

D Series

Pumps





The Danfoss Commitment

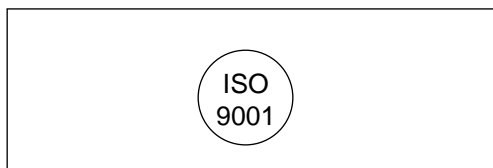
Danfoss has been serving the fluid power industry for more than half a century. In an industry where exacting standards are the norm, the Danfoss name is synonymous with commitment to uncompromising quality, leading-edge technology and prompt and responsive customer service.

Our products define the state of the art in many areas of component technology. Each Danfoss Fluid Power valve, pump, motor, mobile control valve, multi-circuit component, hydraulic integrated circuit and power unit represents a commitment to our overall goal – to make every Danfoss Fluid Power product the very best available.

Index

| | | |
|--------------|-----------------------------------|----|
| Index | Quick Reference | 4 |
| | D Series Pumps | 6 |
| | Load Sensing Priority Flow Valves | 8 |
| | Fixed Priority Flow Dividers | 9 |
| | Multi-Circuit Pumps | 10 |
| | Sizing Multi-Circuit Pumps | 11 |
| | Order Code | 21 |

ISO 9001 quality management



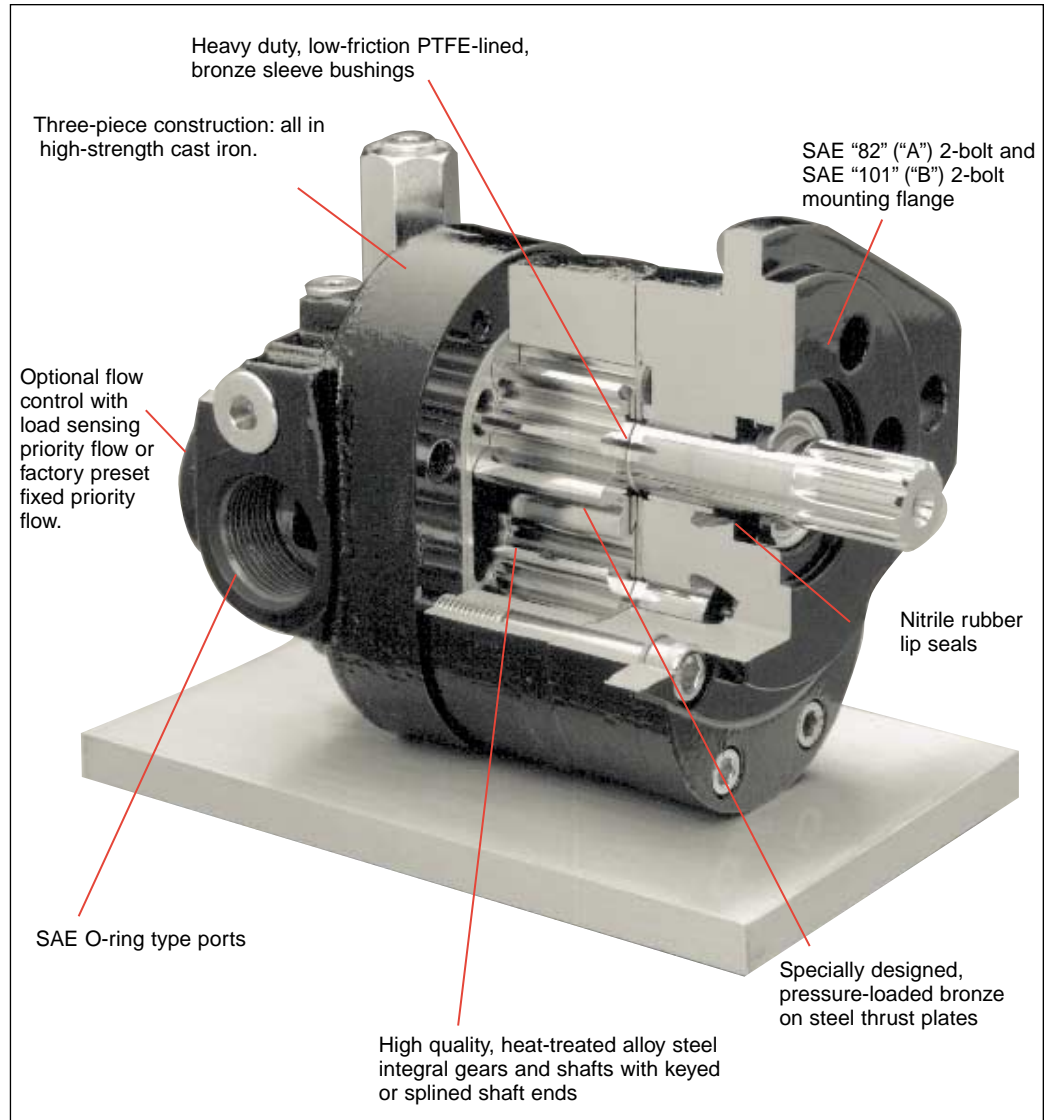
The quality management of Danfoss Hydraulics product development, design, production and sale has been approved in accordance with the international standard ISO 9001. The approval was effected by BSI, the British Standards Institution, who is currently checking that Danfoss Hydraulics fulfills the ISO standard specifications. In North America, the approval was effected by UL, Underwriters Laboratories, Inc.

D Series Hydraulic Pumps

Features

D Series hydraulic pumps provide the ultimate in flexibility, with numerous displacements, features, and shaft/port options. The D Series has an excellent reputation for rugged, dependable performance at continuous pressures to 3500 psi (241 bar) and speeds to 3500 rpm.

D pumps are available in ten displacements from .43 to 2.32 in³/rev (14,1 to 63,6 cm³/rev). Complete information can be found by referring to the specific sections of this catalog.



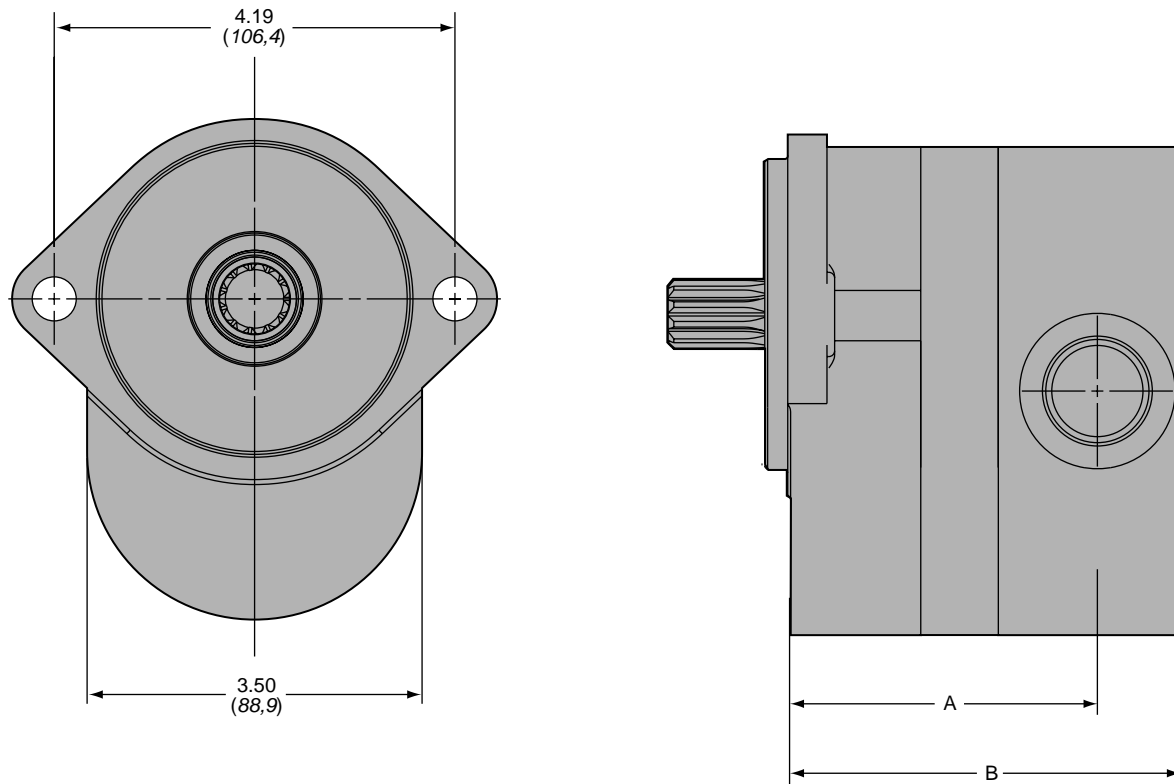
D Series Hydraulic Pumps

| Pump or Motor Displacement Code | 43D | 58D | 77D | 104D | 116D | 125D | 155D | 177D | 194D | 232D |
|--|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Gear width in. (mm) | 0.28 (7,1) | 0.38 (9,7) | 0.50 (12,7) | 0.67 (17,0) | 0.75 (19,0) | 0.81 (20,6) | 1.00 (25,4) | 1.14 (29,0) | 1.25 (31,7) | 1.50 (38,1) |
| Theoretical displacement in ³ /rev (cm ³ /rev) | 0.43 (7,0) | 0.58 (9,5) | 0.77 (12,6) | 1.04 (17,0) | 1.16 (19,0) | 1.25 (20,5) | 1.55 (25,4) | 1.77 (29,0) | 1.94 (31,8) | 2.32 (38,0) |
| Maximum continuous pressure psi (bar) | 3500 (241) | 3500 (241) | 3500 (241) | 3500 (241) | 3500 (241) | 3500 (241) | 3500 (241) | 3500 (241) | 3500 (241) | 3000 (207) |
| Pump - maximum speed (rpm) | 3400 | 3400 | 3400 | 3400 | 3400 | 3400 | 3400 | 3200 | 3000 | 2500 |
| Pump - minimum speed (rpm) | 1200 | 900 | 700 | 600 | 600 | 600 | 600 | 600 | 600 | 600 |

Note: Theoretical pump delivery in gpm (l/min) is determined by multiplying displacement - in³/rev (cm³/rev) - by desired rpm and dividing by 231 (1000).

| Model Number | 43D | 58D | 77D | 104D | 116D | 125D | 155D | 177D | 194D | 232D |
|-----------------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| "A" inches (mm) | 2.70 (68,8) | 2.80 (71,1) | 2.92 (74,4) | 3.09 (78,5) | 3.17 (80,8) | 3.23 (82,3) | 3.42 (87,1) | 3.56 (90,7) | 3.67 (93,5) | 3.92 (99,8) |
| "B" inches (mm) | 3.58 (90,9) | 3.68 (93,5) | 3.80 (96,5) | 3.97 (100,8) | 4.05 (102,9) | 4.11 (104,4) | 4.30 (109,2) | 4.44 (112,8) | 4.55 (115,6) | 4.80 (121,9) |

Dimensions



Dimensions shown: inches (mm)

All metric values are secondary and for reference only.

