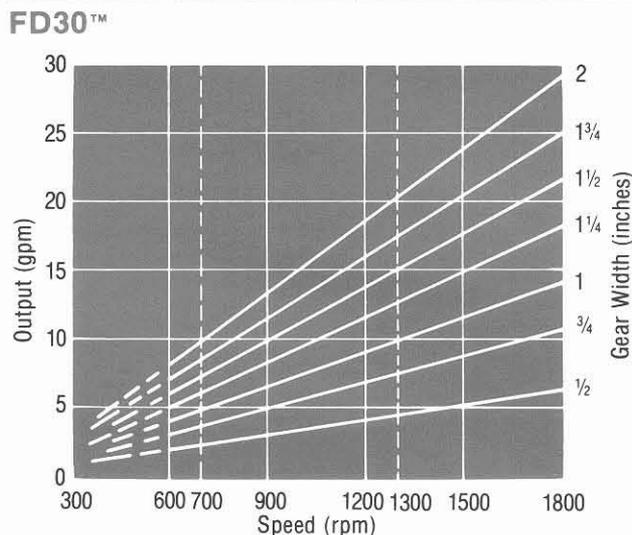


Figure 2

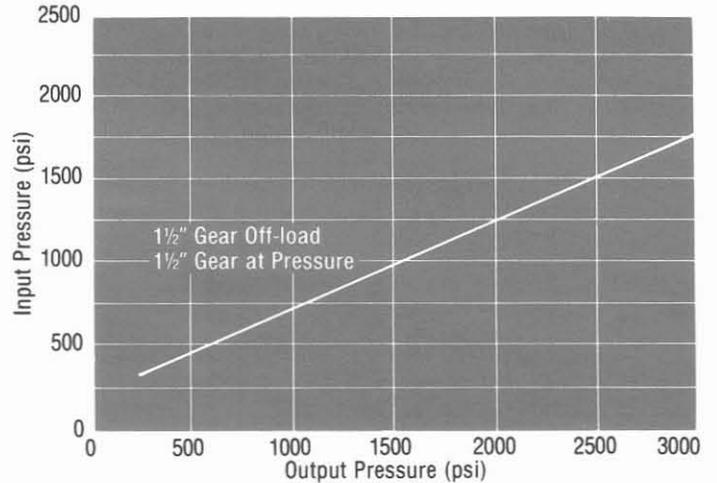


pressure intensification

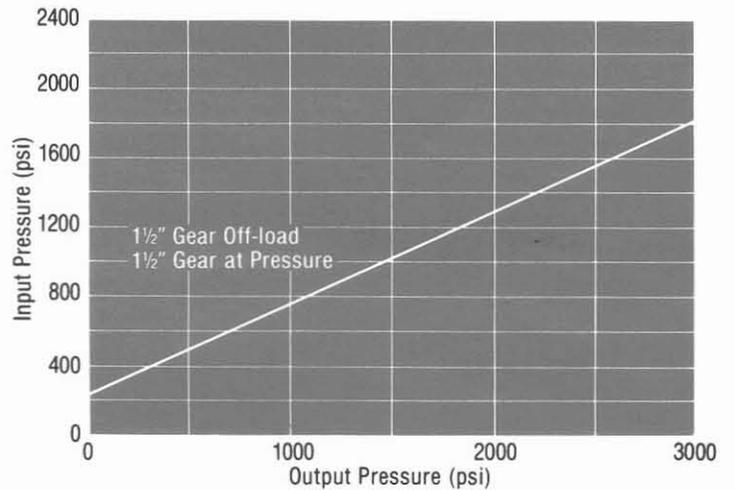
Average output flow • U.S. Gallons per Minute

