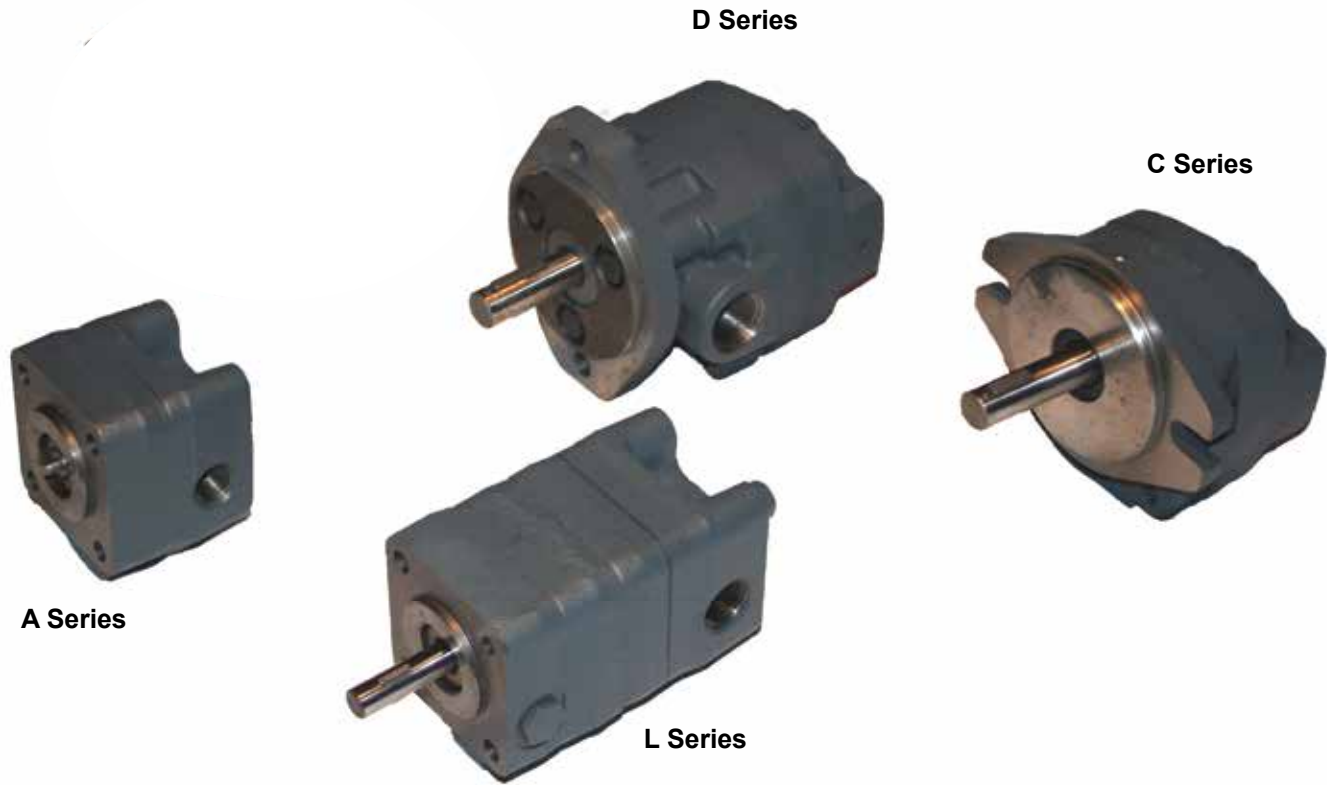


HYDRAULIC COMPONENTS

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WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluations, and testing for suitability.

PHONE: (815) 397-6628 | FAX: (815) 397-2526 | WEB: www.delta-power.com | EMAIL: delta@delta-power.com

A Series, C Series, and D Series Fixed Clearance Pumps

A Series
Tang Drive



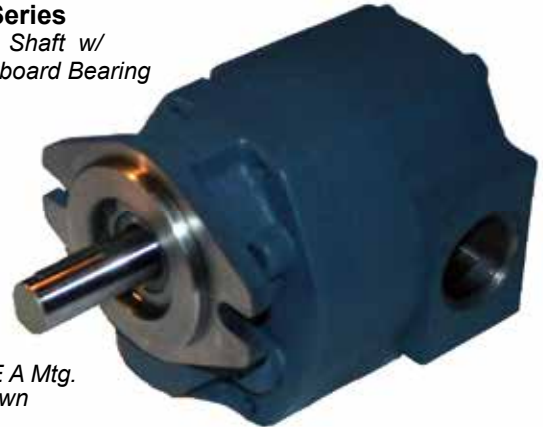
4F17 Mtg.
Shown SAE A Mtg.

C Series
Extended Shaft



Shown

D Series
Ext. Shaft w/
Outboard Bearing



SAE A Mtg.
Shown

Delta's fixed clearance gear pumps are offered in three series A, C, and D with flows ranging from 0.5 GPM to 35 GPM. Delta pumps are designed to provide greater torque efficiencies – especially at high speeds. Numerous shaft, bearing, mounting and seal options are available. Each model is designed to operate as either a single rotation or bi-rotational pump, depending on the application.

A Series, C Series, and D Series hydraulic pumps are designed with long term performance in mind, including: high-strength cast iron bodies, hardened alloy gears and shafts, bronze bearings, and Buna-N sealing members. Integral check valves permit bi-directional rotation to simplify plumbing. The D Series pumps incorporate drive shaft thrust ball bearings to facilitate thrust and radial shaft loads.

Because of their long proven construction, these pumps are found in every type of mobile and industrial applications. They can be expected to perform for the life expectancy of the equipment on which installed.

Installation Notes

On models A1-A8, C1-C8, and D1-D8 be especially careful since these units require that the mounting bolts are installed to complete the assembly. The two shipping bolts are not sufficient to make the assembly intact and care should be exercised while handling in that condition. Bolt torque requirements are 13 to 17 ft-lbs.

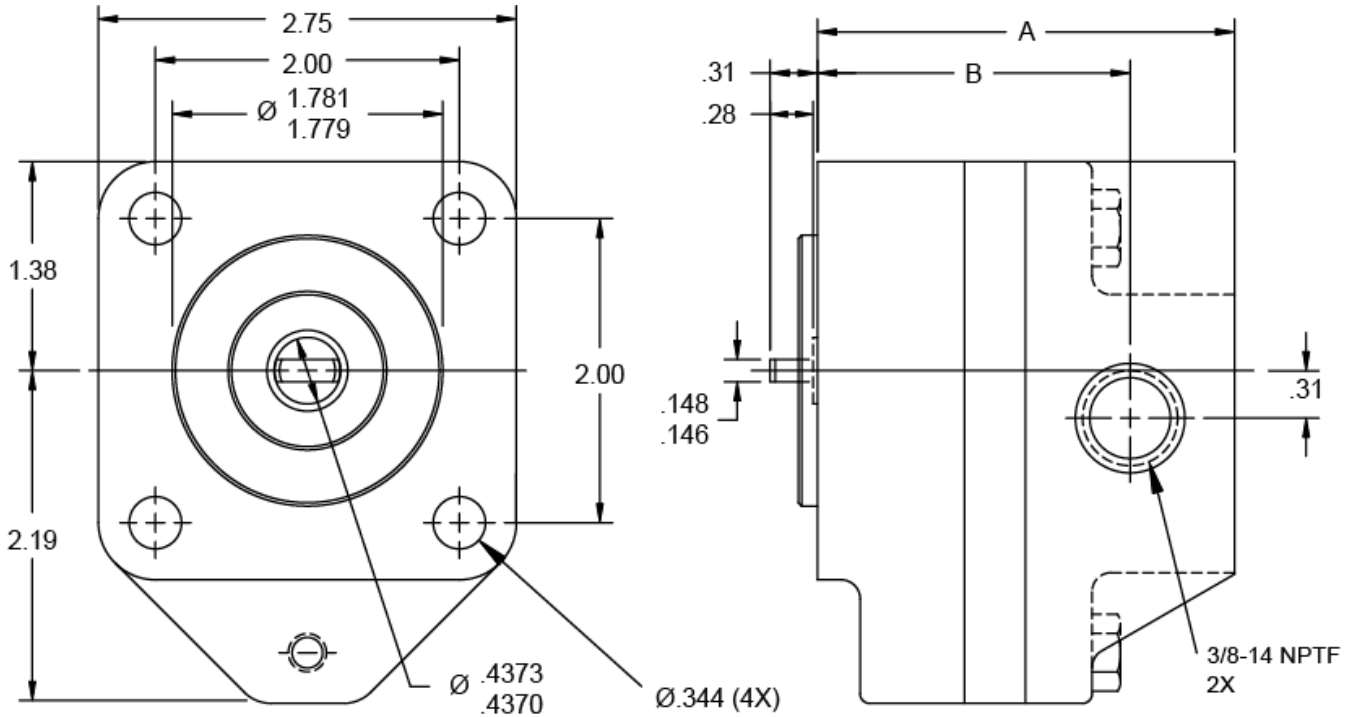
	MODEL	GPM AT 1750 RPM	DISPLACEMENT		SLIP GPM PER 100 PSI	MAX. PSI		MAX. RPM	Page
			GAL./REV	IN ³ /REV		INT. DUTY	CONT. DUTY		
TANG DRIVE	A1	0.49	0.00028	0.065	0.015	2500	1500	5000	5
	A2	0.82	0.00047	0.108	0.017	2500	1500	5000	5
	A4	1.41	0.00081	0.187	0.020	2250	1500	4000	5
	A6	2.39	0.00137	0.316	0.025	1650	950	3600	5
	A8	3.53	0.00202	0.468	0.030	1250	650	2500	5
	A21	3.10	0.00178	0.411	0.040	2000	1500	5000	7
	A23	5.30	0.00304	0.702	0.045	1600	1200	4000	7
	A25	7.42	0.00425	0.981	0.055	1000	850	3500	7
	A27	11.10	0.00633	1.460	0.075	750	550	2400	7
EXTENDED SHAFT	C1	0.49	0.00028	0.065	0.015	2500	1500	5000	9
	C2	0.82	0.00047	0.108	0.017	2500	1500	5000	9
	C4	1.41	0.00081	0.187	0.020	2500	1500	4000	9
	C6	2.39	0.00137	0.316	0.025	1850	1100	3000	9
	C8	3.53	0.00202	0.468	0.030	1500	750	1800	9
	C21	3.10	0.00178	0.411	0.040	2500	1500	5000	11
	C23	5.30	0.00304	0.702	0.045	2350	1500	4000	11
	C25	7.42	0.00425	0.981	0.055	1500	1500	3000	11
	C27	11.10	0.00633	1.460	0.075	1200	1100	1800	11
	C41	11.90	0.0068	1.570	0.070	2500	1500	4000	13
EXT. SHAFT W/OUTBOARD BEARING	D1	0.49	0.00028	0.065	0.015	2500	1500	5000	15
	D2	0.82	0.00047	0.108	0.017	2500	1500	5000	15
	D4	1.41	0.00081	0.187	0.020	2500	1500	4000	15
	D6	2.39	0.00137	0.316	0.025	1850	1100	3000	15
	D8	3.53	0.00202	0.468	0.030	1500	750	1800	15
	D21	3.10	0.00178	0.411	0.040	2500	1500	5000	17
	D23	5.30	0.00304	0.702	0.045	2350	1500	4000	17
	D25	7.42	0.00425	0.981	0.055	1500	1500	3000	17
D27	11.10	0.00633	1.460	0.075	1200	1100	1800	17	
	D41	11.90	0.0068	1.570	0.070	2500	1500	4000	19
	D43	17.80	0.0102	2.350	0.090	2450	1500	3000	19
	D45	23.10	0.0132	3.040	0.110	1850	1500	2300	19
	D47	29.50	0.0169	3.900	0.140	1500	1200	1800	19
	D49	33.60	0.0192	4.430	0.180	1000	700	1800	19

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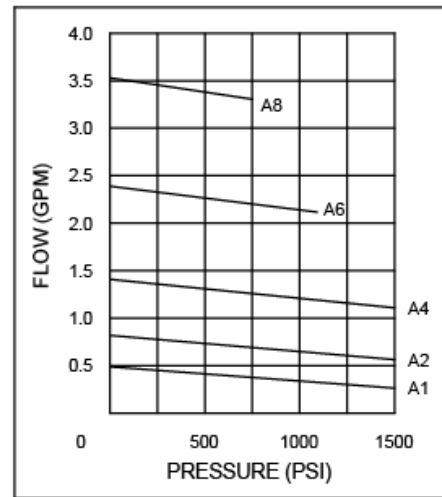
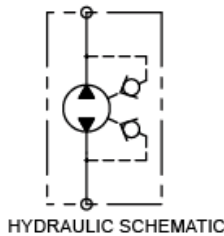
HYDRAULIC PUMPS

4484 Boeing Drive - Rockford, IL 61109

A1-A8 Pump, Bi-Directional



For best performance: Inlet pressure should not exceed 10 PSI and vacuum should be limited to 8 inches of mercury at the pump. Inlet lines always must be large, straight, short and absolutely leak-proof, even more so as RPM increases. Suggested maximum inlet velocity is 6 feet per second.

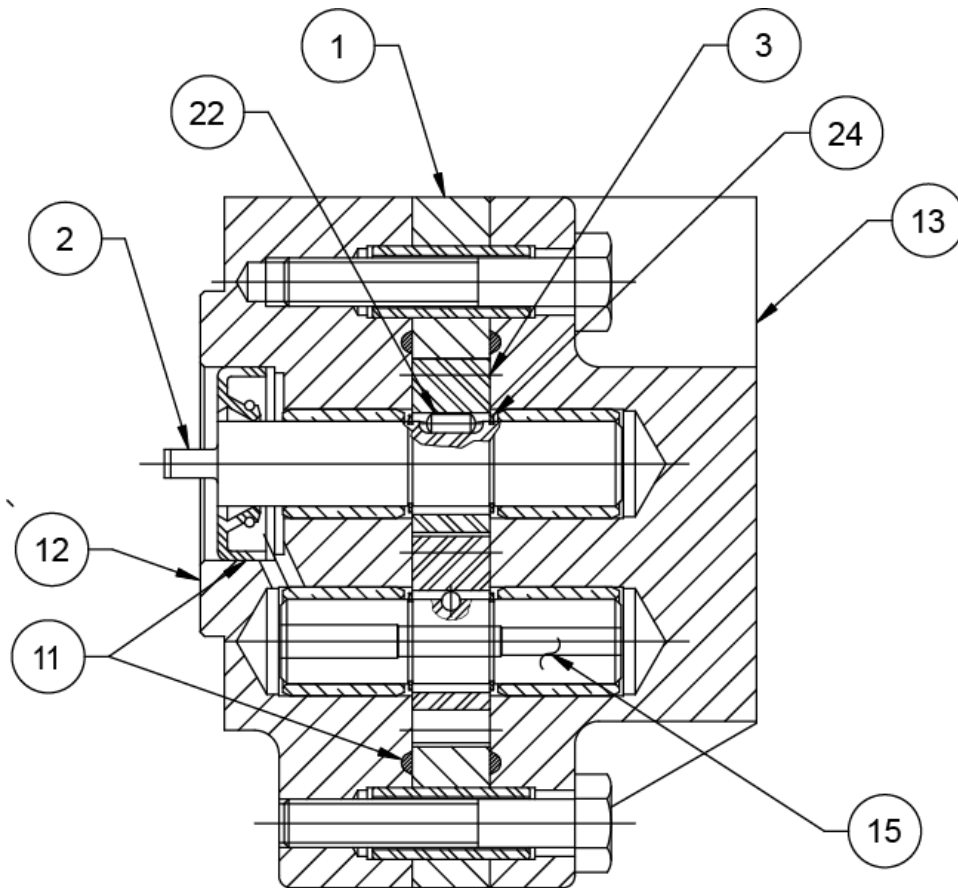


MODEL	GPM AT 1750 RPM	0 PSI DISP. GAL./REV,	DISP. CU. IN./REV.	SLIP GPM PER 100 PSI	MAX. RPM	PRESS. MAX. CONTINUOUS	A	B
A1	0.49	0.00028	0.065	0.015	5000	1500	2.48	1.79
A2	0.82	0.00047	0.108	0.017	5000	1500	2.57	1.88
A4	1.41	0.00081	0.187	0.020	4000	1500	2.74	2.05
A6	2.39	0.00137	0.316	0.025	3600	1100	3.02	2.33
A8	3.53	0.00202	0.468	0.030	2500	750	3.34	2.65

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A1-A8 Pump, Bi-Directional



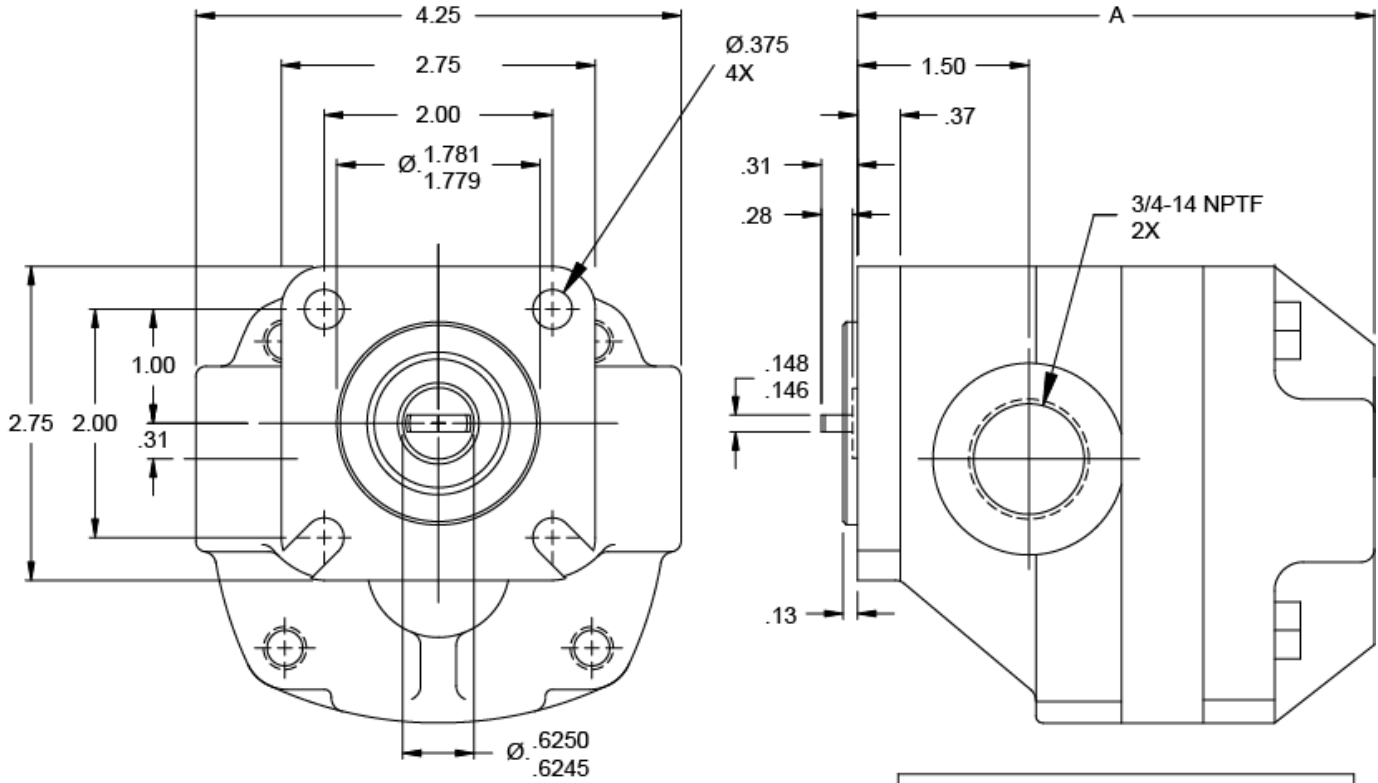
SECTION A-A

ITEM #	DESCRIPTION	QTY.
1	GEAR CASE	1
2	DRIVE SHAFT	1
3	GEAR	1
11	SEAL KIT	1
12	DRIVE PLATE ASS'Y	1
13	END PLATE ASS'Y	1
15	IDLER SHAFT ASS'Y	1
22	GEAR PIN	1
24	RETAINING RING	2

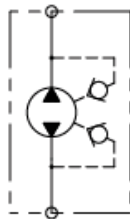
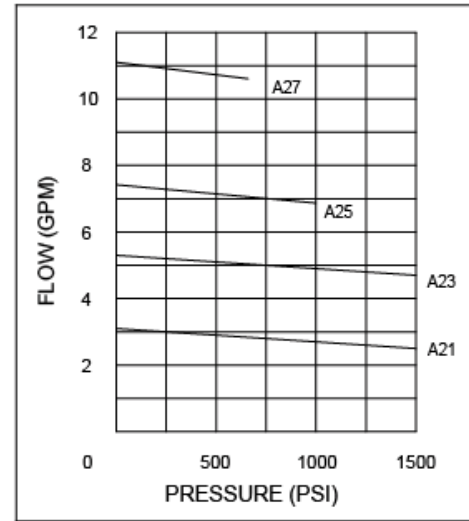
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A21-A27 Pump, Bi-Directional



For best performance: Inlet pressure should not exceed 10 PSI and vacuum should be limited to 8 inches of mercury at the pump. Inlet lines always must be large, straight, short and absolutely leak-proof, even more so as RPM increases. Suggested maximum inlet velocity is 6 feet per second.



