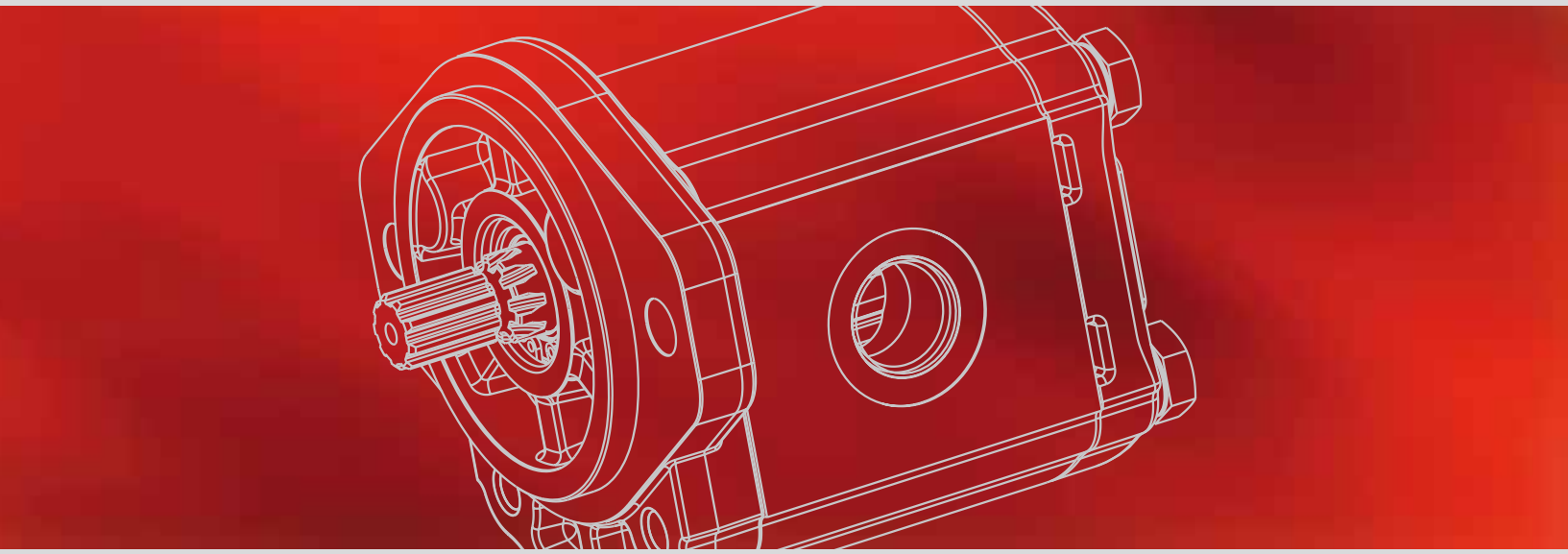
CASAPPA®
FLUID POWER DESIGN



HYDRAULIC GEAR PUMPS AND MOTORS

POLARIS®

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Replaces: 01/10.03
02/07.2006

FEATURES

"POLARIS" more than fifty years of Casappa experience in design and production of hydraulic components, characterized by large investments in research and development in order to propose new and personalized solutions to the market.
Our use of CAD 3D in the developement of this generation permit us the 3D modelling and the virtual simulation of the behaviour of the components inserted in the hydraulic circuit. This means that the process will take less time and the quality of the products is better.
Polaris pumps and motors are basically composed of a gear housing in aluminium alloy, two gear wheels supported by sleeve bearings and two end plates, the front and the rear cover, either in aluminium or in cast iron with excellent mechanical characteristics.
Our success is based largely on the quality of our product. This guaranties the consistencies of the efficiencies and low level of noise emission during the life of our products.

DISPLACEMENTS

From 0.07 in^3/rev (1,07 cm^3/rev)
To 5.56 in^3/rev (91,10 cm^3/rev)

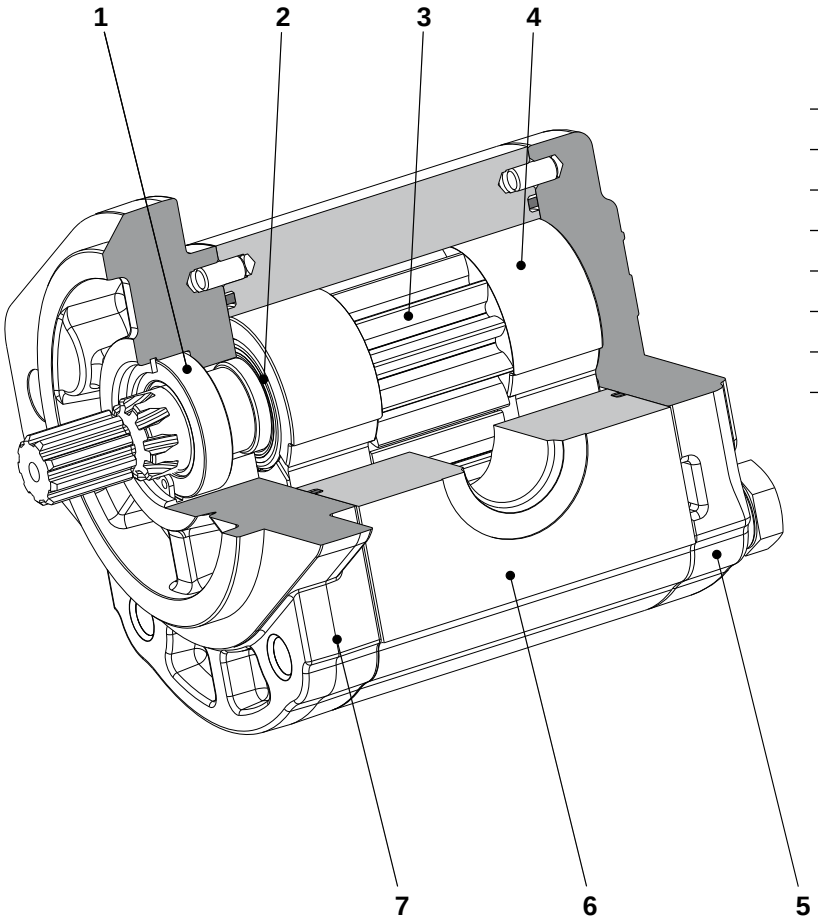
PRESSURE

Max. Continuous 3770 psi (260 bar)
Max. Intermittent 4060 psi (280 bar)
Max. Peak 4350 psi (300 bar)