D Series Hydraulic Pumps

| D Pumps | | gpm (l/min) | | | | | | | | | |
|---------------------------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|
| rpm | psi (bar) | 43D | 58D | 77D | 104D | 116D | 125D | 155D | 177D | 194D | 232D |
| 1800 | 500 (34) | 3.3 (12,5) | 4.5 (17,0) | 6.0 (22,7) | 8.1 (30,7) | 8.9 (33,7) | 9.7 (36,7) | 12.1 (45,8) | 13.8 (52,2) | 15.2 (57,5) | 18.1 (68,5) |
| | 1000 (69) | 3.2 (12,1) | 4.4 (16,7) | 6.0 (22,7) | 8.0 (30,3) | 8.9 (33,7) | 9.6 (36,3) | 12.0 (45,0) | 13.7 (51,9) | 15.1 (57,2) | 18.0 (68,1) |
| | 2000 (138) | 3.0 (11,4) | 4.2 (15,9) | 5.8 (22,0) | 7.8 (29,5) | 8.7 (32,9) | 9.4 (35,6) | 11.8 (44,7) | 13.5 (51,1) | 14.9 (56,4) | 17.7 (67,0) |
| | 3000 (207) | 2.8 (10,6) | 4.1 (15,5) | 5.6 (21,2) | 7.5 (28,4) | 8.4 (31,8) | 9.2 (34,8) | 11.5 (43,5) | 13.2 (50,0) | 14.6 (55,3) | 17.3 (65,5) |
| | 3500 (241) | 2.7 (10,2) | 4.0 (15,1) | 5.5 (20,8) | 7.3 (27,6) | 8.3 (31,4) | 9.1 (34,4) | 11.4 (45,1) | 13.0 (49,2) | 14.5 (54,9) | – |
| 3200 | 500 (34) | 6.1 (23,1) | 8.1 (30,7) | 10.8 (37,6) | 14.4 (54,5) | 16.2 (66,3) | 17.5 (66,2) | 21.6 (81,8) | 24.8 (93,9) | 25.5* (96,5) | 25.3* (95,8) |
| | 1000 (69) | 6.1 (23,1) | 8.0 (30,3) | 10.8 (37,6) | 14.4 (54,5) | 16.1 (60,9) | 17.5 (66,2) | 21.6 (81,8) | 24.7 (93,5) | 25.5* (96,5) | 25.2* (95,4) |
| | 2000 (138) | 5.9 (22,3) | 7.8 (29,5) | 10.6 (40,1) | 14.2 (53,7) | 16.0 (60,6) | 17.3 (65,5) | 21.5 (81,4) | 24.6 (93,1) | 25.3* (95,8) | 25.0* (94,6) |
| | 3000 (207) | 5.8 (22,0) | 7.7 (29,1) | 10.4 (39,4) | 14.0 (53,0) | 15.8 (59,8) | 17.2 (65,1) | 21.3 (80,6) | 24.4 (92,4) | 25.1* (95,0) | 24.6* (93,1) |
| | 3500 (241) | 5.7 (21,6) | 7.7 (29,1) | 10.4 (39,4) | 13.9 (52,6) | 15.7 (59,4) | 17.1 (64,7) | 21.2 (80,2) | 24.3 (92,0) | 25.0* (94,6) | – |
| Input Horsepower hp (kW) | | | | | | | | | | | |
| rpm | psi (bar) | 43D | 58D | 77D | 104D | 116D | 125D | 155D | 177D | 194D | 232D |
| 1800 | 500 (34) | 1.2 (0,9) | 1.6 (1,2) | 2.1 (1,6) | 2.8 (2,1) | 3.1 (2,3) | 3.1 (2,3) | 4.0 (3,0) | 4.6 (3,4) | 5.2 (3,9) | 6.3 (4,7) |
| | 1000 (69) | 2.5 (1,9) | 3.1 (2,3) | 4.2 (3,1) | 5.3 (4,0) | 5.9 (4,4) | 6.2 (4,6) | 7.8 (5,8) | 8.8 (6,6) | 10.0 (7,5) | 11.8 (8,8) |
| | 2000 (138) | 4.9 (3,7) | 6.2 (4,6) | 8.5 (6,3) | 10.6 (7,9) | 11.6 (8,7) | 12.3 (9,2) | 15.5 (11,6) | 17.4 (13,0) | 19.9 (14,8) | 22.9 (17,1) |
| | 3000 (207) | 7.6 (5,7) | 9.8 (7,3) | 12.9 (9,6) | 16.1 (12,0) | 17.3 (12,9) | 18.4 (13,7) | 23.2 (17,3) | 26.1 (19,5) | 30.0 (23,4) | 34.8 (26,0) |
| | 3500 (241) | 9.2 (6,9) | 12.0 (9,0) | 15.3 (11,4) | 19.2 (14,3) | 20.3 (15,1) | 21.7 (16,2) | 27.2 (20,3) | 30.8 (23,0) | 35.5 (26,5) | – |
| 3200 | 500 (34) | 2.2 (1,6) | 2.9 (2,2) | 3.9 (2,9) | 5.1 (13,8) | 5.7 (4,3) | 6.0 (4,5) | 7.6 (5,7) | 8.7 (6,5) | 9.2* (6,9) | 9.1* (6,8) |
| | 1000 (69) | 4.3 (3,2) | 5.6 (4,2) | 7.7 (5,7) | 9.6 (7,2) | 10.7 (8,0) | 11.4 (8,5) | 14.5 (10,8) | 16.5 (12,3) | 17.2* (12,8) | 16.8* (12,5) |
| | 2000 (138) | 8.5 (6,3) | 11.0 (8,2) | 15.4 (11,5) | 18.9 (14,1) | 20.7 (15,4) | 22.2 (16,6) | 28.0 (20,9) | 31.5 (23,5) | 33.6* (25,1) | 32.2* (24,0) |
| | 3000 (207) | 13.1 (9,8) | 16.8 (12,5) | 22.7 (16,9) | 28.7 (21,4) | 30.8 (23,0) | 33.1 (24,7) | 41.5 (31,0) | 46.8 (34,9) | 50.3* (37,5) | 48.4* (36,1) |
| | 3500 (241) | 15.5 (11,6) | 20.1 (15,0) | 26.9 (20,1) | 33.9 (25,3) | 36.1 (26,9) | 38.6 (28,8) | 48.6 (36,3) | 55.1 (41,1) | 59.6* (44,5) | – |

* Performance data rated at 3000 rpm for 194D and 2500 rpm for 232D.

Test data at 175 SUS Hydraulic Oil @ 120° F (49° C).

For higher speeds consult factory.

D Series Hydraulic Pumps

D pumps have a pressure-balanced design for high volumetric and mechanical efficiencies. They feature three-piece high tensile cast iron construction with integral gear and shaft design made of heat-treated alloy steel. Standard features include straight keyed shafts or splined shafts; heavy-duty sleeve bearings; nitrile rubber lip seals; and SAE O-ring ports. Optional flow controls are available with load-sensing or with factory preset constant delivery from 1 to 9 gpm (3,8 to 34,0 l/min).

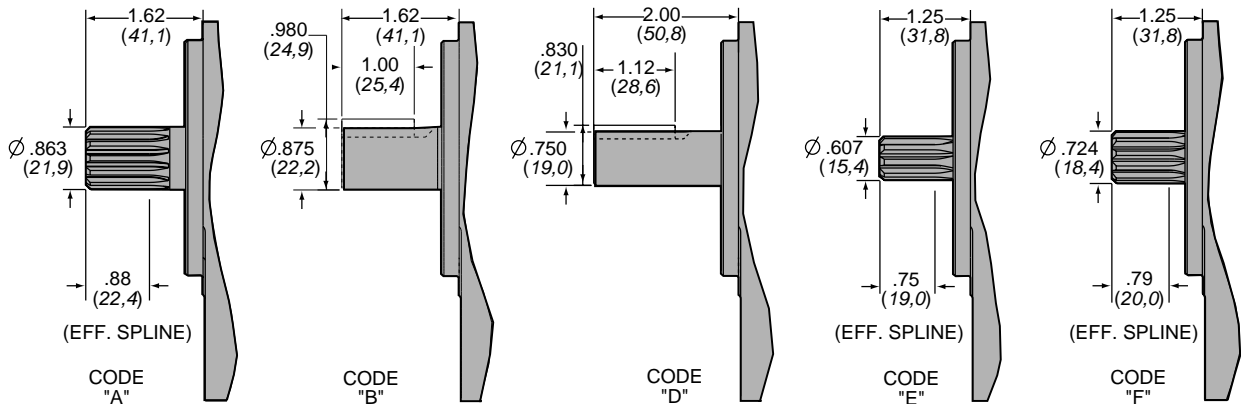
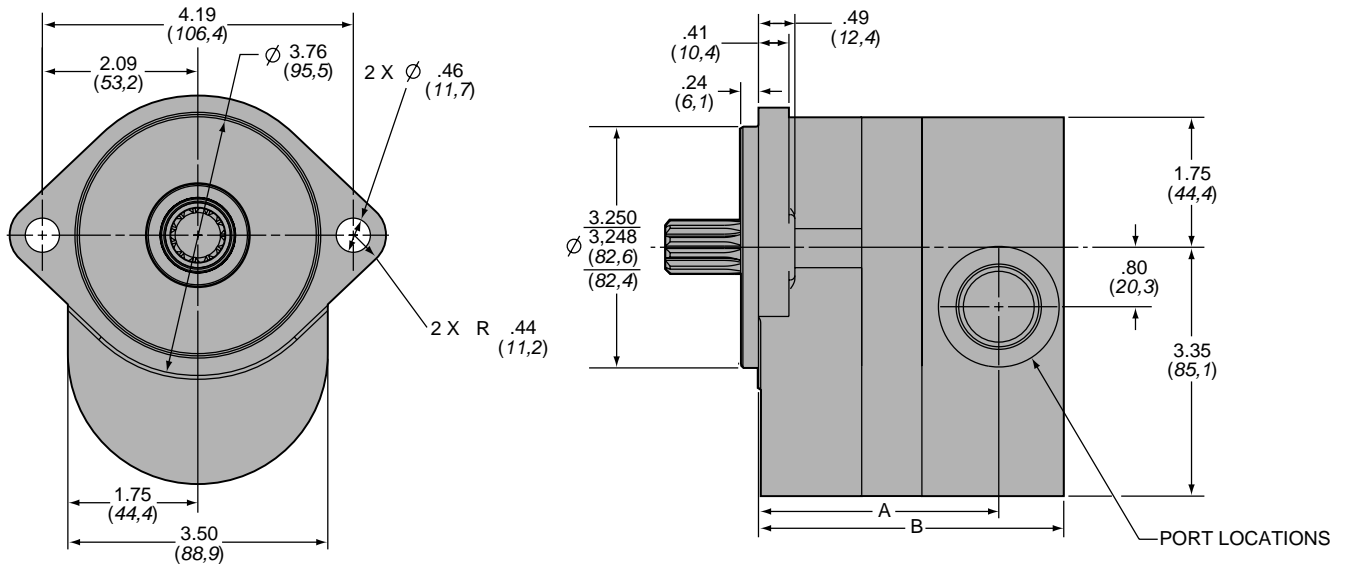
Specifications

| | |
|-------------------------------------|---|
| Operating Pressures | 3500 psi (241 bar) continuous except 232D to 3000 psi (207 bar) continuous. See performance curves |
| Recommended Operating Speeds | To 3500 rpm. (data shown to 3200 rpm) 194D to 3000 rpm. 232D to 2500 rpm See performance curves |
| Mounting | SAE 2-bolt code "82" ("A"). SAE 2-bolt code "101" ("B") |
| Shafts | .86" (21,9 mm) - 13-tooth splined shafts 7/8" (22,2 mm) diameter straight keyed shafts .73" (18,6 mm) - 11-tooth splined shafts 3/4" (19,0 mm) diameter straight keyed shafts .61" (15,5 mm) - 9-tooth splined shafts Other shafts available upon request. |
| Shaft Rotation | Clockwise. Counterclockwise. (When viewed from shaft end) |
| Seals | Nitrile rubber standard. |
| Bearings | Heavy-duty, low-friction PTFE-lined bronze sleeve bushings. |
| Porting | SAE O-ring side location, standard. End or combination location, optional. |
| Optional Flow Control | Load Sensing Priority Valve, static or dynamic version. 10 or 21 gpm (40 or 80 l/min) regulated flow. 60,100 or 140 psi (4, 7 or 10 bar) control spring pressure. Relief valve in L.S. line optional. Fixed Priority Valve pre-set to deliver a constant flow. 1 to 9 gpm (3,8 to 34,0 l/min) at regulated flow port. Relief valve in priority section. |
| Weight | 13.8 to 19.6 pounds (6.3 to 8.9 kg). |

All metric values are secondary and for reference only.

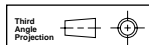
D Series Hydraulic Pumps

Dimensions



| Type | Dimension "A" | Dimension "B" | Type | Dimension "A" | Dimension "B" |
|------|---------------|---------------|------|---------------|---------------|
| 043D | 2.70 (68,8) | 3.58 (90,9) | 125D | 3.23 (82,3) | 4.11 (104,4) |
| 058D | 2.80 (71,1) | 3.68 (93,5) | 155D | 3.42 (87,1) | 4.30 (109,2) |
| 077D | 2.92 (74,4) | 3.80 (96,5) | 177D | 3.56 (90,7) | 4.44 (112,8) |
| 104D | 3.09 (78,5) | 3.97 (100,8) | 194D | 3.67 (93,5) | 4.55 (115,6) |
| 116D | 3.17 (80,8) | 4.05 (102,9) | 232D | 3.92 (99,8) | 4.80 (121,9) |

Dimensions shown: inches (mm)



All metric values are secondary and for reference only.

D Series Hydraulic Pumps

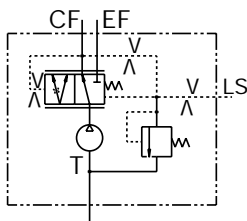
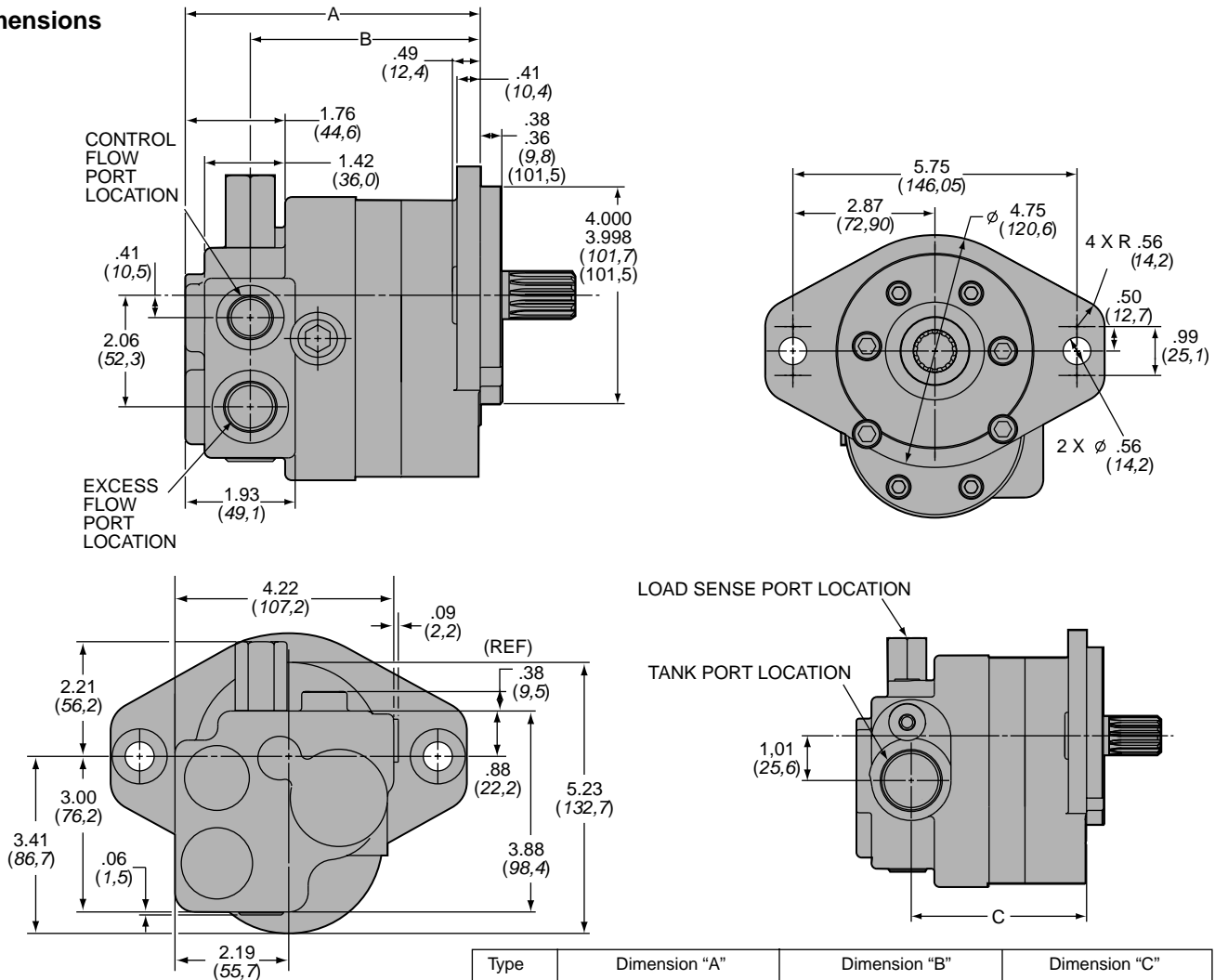
Load Sensing Priority Flow Valves