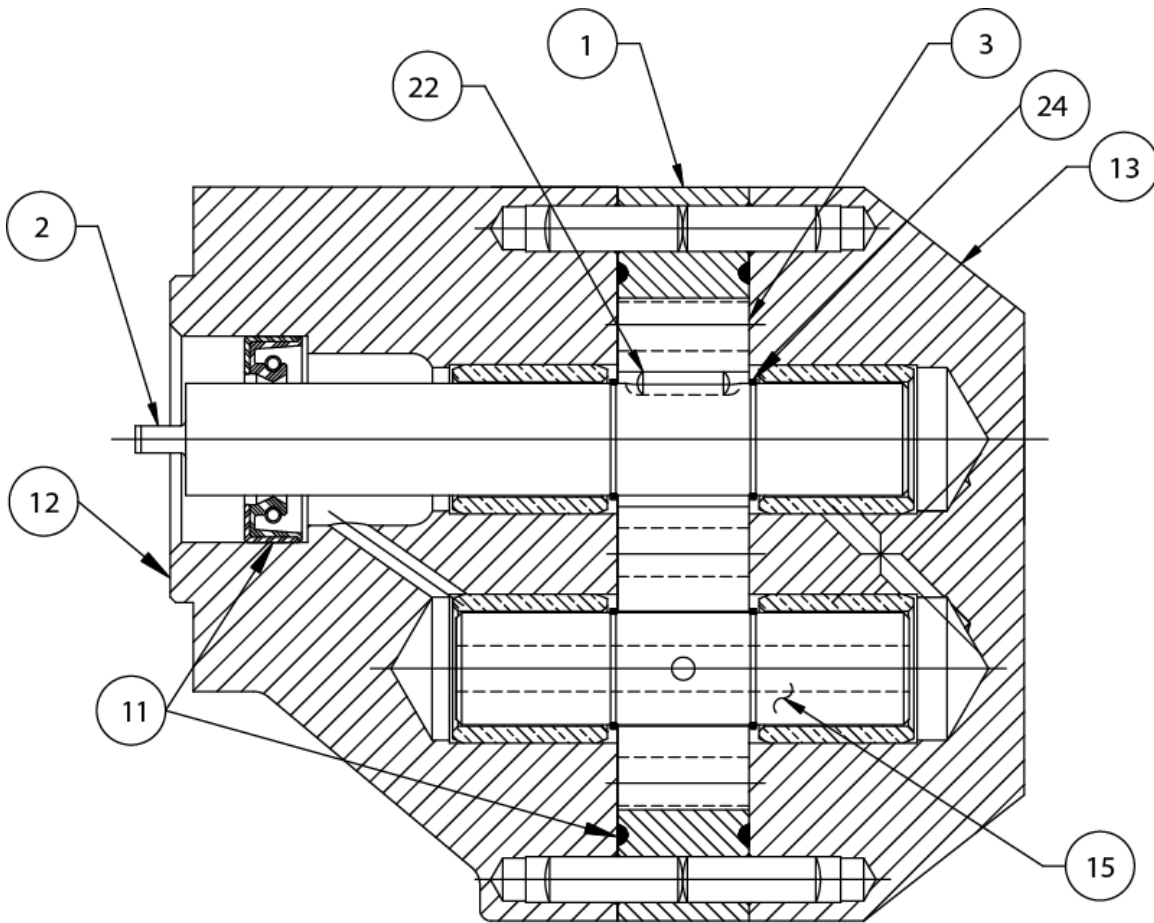
HYDRAULIC SCHEMATIC

MODEL	GPM AT 1750 RPM	0 PSI DISP. GAL./REV,	DISP. CU. IN./REV.	SLIP GPM PER 100 PSI	MAX. RPM	PRESS. MAX. CONTINUOUS	A
A21	3.10	0.00178	0.411	0.040	5000	1500	4.24
A23	5.30	0.00304	0.702	0.045	4000	1500	4.54
A25	7.42	0.00425	0.981	0.055	3500	1000	4.76
A27	11.10	0.00633	1.460	0.075	2400	700	5.32

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A21-A27 Pump, Bi-Directional



SECTION A-A

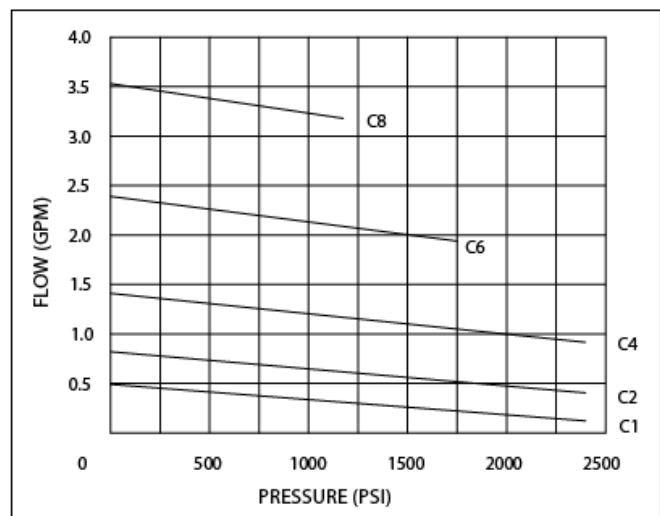
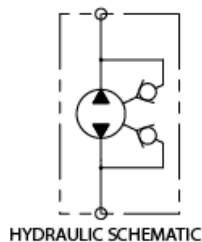
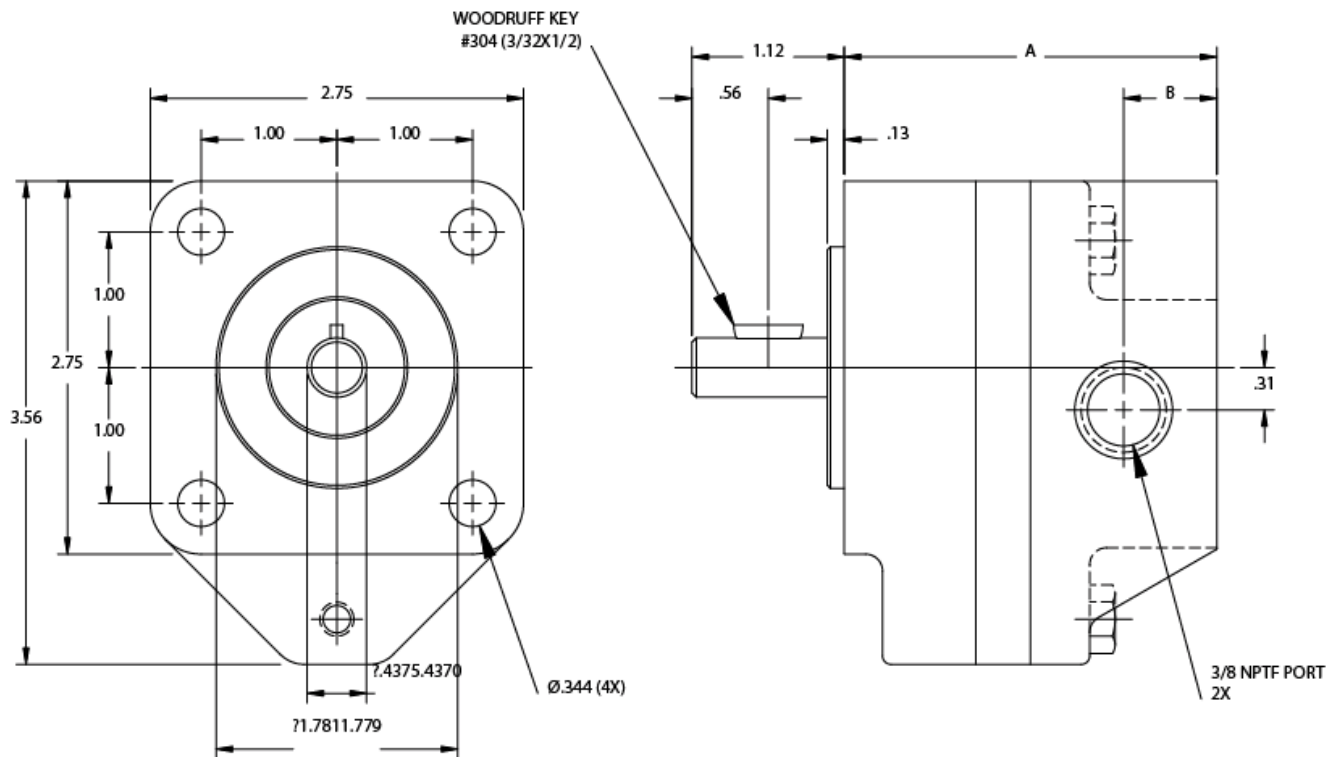
ITEM #	DESCRIPTION	QTY.
1	GEAR CASE	1
2	DRIVE SHAFT	1
3	GEAR	1
11	SEAL KIT	1
12	DRIVE PLATE ASS'Y	1
13	END PLATE ASS'Y	1
15	IDLER SHAFT ASS'Y	1
22	GEAR PIN	1
24	RETAINING RING	2

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluations, and testing for suitability.
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HYDRAULIC PUMPS

4484 Boeing Drive - Rockford, IL 61109

C1-C8 Pump, Bi-Directional

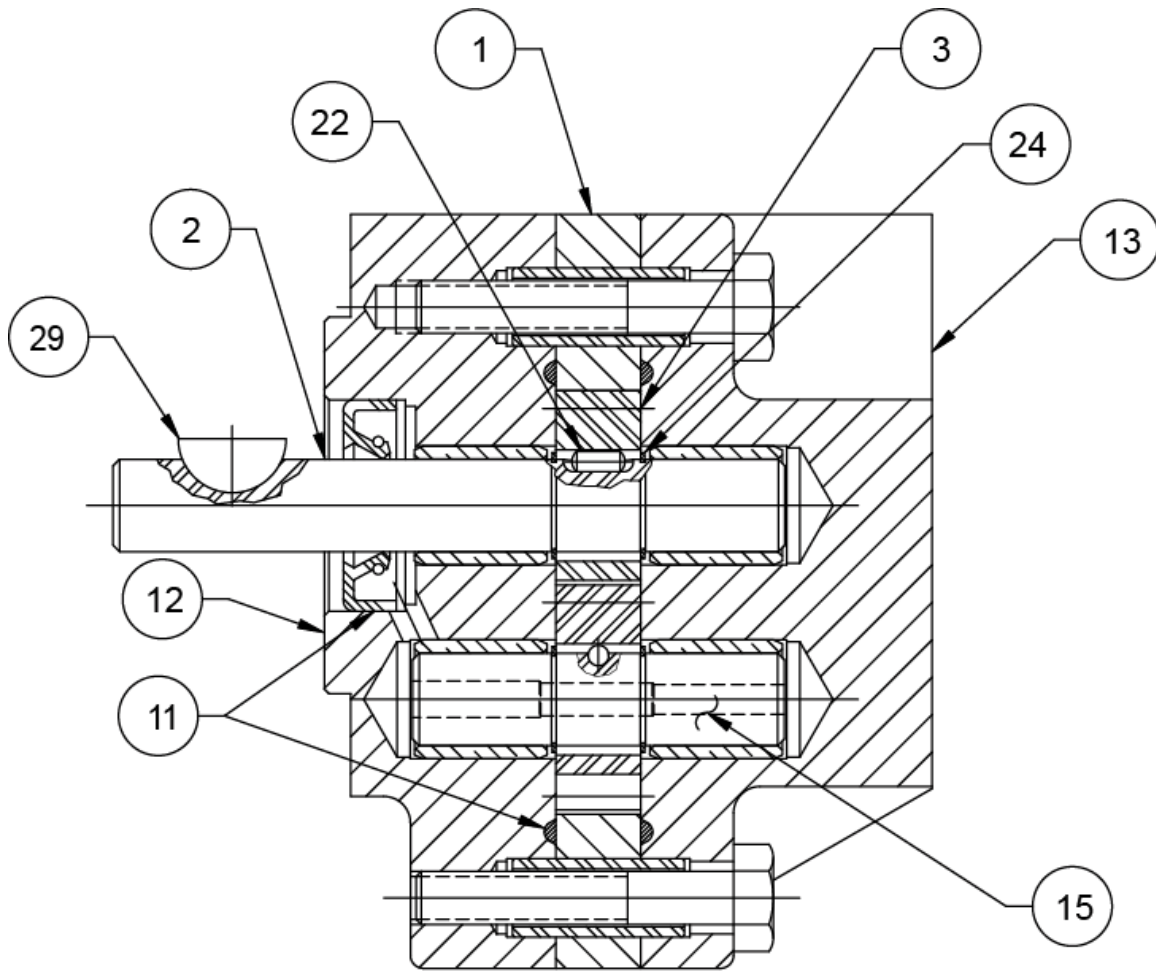


MODEL	GPM AT 1750 RPM	0 PSI DISP. GAL./REV.	DISP. CU. IN./REV.	SLIP GPM PER 100 PSI	MAX. PUMP PRESSURE INTERMITTENT DUTY	MAX. PUMP PRESSURE CONTINUOUS DUTY	SPEED MAX. RPM	A	B
C1	0.49	0.00028	0.065	0.015	2400	1500	5000	2.48	0.688
C2	0.82	0.00047	0.108	0.017	2400	1500	5000	2.57	0.688
C4	1.41	0.00081	0.187	0.020	2400	1500	4000	2.74	0.688
C6	2.39	0.00137	0.316	0.025	1750	1100	3000	3.02	0.688
C8	3.53	0.00202	0.468	0.030	1200	750	1800	3.34	0.688

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C1-C8 Pump, Bi-Directional



SECTION A-A

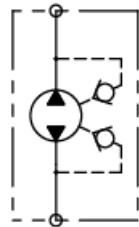
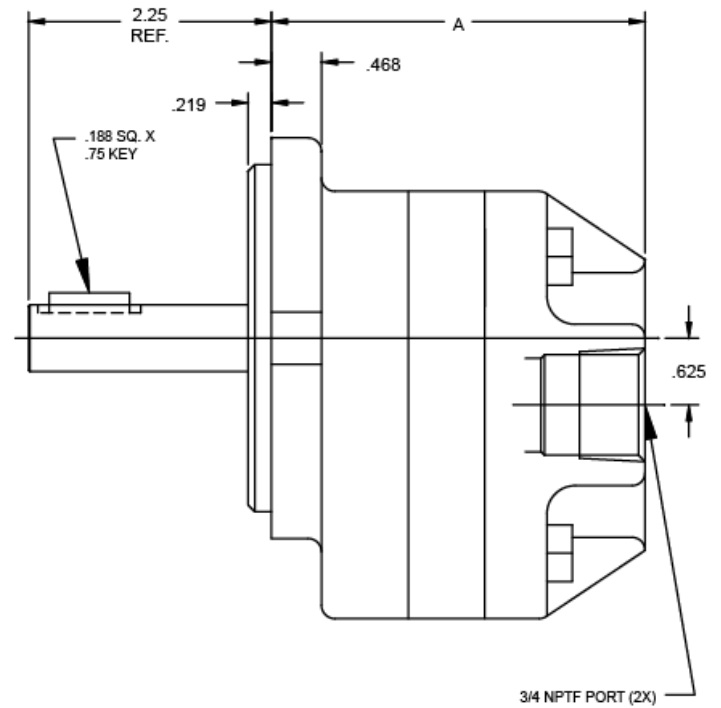
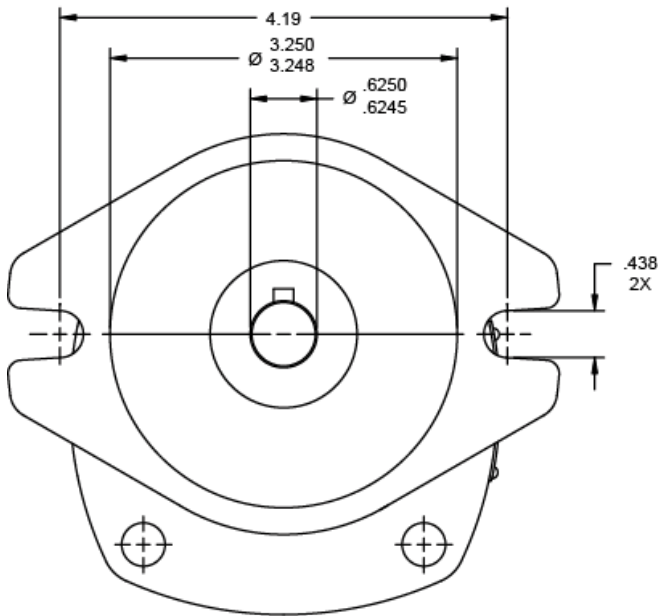
ITEM #	DESCRIPTION	QTY.
1	GEAR CASE	1
2	DRIVE SHAFT	1
3	GEAR	1
11	SEAL KIT	1
12	DRIVE PLATE ASS'Y	1
13	END PLATE ASS'Y	1
15	IDLER SHAFT ASS'Y	1
22	GEAR PIN	1
24	RETAINING RING	2
29	DRIVE KEY	1

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluations, and testing for suitability.