MAX. SPEED

Max. 4000 min^{-1}

- Group 1, 2 and 3 with displacements from 0.07 in^3/rev (1,07 cm^3/rev) to 5.56 in^3/rev (91.10 cm^3/rev).
- Drive shafts, mounting flanges and ports according to the international standards.
- Combination of multiple pumps in standard version, common inlet and separated stages.
- Integrated outboard bearings for heavy duty application.
- Many types of built-in valves.



1	Shaft seal
2	Seal
3	Gear
4	Thrust plate
5	Rear cover
6	Body
7	Mounting flang

02/07.2006

FEATURES

Construction	External gear type pumps and motors
Mounting	EUROPEAN - SAE - GERMAN standard flanges
Line connections	Screw and flange
Direction of rotation (looking at the drive shaft)	Anti-clock (S) - clockwise (D) - reversible external drain (L - R) reversible internal drain (B)
Inlet pressure range for pumps	10 ÷ 44 psi - [0,7 ÷ 3 bar (abs.)]
Max back pressure for single rotation motors and reversible internal drain motors	p_1 (continuous) max 73 psi (5 bar)
	p_2 (for 20 s) max 116 psi (8 bar)
	p_3 (for 8 s) max 218 psi (15 bar)
Max drain line pressure on reversible rotation motors	73 psi (5 bar)
Max back pressure on the series motors (reversible motors external drain)	< p_1 (max continuous pressure) < 2175 psi (<150 bar)
Fluid temperature range	See table (1)
Fluid	Mineral oil based hydraulic fluids to ISO/DIN. For other fluids please consult our technical sales department.
Viscosity range	From 60 to 456 SSU [12 to 100 mm²/s (cSt)] recommended
	Up to 3410 SSU [750 mm²/s (cSt)] permitted
Filtering requirement	See table (2) page 5

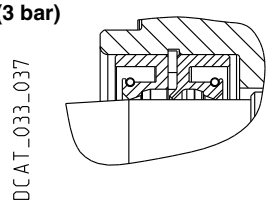
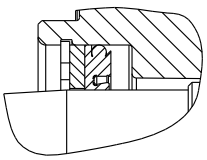
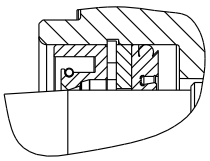
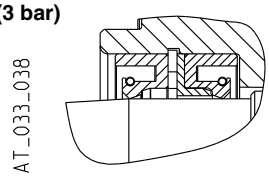
Replaces: 01/10.03

Tab. 1 O

Type	Fluid composition	Max pressure psi - (bar)	Max speed min⁻¹	Temperature °F - (°C) Min	Max continuous	Max peak	Seals (●)	Special shaft seals (◆)
ISO/DIN	Mineral oil based hydraulic fluid to ISO/DIN	See page 6	See page 6	-13 (-25)	176 (80)	212 (100)	N	D - H - C
				-13 (-25)	230 (110)	257 (125)	V	D

(●) **N**= Buna N (standard) - **V**= Viton

(◆) SHAFT SEALS MAX PRESSURE AND MOUNTING SCHEME

	D	H	C
	Standard shaft seals with wiper seal	High pressure special shaft seal	High pressure special shaft seal with wiper seal
Single rotation pumps	**Max 44 psi (3 bar)**  DCAT_033_037	**Max 363 psi (25 bar)** #  DCAT_033_039	**Max 363 psi (25 bar)** #  DCAT_033_036
Single rotation motors Reversible rotation pumps and motors	**Max 44 psi (3 bar)**  DCAT_033_038		

O 02/07.2006

Pressure could change in connection with shaft speed rotation.
For more information please consult out technical sales department.

FEATURES

FILTRATION

Tab. 2 o

Working pressure psi (bar)	Δp < 2030 Δp < (140)	2030 < Δp < 3045 (140) < Δp < (210)	Δp > 3045 Δp > (210)
Contamination class NAS 1638	10	9	8
Contamination class ISO 4406:1999	21/19/16	20/18/15	19/17/14
Achieved with filter $ß_{10}$ (c) ≥ 75 according to ISO 16889	-	10 µm	10 µm
Achieved with filter $ß_{25}$ (c) ≥ 200 according to ISO 16889	25 µm	-	-

Casappa recommends to use its own production filters:

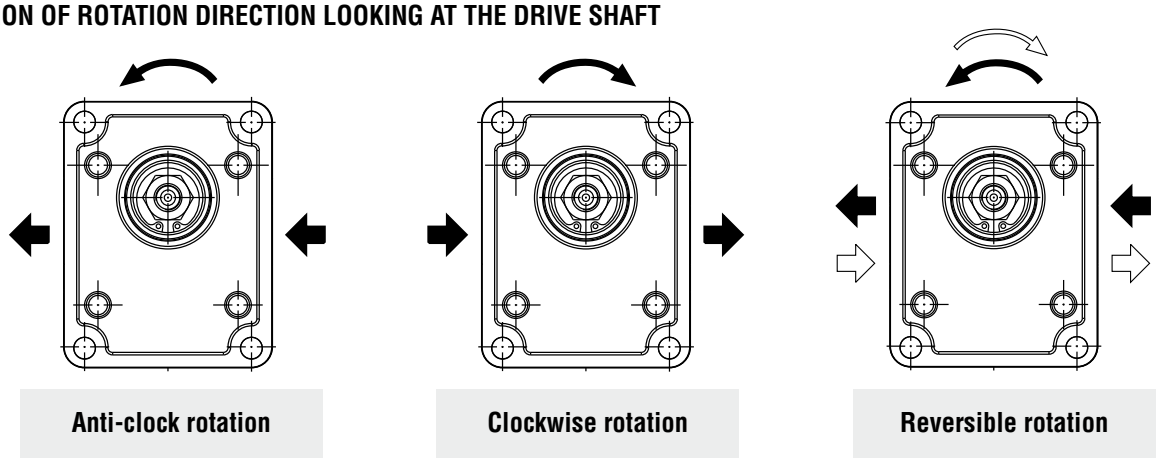
IKRON® Fluid Filtration

Replaces: 02/07.2006

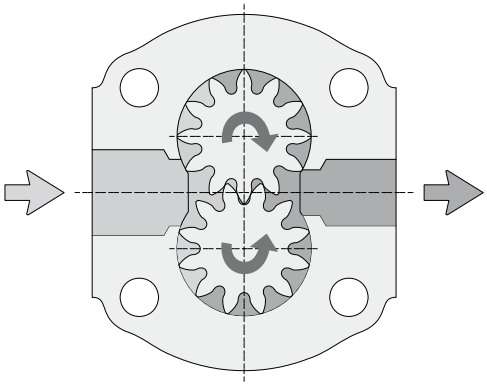
GENERAL NOTES

Available with different inlet and outlet ports.
For more information please consult our technical sales department.

DEFINITION OF ROTATION DIRECTION LOOKING AT THE DRIVE SHAFT

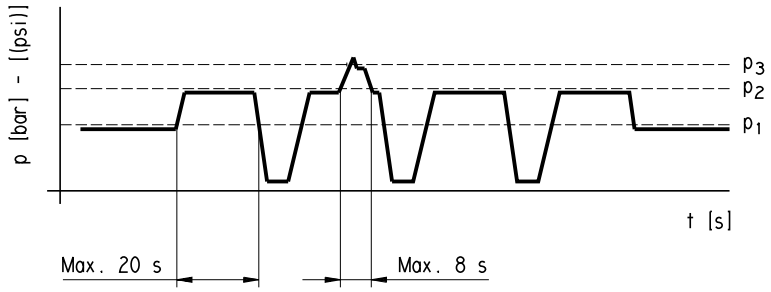


Anti-clock rotation | **Clockwise rotation** | **Reversible rotation**



o 03/02.2012

PRESSURE DEFINITION



p_1 Max. continuous pressure
p_2 Max. intermittent pressure
p_3 Max. peak pressure

GENERAL DATA PUMPS AND MOTORS

Series	Pump type PLP Motor type PLM	Displacement	Max. pressure			Max. speed	Min. speed
			p_1	p_2	p_3		
		in^3/rev (cm^3/rev)	psi (bar)			min^{-1}	
POLARIS 10	**PL. 10•1**	0.07 (1,07)	3770 (260)	4060 (280)	4205 (290)	4000	650
	PL. 10•1,5	0.10 (1,6)	3770 (260)	4060 (280)	4205 (290)	4000	650
	PL. 10•2	0.13 (2,13)	3770 (260)	4060 (280)	4205 (290)	4000	650
	PL. 10•2,5	0.16 (2,67)	3770 (260)	4060 (280)	4205 (290)	4000	650
	PL. 10•3,15	0.20 (3,34)	3770 (260)	4060 (280)	4205 (290)	4000	650
	PL. 10•4	0.26 (4,27)	3625 (250)	3915 (270)	4060 (280)	4000	650
	PL. 10•5	0.33 (5,34)	3625 (250)	3915 (270)	4060 (280)	4000	650
	PL. 10•5,8	0.38 (6,20)	3335 (230)	3625 (250)	3770 (260)	3500	650
	PL. 10•6,3	0.41 (6,67)	3335 (230)	3625 (250)	3770 (260)	3500	650
	PL. 10•8	0.52 (8,51)	2610 (180)	2900 (200)	3045 (210)	3500	650
	PL. 10•10	0.65 (10,67)	2030 (140)	2320 (160)	2465 (170)	3500	650
POLARIS 20	**PL. 20•4**	0.30 (4,95)	3625 (250)	4060 (280)	4350 (300)	4000	600
	PL. 20•6,3	0.40 (6,61)	3625 (250)	4060 (280)	4350 (300)	4000	600
	PL. 20•7,2	0,44 (7,29)	3625 (250)	4060 (280)	4350 (300)	4000	600
	PL. 20•8	0.50 (8,26)	3625 (250)	4060 (280)	4350 (300)	3500	600
	PL. 20•9	0.56 (9,17)	3625 (250)	4060 (280)	4350 (300)	3500	600
	PL. 20•10,5	0.66 (10,9)	3625 (250)	4060 (280)	4350 (300)	3500	600
	PL. 20•11,2	0.69 (11,23)	3625 (250)	4060 (280)	4350 (300)	3500	600
	PL. 20•14	0.89 (14,53)	3625 (250)	4060 (280)	4350 (300)	3500	500
	PL. 20•16	1.03 (16,85)	3625 (250)	4060 (280)	4350 (300)	3000	500
	PL. 20•19	1.16 (19,09)	2900 (200)	3190 (220)	3480 (240)	3000	500
	PL. 20•20	1.29 (21,14)	2900 (200)	3190 (220)	3480 (240)	3000	500
	PL. 20•24,5	1.52 (24,84)	2465 (170)	2755 (190)	3045 (210)	2500	500
	PL. 20•25	1.61 (26,42)	2465 (170)	2755 (190)	3045 (210)	2500	500
	PL. 20•27,8	1.72 (28,21)	1885 (130)	2175 (150)	2465 (170)	2000	500
	PL. 20•31,5	2.01 (33,03)	1885 (130)	2175 (150)	2465 (170)	2000	500
POLARIS 30	**PL. 30•22**	1.34 (21,99)	3625 (250)	3915 (270)	4060 (280)	3000	350
	PL. 30•27	1.63 (26,70)	3625 (250)	3915 (270)	4060 (280)	3000	350
	PL. 30•34	2.11 (34,55)	3480 (240)	3770 (260)	3915 (270)	3000	350
	PL. 30•38	2.40 (39,27)	3480 (240)	3770 (260)	3915 (270)	3000	350
	PL. 30•43	2.68 (43,98)	3335 (230)	3625 (250)	3770 (260)	3000	350
	PL. 30•51	3.16 (51,83)	3045 (210)	3335 (230)	3480 (240)	2500	350
	PL. 30•61	3.74 (61,26)	2755 (190)	3045 (210)	3190 (220)	2500	350
	PL. 30•73	4.50 (73,82)	2465 (170)	2755 (190)	2900 (200)	2500	350
	PL. 30•82	4.98 (81,68)	2320 (160)	2465 (170)	2610 (180)	2200	350
	PL. 30•90	5.56 (91,10)	2175 (150)	2320 (160)	2465 (170)	2200	350