A load-sensing (LS) priority valve is available integrated into a special cover on the D pump. The D pump with LS priority valve is used in load-sensing systems where the steering and working hydraulics are supplied from just one pump. Flow distribution is controlled by the LS signal from the steering unit so that oil flow to the steering always has the highest priority. The D pump is available with static or dynamic priority valve with a 40 or 80 l/min flow spool and 3 different control spring

rates. With the dynamic priority valve a constant flow of 0,5-1,0 l/min is present at all times in the LS-line. This improves pump and priority reaction times at fast initiation of steering wheel movement.

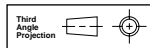
When dimensioning the LS-pump consideration should be given to the control spring pressure and oil flow. Please contact Danfoss Engineering Mobile Hydraulics in case of doubt.

Dimensions



| Type | Dimension "A" | Dimension "B" | Dimension "C" |
|------|---------------|---------------|---------------|
| 043D | 4.66 (118,4) | 3.52 (89,4) | 3.43 (87,1) |
| 058D | 4.76 (120,9) | 3.61 (91,7) | 3.52 (89,4) |
| 077D | 4.88 (124,0) | 3.74 (95,0) | 3.65 (92,7) |
| 104D | 5.05 (128,3) | 3.91 (99,3) | 3.82 (97,0) |
| 116D | 5.13 (130,3) | 3.99 (101,4) | 3.90 (99,1) |
| 125D | 5.19 (131,8) | 4.05 (102,9) | 3.96 (100,6) |
| 155D | 5.38 (136,7) | 4.24 (107,7) | 4.15 (105,4) |
| 177D | 5.52 (140,2) | 4.38 (111,3) | 4.29 (109,0) |
| 194D | 5.63 (143,0) | 4.49 (114,1) | 4.40 (111,8) |
| 232D | 5.88 (149,4) | 4.73 (120,1) | 4.64 (117,9) |

Dimensions shown: inches (mm)



All metric values are secondary and for reference only.

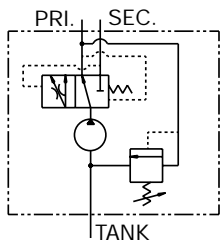
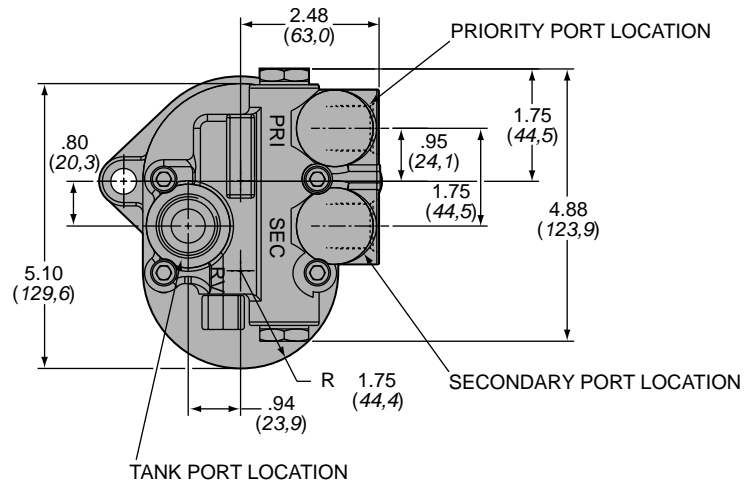
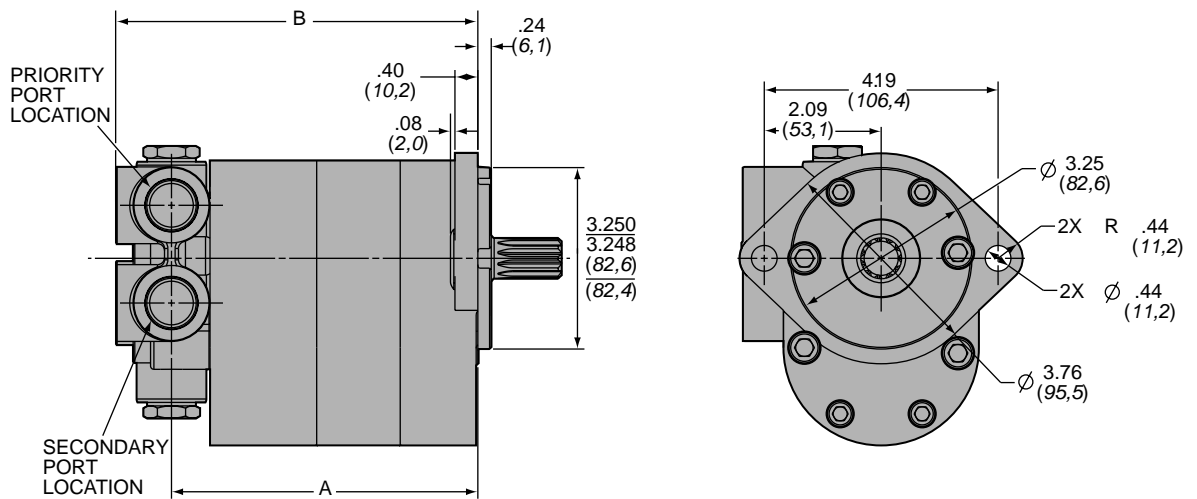
D Series Hydraulic Pumps

Fixed Priority Flow Dividers

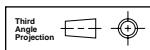
Fixed priority flow dividers can be mounted to D pumps, splitting the flow from the last pumping section into priority and secondary flows. The priority flow, preset at the factory, can deliver from 1.0 to 9.0 gpm (3,8 to 34,1 l/min). Oil not used by the primary circuit can be returned to tank or used by an additional circuit via the secondary port. Priority and secondary circuits do not interact.

Priority flow is pressure compensated, and the priority circuit has an integral, adjustable, direct acting relief valve with internal drain. Relief valve is adjustable from 500 to 2500 psi (34 to 172 bar).

Dimensions



Dimensions shown: inches (mm)



| Type | Dimension "A" | Dimension "B" | Type | Dimension "A" | Dimension "B" |
|------|---------------|---------------|------|---------------|---------------|
| 043D | 4.27 (108,5) | 5.27 (133,9) | 125D | 4.80 (121,9) | 5.80 (147,3) |
| 058D | 4.37 (111,0) | 5.37 (136,4) | 155D | 4.99 (126,8) | 5.99 (152,2) |
| 077D | 4.49 (114,1) | 5.49 (139,5) | 177D | 5.13 (130,3) | 6.13 (155,7) |
| 104D | 4.66 (118,4) | 5.66 (143,8) | 194D | 5.24 (133,1) | 6.24 (158,5) |
| 116D | 4.74 (120,4) | 5.74 (145,8) | 232D | 5.49 (139,5) | 6.49 (164,9) |

All metric values are secondary and for reference only.

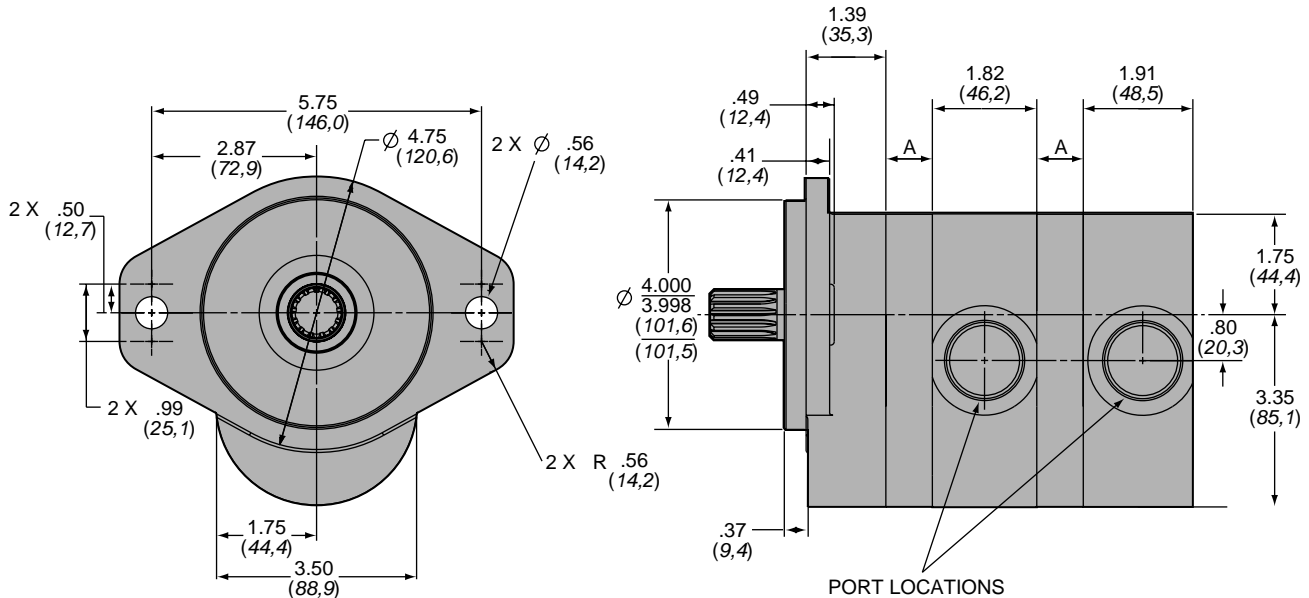
D Series Hydraulic Pumps

Multi-Circuit Pumps

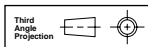
D Series hydraulic pumps can readily be adapted for use in multi-circuit pump arrangements. Multi-circuit pumps combine the capability of several pumps into one, utilizing a single drive point. This reduces the number of components as well as hoses, fittings and installation time. Operating costs are lower because less horsepower and fuel are required.

D pumps can be combined to create dual pumps. Multi-circuit D pumps can have either a) separate inlets and outlets or b) one common inlet and separate outlets. Consult factory for applications with common inlets for proper pump configuration.

Dimensions



Dimensions shown: inches (mm)



| Type | Dimension "A" | Type | Dimension "A" |
|------|---------------|------|---------------|
| 043D | 0.28 (7,1) | 125D | 0.81 (20,6) |
| 058D | 0.38 (9,7) | 155D | 1.00 (25,4) |
| 077D | 0.50 (12,7) | 177D | 1.14 (29,0) |
| 104D | 0.67 (17,0) | 194D | 1.25 (31,8) |
| 116D | 0.75 (19,1) | 232D | 1.50 (38,1) |

All metric values are secondary and for reference only.

D Series Hydraulic Pumps

Sizing Multi-Circuit Pumps

When sizing multi-circuit pumps, maximum pressure units (MPU) cannot exceed a total of 15,000 units. Total MPUs are calculated by adding together the in³/rev displacement times the maximum pressure of each pump section. The sum of MPUs on the pump sections after the first one should not exceed 8000. Generally, the pump section with the largest individual MPUs should be the first section.