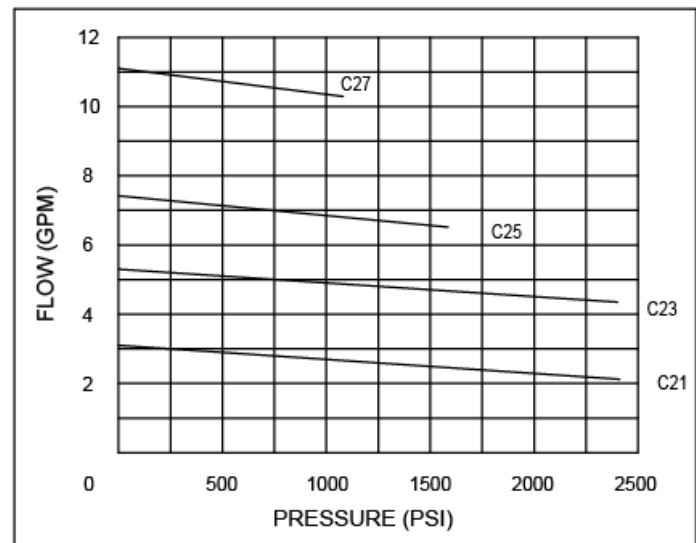
HYDRAULIC PUMPS

4484 Boeing Drive - Rockford, IL 61109

C21-C27 Pump, Bi-Directional



HYDRAULIC SCHEMATIC

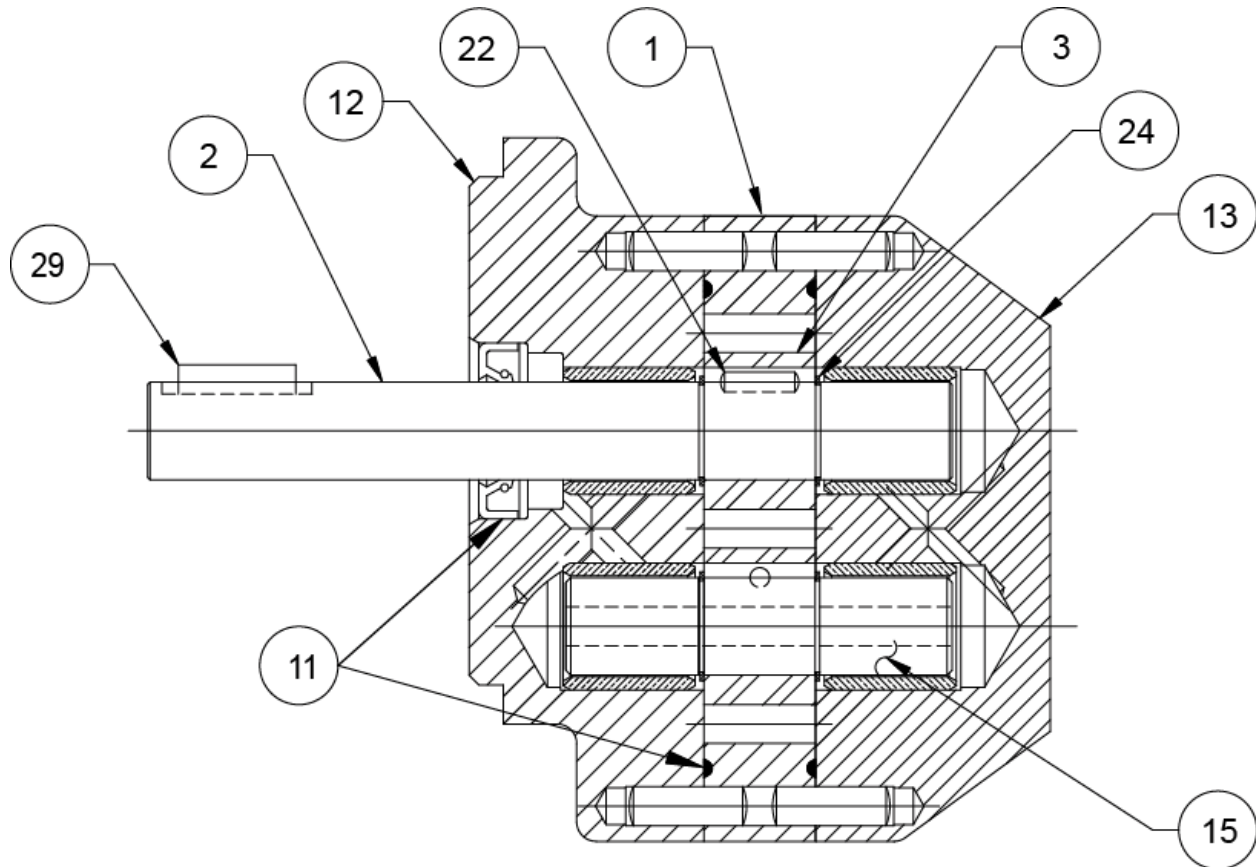


MODEL	GPM AT 1750 RPM	0 PSI DISP. GAL./REV.	DISP. CU. IN./REV.	SLIP GPM PER 100 PSI	MAX. PUMP PRESSURE INTERMITTENT DUTY	MAX. PUMP PRESSURE CONTINUOUS DUTY	SPEED MAX. RPM	A
C21	3.10	0.00178	0.411	0.040	2400	1500	5000	3.21
C23	5.30	0.00304	0.702	0.045	2400	1500	4000	3.56
C25	7.42	0.00425	0.981	0.055	1600	1000	3000	3.78
C27	11.10	0.00633	1.460	0.075	1100	700	1800	4.21

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C21-C27 Pump, Bi-Directional



SECTION A-A

ITEM #	DESCRIPTION	QTY.
1	GEAR CASE	1
2	DRIVE SHAFT	1
3	GEAR	1
11	SEAL KIT	1
12	DRIVE PLATE ASS'Y	1
13	END PLATE ASS'Y	1
15	IDLER SHAFT ASS'Y	1
22	GEAR PIN	1
24	RETAINING RING	2
29	DRIVE KEY	1

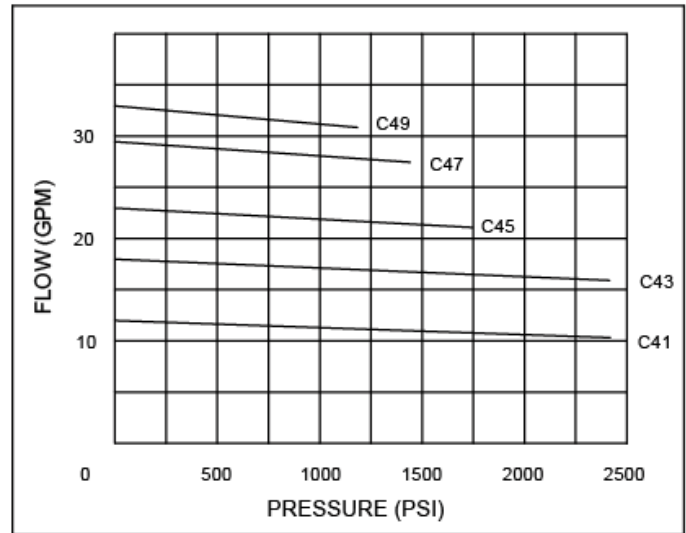
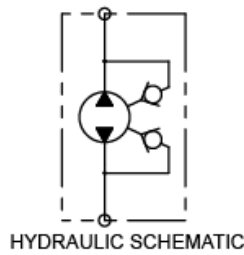
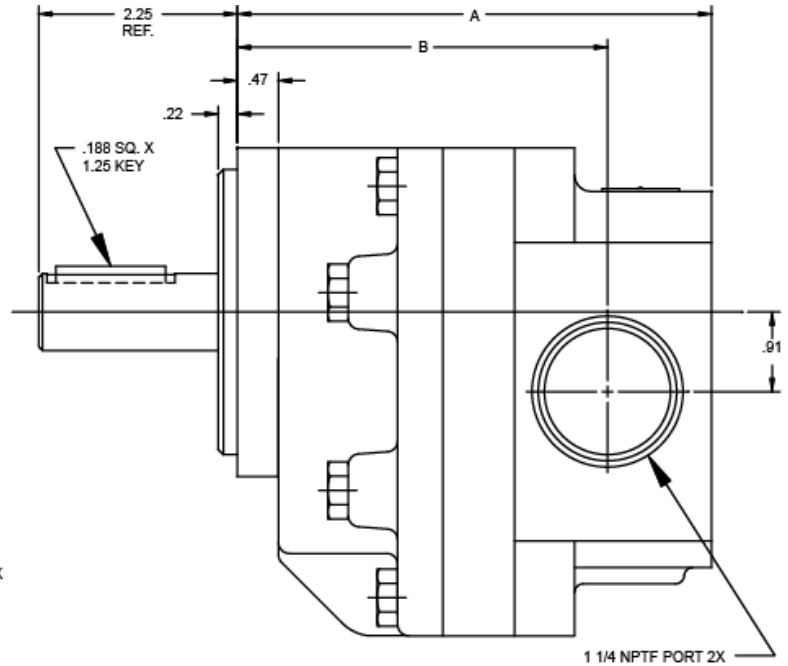
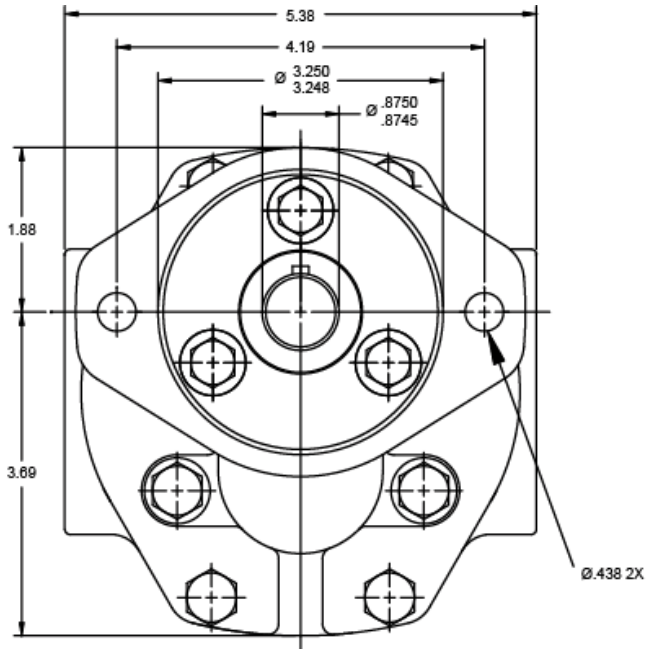
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HYDRAULIC PUMPS

4484 Boeing Drive - Rockford, IL 61109

C41-C49 Pump, Bi-Directional

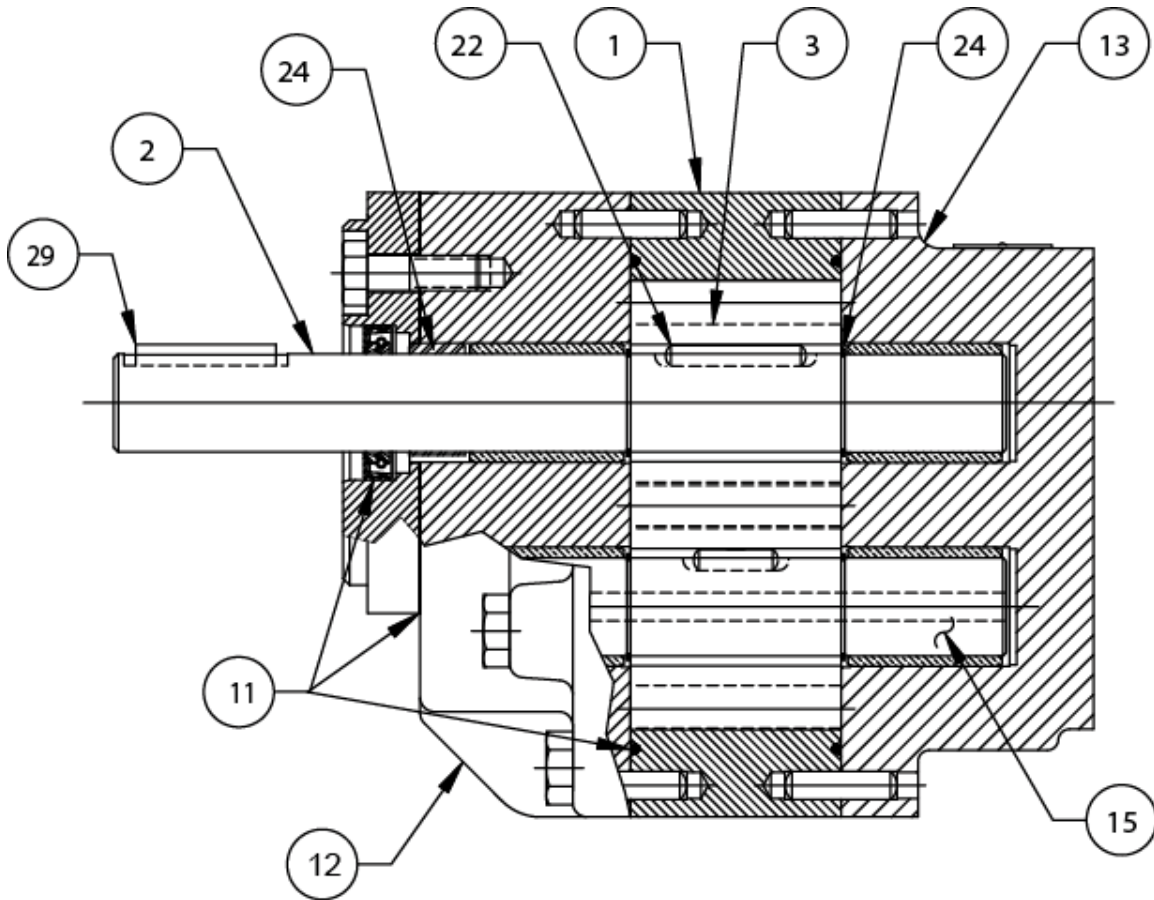


MODEL	GPM AT 1750 RPM	0 PSI DISP. GAL./REV.	DISP. CU. IN./REV.	SLIP GPM PER 100 PSI	MAX. PUMP PRESSURE INTERMITTENT DUTY	MAX. PUMP PRESSURE CONTINUOUS DUTY	SPEED MAX. RPM	A	B
C41	11.90	0.0068	1.570	0.070	2400	1500	4000	5.41	4.22
C43	17.80	0.0102	2.350	0.090	2400	1500	3000	5.72	4.59
C45	23.10	0.0132	3.040	0.110	1750	1100	2300	6.06	4.94
C47	29.50	0.0169	3.900	0.140	1450	900	1800	6.47	5.41
C49	33.60	0.0192	4.430	0.180	1200	750	1800	6.72	5.59

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluations, and testing for suitability.

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C41-C49 Pump, Bi-Directional



SECTION A-A

ITEM #	DESCRIPTION	QTY.
1	GEAR CASE	1
2	DRIVE SHAFT	1
3	GEAR	1
11	SEAL KIT	1
12	DRIVE PLATE ASS'Y	1
13	END PLATE ASS'Y	1
15	IDLER SHAFT ASS'Y	1
22	GEAR PIN	1
24	RETAINING RING	2
29	DRIVE KEY	1

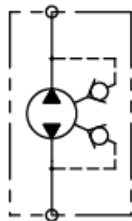
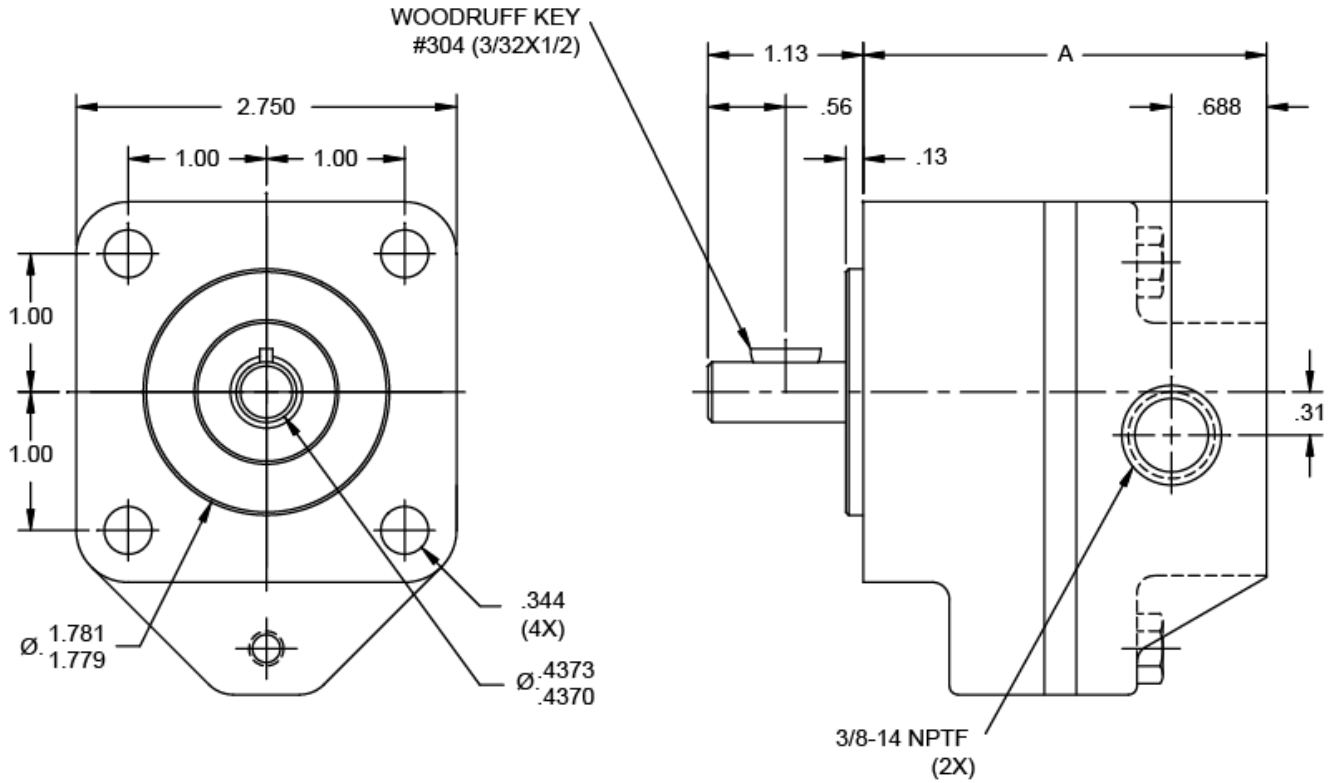
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PHONE: (815) 397-6628 | FAX: (815) 397-2526 | WEB: www.delta-power.com | EMAIL: delta@delta-power.com