p_1= Max. continuous pressure p_2= Max. intermittent pressure p_3= Max. peak pressure

The values in the table refer to unidirectional pumps and motors. Reversible pumps and motors max pressures are 15% lower than those shown in table. For different working conditions please consult our sales department.

01/10.03

GENERAL DATA PUMPS AND MOTORS

Replaces: 01/10.03

Q	US gpm (l/min)	Flow
M	lbf in (Nm)	Torque
P	HP (kW)	Power
V	in^3/rev (cm^3/rev)	Displacement
n	min^{-1}	Speed
Δp	psi (bar)	Pressure

Efficiencies

		Pumps	Motor
$\eta_v = \eta_v (V, \Delta p, n)$	Volumetric efficiency	(≈ 0,97)	(≈ 0,96)
$\eta_{hm} = \eta_{hm} (V, \Delta p, n)$	Hydro-mechanical efficiency	(≈ 0,88)	(≈ 0,85)
$\eta_t = \eta_v \bullet \eta_{hm}$	Overall efficiency	(≈ 0,85)	(≈ 0,82)

Design calculations for pump

$$Q = Q_{theor.} \bullet \eta_v$$

$$Q_{theor.} = \frac{V\ (cm^3/rev) \bullet n\ (min^{-1})}{1000}\ [l/min]$$

$$M = \frac{M_{teor.}}{\eta_{hm}}$$

$$M_{theor.} = \frac{\Delta p\ (bar) \bullet V\ (cm^3/rev)}{62,83}\ [Nm]$$

$$P_{IN} = \frac{P_{OUT}}{\eta_t}$$

$$P_{OUT} = \frac{\Delta p\ (bar) \bullet Q\ (l/min)}{600}\ [kW]$$

Design calculations for motor

$$Q = \frac{Q_{theor.}}{\eta_v}$$

$$Q_{theor.} = \frac{V\ (cm^3/rev) \bullet n\ (min^{-1})}{1000}\ [l/min]$$

$$M = M_{theor.} \bullet \eta_{hm}$$

$$M_{theor.} = \frac{\Delta p\ (bar) \bullet V\ (cm^3/rev)}{62,83}\ [Nm]$$

$$P_{IN} = \frac{\Delta p\ (bar) \bullet Q\ (l/min)}{600}\ [kW]$$

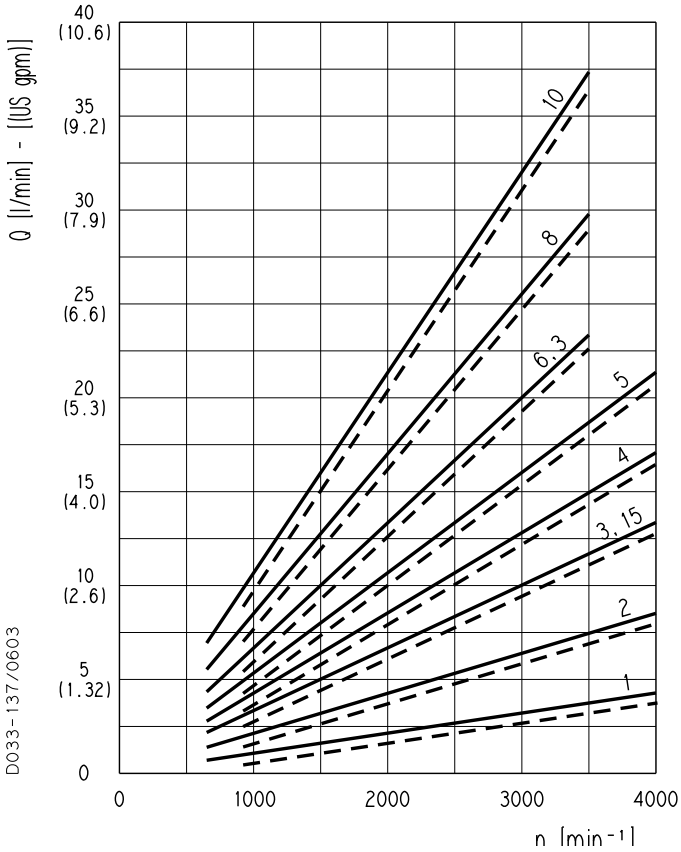
$$P_{OUT} = P_{IN} \bullet \eta_t$$

O 03/02.2012

Note: Diagrams providing approximate selection data will be found on subsequent pages.