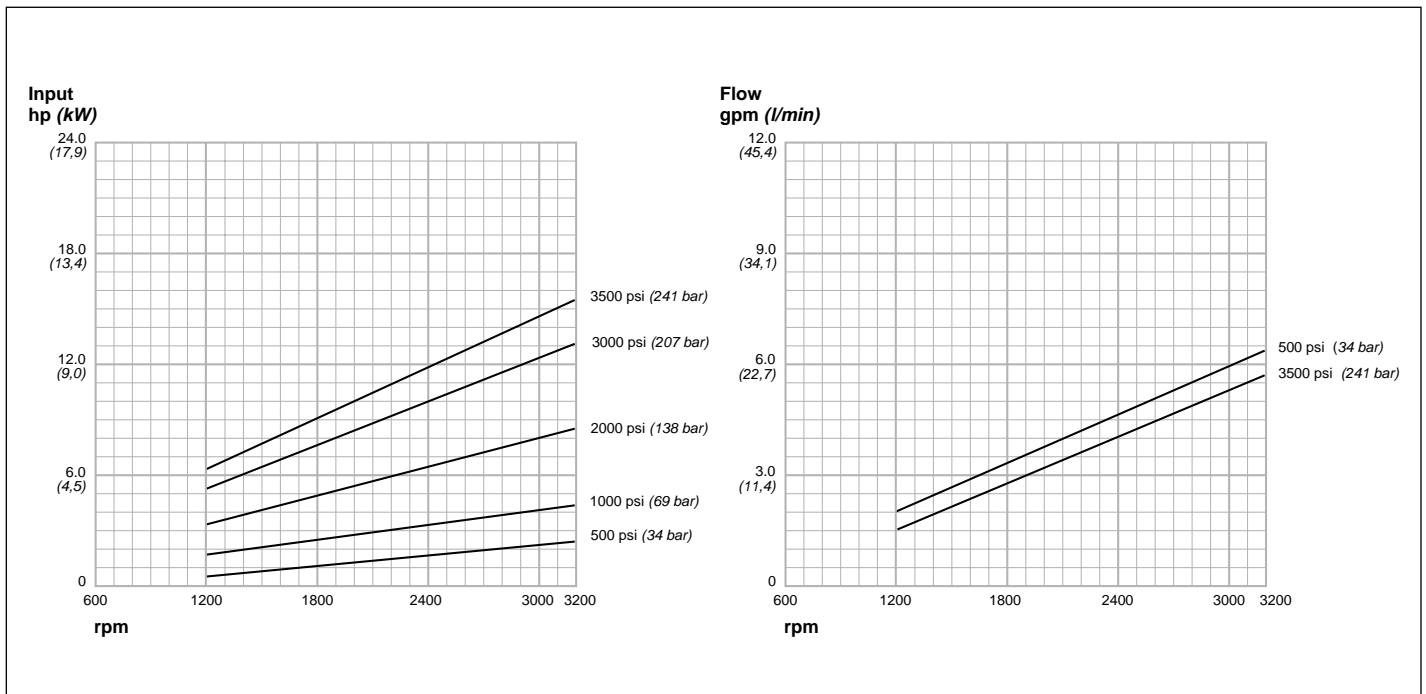
Example: 194D/155D/155D triple

If the front section needs to run at 3000 psi, how would you calculate the pressures for sections two and three?

- 1) 1st Section:
1.94 in³/rev x 3000 psi = 5820 MPUs
- 2) Sections 2 & 3 would divide 8000 MPUs.
If they were divided equally, each section could run at 2500 psi: 1.55 in³/rev x 2500 psi = 3875 x 2 pumps = 7750 MPUs. Any combination is possible as long as the total does not exceed 8000 MPUs.
- 3) The total of all 3 sections easily conforms to the 15000 total limit: 5820 + 7750 = 13570 MPUs.

Model 043D Typical Performance Data

| Pressure | Flow | | | | Input | | | |
|--------------------|------|-------|------|------|-------|-------|------|------|
| | gpm | l/min | hp | kw | gpm | l/min | hp | kw |
| 500 psi (34 bar) | 2.2 | 8,3 | 3.3 | 12,5 | 4.5 | 17,0 | 6.1 | 23,1 |
| | 0.8 | 0,6 | 1.2 | 0,9 | 1.6 | 1,2 | 2.2 | 1,6 |
| 1000 psi (69 bar) | 2.1 | 7,9 | 3.2 | 12,1 | 4.5 | 17,0 | 6.1 | 23,1 |
| | 1.7 | 1,3 | 2.5 | 1,9 | 3.2 | 2,4 | 4.3 | 3,2 |
| 2000 psi (138 bar) | 1.9 | 7,2 | 3.0 | 11,4 | 4.3 | 16,3 | 5.9 | 22,3 |
| | 3.3 | 2,5 | 4.9 | 3,7 | 6.4 | 4,8 | 8.5 | 6,3 |
| 3000 psi (207 bar) | 1.7 | 6,4 | 2.8 | 10,6 | 4.2 | 15,9 | 5.8 | 22,0 |
| | 5.2 | 3,9 | 7.6 | 5,7 | 9.9 | 7,4 | 13.1 | 9,8 |
| 3500 psi (241 bar) | 1.6 | 6,1 | 2.7 | 10,2 | 4.1 | 15,5 | 5.7 | 21,6 |
| | 6.3 | 4,7 | 9.2 | 6,9 | 11.9 | 8,9 | 15.5 | 11,6 |
| rpm | 1200 | | 1800 | | 2400 | | 3200 | |



All metric values are secondary and for reference only.

D Series Hydraulic Pumps

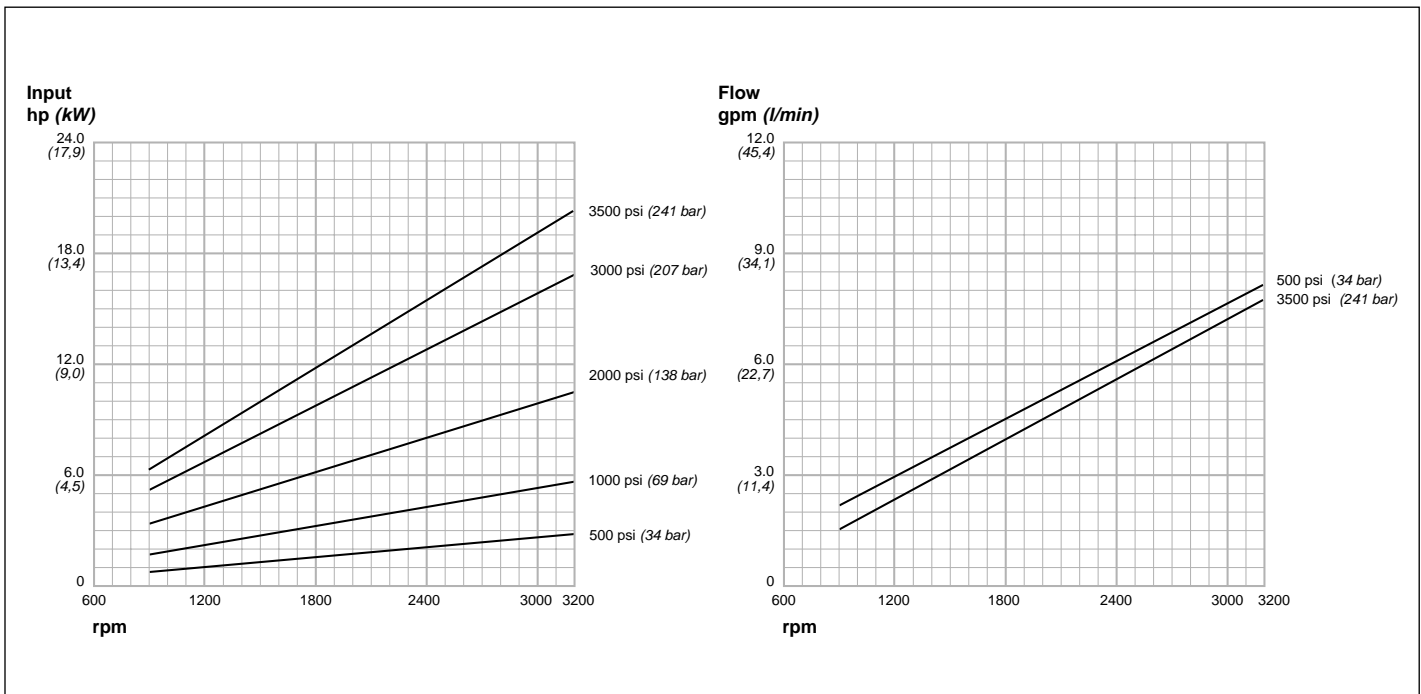
Filtration

Recommended filtration is 10 micron nominal for maximum service life. The filter should be installed in the return line. Make sure that the filter is properly sized for your system and cleaned on a regular basis. If practical, the hydraulic

system should include a warning device which signals when the filter is dirty, preventing the filter from going into a bypass condition. This will help ensure maximum component life and efficiency.

Model 058D Typical Performance Data

| Pressure | Flow | | | | | | | | | |
|--------------------|------|-----|-------|------|------|------|------|------|-------|------|
| | gpm | | l/min | | hp | | kW | | Input | |
| 500 psi (34 bar) | 2.2 | 8.3 | 2.9 | 11.0 | 4.5 | 17.0 | 6.0 | 22.7 | 8.1 | 30.7 |
| | 0.8 | 0.6 | 1.1 | 0.8 | 1.6 | 1.2 | 2.1 | 1.6 | 2.9 | 2.2 |
| 1000 psi (69 bar) | 2.1 | 7.9 | 2.8 | 10.6 | 4.4 | 16.7 | 6.0 | 22.7 | 8.0 | 30.3 |
| | 1.6 | 1.2 | 2.1 | 1.6 | 3.1 | 2.3 | 4.1 | 3.1 | 5.6 | 4.2 |
| 2000 psi (138 bar) | 1.9 | 7.2 | 2.7 | 10.2 | 4.2 | 15.9 | 5.8 | 22.0 | 7.8 | 29.5 |
| | 3.3 | 2.5 | 4.2 | 3.1 | 6.2 | 4.6 | 8.2 | 6.1 | 11.0 | 8.2 |
| 3000 psi (207 bar) | 1.6 | 6.1 | 2.5 | 9.5 | 4.1 | 15.5 | 5.6 | 21.2 | 7.7 | 29.1 |
| | 5.2 | 3.9 | 6.7 | 5.0 | 9.8 | 7.3 | 12.8 | 9.5 | 16.8 | 12.5 |
| 3500 psi (241 bar) | 1.5 | 5.7 | 2.3 | 8.7 | 4.0 | 15.1 | 5.5 | 20.8 | 7.7 | 29.1 |
| | 6.3 | 4.7 | 8.2 | 6.1 | 12.0 | 9.0 | 15.7 | 11.7 | 20.1 | 15.0 |
| rpm | 900 | | 1200 | | 1800 | | 2400 | | 3200 | |



All metric values are secondary and for reference only.

D Series Hydraulic Pumps

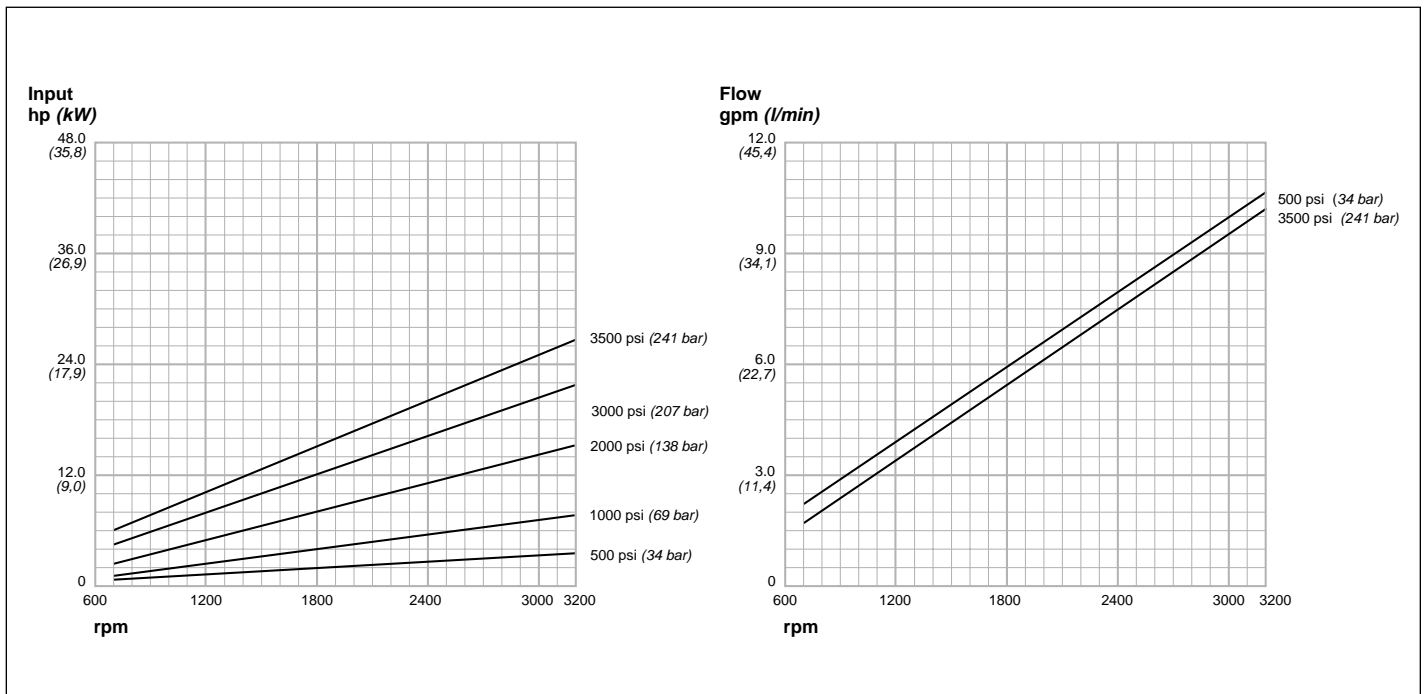
Reservoir

The reservoir provides hydraulic system oil storage, oil deaeration, and some heat dissipation. Reservoir construction should include at least one internal baffle, creating separate chambers for system return oil and pump inlet oil. This allows return oil to deaerate and contaminants to settle out. Surplus oil would then flow over baffle to pump inlet side. Oil cleanliness is especially important at startup.

Reservoirs are ideally sized so the volume of reservoir oil is not replaced more than twice per minute. Practical considerations of space and weight, however, sometimes make this difficult on mobile equipment. A heat exchanger may be required depending on maximum system load and duty cycle.