- British Imperial Gallons per Minute
- Litres per Minute

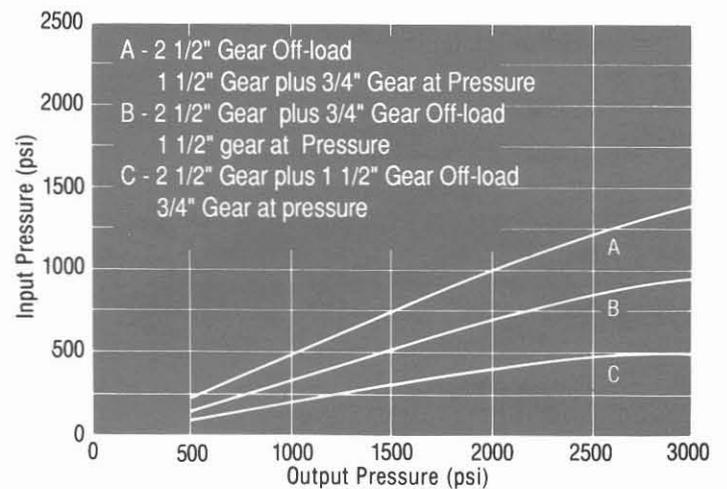
Speed rpm	Gear Width (inches)						
	½	¾	1	1¼	1½	1¾	2
600	2	3	4	5	6	7	8
	1.5	2.5	3.5	4	5	6	6.5
	7.5	11	15	19	22.5	26.5	30.5
900	3	5	6.5	8	10	12	13.5
	2.5	4	5.5	6.5	8.5	10	11
	11	19	24.5	30.5	38	45.5	51
1200	4	7	9	11.5	14	16	18.5
	3.5	6	7.5	9.5	11.5	13.5	15.5
	15	26.5	34	43.5	53	60.5	70
1500	5	8	11.5	14.5	17.5	20.5	23.5
	4	6.5	9.5	12	14.5	17	19.5
	19	30.5	43.5	55	66	77.5	89
1800	6	10.5	14	18	21.5	25	29
	5	8.5	11.5	15	18	21	24
	22.5	39.5	53	68	81.5	94.5	110
2100	7	12.5	16.5	21	25	29.5	34
	6	10.5	13.5	17.5	21	24.5	28.5
	26.5	47.5	62.5	79.5	94.5	112	129



Speed rpm	Gear Width (inches)								
	½	¾	1	1¼	1½	1¾	2	2¼	2½
600	2	3.5	5	6.5	8	9.5	11	12.5	14
	1.5	3	4	5.5	6.5	8	9	10.5	11.5
	7.5	13	19	24.5	30.5	36	41.5	47.5	53
900	4.5	6	8.5	10.5	13	15	17.5	20	22
	3.5	5	7	8.5	11	12.5	14.5	16.5	18.5
	17	22.5	32	39.5	49	57	66	75.5	83.5
1200	6	9	12	15	18	21	24	27	30
	5	7.5	10	12.5	15	17.5	20	22.5	25
	22.5	34	45.5	57	68	79.5	91	102	114
1500	8	11.5	15	19	23	27	31	35	39
	6.5	9.5	12.5	16	19	22.5	26	29	32.5
	30.5	43.5	57	72	87	102	117	132	148
1800	9.5	14	18	23	27.5	32.5	37.5	42	47
	8	11.5	15	19	23	27	31	35	39
	36	53	68	87	104	123	142	159	178
2100	11	16	21.5	27	32.5	38.5	44	49.5	55
	9	13.5	18	22.5	27	32	36.5	41	46
	41.5	60.5	81.5	102	123	146	167	187	208



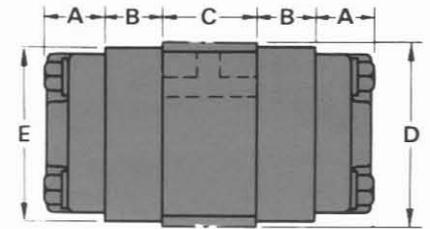
Speed rpm	Gear Width (inches)									
	¾	1	1¼	1½	1¾	2	2¼	2½	2¾	3
600	3	6	9	11.5	13.5	16.5	18.5	21	23	26
	2.5	5	7.5	9.5	11	13.5	15.5	17.5	19	21.5
	11	22.5	34	43.5	51	62.5	70	79.5	87	98.5
900	7	11	15	19	23	27	30	34	38	42
	6	9	12.5	16	19	22.5	25	28.5	31.5	35
	26.5	41.5	57	72	87	102	114	129	144	159
1200	11	17	22	27	32	37.5	42	48	52.5	58
	9	14	18.5	22.5	26.5	31	35	40	43.5	48.5
	41.5	64.5	83.5	102	121	142	159	182	199	220
1500	15	22	29	35.5	41.5	48	54.5	61	67	74
	12.5	18.5	24	29.5	34.5	40	45.5	51	56	61.5
	57	83.5	110	134	157	182	206	231	254	280
1800	19	27.5	35.5	43.5	51	59	66	74	81.5	90
	16	23	29.5	36	42.5	49	55	61.5	68	75
	72	104	134	165	193	223	250	280	308	341
2100	22	33	42	51.5	60	69.5	78	87	96.5	106
	18.5	27.5	35	43	50	58	65	72.5	80.5	88.5
	83.5	125	159	195	227	263	295	329	365	401