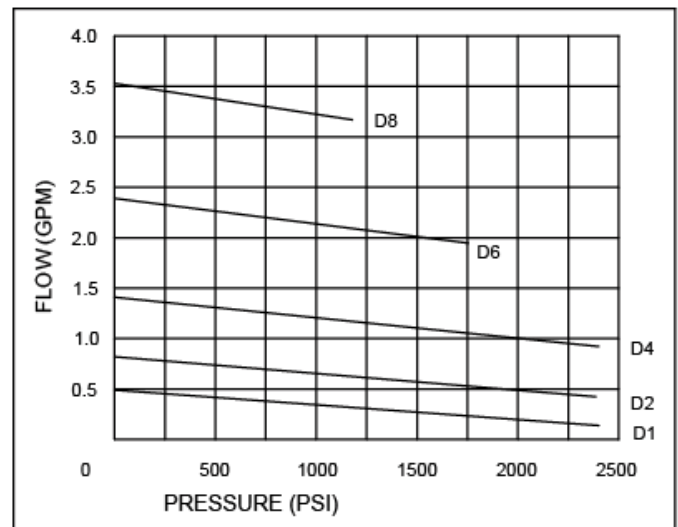
HYDRAULIC PUMPS

4484 Boeing Drive - Rockford, IL 61109

D1-D8 Pump, Bi-Directional



HYDRAULIC SCHEMATIC

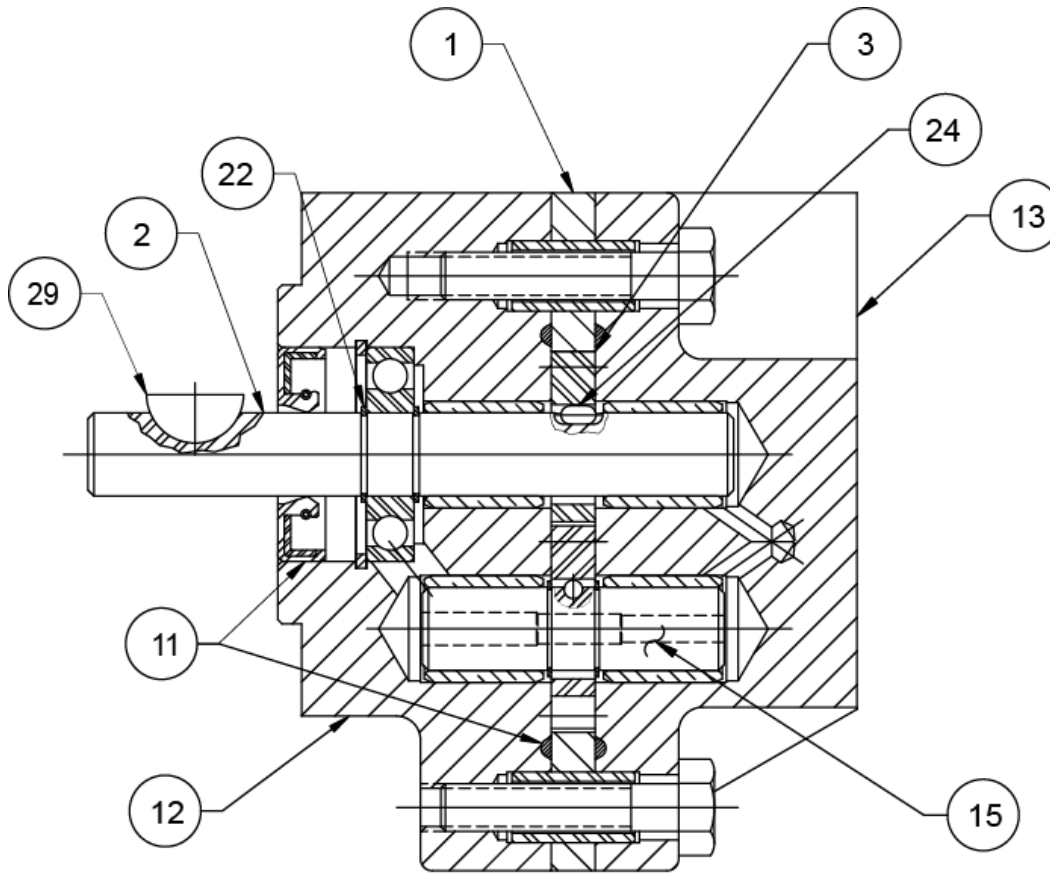


MODEL	GPM AT 1750 RPM	0 PSI DISP. GAL./REV.	DISP. CU. IN./REV.	SLIP GPM PER 100 PSI	MAX. PUMP PRESSURE INTERMITTENT DUTY	MAX. PUMP PRESSURE CONTINUOUS DUTY	SPEED MAX. RPM	A
D1	0.49	0.00028	0.065	0.015	2400	1500	5000	2.82
D2	0.82	0.00047	0.108	0.017	2400	1500	5000	2.91
D4	1.41	0.00081	0.187	0.020	2400	1500	4000	3.08
D6	2.39	0.00137	0.316	0.025	1750	1100	3000	3.36
D8	3.53	0.00202	0.468	0.030	1200	750	1800	3.68

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluations, and testing for suitability.

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D1-D8 Pump, Bi-Directional



SECTION A-A

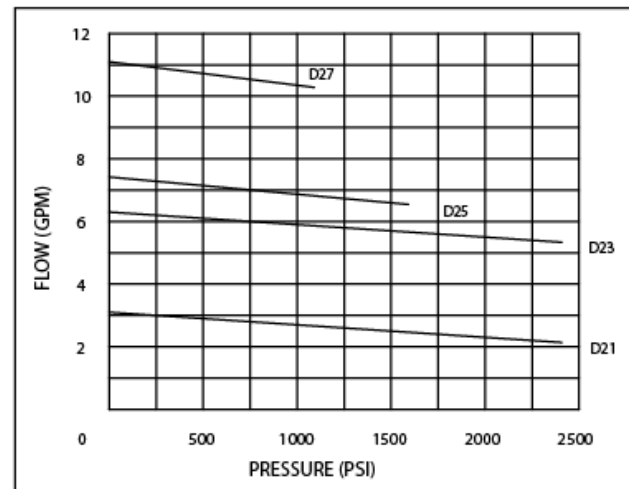
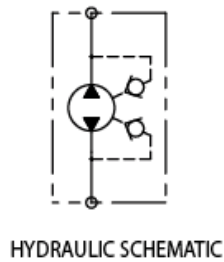
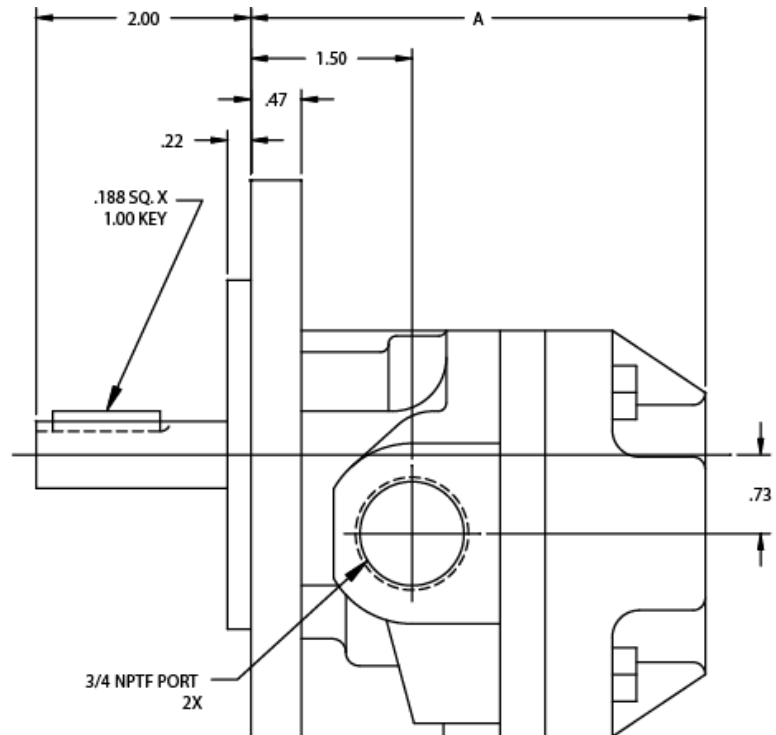
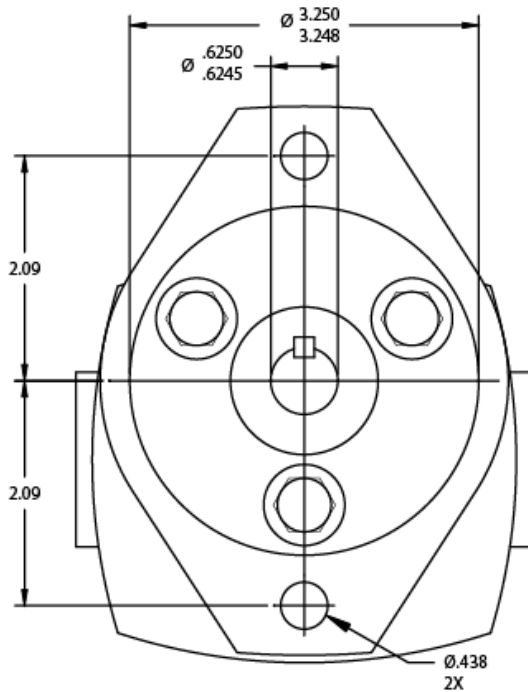
ITEM #	DESCRIPTION	QTY.
1	GEAR CASE	1
2	DRIVE SHAFT	1
3	GEAR	1
11	SEAL KIT	1
12	DRIVE PLATE ASS'Y	1
13	END PLATE ASS'Y	1
15	IDLER SHAFT ASS'Y	1
22	GEAR PIN	1
24	RETAINING RING	2
28	OUTBOARD BEARING	1
29	DRIVE KEY	1
31	SNAP RING	1

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluations, and testing for suitability.
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HYDRAULIC PUMPS

4484 Boeing Drive - Rockford, IL 61109

D21-D27 Pump, Bi-Directional

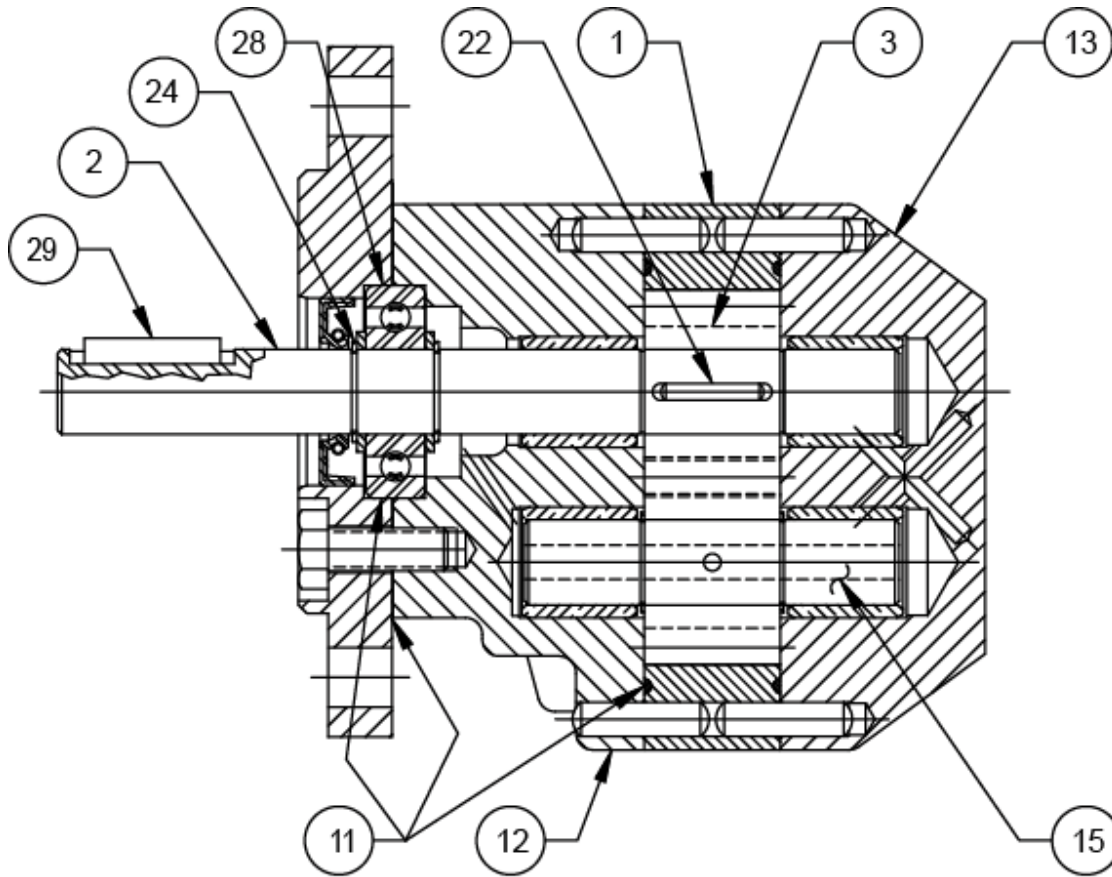


MODEL	GPM AT 1750 RPM	0 PSI DISP. GAL./REV.	DISP. CU. IN./REV.	SLIP GPM PER 100 PSI	MAX. PUMP PRESSURE INTERMITTENT DUTY	MAX. PUMP PRESSURE CONTINUOUS DUTY	SPEED MAX. RPM	A
D21	3.10	0.00178	0.411	0.040	2400	1500	5000	3.21
D23	5.30	0.00304	0.702	0.045	2400	1500	4000	3.56
D25	7.42	0.00425	0.981	0.055	1600	1000	3000	3.78
D27	11.10	0.00633	1.460	0.075	1100	700	1800	4.21

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D21-D27 Pump, Bi-Directional



SECTION A-A

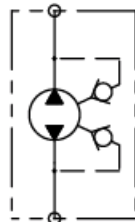
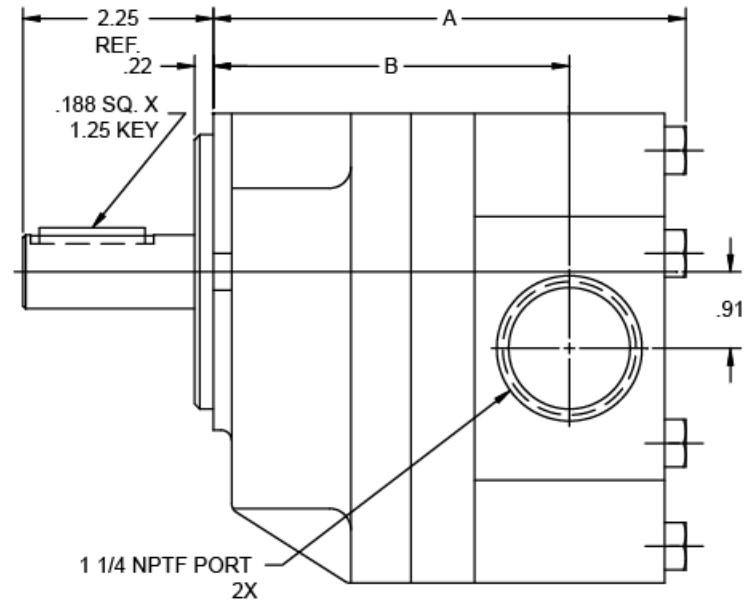
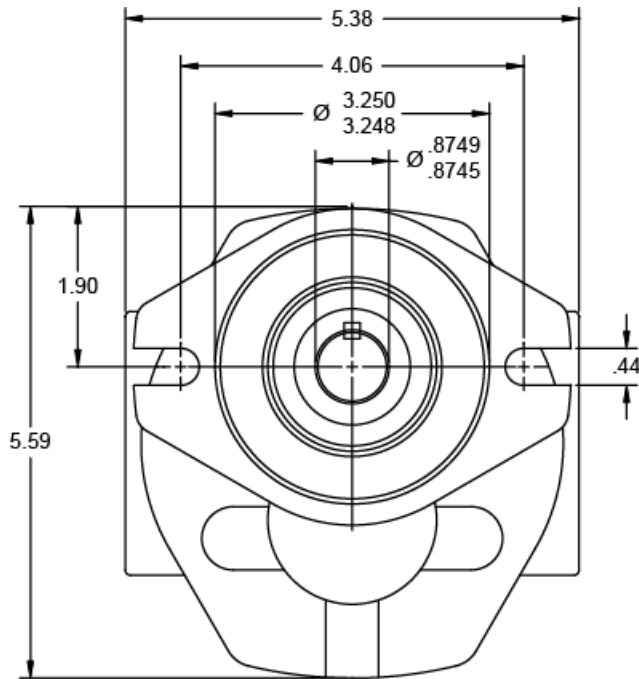
ITEM #	DESCRIPTION	QTY.
1	GEAR CASE	1
2	DRIVE SHAFT	1
3	GEAR	1
11	SEAL KIT	1
12	DRIVE PLATE ASS'Y	1
13	END PLATE ASS'Y	1
15	IDLER SHAFT ASS'Y	1
22	GEAR PIN	1
24	RETAINING RING	2
28	OUTBOARD BEARING	1
29	DRIVE KEY	1