Model 077D Typical Performance Data

| Pressure | gpm | | l/min | | Flow | | hp | | kw | | Input |
|--------------------|------------|-----|-------------|-----|-------------|------|-------------|------|-------------|------|-------|
| | hp | kw | hp | kw | hp | kw | hp | kw | | | |
| 500 psi (34 bar) | 2.3 | 1.7 | 8.7 | 6.6 | 4.0 | 3.0 | 15.1 | 11.2 | 6.0 | 4.4 | 22.7 |
| | 0.8 | 0.6 | 1.4 | 1.0 | 2.1 | 1.6 | 2.9 | 2.2 | 3.9 | 2.9 | 40.9 |
| 1000 psi (69 bar) | 2.2 | 1.6 | 8.3 | 6.2 | 3.9 | 2.9 | 14.8 | 11.0 | 6.0 | 4.4 | 22.7 |
| | 1.7 | 1.3 | 2.8 | 2.1 | 4.2 | 3.1 | 5.7 | 4.3 | 7.7 | 5.7 | 40.9 |
| 2000 psi (138 bar) | 2.1 | 1.5 | 7.9 | 5.9 | 3.8 | 2.8 | 14.4 | 10.8 | 5.8 | 4.3 | 22.0 |
| | 3.4 | 2.5 | 5.7 | 4.3 | 8.5 | 6.3 | 11.2 | 8.4 | 15.4 | 11.5 | 40.1 |
| 3000 psi (207 bar) | 1.9 | 1.4 | 7.2 | 5.4 | 3.6 | 2.7 | 13.6 | 10.2 | 5.6 | 4.1 | 21.2 |
| | 5.2 | 3.9 | 8.6 | 6.4 | 12.9 | 9.6 | 17.3 | 12.9 | 22.7 | 16.9 | 39.4 |
| 3500 psi (241 bar) | 1.7 | 1.3 | 6.4 | 4.8 | 3.5 | 2.6 | 13.2 | 9.8 | 5.5 | 4.0 | 20.8 |
| | 6.0 | 4.5 | 10.1 | 7.5 | 15.3 | 11.4 | 20.6 | 15.4 | 26.9 | 20.1 | 39.4 |
| rpm | 700 | | 1200 | | 1800 | | 2400 | | 3200 | | |



All metric values are secondary and for reference only.

D Series Hydraulic Pumps

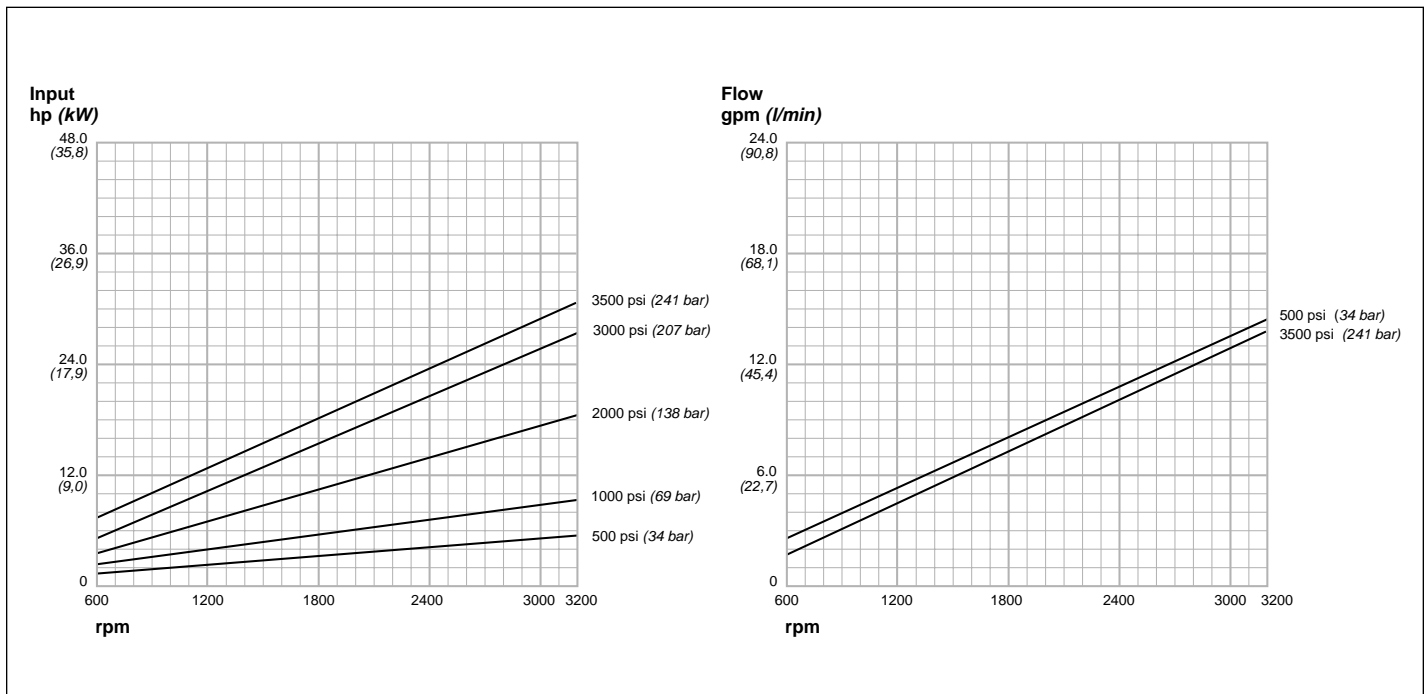
Operating Temperatures

Pumps with nitrile rubber seals should operate at system temperatures of 180°F (82,2°C) maximum. Nitrile rubber seals can tolerate intermittent pump operation periods to 200°F (93,3°C) without damage to the pump seals. However, system temperatures exceeding 225°F (107,2°C) will cause premature seal failure and result in external leakage.

Oil in a hydraulic system that is consistently overheated will break down, forming varnish on system components, and destroying system sealing materials. Poor and erratic system operation is the usual result of an overheated system. If system temperatures are expected to consistently exceed 180°F (82,2°C), it will be necessary to place a heat exchanger in the system.

Model 104D Typical Performance Data

| Pressure | Flow | | | | | | | | | |
|--------------------|------|-----|-------|------|------|------|------|------|-------|------|
| | gpm | | l/min | | hp | | kw | | Input | |
| 500 psi (34 bar) | 2.6 | 9,8 | 5.4 | 20,4 | 8.1 | 30,7 | 10.8 | 40,9 | 14.4 | 54,5 |
| | 0.9 | 0,7 | 1.8 | 1,3 | 2.8 | 2,1 | 3.8 | 2,8 | 5.1 | 3,8 |
| 1000 psi (69 bar) | 2.5 | 9,5 | 5.3 | 20,1 | 8.0 | 30,3 | 10.8 | 40,9 | 14.4 | 54,5 |
| | 1.8 | 1,3 | 3.5 | 2,6 | 5.3 | 4,0 | 7.2 | 5,4 | 9.6 | 7,2 |
| 2000 psi (138 bar) | 2.2 | 8,3 | 5.1 | 19,3 | 7.8 | 29,5 | 10.6 | 40,1 | 14.2 | 53,7 |
| | 3.6 | 2,7 | 7.1 | 5,3 | 10.6 | 7,9 | 14.1 | 53,4 | 18.9 | 14,1 |
| 3000 psi (207 bar) | 1.9 | 7,2 | 4.8 | 18,2 | 7.5 | 28,4 | 10.3 | 39,0 | 14.0 | 53,0 |
| | 5.7 | 4,3 | 10.8 | 8,1 | 16.1 | 12,0 | 21.4 | 16,0 | 28.7 | 21,4 |
| 3500 psi (241 bar) | 1.7 | 6,4 | 4.7 | 17,8 | 7.3 | 27,6 | 10.2 | 38,6 | 13.9 | 52,6 |
| | 6.7 | 5,0 | 12.9 | 9,6 | 19.2 | 14,3 | 25.4 | 18,9 | 33.9 | 25,3 |
| rpm | 600 | | 1200 | | 1800 | | 2400 | | 3200 | |



All metric values are secondary and for reference only.

D Series Hydraulic Pumps

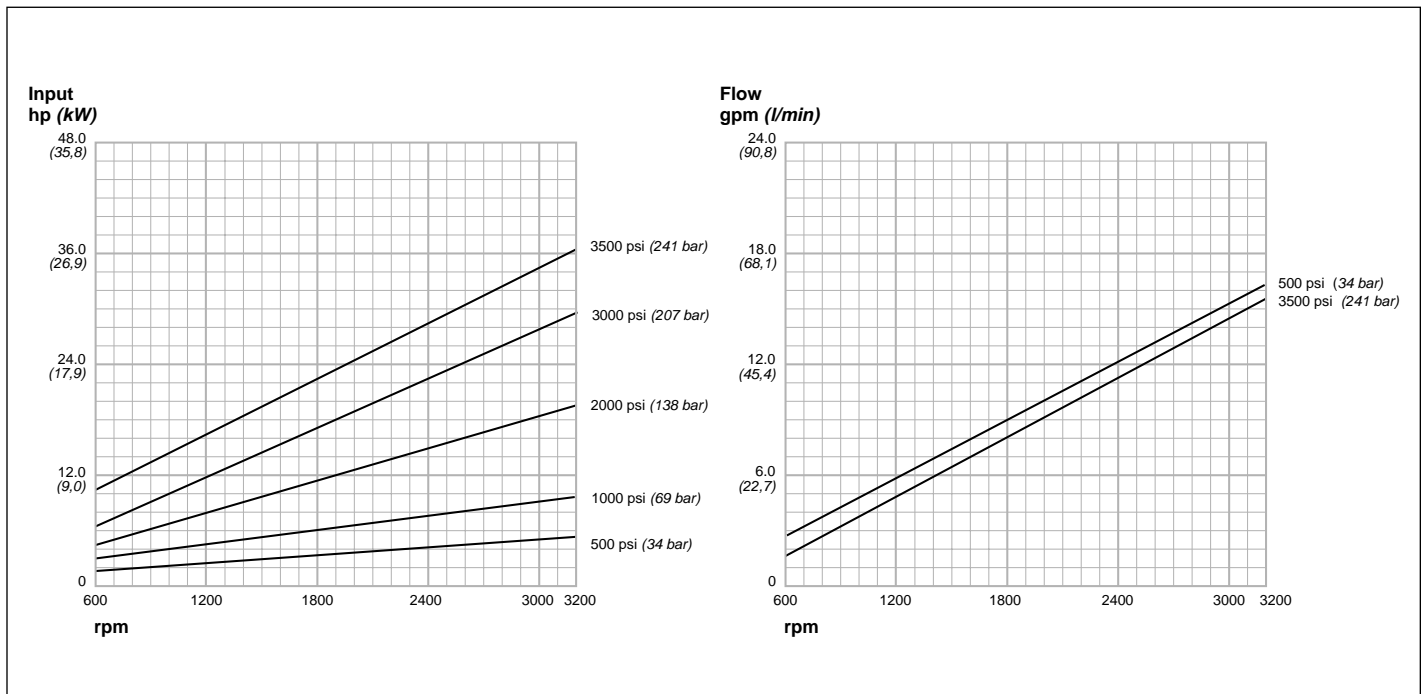
Drives

D Series hydraulic pumps can be mounted in either direct or indirect drive configurations. The pump mount and drive should be designed to minimize axial and radial loads on the pump shaft. The preferred method is direct mounting using a flex coupler. The coupler may be omitted if .004" (0,10 mm) total indicator

reading is maintained between the pilot mounting diameter and the drive shaft powering the pump. For indirect drives, consult Danfoss.

Model 116D Typical Performance Data

| Pressure | 600 rpm | | 1200 rpm | | 1800 rpm | | 2400 rpm | | 3200 rpm | |
|--------------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | gpm hp | l/min kw | gpm hp | l/min kw | gpm hp | l/min kw | gpm hp | l/min kw | gpm hp | l/min kw |
| 500 psi (34 bar) | 2.8 | 10,6 | 5.9 | 22,3 | 8.9 | 33,7 | 12.1 | 45,8 | 16.2 | 61,3 |
| | 1.0 | 0,7 | 2.0 | 1,5 | 3.1 | 2,3 | 4.2 | 3,1 | 5.7 | 4,3 |
| 1000 psi (69 bar) | 2.7 | 10,2 | 5.8 | 22,0 | 8.9 | 33,7 | 12.0 | 45,4 | 16.1 | 60,9 |
| | 2.0 | 1,5 | 3.9 | 2,9 | 5.9 | 4,4 | 8.0 | 6,0 | 10.7 | 8,0 |
| 2000 psi (138 bar) | 2.4 | 9,1 | 5.5 | 20,5 | 8.7 | 32,9 | 11.8 | 44,7 | 16.0 | 60,6 |
| | 4.0 | 3,0 | 7.7 | 5,7 | 11.6 | 8,7 | 15.5 | 11,6 | 20.7 | 15,4 |
| 3000 psi (207 bar) | 2.0 | 7,6 | 5.2 | 19,7 | 8.4 | 31,8 | 11.6 | 43,9 | 15.8 | 59,8 |
| | 6.1 | 4,6 | 11.6 | 8,7 | 17.3 | 12,9 | 23.1 | 17,2 | 30.8 | 23,0 |
| 3500 psi (241 bar) | 1.8 | 6,8 | 5.1 | 19,3 | 8.3 | 31,4 | 11.5 | 43,5 | 15.7 | 59,4 |
| | 7.3 | 5,4 | 13.7 | 10,2 | 20.3 | 15,1 | 27.0 | 20,1 | 36.1 | 26,9 |
| rpm | 600 | | 1200 | | 1800 | | 2400 | | 3200 | |



All metric values are secondary and for reference only.