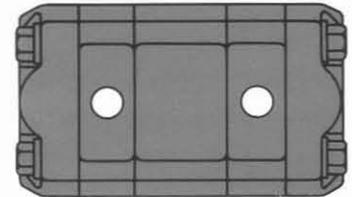
dimensional data

Only overall dimensions are shown on this page. For specific dimensions on the various components of the FD30/31, FD50/51 and FD75/76, except those of the bearing carriers shown on the next page, are the same as corresponding dimensions of the P30/31, P50/51 and P75/76 pumps detailed in catalogs H-60 and H-58.

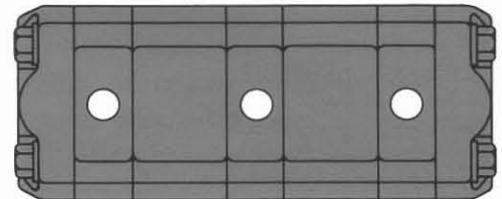
Please consult our Technical Service Department when specifying split flange fittings. Because of the width of SAE split flange fittings, it may be necessary to code special gear housings and bearing carriers into the unit in order to install these fittings properly.



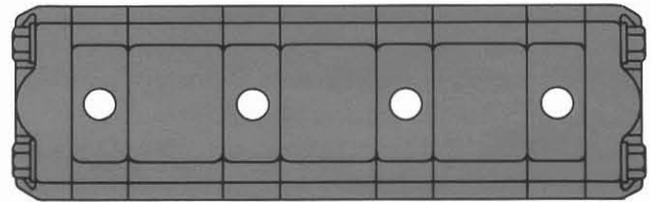
TWO SECTION



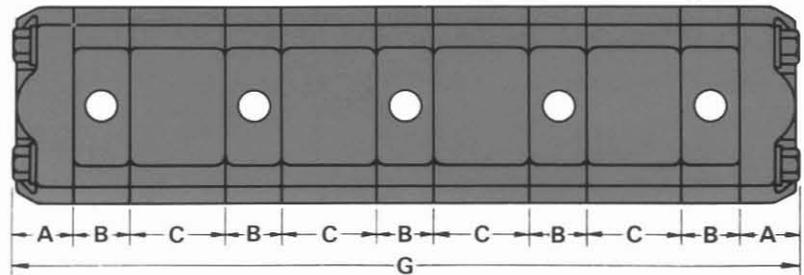
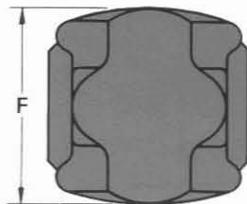
THREE SECTION



FOUR SECTION



FIVE SECTION

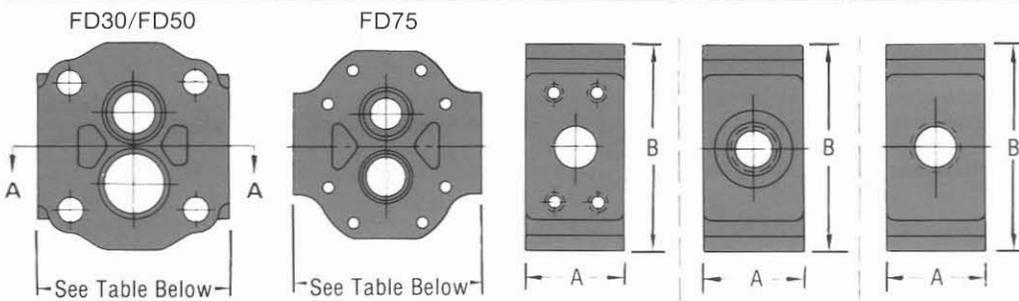


Model	A	B	C	D	E	F	G			
							Two Section	Three Section	Four Section	Five Section
FD30	44.4 1.75	19.0 .75 + Gear Width	63.5 2.50	131.8 5.19	134.9 5.31	136.5 5.37	190.5 7.50	273.0 10.75	355.6 14.00	438.2 17.25
				to 146.0 5.75	to 138.1 5.44		+ Gear Widths	+ Gear Widths	+ Gear Widths	+ Gear Widths
FD50	44.4 1.75	19.0 .75 + Gear Width	73.0 2.88	131.8 5.19	134.9 5.31	152.4 6.00	200.0 7.88	292.1 11.50	384.2 15.12	476.3 18.75
				to 146.0 5.75	to 171.4 6.75		+ Gear Widths	+ Gear Widths	+ Gear Widths	+ Gear Widths
FD75	50.8 2.00	25.4 1.00 + Gear Width	76.2 3.00	187.3 7.38	190.5 7.50	200.0 7.88	228.6 9.00	330.2 13.00	431.8 17.00	533.4 21.0
				to 200.0 7.88	to 193.7 7.62		+ Gear Widths	+ Gear Widths	+ Gear Widths	+ Gear Widths