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluations, and testing for suitability.
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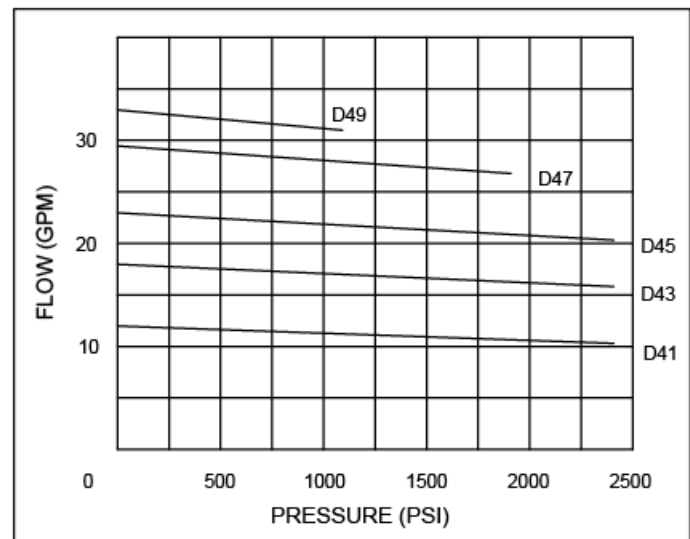
HYDRAULIC PUMPS

4484 Boeing Drive - Rockford, IL 61109

D41-D49 Pump, Bi-Directional



HYDRAULIC SCHEMATIC

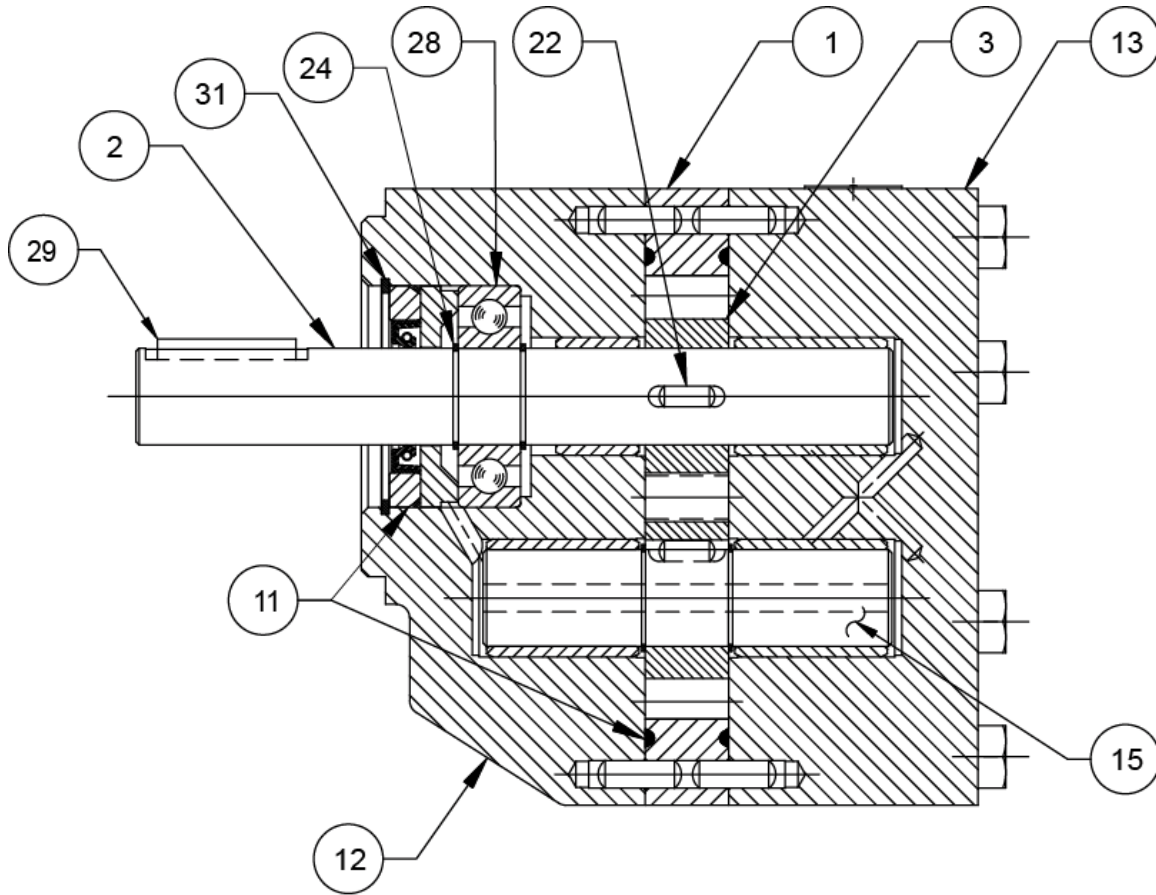


MODEL	GPM AT 1750 RPM	0 PSI DISP. GAL./REV,	DISP. CU. IN./REV.	SLIP GPM PER 100 PSI	MAX. PUMP PRESSURE INTERMITTENT DUTY	MAX. PUMP PRESSURE CONTINUOUS DUTY	SPEED MAX. RPM	A	B
D41	11.90	0.0068	1.570	0.070	2400	1500	4000	5.34	4.22
D43	17.80	0.0102	2.350	0.090	2400	1500	3000	5.72	4.59
D45	23.10	0.0132	3.040	0.110	2400	1500	2300	6.06	4.94
D47	29.50	0.0169	3.900	0.140	1900	1200	1800	6.47	5.34
D49	33.60	0.0192	4.430	0.180	1100	700	1800	6.72	5.59

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D41-D49 Pump, Bi-Directional



SECTION A-A

ITEM #	DESCRIPTION	QTY.
1	GEAR CASE	1
2	DRIVE SHAFT	1
3	GEAR	1
11	SEAL KIT	1
12	DRIVE PLATE ASS'Y	1
13	END PLATE ASS'Y	1
15	IDLER SHAFT ASS'Y	1
22	GEAR PIN	1
24	RETAINING RING	2
28	OUTBOARD BEARING	1
29	DRIVE KEY	1
31	SNAP RING	1

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluations, and testing for suitability.
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L Series 2 Stage HI-LO Pumps

L6 and L8 Series



4F17 Mtg.
Shown

L24 and L26 Series



4F17 Mtg.
Shown

While originally designed for log splitters, our enterprising distributors have found other unique applications.

Two pump sections with different size gear sets in a single housing that provides, high speed positioning capabilities with efficient working pressures. With multi circuit integration through internal valving to provide low pressure, high volume flow in the first stage and high pressure, low volume flow in the second stage.

- Direct couple to gas engines or AC electric motors at approx (3600 RPM).
- Require only a fraction of the engine horsepower that would be necessary with single stage pumps while providing much higher overall efficiency.

To adapt to a variety of applications, all pumps have an SAE 4F17 mounting flange plus an optional K4 mounting bracket for foot mounting.

MODEL	0 PSI DISP. IN ³ /REV	MAX. PSI	MAX. RPM	~GPM AT 3450 RPM	HP REQUIRED	INLET	OUTLET	PAGE
L6-2	.316 + .108	3000	3600	6.0\1.0	4	3/4 NPTF	1/2 NPTF	21
L8-4	.468 + .187	3000	3600	9.0\2.0	6	3/4 NPTF	1/2 NPTF	21
L24-2	.880 + .222	3000	3600	16\2.5	10	1" TUBE	3/4 NPTF	23
L26-2	1.000 + .416	3000	3600	20\5.0	12	1.25 " TUBE	3/4 NPTF	23

Note: Displacement given as larger gear set + smaller gear set.
 ~ GPM given as combined flow\sequenced flow.
 Operation @1725 RPM will give ~50% of combined flow and ~ 40% of sequenced flow.

Unloading Valve Settings: Factory set at 500 PSI for L6 and L8 models; 600 PSI for L24 and L26 models.
 Rotation: All models rotate clockwise facing pump shaft.
 Mounting: 4F17 four bolt all models.

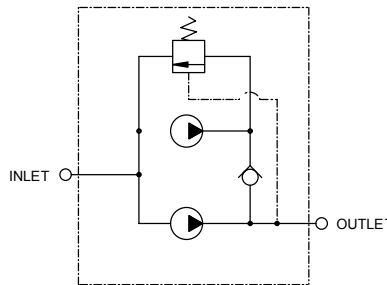
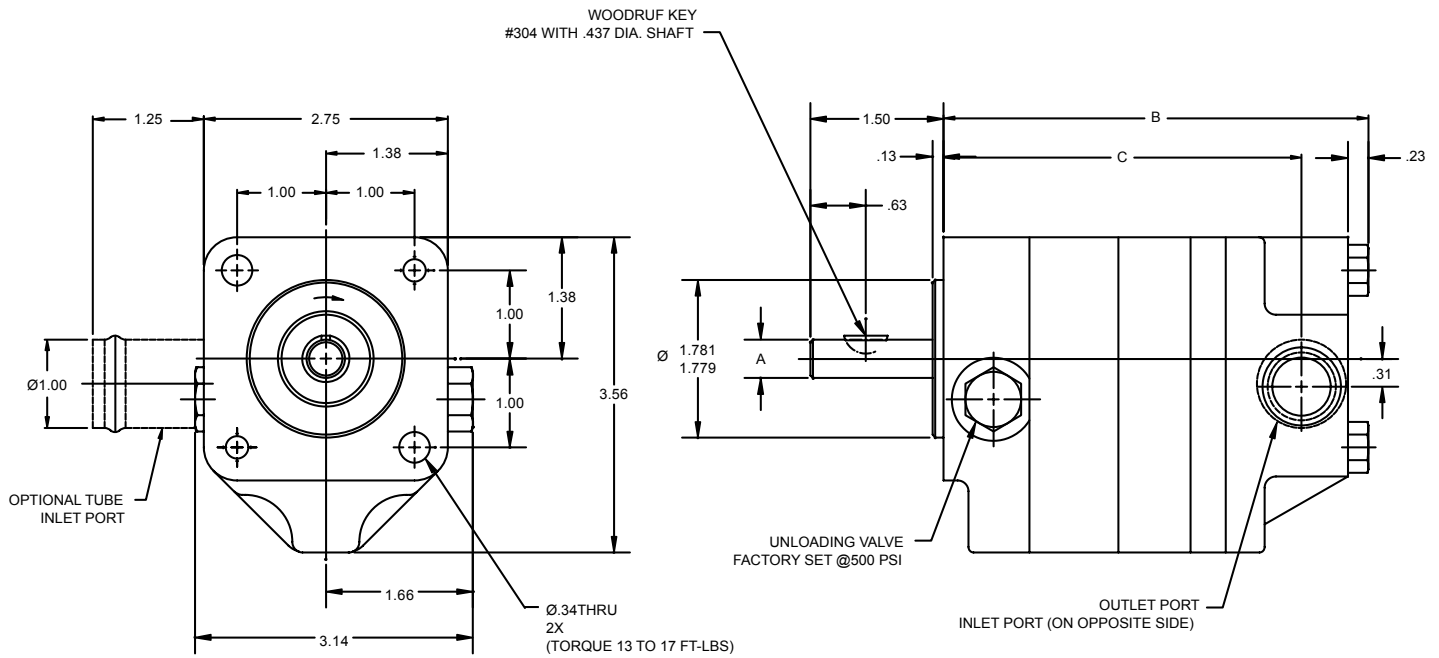
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HYDRAULIC PUMPS

4484 Boeing Drive - Rockford, IL 61109

L6 and L8 Series 2 Stage HI-LO Pumps



HYDRAULIC SCHEMATIC

Unloading Valve is factory set at 500 PSI.

Rotation: All models rotate clockwise facing pump shaft or drive end (CWDE).

Mounting: 4F17 four bolt all models.

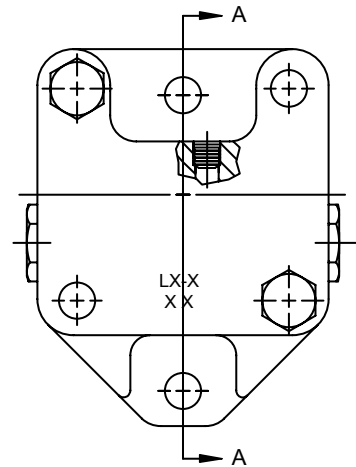
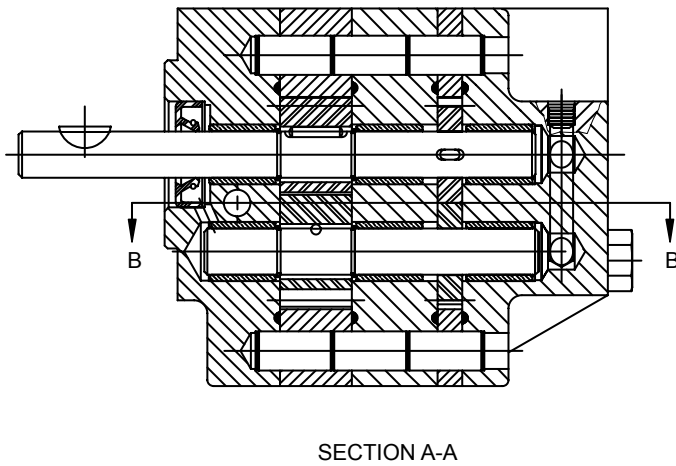
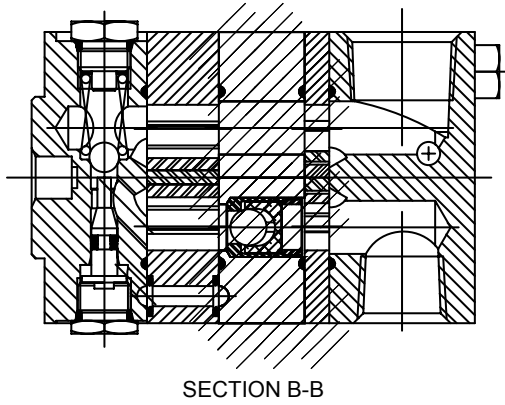
MODEL	0 PSI DISP. IN ³ /REV	MAX. PSI	MAX. RPM	~GPM AT 3450 RPM	HP REQUIRED	INLET	OUTLET	A	B	C
L6-2	.316 + .108	3000	3600	6.0/1.0	4	3/4 NPTF	1/2 NPTF	0.437	4.29	3.37
L8-4	.468 + .187	3000	3600	9.0/2.0	6	3/4 NPTF	1/2 NPTF	0.437	4.79	3.87

Note: Displacement given as larger gear set + smaller gear set.
 ~ GPM given as combined flow/sequenced flow.
 Operation @1725 RPM will give ~50% of combined flow and ~ 40% of sequenced flow.

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L6 and L8 Series 2 Stage HI-LO Pumps



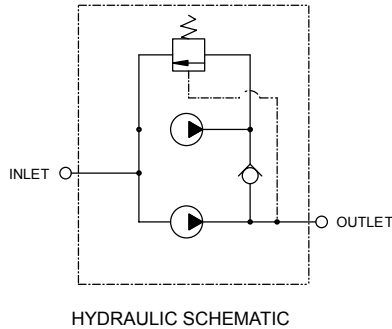
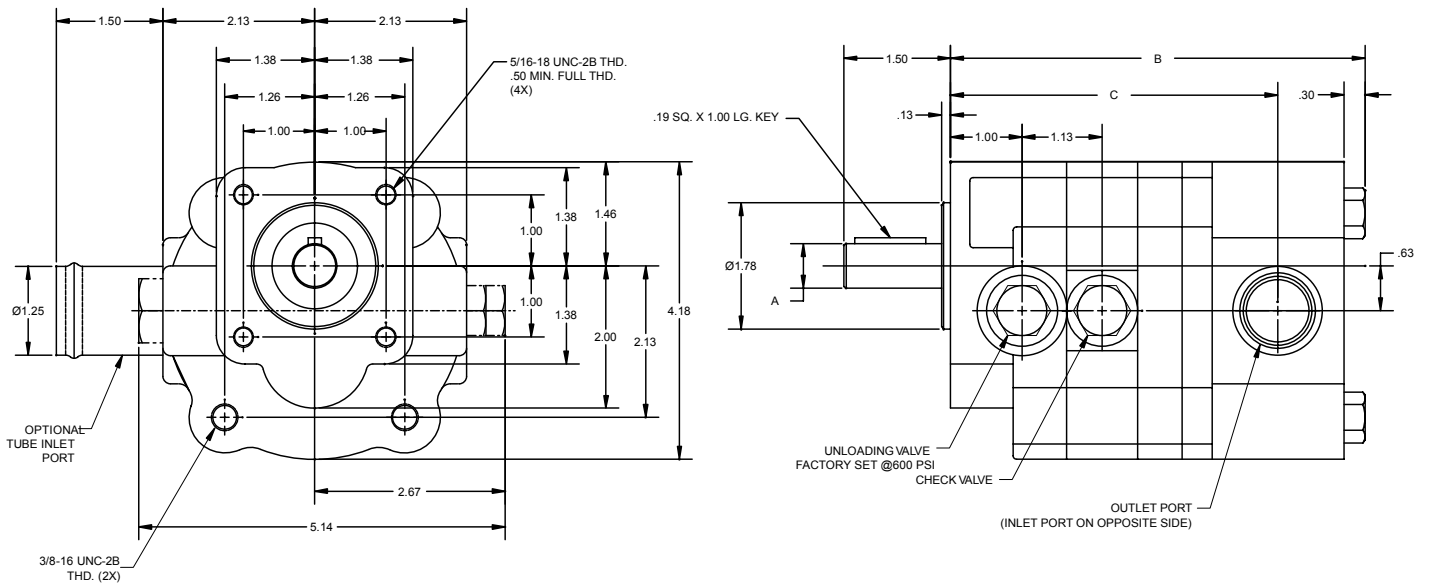
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HYDRAULIC PUMPS

4484 Boeing Drive - Rockford, IL 61109

L24 and L26 Series 2 Stage HI-LO Pumps



Unloading Valve is factory set at 600 PSI.

Rotation: All models rotate clockwise facing pump shaft or drive end (CWDE).

Mounting: 4F17 four bolt all models.

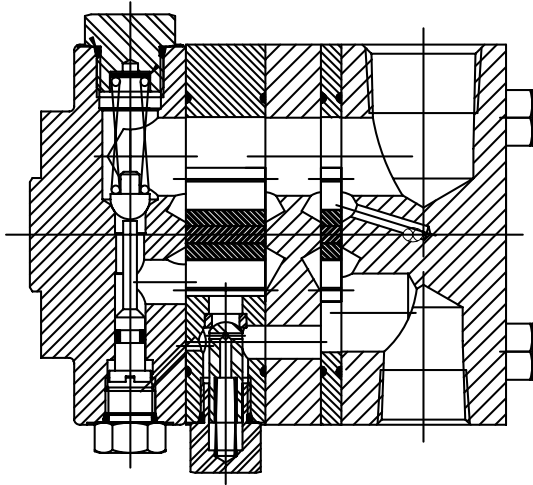
MODEL	0 PSI DISP. IN ³ /REV	MAX. PSI	MAX. RPM	~GPM AT 3450 RPM	HP REQUIRED	INLET	OUTLET	A	B	C
L24-2	.880 + .222	3000	3600	16/2.5	10	1 NPTF	3/4 NPTF	0.625	5.52	4.30
L26-2	1.000 + .416	3000	3600	20/5.0	12	1.25" TUBE	3/4 NPTF	0.625	5.82	4.59

Note: Displacement given as larger gear set + smaller gear set.
 ~ GPM given as combined flow/sequenced flow.
 Operation @1725 RPM will give ~50% of combined flow and ~ 40% of sequenced flow.