D Series Hydraulic Pumps

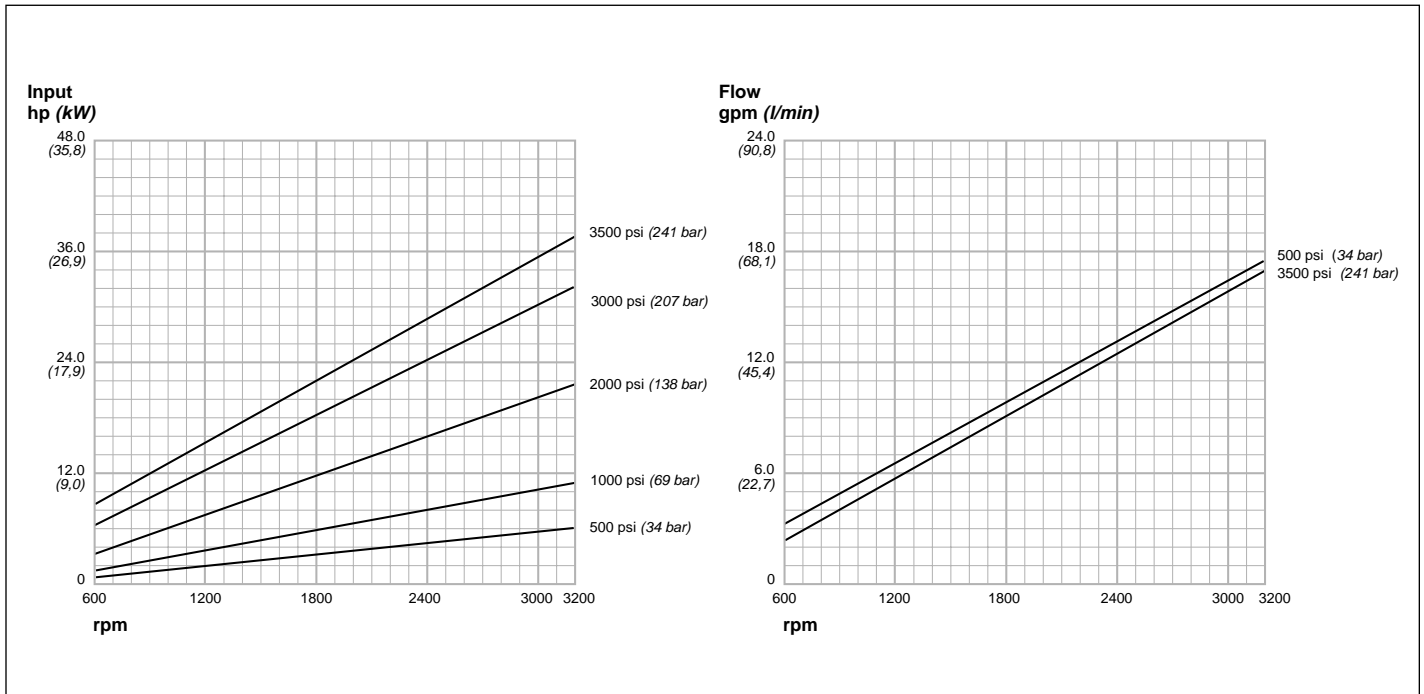
System Plumbing

The major objective in the specification of tubing and hose sizes is to limit maximum oil velocity. This results in quieter system operation, consistent operating temperature, and a reduction of heat through the elimination of pressure drops. To avoid pump cavitation, maximum inlet line flow should not exceed 10 feet per second (3,04 m/sec). Inlet vacuum should not exceed 10" Hg (254 mm) at the normal

operating temperature. Continuous operation at vacuums in excess of 10" Hg (254 mm) will cause premature unit failure. On cold starts, a vacuum of 12" Hg (305 mm) can be tolerated for short durations. Higher inlet vacuums than 12" Hg (305 mm) shorten pump life by creating heat and excessive pressure on the pump. Pump discharge lines should have flow velocities under 25 feet per second (7,6 m/sec).

Model 125D Typical Performance Data

| Pressure | gpm | | l/min | | hp | | kW | | Flow Input | |
|--------------------|-----|------|-------|------|------|------|------|------|------------|--|
| | | | | | | | | | | |
| 500 psi (34 bar) | 3.1 | 11,7 | 6.3 | 23,8 | 9.7 | 36,7 | 13.1 | 49,6 | 17.5 | |
| | 1.0 | 0,7 | 2.1 | 1,6 | 3.1 | 2,3 | 4.3 | 3,2 | 6.0 | |
| 1000 psi (69 bar) | 3.0 | 11,4 | 6.3 | 23,8 | 9.6 | 36,3 | 13.0 | 49,2 | 17.5 | |
| | 2.1 | 1,6 | 4.1 | 3,1 | 6.2 | 4,6 | 8.3 | 6,2 | 11.4 | |
| 2000 psi (138 bar) | 2.7 | 10,2 | 6.0 | 22,7 | 9.4 | 35,6 | 12.8 | 48,4 | 17.3 | |
| | 4.2 | 3,1 | 8.2 | 6,1 | 12.3 | 9,2 | 16.5 | 12,3 | 22.2 | |
| 3000 psi (207 bar) | 2.4 | 9,1 | 5.8 | 22,0 | 9.2 | 34,8 | 12.6 | 47,7 | 17.2 | |
| | 6.5 | 4,8 | 12.5 | 9,3 | 18.4 | 13,7 | 24.7 | 18,4 | 33.1 | |
| 3500 psi (241 bar) | 2.2 | 8,3 | 5.6 | 21,2 | 9.1 | 34,4 | 12.5 | 47,3 | 17.1 | |
| | 7.8 | 5,8 | 14.8 | 11,0 | 21.7 | 16,2 | 28.8 | 21,5 | 38.6 | |
| rpm | 600 | | 1200 | | 1800 | | 2400 | | 3200 | |



All metric values are secondary and for reference only.

D Series Hydraulic Pumps

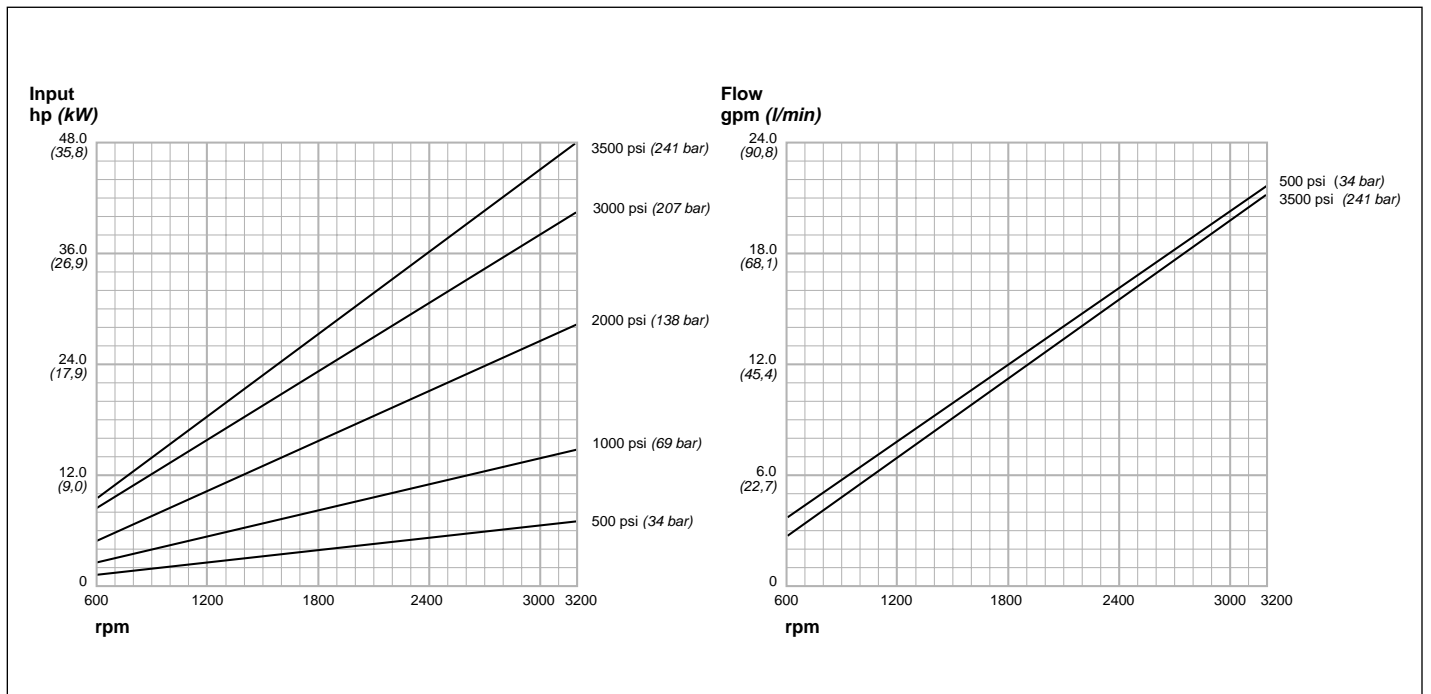
Cavitation

Cavitation problems can be the result of excessive air in the oil, high inlet vacuum, improper reservoir construction and placement, or operation exceeding rated operating speed. Hydraulic oil normally has some dissolved air. Air leaks on the pump inlet side, however, will raise the air content substantially. Since air is more compressible than oil, air bubbles will collapse (or implode)

when pressurized, causing severe stress on hydraulic system components. As the air content increases, resultant damage to the system also increases. High inlet vacuum, often caused by restrictions or improper reservoir configuration, are another source of cavitation. Operation of a pump at higher than rated speeds increases inlet vacuum and can result in cavitation as well.

Model 155D Typical Performance Data

| Pressure | gpm | | l/min | | hp | | kW | | Flow Input | |
|--------------------|------|-------|-------|-------|------|-------|------|-------|------------|------|
| | Flow | Input | Flow | Input | Flow | Input | Flow | Input | | |
| 500 psi (34 bar) | 3.8 | 14.4 | 7.9 | 29.9 | 12.1 | 45.8 | 16.2 | 61.3 | 21.6 | 81.8 |
| | 1.3 | 1.0 | 2.6 | 1.9 | 4.0 | 3.0 | 5.5 | 4.1 | 7.6 | 5.7 |
| 1000 psi (69 bar) | 3.7 | 14.0 | 7.8 | 29.5 | 12.0 | 45.4 | 16.1 | 60.9 | 21.6 | 81.8 |
| | 2.6 | 1.9 | 5.1 | 3.8 | 7.8 | 5.8 | 10.6 | 7.9 | 14.5 | 10.8 |
| 2000 psi (138 bar) | 3.4 | 12.9 | 7.6 | 28.8 | 11.8 | 44.7 | 16.0 | 60.6 | 21.5 | 81.4 |
| | 5.2 | 3.9 | 10.3 | 7.7 | 15.5 | 11.6 | 20.8 | 15.5 | 28.0 | 20.9 |
| 3000 psi (207 bar) | 3.0 | 11.4 | 7.3 | 27.6 | 11.5 | 43.5 | 15.8 | 59.8 | 21.3 | 80.6 |
| | 8.1 | 6.0 | 15.5 | 11.6 | 23.2 | 17.3 | 31.0 | 32.1 | 41.5 | 31.0 |
| 3500 psi (241 bar) | 2.8 | 10.6 | 7.1 | 26.9 | 11.4 | 43.1 | 15.6 | 59.0 | 21.2 | 80.2 |
| | 9.6 | 7.2 | 18.3 | 13.7 | 27.2 | 20.3 | 36.2 | 27.0 | 48.6 | 36.3 |
| rpm | 600 | | 1200 | | 1800 | | 2400 | | 3200 | |



All metric values are secondary and for reference only.