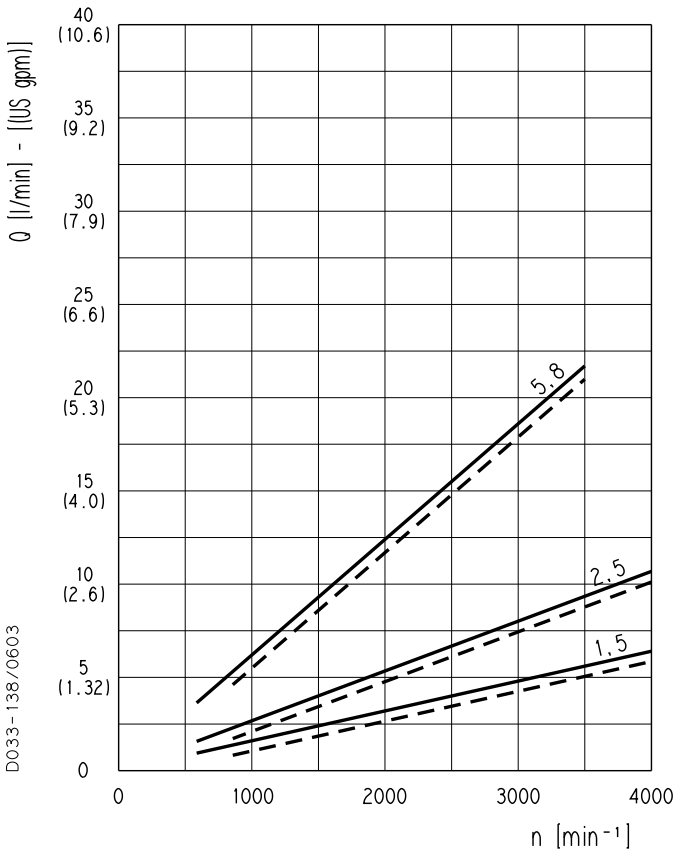
PLP 10 POLARIS 10 GEAR PUMPS PERFORMANCE CURVES

PLP 10



Each curve has been obtained at 122 °F (50°C), using oil with viscosity 168 SSU (36 cSt) at 104 °F (40°C) and at these pressures.

PLP 10•1	——	290 psi (20 bar)
	– –	3770 psi (260 bar)
PLP 10•2	——	290 psi (20 bar)
	– –	3770 psi (260 bar)
PLP 10•3,15	——	290 psi (20 bar)
	– –	3770 psi (260 bar)
PLP 10•4	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLP 10•5	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLP 10•6,3	——	290 psi (20 bar)
	– –	3335 psi (230 bar)
PLP 10•8	——	290 psi (20 bar)
	– –	2610 psi (180 bar)
PLP 10•10	——	290 psi (20 bar)
	– –	2030 psi (140 bar)

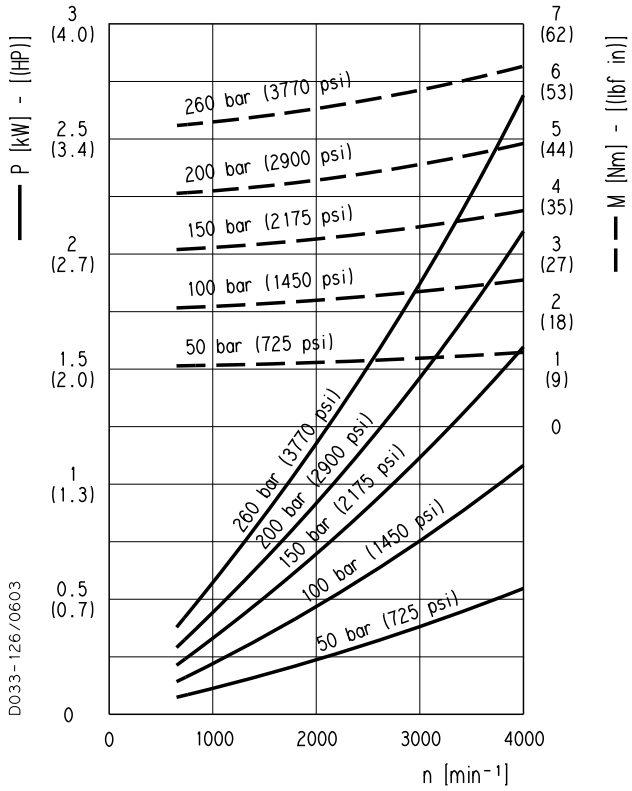


PLP 10•1,5	——	290 psi (20 bar)
	– –	3770 psi (260 bar)
PLP 10•2,5	——	290 psi (20 bar)
	– –	3770 psi (260 bar)
PLP 10•5,8	——	290 psi (20 bar)
	– –	3335 psi (230 bar)