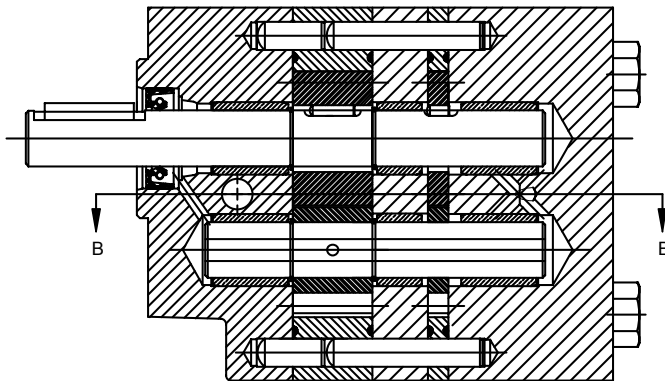
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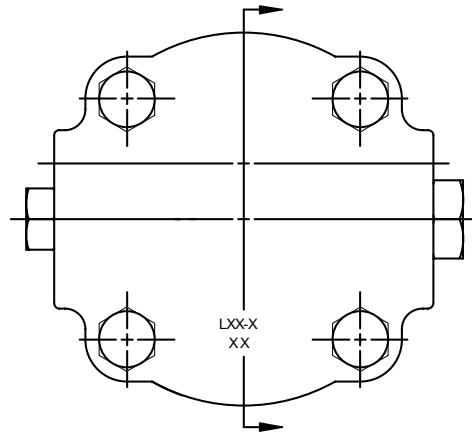
L24 and L26 Series 2 Stage HI-LO Pumps



SECTION B-B



SECTION A-A



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DM Series Hydraulic Motor

DM1 thru DM8 Series



DM21 thru DM27 Series



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DM Series Hydraulic Motor

DM1 thru DM8 Series



4F17 Mtg.
Shown

DM21 thru DM27Series



4F17 Mtg.
Shown

DM Series hydraulic motors are designed with performance in mind, including: High-strength cast iron bodies with precision machined filling and trapping grooves, and hardened alloy gears and shafts to run smoothly, special Buna-N o-ring and shaft seals to withstand up to 200 PSI return line back pressure, anti-friction bearings for 60-70% starting torque, ball thrust bearings to withstand thrust and radial shaft loads, and integral check valves to permit bi-directional rotation (to eliminate the need for external case drains). And, they will turn as slow as 300 rpm...or lower on low-torque applications.

DM Series motors are found in material handling equipment, agricultural implements, snow removal equipment, marine gear and numerous industrial equipment and machine tools...as drives for pumps, fans, compressors, mowers and other applications where moderate starting torque and moderate to high speed efficiency is needed.

And, because of their design and manufacturing quality, they can be expected to add to the overall performance and life expectancy of the equipment.

Installation Notes:

Hydraulic motor controls should be placed on the pressure side of the motor in order to preclude high seal or case pressures. Return line should be straight to tank.

On DM1 thru DM8 series, be especially careful since these units require that the mounting bolts are installed to complete the assembly. The two shipping bolts are not sufficient to make the assembly intact and care should be exercised while handling in this condition. Bolt torque requirements are 13 to 17 ft-lbs.

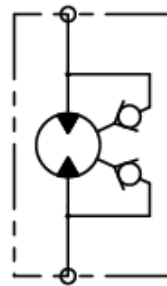
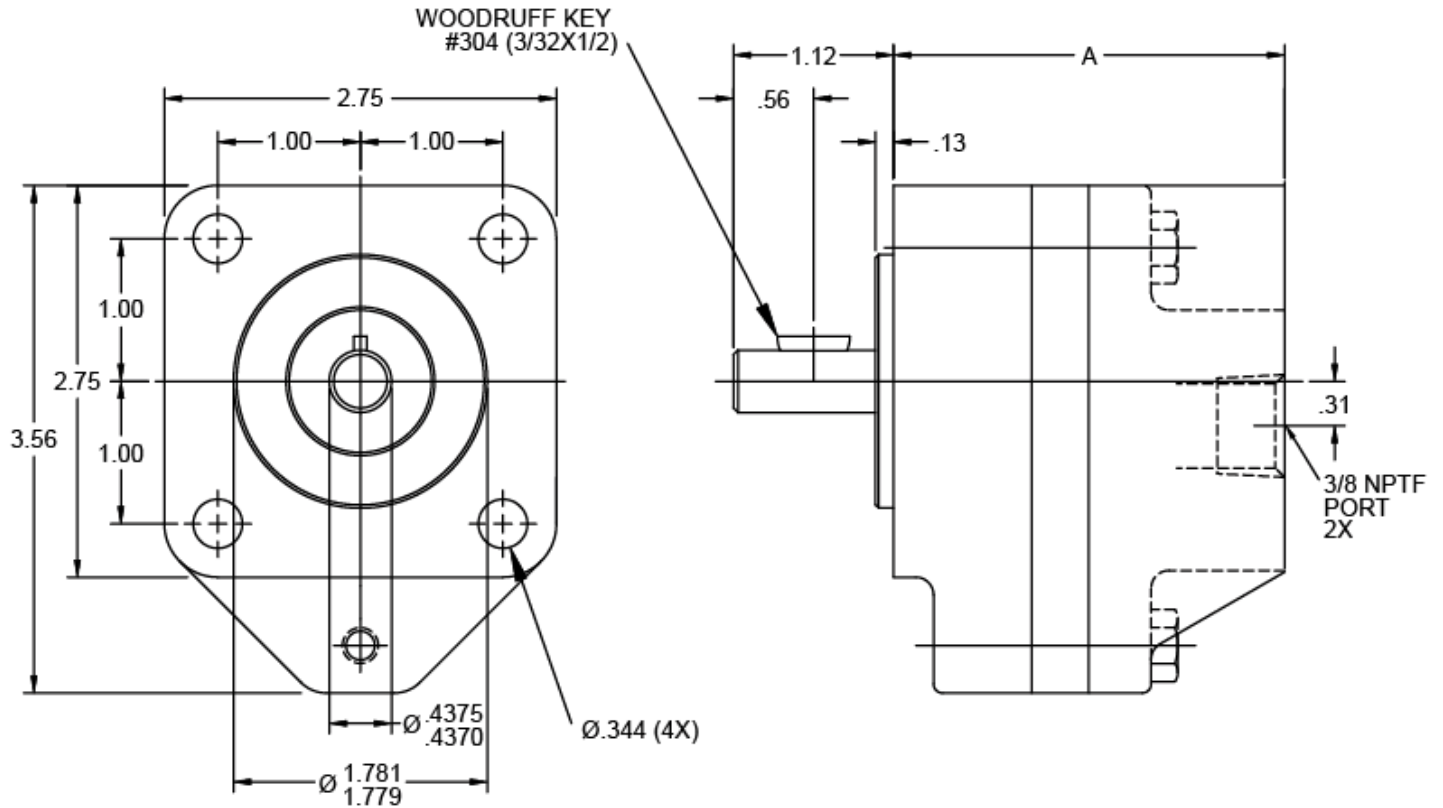
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HYDRAULIC MOTORS

4484 Boeing Drive - Rockford, IL 61109

DM1-DM8 Hydraulic Motor, Bi-Directional



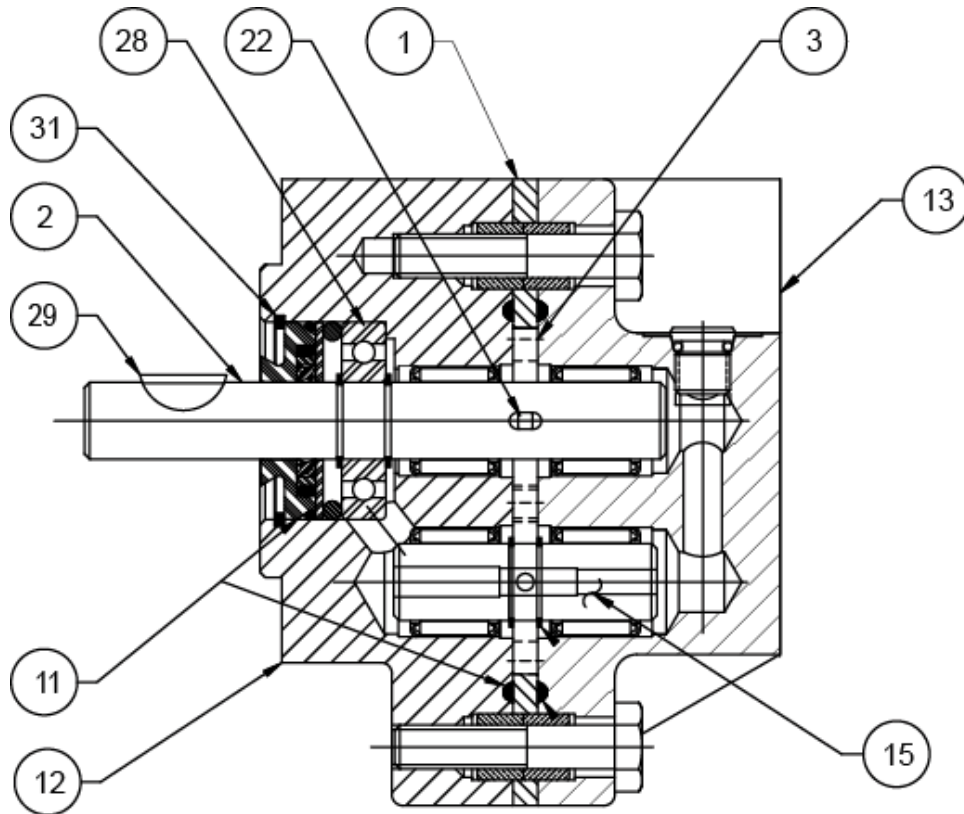
HYDRAULIC SCHEMATIC

MODEL	0 PSI DISP. GAL./REV.	DISP. CU. IN./REV.	SLIP GPM PER 100 PSI	THEORETICAL TORQUE IN.LBS./100 PSI	APPROX. TORQUE LOSS IN.LBS./1000 RPM	MAX. CONT PSI	MAX. SPEED RPM	A
DM1	0.00028	0.065	0.015	1.05	0.37	1500	4000	2.82
DM2	0.00047	0.108	0.017	1.75	0.61	1500	4000	2.91
DM4	0.00081	0.187	0.020	2.00	1.00	1500	4000	3.08
DM6	0.00137	0.316	0.025	5.10	1.80	950	3000	3.36
DM8	0.00202	0.468	0.030	7.50	2.60	650	3000	3.68

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DM1-DM8 Hydraulic Motor, Bi-Directional



SECTION A-A

ITEM #	DESCRIPTION	QTY.
1	GEAR CASE	1
2	DRIVE SHAFT	1
3	GEAR	1
11	SEAL KIT	1
12	DRIVE PLATE ASS'Y	1
13	END PLATE ASS'Y	1
15	IDLER SHAFT ASS'Y	1
22	GEAR PIN	1
28	OUTBOARD BEARING	1
29	DRIVE KEY	1
31	SNAP RING	1

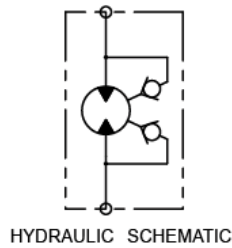
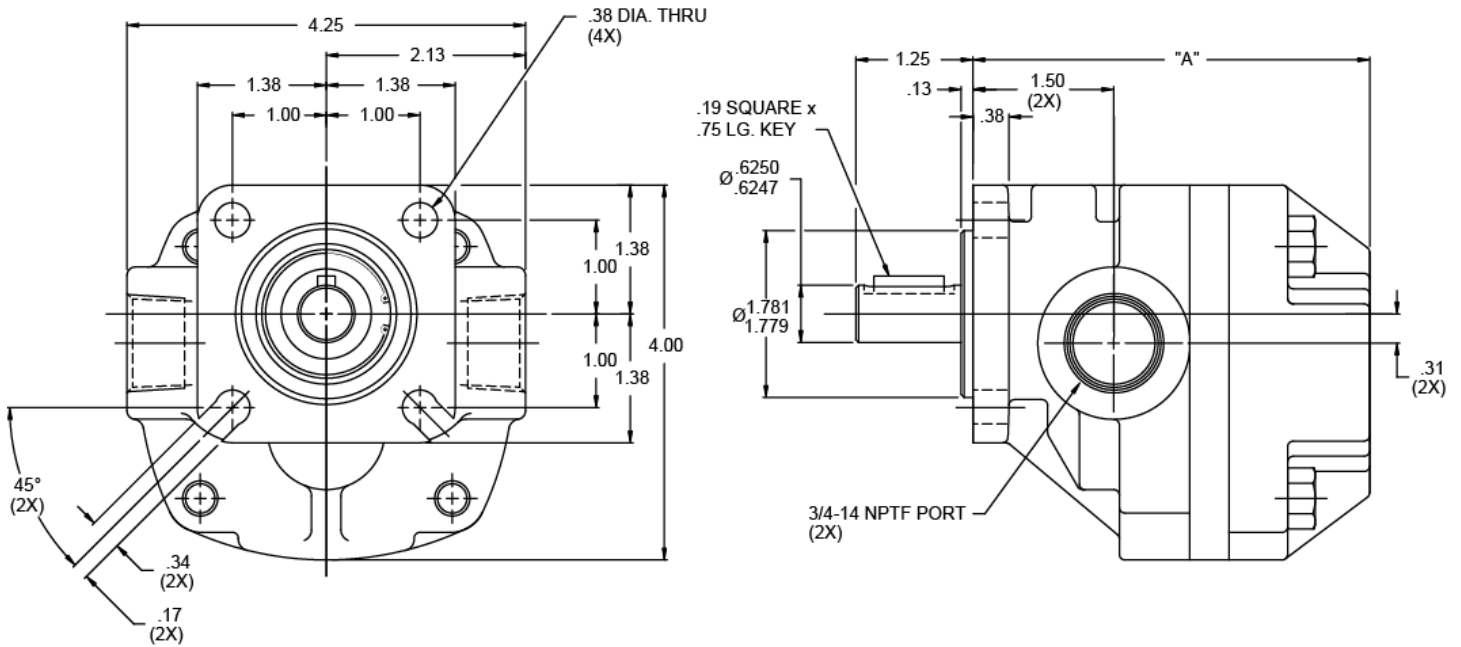
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HYDRAULIC MOTORS

4484 Boeing Drive - Rockford, IL 61109

DM21-DM27 Hydraulic Motor, Bi-Directional

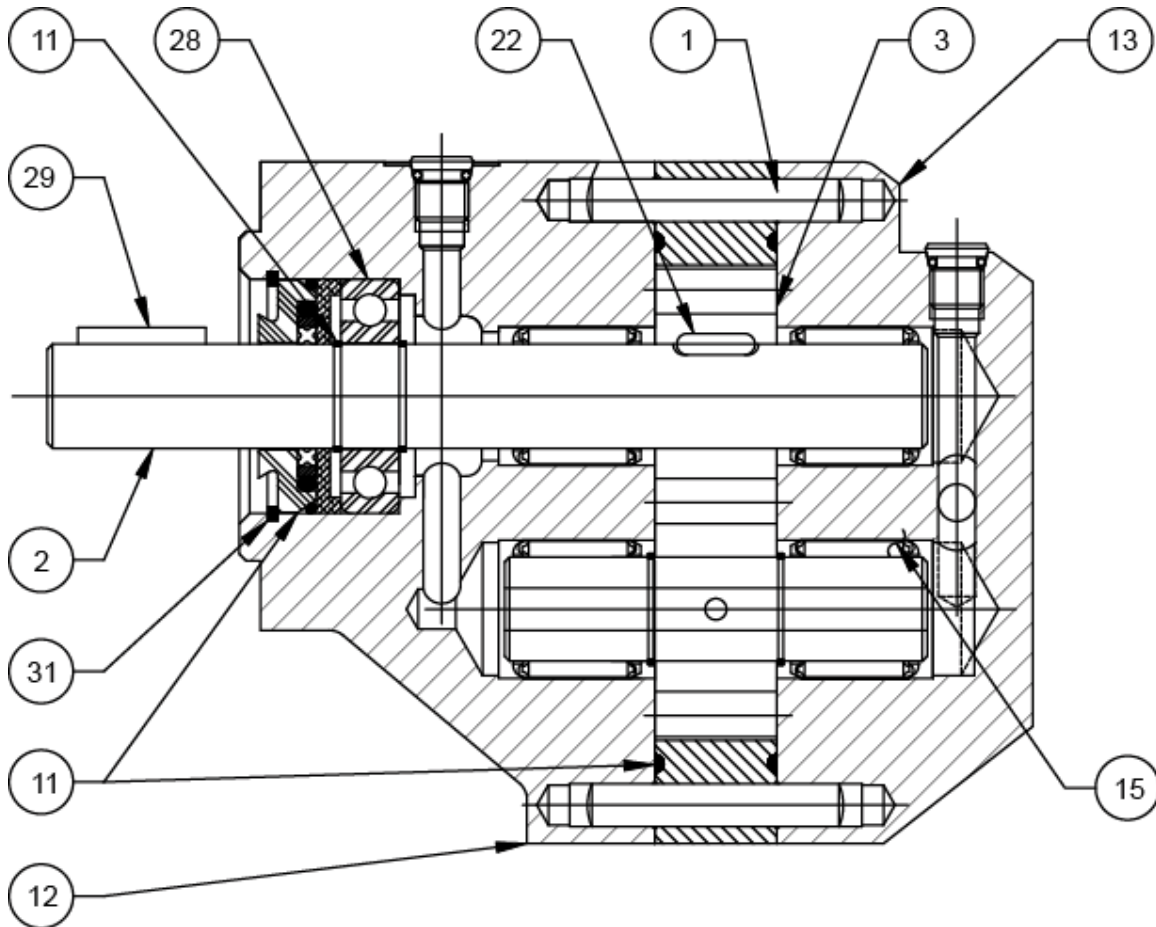


MODEL	0 PSI DISP. GAL./REV.	DISP. CU. IN./REV.	SLIP	GPM/100 PSI	THEORETICAL TORQUE IN.LBS./100 PSI	APPROX. TORQUE LOSS IN.LBS./1000 RPM	MAX. CONT. PSI	MAX. SPEED RPM	A
DM21	0.00178	0.411	0.060		6.5	2.3	1500	3000	4.25
DM23	0.00304	0.702	0.068		11.1	3.9	1200	3000	4.53
DM25	0.00425	0.981	0.083		15.6	5.5	850	2500	4.81
DM27	0.00633	1.460	0.113		23.2	8.1	550	2000	5.31