D Series Hydraulic Pumps

Operating Speeds and Pressure Ratings

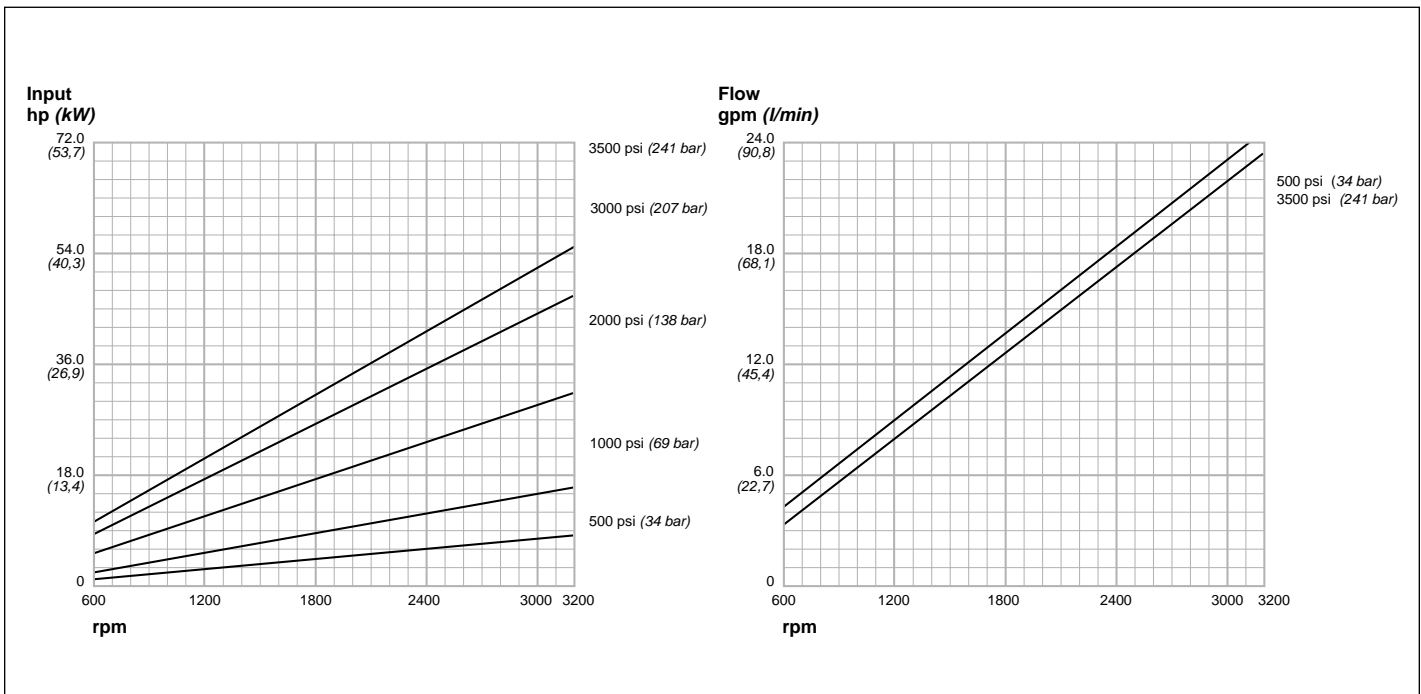
A hydraulic pump's speed rating is determined by the ability of the pump to fill with oil without cavitating, with a given inlet pressure and oil viscosity. Maximum speed for D Series pumps is limited to 3500 rpm, based on operation at sea level using SAE oil with a viscosity of 175 SUS at 110°F (43.3°C). Minimum speed for the D Series is 600 rpm. This is the normal minimum speed at which the pump will operate continuously at rated

pressure. Consult Danfoss for operation outside these limits.

D Series pumps are designed to operate continuously at the rated pressures shown on page 5. In most applications this should also be considered maximum relief valve setting. Lower operating pressures will extend the life of the unit. Maximum operating pressures decrease in the higher displacement pumps.

Model 177D Typical Performance Data

| Pressure | gpm | | l/min | | hp | | kW | | Flow Input | |
|--------------------|------|-------|-------|-------|------|-------|------|-------|------------|------|
| | hp | Input | hp | Input | hp | Input | hp | Input | | |
| 500 psi (34 bar) | 4.3 | 16,3 | 9.1 | 34,4 | 13.8 | 52,2 | 18.5 | 70,0 | 24.8 | 93,9 |
| | 1.5 | 1,1 | 2.9 | 2,2 | 4.6 | 3,4 | 6.2 | 4,6 | 8.7 | 6,5 |
| 1000 psi (69 bar) | 4.3 | 16,3 | 9.0 | 34,1 | 13.7 | 51,9 | 18.4 | 69,6 | 24.7 | 93,5 |
| | 2.9 | 2,2 | 5.9 | 4,4 | 8.8 | 6,6 | 11.9 | 8,9 | 16.5 | 12,3 |
| 2000 psi (138 bar) | 3.9 | 14,8 | 8.7 | 32,9 | 13.5 | 51,1 | 18.3 | 69,3 | 24.6 | 93,1 |
| | 5.8 | 4,3 | 11.6 | 8,7 | 17.4 | 13,0 | 23.3 | 17,3 | 31.5 | 23,5 |
| 3000 psi (207 bar) | 3.6 | 13,6 | 8.4 | 31,8 | 13.2 | 50,0 | 18.0 | 68,1 | 24.4 | 92,7 |
| | 8.9 | 6,6 | 17.5 | 66,2 | 26.1 | 19,5 | 35.0 | 26,1 | 46.8 | 34,9 |
| 3500 psi (241 bar) | 3.3 | 12,5 | 8.2 | 31,0 | 13.0 | 49,2 | 17.9 | 67,8 | 24.3 | 92,0 |
| | 10.7 | 8,0 | 20.6 | 15,4 | 30.8 | 23,0 | 41.1 | 30,7 | 55.1 | 41,1 |
| rpm | 600 | | 1200 | | 1800 | | 2400 | | 3200 | |



All metric values are secondary and for reference only.

D Series Hydraulic Pumps

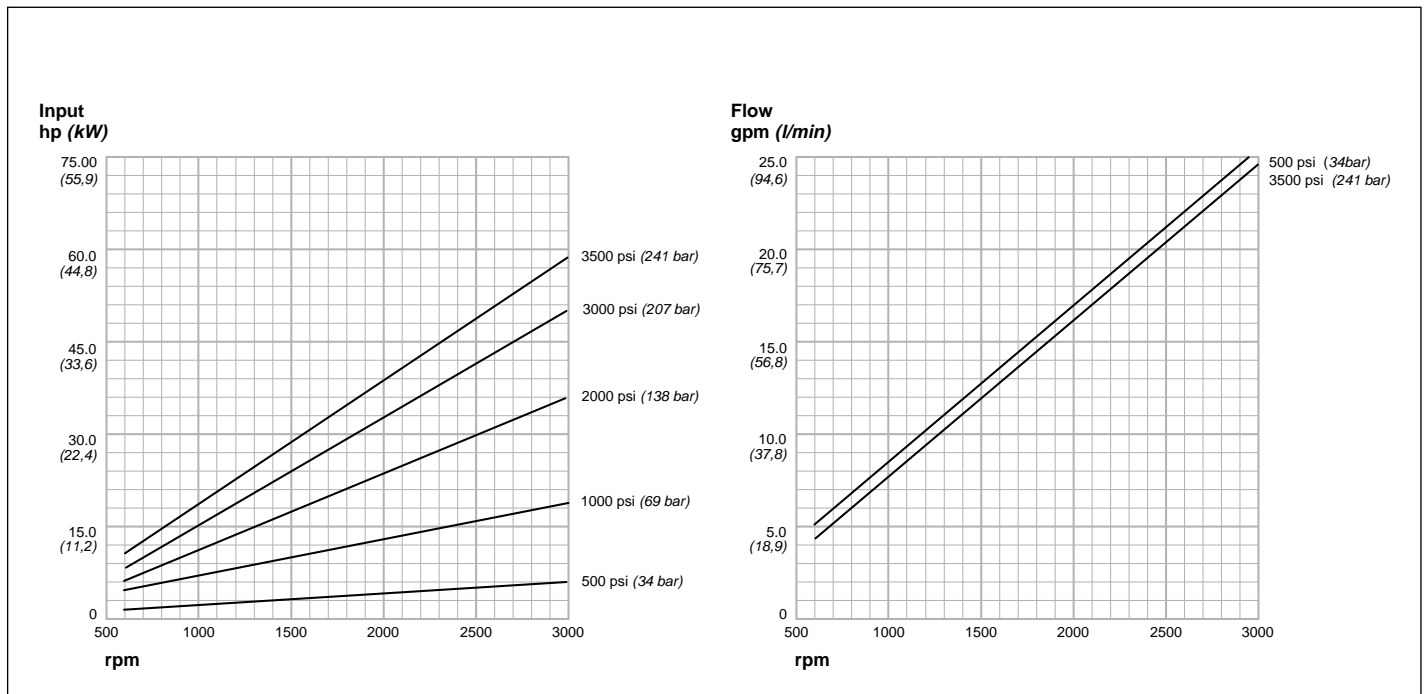
Hydraulic Fluids

Hydraulic fluid performs three basic functions. First, it provides efficient transfer of power from the pump to the actuators. Second, the fluid provides lubrication and surface protection to the working parts. The use of petroleum-based fluids with rust and oxidation inhibitors remains the principal choice for most hydraulic systems. Third, the fluid acts to transfer heat to maintain a consistent system temperature operating range.

Viscosity is the most important property of a hydraulic fluid. It measures how the fluid resists flow. Thick, dense oil has high viscosity; thin oil has low viscosity. Ideally, the fluid should have a viscosity of 100 to 180 SUS (21-39 cSt) at operating temperature, with 7500 SUS (1618 cSt) maximum viscosity for low temperature startup condition.

Model 194D Typical Performance Data

| Pressure | Flow | | | | | | | | | |
|--------------------|------|------|-------|------|------|------|------|------|-------|------|
| | gpm | | l/min | | hp | | kw | | Input | |
| 500 psi (34 bar) | 4.9 | 18,5 | 10.1 | 38,2 | 15.2 | 57,5 | 20.4 | 77,2 | 25.5 | 96,5 |
| | 1.7 | 1,3 | 3.4 | 2,5 | 5.2 | 3,9 | 7.2 | 5,4 | 9.2 | 6,9 |
| 1000 psi (69 bar) | 4.8 | 18,2 | 10.0 | 37,8 | 15.1 | 57,2 | 20.4 | 77,2 | 25.5 | 96,5 |
| | 3.3 | 2,5 | 6.6 | 4,9 | 10.0 | 7,5 | 13.6 | 10,1 | 17.2 | 12,8 |
| 2000 psi (138 bar) | 4.5 | 17,0 | 9.7 | 36,7 | 14.9 | 56,4 | 20.2 | 76,5 | 25.3 | 95,8 |
| | 6.7 | 5,0 | 13.1 | 9,8 | 19.9 | 14,8 | 26.7 | 19,9 | 33.6 | 25,1 |
| 3000 psi (207 bar) | 4.1 | 15,5 | 9.5 | 36,0 | 14.6 | 55,3 | 20.0 | 75,7 | 25.1 | 95,0 |
| | 10.2 | 7,6 | 20.0 | 14,9 | 30.0 | 22,4 | 40.0 | 29,8 | 50.3 | 37,5 |
| 3500 psi (241 bar) | 4.0 | 15,1 | 9.4 | 35,6 | 14.5 | 54,9 | 19.9 | 75,3 | 25.0 | 94,6 |
| | 12.2 | 9,1 | 23.6 | 17,6 | 35.5 | 26,5 | 47.4 | 35,4 | 59.6 | 44,5 |
| rpm | 600 | | 1200 | | 1800 | | 2400 | | 3000 | |



All metric values are secondary and for reference only.

D Series Hydraulic Pumps

Hydraulic Fluids (continued)

Viscosity index measures how the viscosity of the hydraulic fluid changes with temperature. A high viscosity index indicates that the hydraulic fluid will have almost the same viscosity at high and low temperatures. Fluids with viscosities that vary widely with temperatures changes have a low viscosity index. Because of the wide range of operating temperatures encountered, hydraulic pumps should use fluids with a high viscosity index.

Pour point is the lowest rated temperature at which a hydraulic fluid will flow. Because hydraulic pumps are often used on mobile equipment that may be exposed to very low outside temperatures, a low pour point is very important. Ideally, the fluid pour point should be at least 20°F (11,1°C) below the lowest expected outside temperature. Hydraulic fluid in everyday use is constantly stressed by temperature changes, high pressures, oxidation, and contamination.

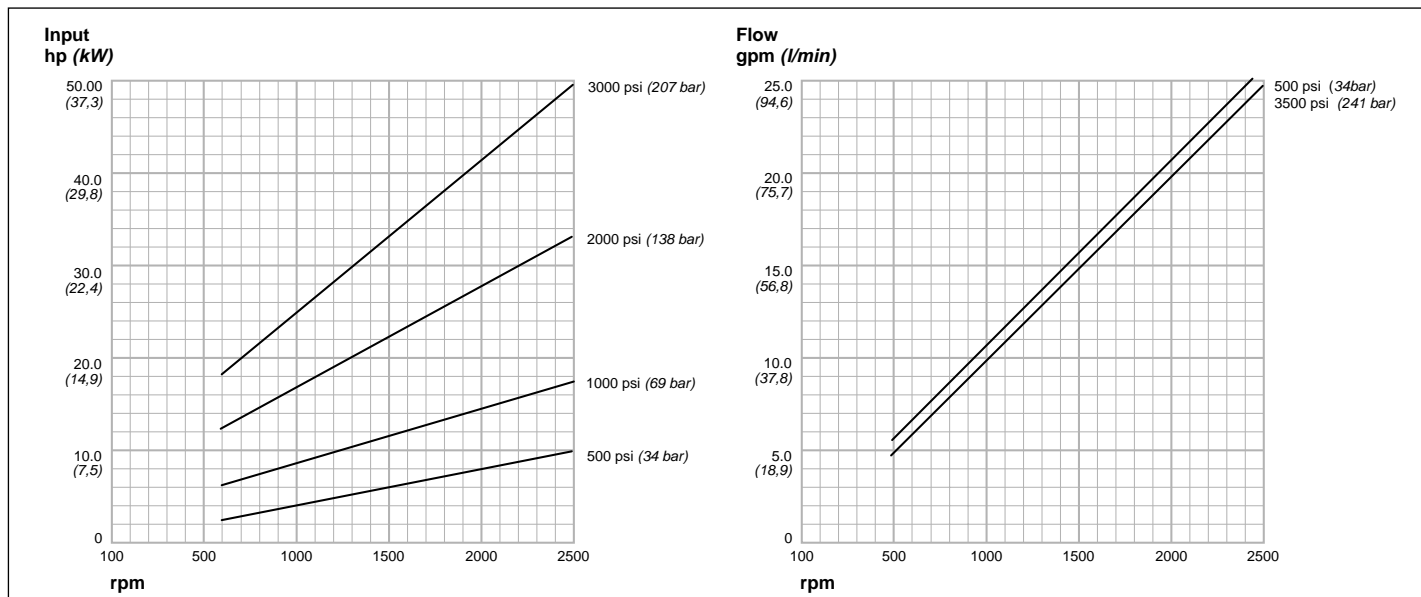
A hydraulic fluid with **good stability characteristics** will resist premature breakdown. At the same time, keeping the hydraulic fluid **clean** is probably the most essential aspect for ensuring the reliable performance of the system. Contamination is the leading cause of hydraulic system breakdowns. The system should always be filtered and the element should be regularly cleaned or replaced. When the fluid needs replacing, be sure to use a good grade of new, clean fluid.