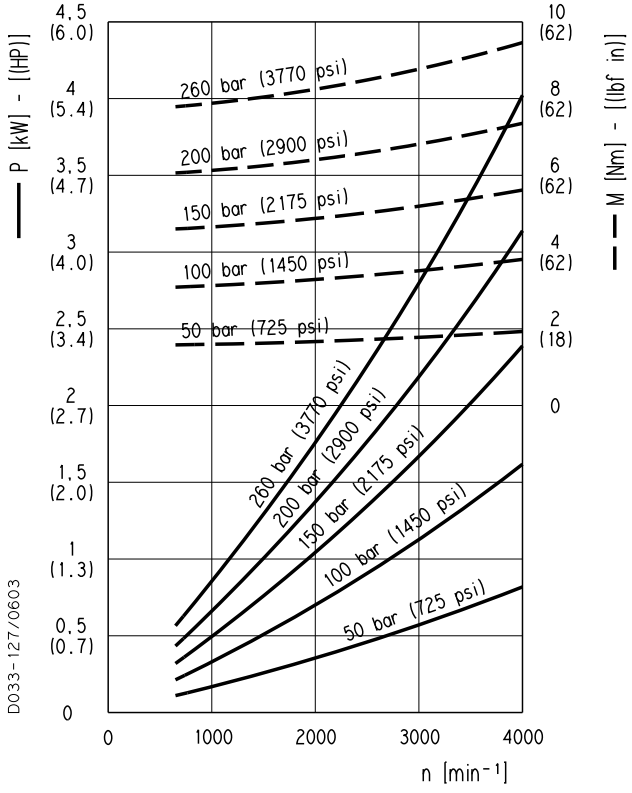
01/10.03

PLP 10 POLARIS 10 GEAR PUMPS PERFORMANCE CURVES

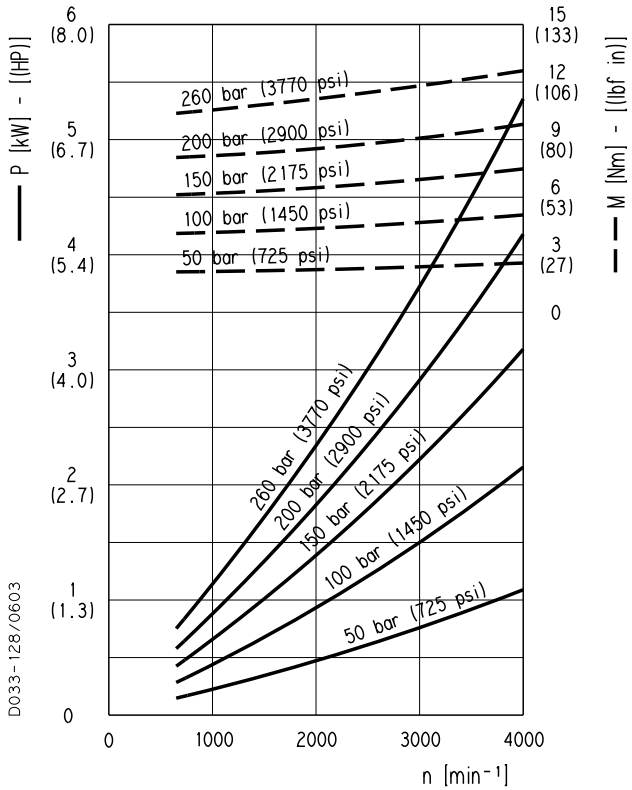
PLP 10•1



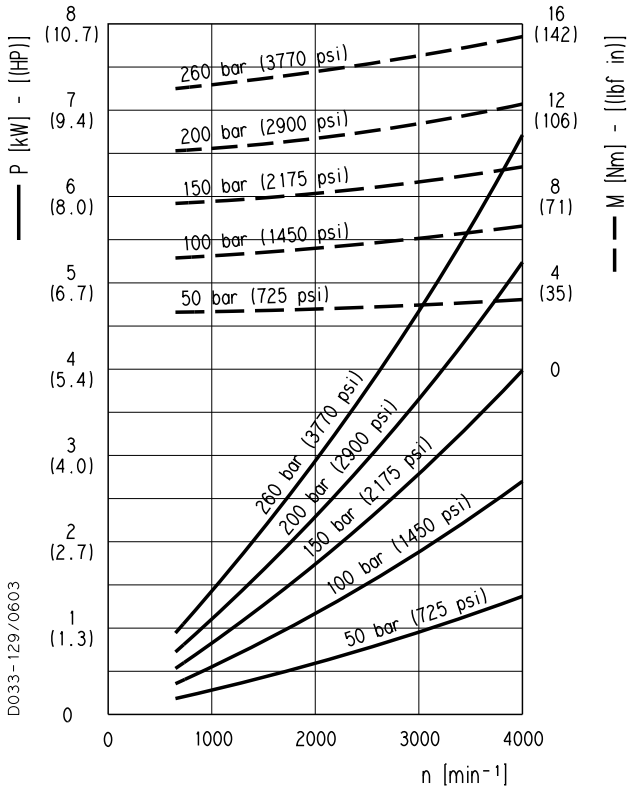
PLP 10•1,5



PLP 10•2



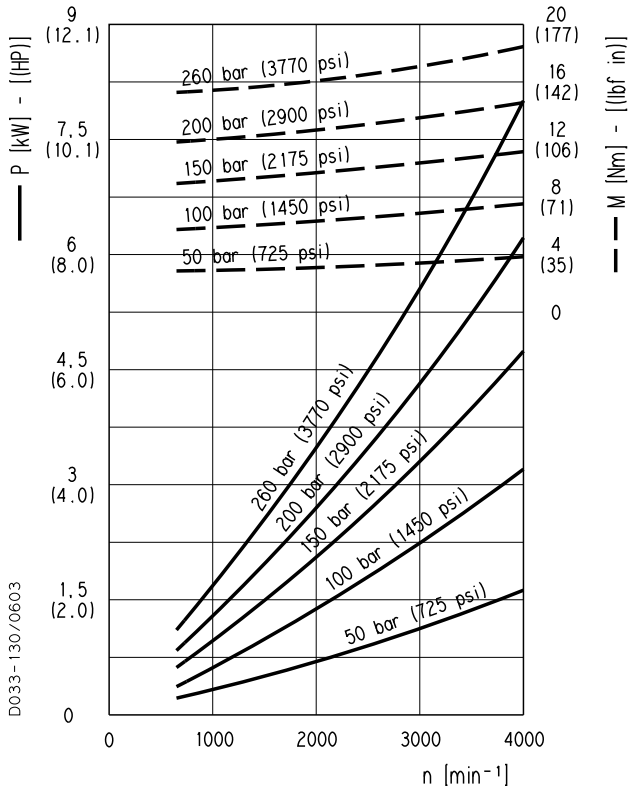
PLP 10•2,5