bearing carriers

This catalog contains codes for most widely used models only. Complete codes for assembling all configurations are readily available from our sales representatives.

FD30™ /FD50™ /FD75™ dimensional data shown in $\frac{\text{mm}}{\text{inches}}$



Model	A	B
FD30	63.5	136.5
	2.50	5.38
FD50	73.0	152.4
	2.88	6.00
FD75	76.2	200.0
	3.00	7.88

FD30/FD50/FD75 CODE SELECTION

Section A-A back front	Port Size (inches) Left Right		Split Flange Ports				Straight Thread Ports				Pipe Thread Ports			
			Width		Code SAE	Width		Code SAE	Width		Code NPT			
			mm	inches		mm	inches		mm	inches		BSPP		
	NONE	NONE	131.8 5.19	131.8 5.19	187.3 7.38	B B	131.8 5.19	131.8 5.19	187.3 7.38	B B	131.8 5.19	131.8 5.19	187.3 7.38	B B
	NONE	NONE	131.8 5.19	131.8 5.19	187.3 7.38	E E	131.8 5.19	131.8 5.19	187.3 7.38	E E	131.8 5.19	131.8 5.19	187.3 7.38	E E
	1	NONE	144.5 5.69	144.5 5.69	198.5 7.81	J T	146.0 5.75	146.0 5.75	200.0 7.88	F Q	146.0 5.75	146.0 5.75	200.0 7.88	M X
	1/4	NONE				K V				G R				N Y
	1/2	NONE				L W				H S				P Z
	NONE	3/4	144.5 5.69	144.5 5.69	198.5 7.81	GR TR	146.0 5.75	146.0 5.75	200.0 7.88	GJ QJ	146.0 5.75	146.0 5.75	200.0 7.88	BX DG
	NONE	1				MT FM				BK ML				KZ DF
	NONE	3/4	144.5 5.69	144.5 5.69	198.5 7.81	FD KT	146.0 5.75	146.0 5.75	200.0 7.88	JH BZ	146.0 5.75	146.0 5.75	200.0 7.88	CV DM
	NONE	1				JG RP				PC MK				NK MN
	1	3/4	142.9 5.62	142.9 5.62	196.9 7.75	HR VR	146.0 5.75	146.0 5.75	200.0 7.88	HJ SJ	146.0 5.75	146.0 5.75	200.0 7.88	GX FG
	1/4	3/4				PR WR				MJ XJ				HX SG
	1/2	3/4				QR XR				RJ ZJ				RX XG
	1/4	1				NT QM				PK PL				LZ GF
	1/2	1				RT VM				RK QL				TZ MF
	1/2	1												
	1	3/4	142.9 5.62	142.9 5.62	196.9 7.75	GD PT	146.0 5.75	146.0 5.75	200.0 7.88	PH PZ	146.0 5.75	146.0 5.75	200.0 7.88	GV NM
	1/4	3/4				MD QT				RH QZ				MV PM
	1/2	3/4				PD ZT				WH YZ				NV TM
	1/4	1				PG TP				QC QK				TK QN
	1/2	1				RG ZP				VC SK				ZK TN
	1/2	1												
	1	3/4	142.9 5.62	142.9 5.62	196.9 7.75	WL FP	146.0 5.75	146.0 5.75	200.0 7.88	MC CP	146.0 5.75	146.0 5.75	200.0 7.88	VG HP
	1	3/4	142.9 5.62	142.9 5.62	196.9 7.75	ZL GP	146.0 5.75	146.0 5.75	200.0 7.88	SC DP	146.0 5.75	146.0 5.75	200.0 7.88	WG LP

Commercial Intertech

Global Headquarters are located at 1775 Logan Avenue, Youngstown, Ohio 44501-0239 • U.S.A.