The hydraulic fluid must be **compatible** with nitrile rubber sealing components. In addition, a good grade of hydraulic fluid will **contain additives** to help control wear, oxidation and foaming.

Please consult Danfoss before using any non-petroleum base or fire resistant fluids which may require special seal materials.

Model 232D Typical Performance Data

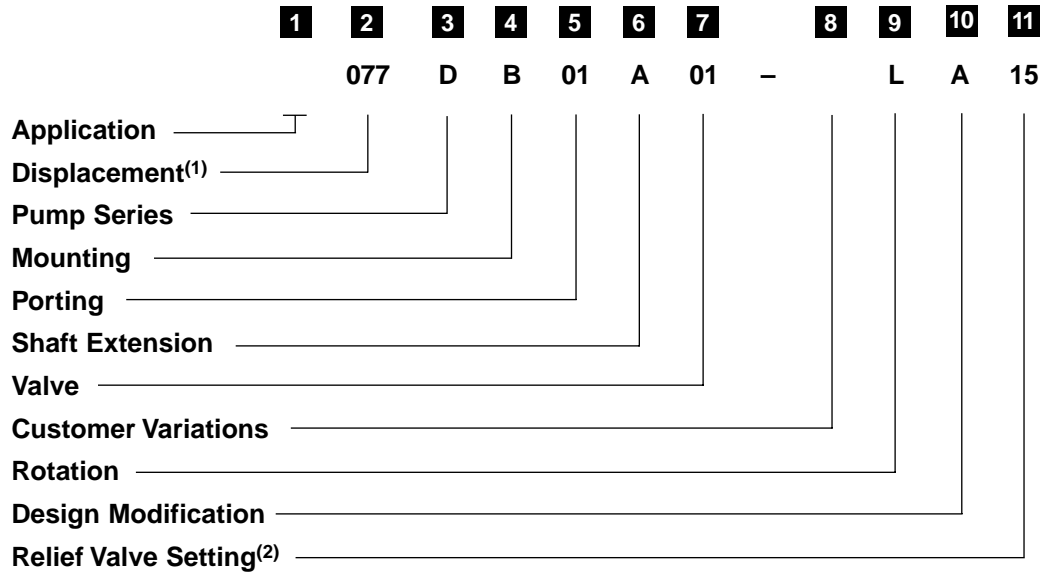
| Pressure | rpm | | | | Flow | | | |
|--------------------|------|------|------|------|-----------|-------------|-----------|-------------|
| | 600 | 1200 | 1800 | 2500 | gpm hp | l/min kw | gpm hp | l/min kw |
| 500 psi (34 bar) | 5.8 | 11.9 | 18.1 | 25.3 | 22,0 | 45,0 | 68,5 | 95,8 |
| | 2.0 | 4.1 | 6.3 | 9.1 | 1,5 | 3,1 | 4,7 | 6,8 |
| 1000 psi (69 bar) | 5.6 | 11.8 | 18.0 | 25.2 | 21,2 | 44,7 | 68,1 | 95,4 |
| | 3.9 | 7.8 | 11.8 | 16.8 | 2,9 | 5,8 | 8,8 | 12,5 |
| 2000 psi (138 bar) | 5.1 | 11.5 | 17.7 | 25.0 | 19,3 | 43,5 | 67,0 | 94,6 |
| | 7.8 | 15.2 | 22.9 | 32.2 | 5,8 | 11,3 | 17,1 | 24,0 |
| 3000 psi (207 bar) | 4.6 | 11.0 | 17.3 | 24.6 | 17,4 | 41,6 | 65,5 | 93,1 |
| | 12.1 | 23.4 | 34.8 | 48.4 | 9,0 | 17,5 | 26,0 | 36,1 |
| rpm | 600 | 1200 | 1800 | 2500 | | | | |



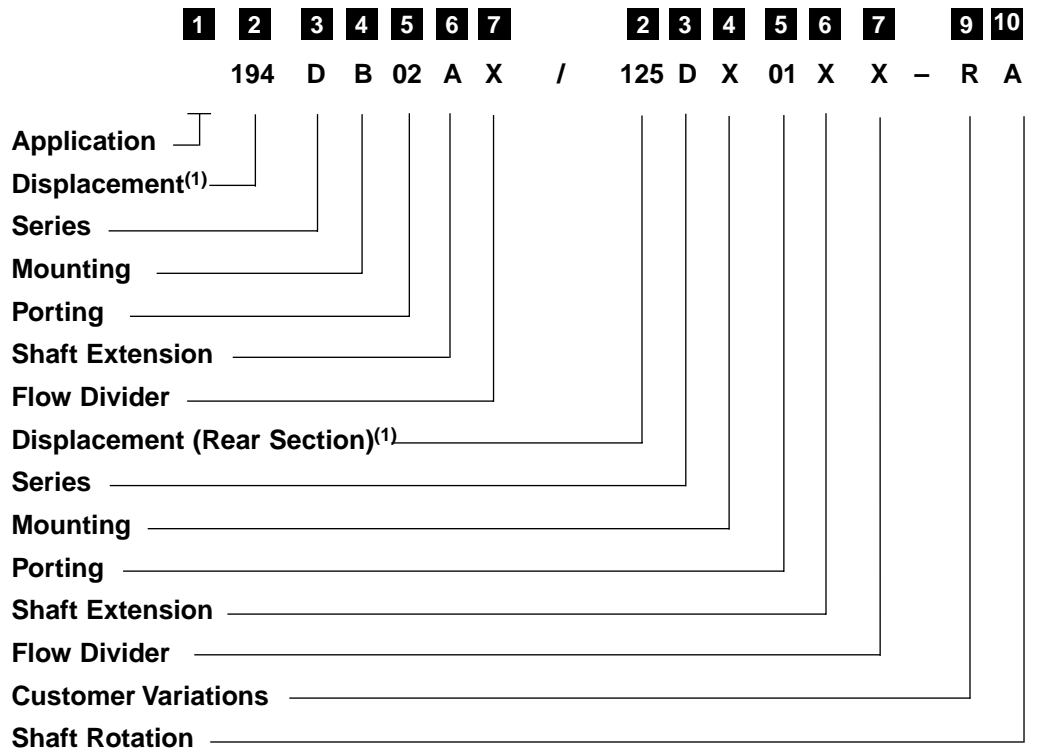
All metric values are secondary and for reference only.

Order Code Analysis

For Single Pumps



For Multi-Circuit Pumps



Notes:

1. This number denotes cubic inch displacement per revolution. For example, 232 = 2.32 cubic inch per revolution. Theoretical pump delivery (gpm) is determined by multiplying actual displacement by desired pump rpm and dividing by 231.
2. On all pumps incorporating relief valves, pump code must indicate relief valve pressure setting which is to be indicated as follows: 01 = 100, 02 = 200, etc. These digits represent desired valve setting multiplied by 1/100.

This code analysis applies to single and multiple section pump assemblies with respective modifications for each as noted. An example of the foregoing is as follows:

W/O Flow Divider
 Single: 194DB02AX-LA
 Double: 194DBO2AX / 125DX01XX-RA

Order Code Analysis

| | |
|-------------|--------------------------|
| 1 | Application |
| Omit | No letter indicates pump |

| | | | |
|----------|--------------------------|---|----------------------------------|
| 2 | Displacement | | |
| | Displacement Code | Displacement in³/rev (cm³/rev) | Gear Plate Width in. (mm) |
| | 043 | .43 (7,0) | 0.280 (7,1) |
| | 058 | .58 (9,5) | 0.375 (9,5) |
| | 077 | .77 (12,6) | 0.500 (12,7) |
| | 104 | 1.04 (17,0) | 0.670 (17,0) |
| | 116 | 1.16 (19,0) | 0.750 (19,0) |
| | 125 | 1.25 (20,5) | 0.810 (20,6) |
| | 155 | 1.55 (25,4) | 1.000 (25,4) |
| | 177 | 1.77 (29,0) | 1.141 (29,0) |
| | 194 | 1.94 (31,8) | 1.250 (31,7) |
| | 232 | 2.32 (38,0) | 1.496 (38,0) |

| | |
|----------|------------------------|
| 4 | Mounting |
| A | SAE 2-bolt "82" ("A") |
| B | SAE 2-bolt "101" ("B") |

| | |
|-----------|--|
| 5 | Porting |
| | Pump Without Flow Control (Unless Specified, Porting is in Cover) |
| 01 | 1 1/16 - 12 SAE, side-inlet; 7/8 - 14 SAE, side-out |
| 02 | 1 1/16 - 12 SAE, side-inlet; 1 1/16 - 12 SAE, side-out |
| 03 | 1 5/16 - 12 SAE, side-inlet; 7/8 - 14 SAE, side-out |
| 04 | 1 5/16 - 12 SAE, side-inlet; 1 1/16 - 12 SAE, side-out |
| 05 | 1 1/16 - 12 SAE, end-inlet; 7/8 - 14 SAE, end-out |
| 06 | 1 1/16 - 12 SAE, end-inlet; 1 1/16 - 12 SAE, end-out |
| 07 | 1 5/16 - 12 SAE, end-inlet; 7/8 - 14 SAE, end-out |
| 08 | 1 5/16 - 12 SAE, end-inlet; 1 1/16 - 12 SAE, end-out |
| 09 | 1 5/16 - 12 SAE, side-inlet; 1 1/16 - 12 SAE, end-out |

| | |
|-----------|--|
| | Pump With Flow Control |
| 01 | 1 5/16 - 12 SAE, side-inlet; 7/16 - 20 SAE, side - L.S. 7/8 - 14 SAE, side - EF & 3/4 - 16 SAE, side - CF |
| 02 | 1 5/16 - 12 SAE, end-inlet; 7/16 - 20 SAE, side - L.S. 7/8 - 14 SAE, end - EF & 3/4 - 16 SAE, end - CF |
| 03 | 1 5/16 - 12 SAE, end-inlet; 7/16 - 20 SAE, end - L.S. 1 1/16 - 12 SAE, end - EF & 3/4 - 16 SAE, side - CF |
| 04 | 1 5/16 - 12 SAE, side-inlet; 7/16 - 20 SAE, end - L.S. 7/8 - 14 SAE, side - EF & 3/4 - 16 SAE, side - CF |
| 05 | 1 5/16 - 12 SAE, end-inlet; 7/16 - 20 SAE, end - L.S. 7/8 - 14 SAE, end - EF & 3/4 - 16 SAE, end - LF |
| 06 | 1 1/4 dia. tube, side-inlet 3/4 - 16 SAE, side - PRI. & 7/8 - 14 SAE, side - SEC. |

All metric values are secondary and for reference only.

Order Code Analysis

| 6 | Shaft Extension |
|---|---|
| A | SAE B splined dia. $\frac{7}{8}$ " - 13-tooth x 1.62 ext |
| B | SAE B keyed dia. $\frac{7}{8}$ " - $\frac{1}{4}$ " keyway x 1.62 ext. |
| C | Splined dia. $\frac{3}{4}$ " - 11-tooth x 1.50 ext. |
| D | Keyed dia. $\frac{3}{4}$ " - $\frac{1}{4}$ " keyway x 2.00 ext. |
| E | SAE A splined dia. $\frac{5}{8}$ " - 9-tooth 1.25 ext. |
| F | Splined dia. $\frac{3}{4}$ " - 11-tooth x 1.25 ext. |

| 7 | Valving | D = Dynamic LS | S= Static LS |
|----------|--|----------------|--------------|
| X | None | | |
| 01 | Fixed priority flow 1.0 gpm (3,8 l/min) | | |
| 02 | Fixed priority flow 2.0 gpm (7,6 l/min) | | |
| 03 | Fixed priority flow 3.0 gpm (11,4 l/min) | | |
| 04 | Fixed priority flow 4.0 gpm (15,1 l/min) | | |
| 05 | Fixed priority flow 5.0 gpm (18,9 l/min) | | |
| 06 | Fixed priority flow 6.0 gpm (22,7 l/min) | | |
| 07 | Fixed priority flow 7.0 gpm (26,5 l/min) | | |
| 08 | Fixed priority flow 8.0 gpm (30,3 l/min) | | |
| 09 | Fixed priority flow 9.0 gpm (34,1 l/min) | | |
| 10 (D/S) | Load sensing priority flow - 20 gpm, (10 bar) standby pressure | | |
| 11 (D/S) | Load sensing priority flow - 20 gpm, (7 bar) standby pressure | | |
| 12 (D/S) | Load sensing priority flow - 20 gpm, (4 bar) standby pressure | | |
| 13 (D/S) | Load sensing priority flow - 10 gpm, (10 bar) standby pressure | | |
| 14 (D/S) | Load sensing priority flow - 10 gpm, (7 bar) standby pressure | | |
| 15 (D/S) | Load sensing priority flow - 10 gpm, (4 bar) standby pressure | | |

| 8 | Customer Modification |
|----|--|
| 01 | Wet mount, gasket (shipped unattached) |

| 9 | Rotation |
|---|------------------------------|
| R | Right hand (Clockwise) |
| L | Left hand (Counterclockwise) |

| 10 | Design Modification |
|----|---------------------|
| A | Original design |

All metric values are secondary and for reference only.