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DM21-DM27 Hydraulic Motor, Bi-Directional

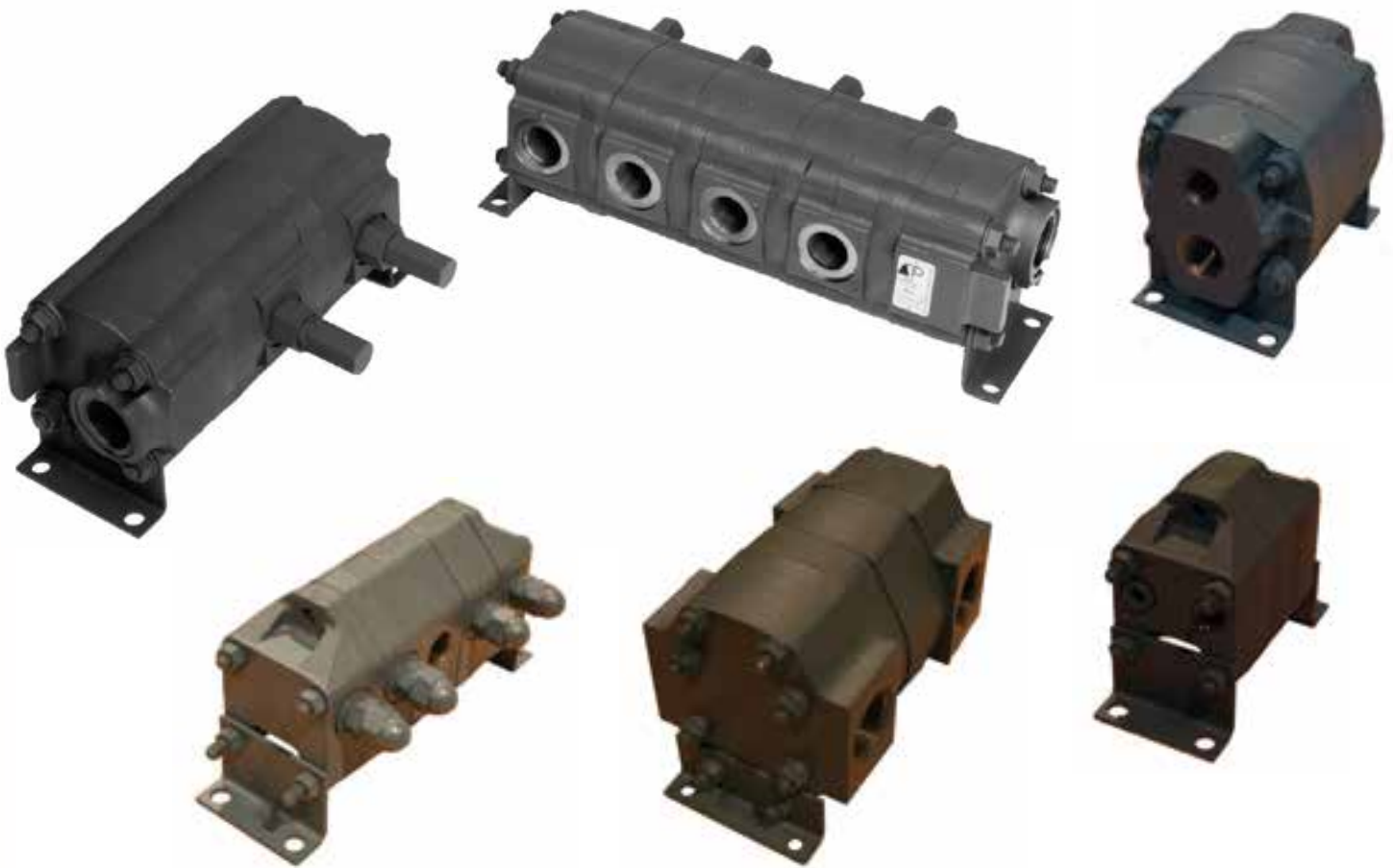


SECTION A-A

ITEM #	DESCRIPTION	QTY.
1	GEAR CASE	1
2	DRIVE SHAFT	1
3	GEAR	1
11	SEAL KIT	1
12	DRIVE PLATE ASS'Y	1
13	END PLATE ASS'Y	1
15	IDLER SHAFT ASS'Y	1
22	GEAR PIN	1
24	RETAINING RING	2
28	OUTBOARD BEARING	1
29	DRIVE KEY	1
31	SNAP RING	1

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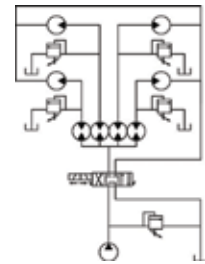
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P Series, Equal Flow Multi-Sections	36
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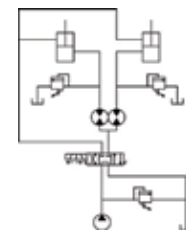
Delta Power Rotary Flow Divider, Positive Displacement



- High-strength permanent mold cast iron housing
- Precision needle bearings
- Precise machined trapping relief grooves provide constant filling and discharging to assure quiet operation and maximum bearing life.
- O-ring seals between sections (Buna-N)



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

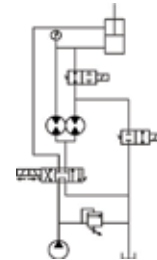


Where two or more cylinders must be synchronized: lift platforms, scaffolds, presses.

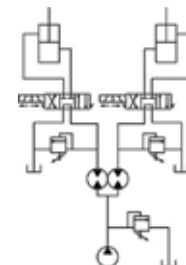
Delta Series P geared flow dividers, accurately divide flow from a single hydraulic source into two or more equal or *proportionate* circuits. In like manner, the input pressure required will be proportional to levels of flow/pressure out of the flow divider, rather than at the highest pressure level, thereby saving what would normally be wasted energy. Proven design, stable material selection and precision machining are the Delta keys to reliable performance you can depend on in a variety of applications.

Application Suggestions

1. For greatest efficiency and accuracy, flow dividers should be used at near maximum rated inlet gallonage. For quieter operations, lowered RPM should be considered.
2. Maximum (3500) and minimum 500 RPM; inlet pressure ratings and differential pressure ratings should be followed.
3. Provide over-pressure protection (relief valves) in each circuit.
4. When designing flow dividers into a static circuit, remember that they are *dynamic* devices which do nothing while static.
5. Use SAE 10 through SAE 30 industrial petroleum-based hydraulic oil with 200 SSU viscosity; filter to 25 microns.
6. Do not use teflon tape in installation. Use plastic pipe sealant with NPTF ports.



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



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

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Application Data

The Delta flow divider is a positive displacement flow dividing or proportioning apparatus. It will divide the flow from one source into two or more equal or proportionate circuits, and intensify or reduce the pressure level as required. Note that these flow dividers will operate in reverse in a combine mode, but in that mode, the accuracy likely would be significantly reduced.

In its basic configuration, the unit consists of a number of inter coupled gear type hydraulic pump motors. Each section must be capable of performing the pumping or motoring function. The section have a common inlet and separate outlets. Fluid from a prime source, such as pump, supplies the motive power to the flow divider. No energy is added to the fluid in the device, although each outlet may have an energy level difference than any other section. When the sections are of like size, the function is to divide the total flow into equal increments of flow, and when the sections are of unlike size, the function is to divide the flow into proportionate increments relative to the chosen geometric displacements.

Since the flow divider is a positive displacement machine, it will accomplish its function over a wide range of pressure of viscosity differentials. Nevertheless, certain limits are imposed due to slip characteristics and torque losses in the machine. Therefore, the performance criteria in this paper will be developed around a unit of average tolerance allowance. The data, so derived, will be averaged. Be aware that these units can require a certain amount of break-away pressure. It is recommended that operation at low pressures (< 100 PSI) is not attempted without consultation with the factory.

General Relationships

In any unit, neglecting any losses, there exists the relationship that

$$Q_i = Q_1 + Q_2 + \dots + Q_n;$$

Where Q_i is the flow into the unit and Q_1 , Q_2 and Q_n are the displacements out of each section. Since no energy is added and if none were lost, it follows that

$$P_i Q_i = P_1 Q_1 + P_2 Q_2 + \dots + P_n Q_n;$$

Where P_i is the pressure into the unit and P_1 , P_2 and P_n are the pressure levels out of each section.

In a unit consisting of any number of/or sizes of sections

$$P_i = \frac{P_1 Q_1 + P_2 Q_2 + \dots + P_n Q_n}{Q_i}$$

In any actual case, the above theoretical observations must be corrected to encompass the pressure drop and slip losses in the flow divider. The pressure drop is primarily a function of the amount of fluid and viscosity. At the usual viscosities (100 to 300 SSU) encountered in hydraulic systems, the pressure drop ΔP_p , can be approximated by the relationship, where n is the number of sections,

$$\Delta P_p \cong \frac{6Q_i}{n} + 25$$

Since the flow divider itself is a parallel circuit, the actual pressure P_{ia} into the unit is

$$P_{ia} \cong \frac{P_1 Q_1 + P_2 Q_2 + \dots + P_n Q_n}{Q_i} + \Delta P_p$$

Application Data

Slip is a function of the viscosity, pressure differential and clearance and can be estimated from the following chart:

MODEL	DISPLACEMENT GAL./REV./SECT.	SLIP/100 PSI (GPM)	MAX. FLOW/SECT. (GPM)
PM2	.00047	.03	2.0
PM6	.00137	.04	5.5
P21	.00178	.06	7.6
P23	.00304	.07	12
P25	.00425	.08	17
P26	.00531	.10	20
P27	.00633	.11	25
P43	.01020	.15	35
P47	.01690	.22	50

The slip function increases or decreases the flow from a section, dependent on whether the pressure differential is positive or negative across that section.

The performance of a system would be determined in the following manner.

1. Determine the size of the sections that will best give the required flow and pressure. The displacement from each section will be the fractional proportion of the sectional displacement versus the sum of the displacements of all the sections. That fraction multiplied by the input flow gives output displaced by each section.

2. Determine ΔP_p from $\Delta P_p \cong \frac{6Q_i}{n} + 25$

3. Determine P_{ia} from $P_{ia} \cong \frac{P_1 Q_1 + P_2 Q_2 \dots P_n Q_n}{Q_1} + \Delta P_p$

4. Determine the pressure differential $\Delta P_1, \Delta P_2, \Delta P_n$ across the individual section where $\Delta P_1 = \Delta P_{ia} - \Delta P_1$, etc., and from this value, determine the slips S_1, S_2, S_n .

5. Determine Q_{1a}, Q_{2a}, Q_{na} from $Q_{1a} = Q_1 + S_1$, etc.

The foregoing description is intended as an aid in determining the results of a flow divider system. Any specific application should not be undertaken without independent study, evaluation and testing for suitability. Exceeding the specifications could result in equipment malfunction, property damage, serious injury or death.

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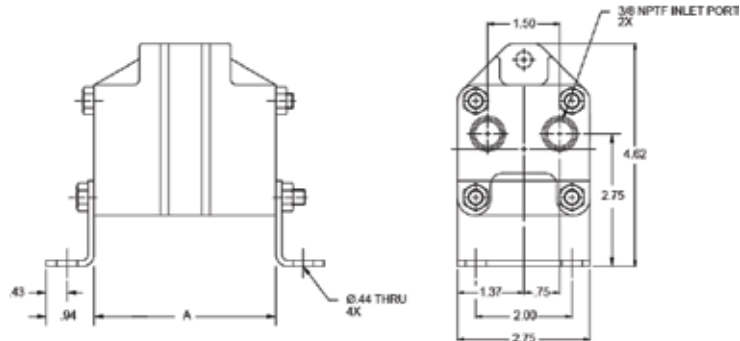
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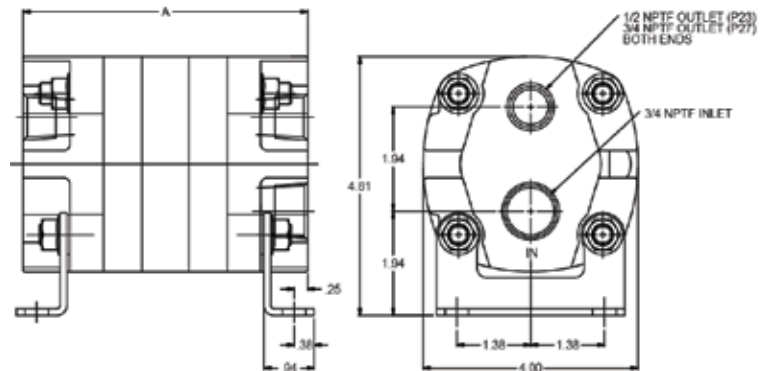
P Series, Equal Flow Two Sections

Equal flow two-section units divide flow from a common pump source into separate flows of equal proportion. Both gear sets are assembled to a common shaft.

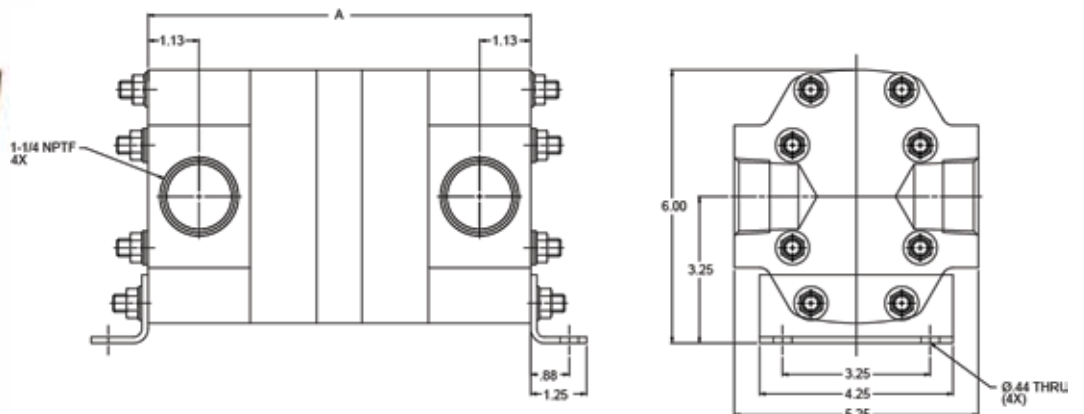
PM2 & PM6



P23 & P27



P43 & P47



MODEL	NUMBER OF SECTIONS	TOTAL MAX. INLET (GPM)	0 PSI DISP. PER SECT. GAL./REV	SLIP GPM/100 PSI	MAXIMUM INTERMITTENT PSI	MAXIMUM CONTINUOUS PSI	BOLT TORQUE Ft.Lb.	A	MAX. DIFF. BETWEEN SECT. (PSI)
PM2	2	3.5	0.00047	0.026	2500	2000	13-17	3.83	1500
PM6	2	9.5	0.00137	0.038	2000	1500	13-17	4.72	1000
P23	2	21.0	0.00304	0.068	2000	1500	24-31	5.32	1000
P25	2	30.0	0.00425	0.083	2000	1500	24-31	-	1000
P27	2	44.0	0.00633	0.113	2000	1500	24-31	6.86	1000
P43	2	70.0	0.01020	0.135	2000	1500	24-31	7.75	1000
P47	2	100.0	0.01690	0.210	2000	1500	24-31	9.25	1000

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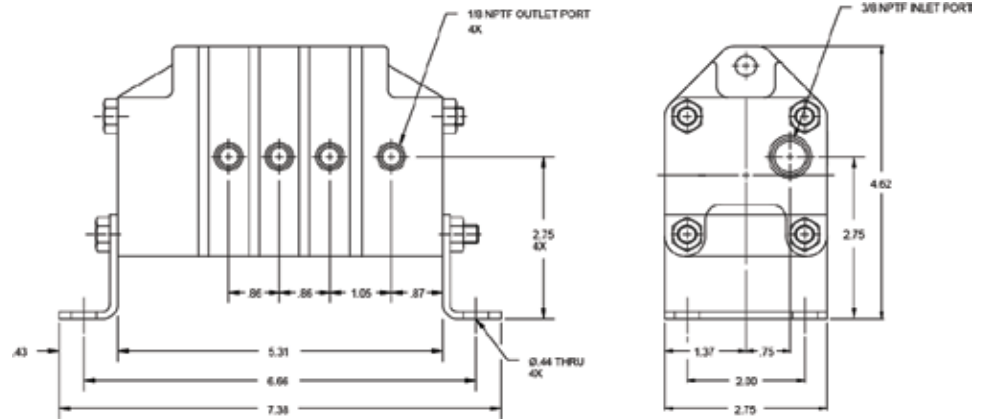
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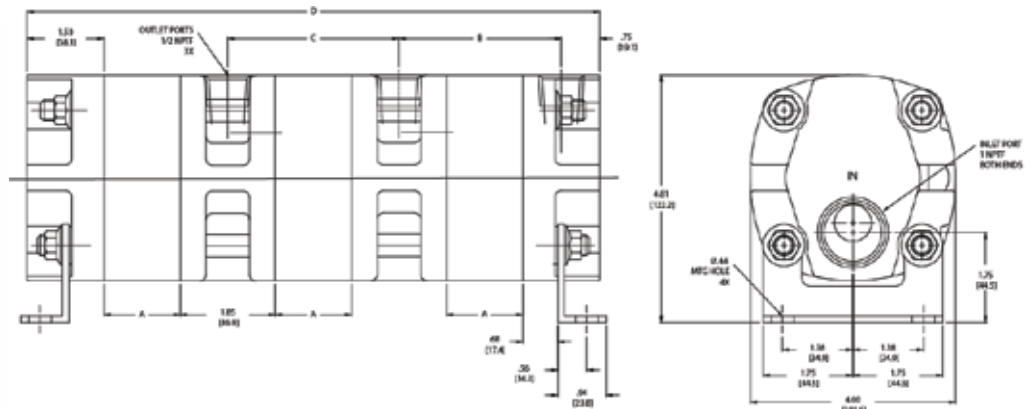
P Series, Equal Flow Multi-Sections

Equal flow multi-section units consist of several identical, individual sections coupled together to divide a flow from a common pump source into three or more equal flows. Each set of gear and shaft assemblies are individually supported in needle bearings.