...we're putting technology to work worldwide

District sales offices:

ACTON, ON L7J 2M6 CANADA

Commercial Intertech Ltd.
6 Commerce Crescent, P.O. Box 450
Phone: (519) 853-0770
Facsimile: (519) 853-3837

BEAVERTON, OR 97005-5464

6700 S.W. 105th, Suite 311R
Phone: (503) 643-0195
Facsimile: (503) 641-4360

BENTON, AR 72015-0647

20138 I-30
P.O. Box 647
Phone: (501) 794-0334
Facsimile: (501) 794-0732

CHICAGO, IL 60638-4911

6501 West 65th Street
Phone: (708) 594-1161
Facsimile: (708) 458-2463

DALLAS, TX 75234-7311

2655 Villa Creek Drive, Suite 299
Phone: (214) 241-1975
Facsimile: (214) 241-2128

HICKSVILLE, OH 43526

373 Meuse Argonne
Phone: (419) 542-6611
Facsimile: (419) 542-8871

KINGS MOUNTAIN, NC 28086-0219

101 Canterbury Road
P.O. Box 219
Phone: (704) 739-8232
Facsimile: (704) 739-2269

ORANGE, CA 92667-5597

341 West Collins Avenue
Phone: (714) 639-4630
Facsimile: (714) 532-4126

YOUNGSTOWN, OH 44501-0239

1775 Logan Avenue
P.O. Box 239
Phone: (216) 746-8011 • Telex: 433-2153
Facsimile: (214) 746-1148

Subsidiary companies:

MINNEAPOLIS, MN 55428-4998

Oildyne Division
Commercial Intertech Corp.
4301 Quebec Avenue, North
Phone: (612) 533-1600
Facsimile: (612) 533-0082

MINNEAPOLIS, MN 55434

Cylinder City, Inc.
1532 93rd Lane, N.E.
P.O. Box 34220
Phone: (612) 780-2550
Facsimile: (612) 780-2565

PORT MELBOURNE, VICTORIA 3207, AUSTRALIA

Commercial Hydraulics Pty., Ltd.
265 Ingles Street, P.O. Box 191
Phone: 61-3-646-2017 • Telex: 34377
Facsimile: 61-3- 646-2257

SAO PAULO, BRAZIL

Commercial Intertech do Brasil Ltda.
Avenida Paulista, 460
3. Andar, 01310 - SP
Sao Paulo, Brazil
Phone: 55-11-285-4977
Facsimile: 55-11-289-4452

GLOUCESTER GL3 4XE, ENGLAND

Commercial Hydraulics Gloucester Ltd.
Gloucester Trading Estate, Hucclecote
Phone: 44-452-618-666
Telex: 43651 CHCLOS G
Facsimile: 44-452-371-106

GRANTHAM NG31 9SJ, ENGLAND

Commercial Hydraulics Kontak Ltd.
Belton Park, Londonthorpe Rd.
Grantham, Lincolnshire
Phone: 44-476-64105
Facsimile: 44-476-66462 Telex: 37170

LIVERPOOL L9 7BW, ENGLAND

Commercial Hydraulics Liverpool Ltd.
Long Lane, Fazakerley
Phone: 44-51-525-5933
Telex: 629-561 COMLIV G
Facsimile: 44-51-523-4198

WARWICK CV34 6TU, ENGLAND

Commercial Hydraulics Keelavite Ltd.
Tachbrook Park Drive, Tachbrook Park
Phone: 0926-889-000
Facsimile: 0926-889-172

FRANCE

Commercial Hydraulics Astron S.A.R.L.
BP 73,
20, rue Pierre Mendes - France, Torcy
77202 Marne LaVallee - Cedex 01
Phone: 33-1-6462-1100
Telex: 693-737 F
Facsimile: 33-1-6462-1093

HAMBURG 90, GERMANY

Commercial Intertech GmbH
Winsener Strasse 69, D-2100
Phone: 49-40-763-8399
Facsimile: 49-40-764-3964

LAMADELAINE, LUXEMBOURG

Commercial Intertech S.A.
39, rue de la Gare, L-4873
Phone: 352-503-7271
Telex: 848-3367
Facsimile: 352-501-359

STOCKHOLM, SWEDEN

Commercial Hydraulics AB
Saldovagen 5, S-175-62 JARFALLA
Phone: 46-8-795-5660
Facsimile: 46-8-795-6621

VERONA, ITALY

Commercial Hydraulics SRI
Via dell'Agricoltura 1/A
Phone: 39-45-676-7250
Telex: 843-351-893
Facsimile: 39-045-676-7229

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