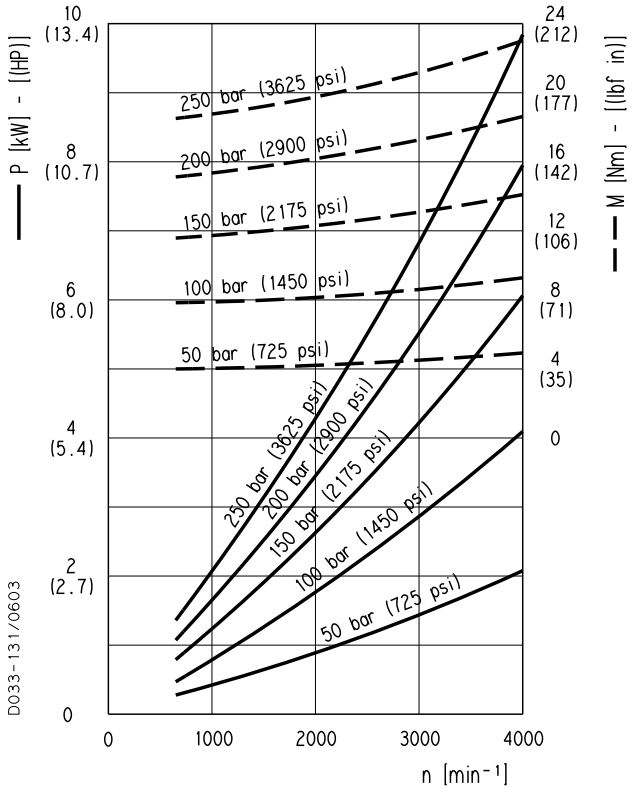
01/10.03

PLP 10 POLARIS 10 GEAR PUMPS PERFORMANCE CURVES

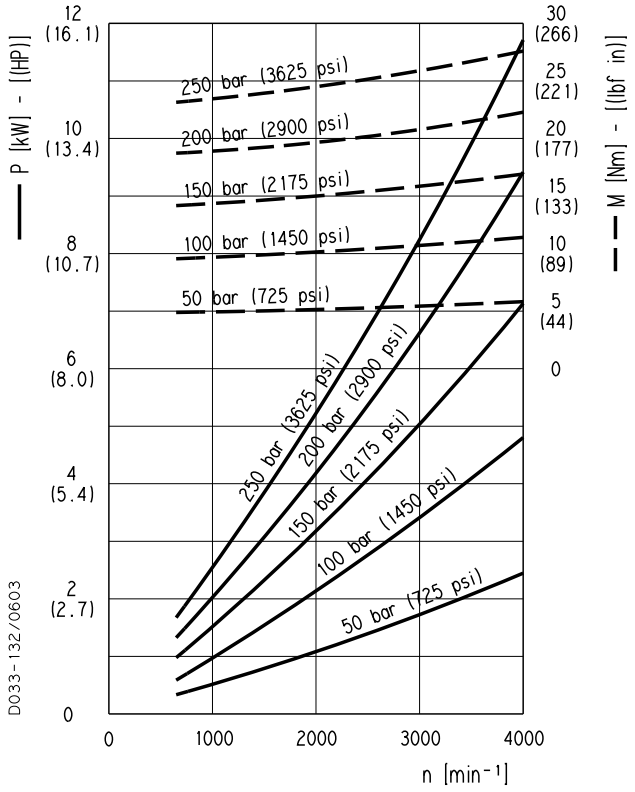
PLP 10•3,15



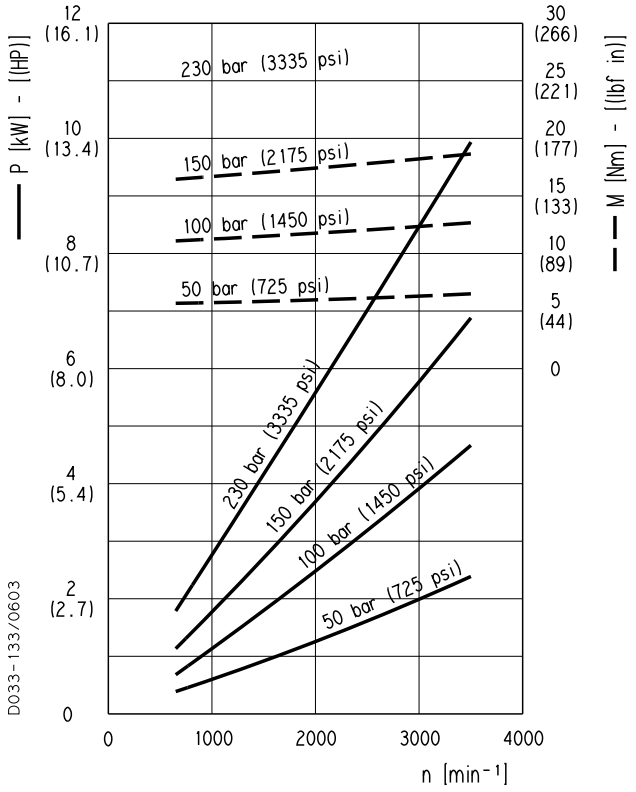
PLP 10•4



PLP 10•5



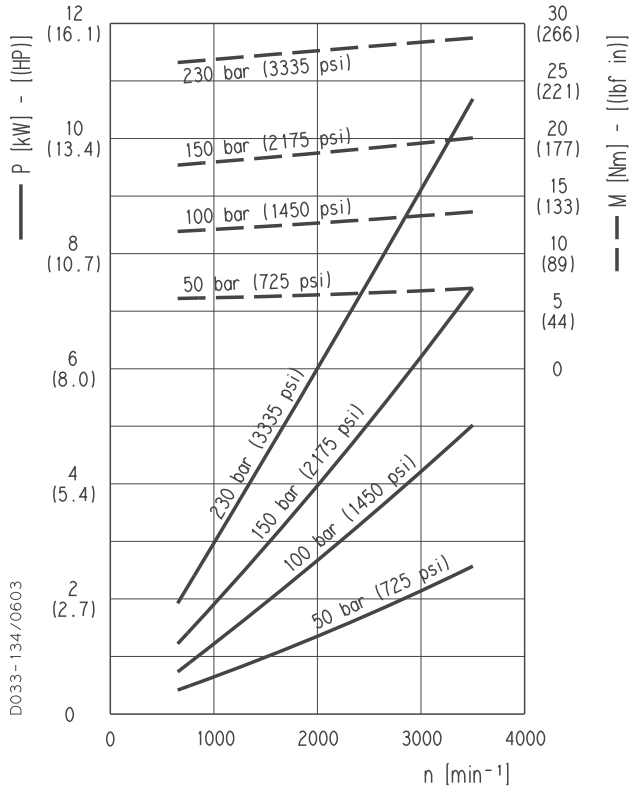
PLP 10•5,8