PPM2



P23-(57-60) & P27-(57-60)



MODEL	NUMBER OF SECTIONS	TOTAL MAX. INLET (GPM)	0 PSI DISP. PER SECT. GAL./REV.	SLIP	GPM/100 PSI	MAXIMUM INTERMITTENT PSI	MAXIMUM CONTINUOUS PSI	BOLT TORQUE Ft.-Lb.	A	B	C	D	MAX. DIFF. BETWEEN SECT. (PSI)
PPM2	4	7.0	0.00047		0.026	2000	1500	13-17	-	-	-	-	1000
P21-60	3	18.6	0.00178		0.06	2000	1500	24-31	-	-	-	-	1000
P21-59	4	24.8	0.00178		0.06	2000	1500	24-31	-	-	-	-	1000
P21-58	5	31	0.00178		0.06	2000	1500	24-31	-	-	-	-	1000
P21-57	6	37.2	0.00178		0.06	2000	1500	24-31	-	-	-	-	1000
P23-60	3	31.5	0.00304		0.068	2000	1500	24-31	0.715	2.39	2.56	8.83	1000
P23-59	4	42.0	0.00304		0.068	2000	1500	24-31	0.715	2.39	2.56	11.39	1000
P23-58	5	52.5	0.00304		0.068	2000	1500	24-31	0.715	2.39	2.56	13.95	1000
P23-57	6	63.0	0.00304		0.068	2000	1500	24-31	0.715	2.39	2.56	16.51	1000
P27-60	3	66.0	0.00633		0.113	2000	1500	24-31	1.490	3.16	3.33	11.16	1000
P27-59	4	88.0	0.00633		0.113	2000	1500	24-31	1.490	3.16	3.33	14.49	1000
P27-58	5	110.0	0.00633		0.113	2000	1500	24-31	1.490	3.16	3.33	17.82	1000
P27-57	6	132.0	0.00633		0.113	2000	1500	24-31	1.490	3.16	3.33	21.15	1000

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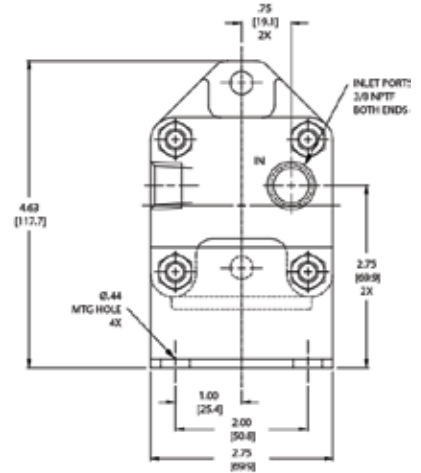
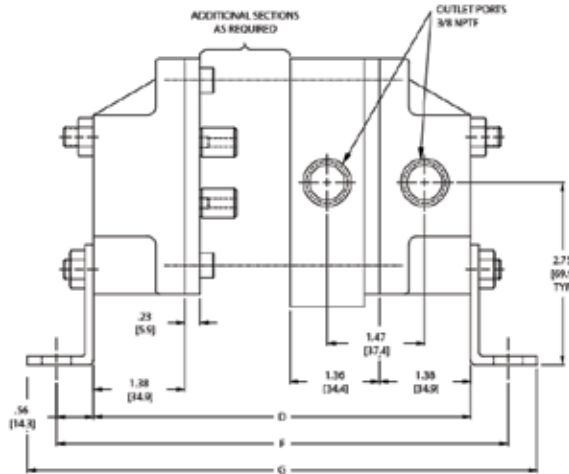
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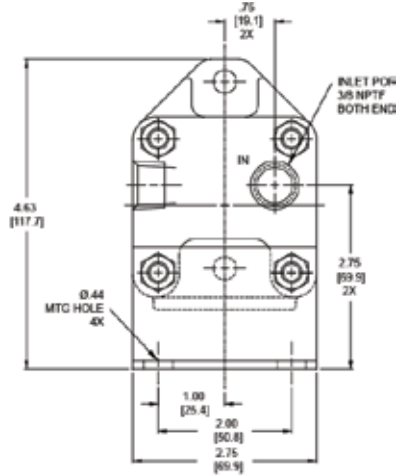
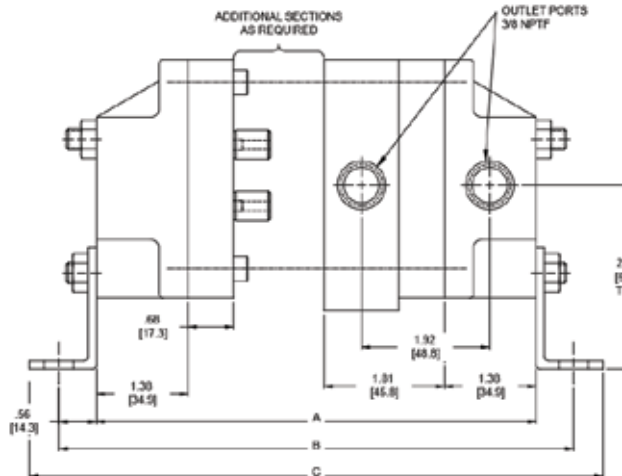
PM Series, Equal Flow Multi-Sections

Equal flow multi-section units consist of several identical, individual sections coupled together to divide a flow from a common pump source into three or more equal flows. Each set of gear and shaft assemblies are individually supported in needle bearings.

PM2



PM6



MODEL	NUMBER OF SECTIONS	TOTAL MAX. INLET (GPM)	0 PSI DISP. PER SECT. GAL./REV.	SLIP	GPM/100 PSI	MAXIMUM INTERMITTENT PSI	MAXIMUM CONTINUOUS PSI	BOLT TORQUE Ft.-Lb.	A	B	C	MAX. DIFF. BETWEEN SECT. (PSI)
PM1-59	4	4	0.00028		0.015	2500	2000	24-31	-	-	-	1000
PM1-57	6	6	0.00028		0.015	2500	2000	24-31	-	-	-	1000
PM2-60	3	5.3	0.00047		0.017	2500	2000	24-31	5.71	6.83	7.71	1000
PM2-59	4	7.0	0.00047		0.017	2500	2000	24-31	7.07	8.19	9.07	1000
PM2-58	5	8.8	0.00047		0.017	2500	2000	24-31	8.43	9.55	10.43	1000
PM2-57	6	10.5	0.00047		0.017	2500	2000	24-31	9.79	10.91	11.79	1000
PM6-60	3	14.3	0.00137		0.025	2000	1500	24-31	7.06	8.18	9.06	1000
PM6-59	4	19.0	0.00137		0.025	2000	1500	24-31	8.87	9.99	10.87	1000
PM6-58	5	23.8	0.00137		0.025	2000	1500	24-31	10.68	11.80	12.68	1000
PM6-57	6	28.5	0.00137		0.025	2000	1500	24-31	12.49	13.51	14.49	1000

Additional equal-flow units (up to 6 sections) may be built up using several of the same sections as shown in the Mixed Flow Chart.

Note: when computing slip loss, above figures should be applied to reflect differential pressure between inlet and outlet of each section. Due to normal manufacturing tolerances, accuracies can be assumed to be no greater than +/- 1% between sections under balanced load conditions.

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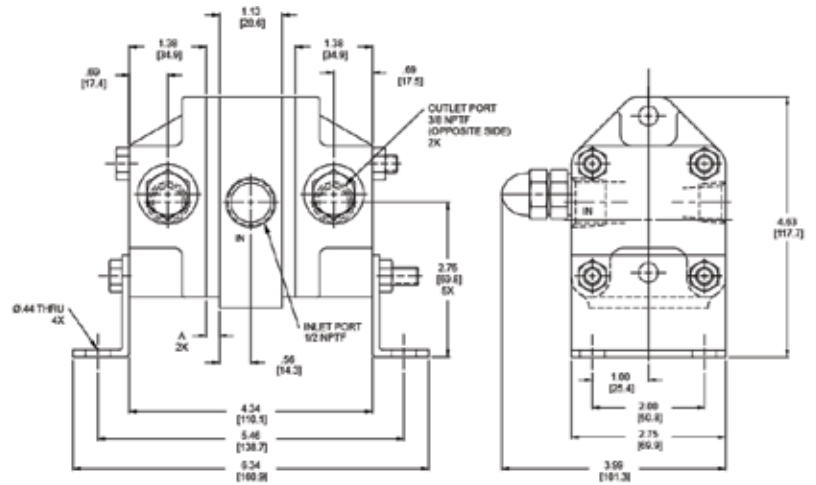
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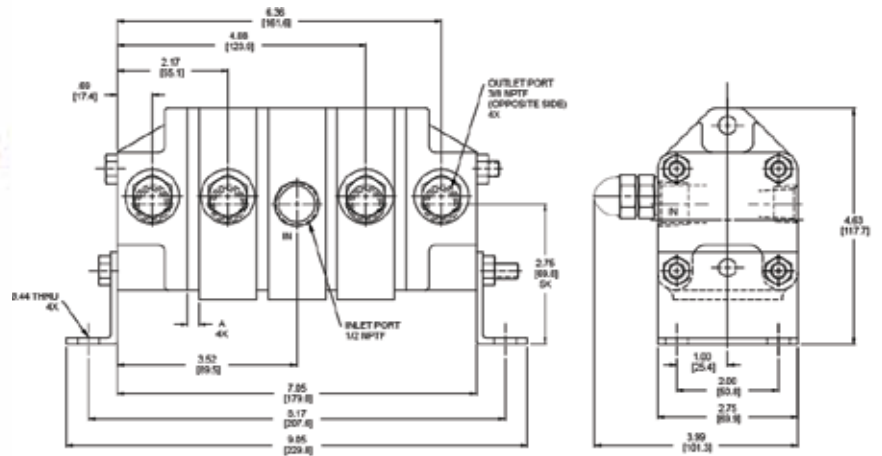
PM Series, Equal Flow Multi-Sections with Relief Valves

Equal flow multi-section units consist of several identical, individual sections coupled together to divide a flow from a common pump source into two or more equal flows. Each set of gear and shaft assemblies are individually supported in needle bearings.

PM2RV & PM6RV



PPM2RV



MODEL	NUMBER OF SECTIONS	TOTAL MAX. INLET (GPM)	0 PSI DISP. PER SECT. GAL./REV.	SLIP GPM/100 PSI	MAXIMUM INTERMITTENT PSI	MAXIMUM CONTINUOUS PSI	BOLT TORQUE Ft.-Lb.	MAX. DIFF. BETWEEN SECT. (PSI)	MAXIMUM RPM	MINIMUM RPM	A
PM2RV	2	3.5	0.00047	0.026	2500	2000	13-17	1500	3500	500	0.23
PM6RV	2	9.5	0.00137	0.038	2000	1500	13-17	1000	3500	500	0.40
PPM2RV	4	7.0	0.00047	0.026	2000	1500	13-17	1000	3500	500	0.53

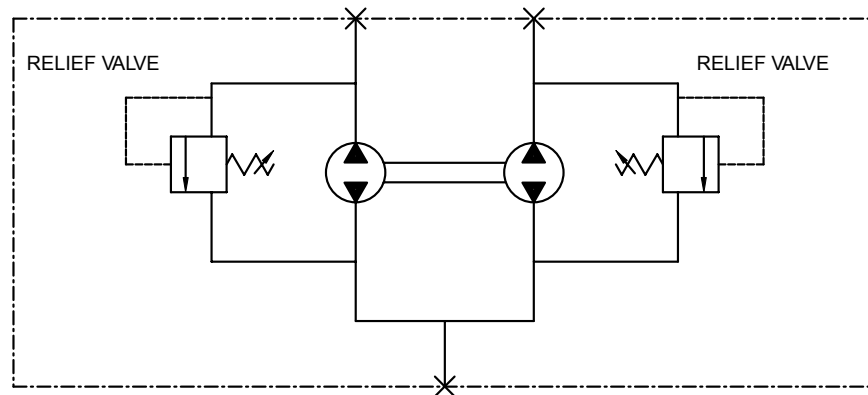
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FLOW DIVIDERS

4484 Boeing Drive - Rockford, IL 61109

HPR Series, Heavy Duty with Relief Valves



HYDRAULIC SCHEMATIC
(TWO SECTION SHOWN)

5000 PSI (345 Bar) Intermittent Duty

3000 PSI (206 Bar) Continuous Duty

Note: HPR26-XX and HPR27-XX are 2000 PSI (137 Bar)

3000 PSI Delta P between Sections, Intermittently

Standard Setting on Relief Valves – 750 PSI Differential between Outlet and Inlet Pressure

Note that these relief valves do not offer system relief protection. They simply limit the pressure between the outlet and inlet of the flow divider, and will aid in re-phasing whenever as section runs against a stop.

Standard Ports – 1 5/16 12 SAE Inlet, 1 1/16-12 SAE Outlet

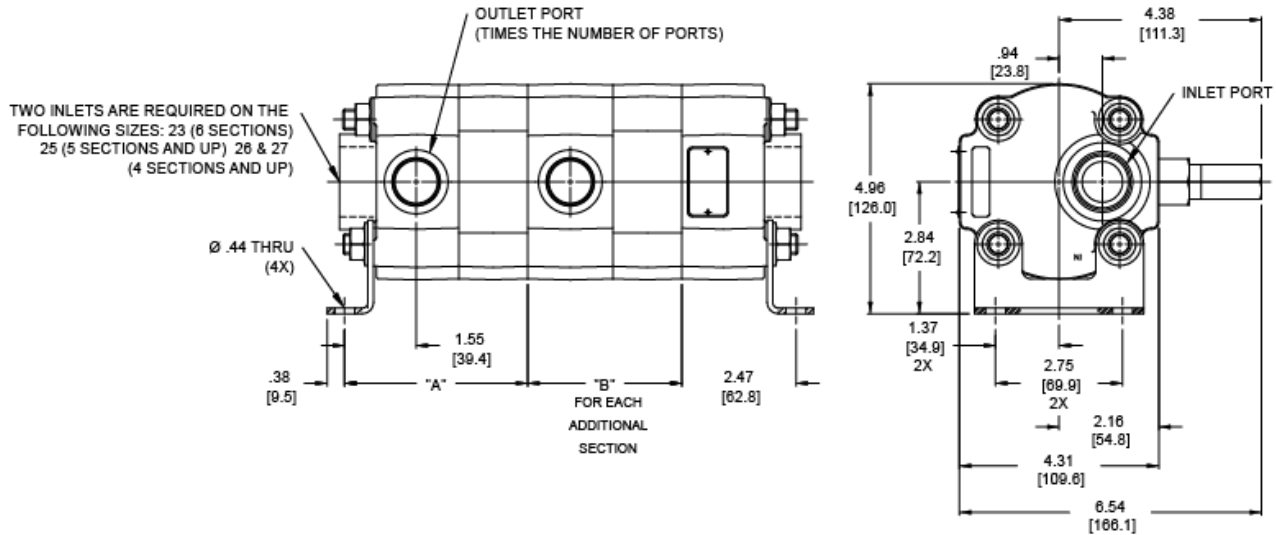
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FLOW DIVIDERS

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HPR Series, Heavy Duty with Relief Valves



EQUAL FLOW TWO SECTION				
(2) SECTION MODEL-	0 PSI DISPLACEMENT PER SECTION GAL./REV,	DIMENSION		MAX. INLET @3500 RPM GPM [LPM]
		A	B	
HPR21	0.00178	-	-	12.4 GPM [47 LPM]
HPR23	0.00304	3.19 [81.0]	2.56 [65.0]	21 GPM [79 LPM]
HPR25	0.00425	-	-	30 GPM [114 LPM]
HPR27	0.06330	3.96 [100.6]	3.34 [84.8]	44 GPM [166 LPM]

EQUAL FLOW MULTI-SECTION				
(4) SECTION MODEL	0 PSI DISPLACEMENT PER SECTION GAL./REV,	DIMENSION		MAX. INLET @3500 RPM GPM [LPM]
		A	B	
HPR21-59	0.00178	2.89 [73.4]	2.26 [57.4]	25 GPM [95 LPM]
HPR23-59	0.00304	3.19 [81.0]	2.56 [65.0]	42 GPM [160 LPM]
HPR25-59	0.00425	3.47 [88.1]	2.85 [72.4]	59 GPM [223 LPM]
HPR26-59	0.00531	3.72 [94.5]	3.10 [78.7]	74 GPM [280 LPM]
HPR27-59	0.00633	3.96 [100.6]	3.34 [84.8]	88 GPM [333 LPM]
(3) SECTION MODEL	0 PSI DISPLACEMENT PER SECTION GAL./REV,	DIMENSION		MAX. INLET @3500 RPM GPM [LPM]
		A	B	
HPR21-60	0.00178	-	-	18.6 GPM [70 LPM]
HPR23-60	0.00304	-	-	31.5 GPM [119 LPM]
HPR25-60	0.00425	-	-	45 GPM [171 LPM]
HPR27-60	0.00633	-	-	66 GPM [250 LPM]

Note: Dimension in [XX.X] are mm

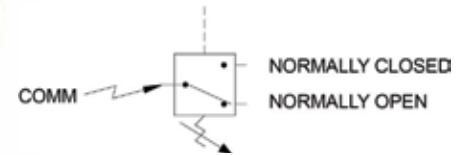
FOR QUIETER OPERATION, LIMIT SPEED TO 2000 RPM

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Pressure Switch

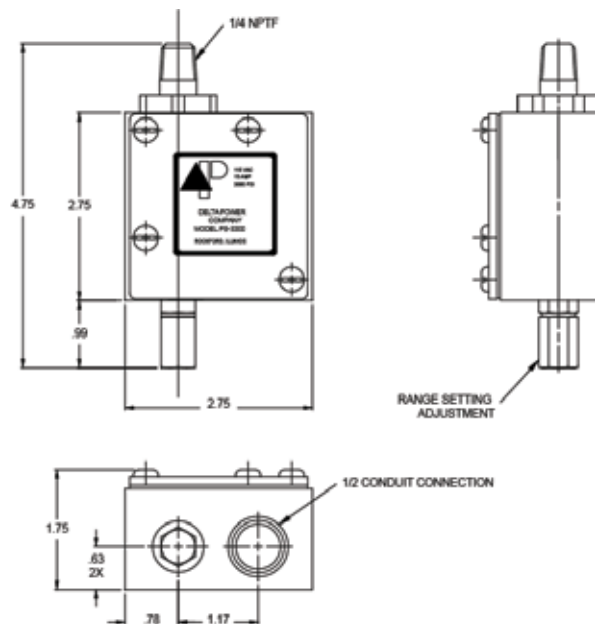
MODEL	RANGE
PS3000	500-3000 PSI ADJUSTABLE



This compact, rugged pressure switch is designed to meet today's need for an inexpensive, yet dependable control. Although housed in an oil-tight, aluminum body, the assembly weighs only 1 lbs. 4 oz. and can be easily included into new or existing circuitry.

Micro Switch Electrical Data UL and CSA Listed:

- 15 Amps and 1/2 HP, 125 or 250 VAC
- 1/2 Amp, 125VDC
- 1/4 Amp, 250 VDC
- 5 Amps, 12 VAC "L"



Features Include:

- A micro switch rated for 2 million cycles
- A specially designed actuator consisting of a dampened piston and positive stop striker plate
- Externally adjustable pressure range
- 1/2 Conduit connector
- 1/4 NPTF male pipe thread
- Common, normally open, and normally closed terminals
- Gasket, removable cover for ease of wire assembly

Pressure reset characteristics: 250-350 PSI differential

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