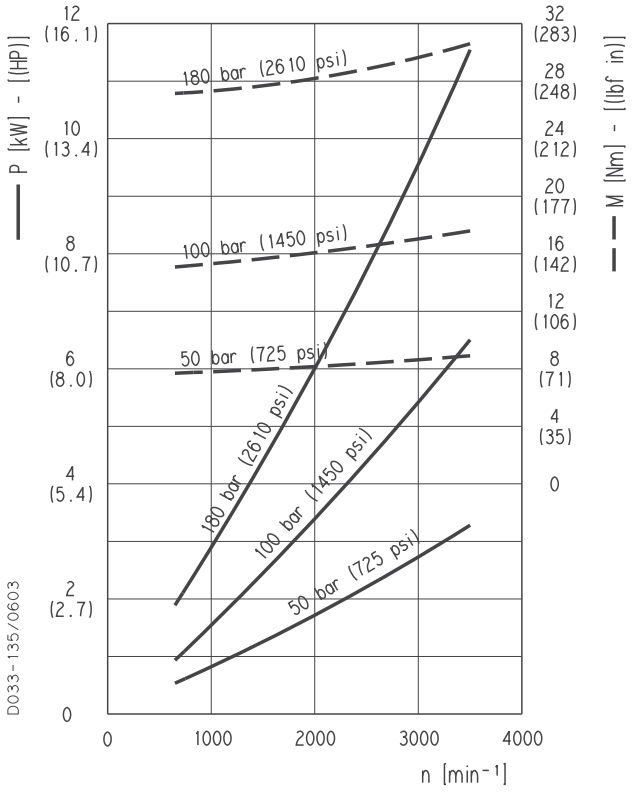
01/10.03

PLP 10 POLARIS 10 GEAR PUMPS PERFOMANCE CURVES

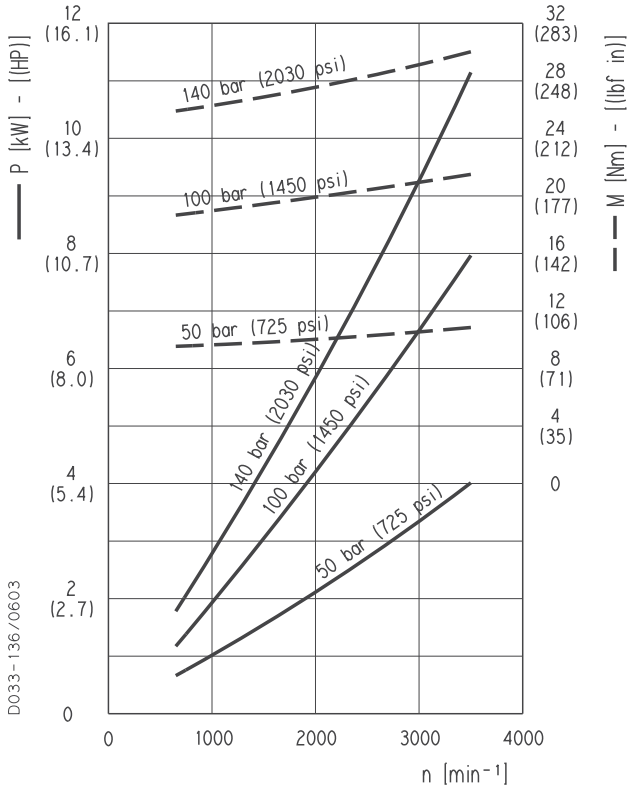
PLP 10•6,3



PLP 10•8



PLP 10•10



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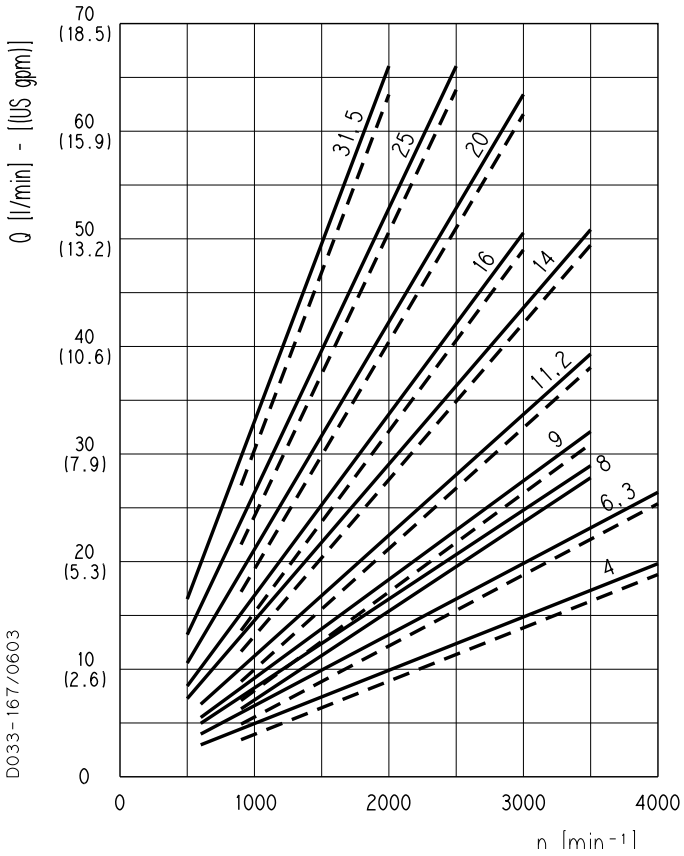
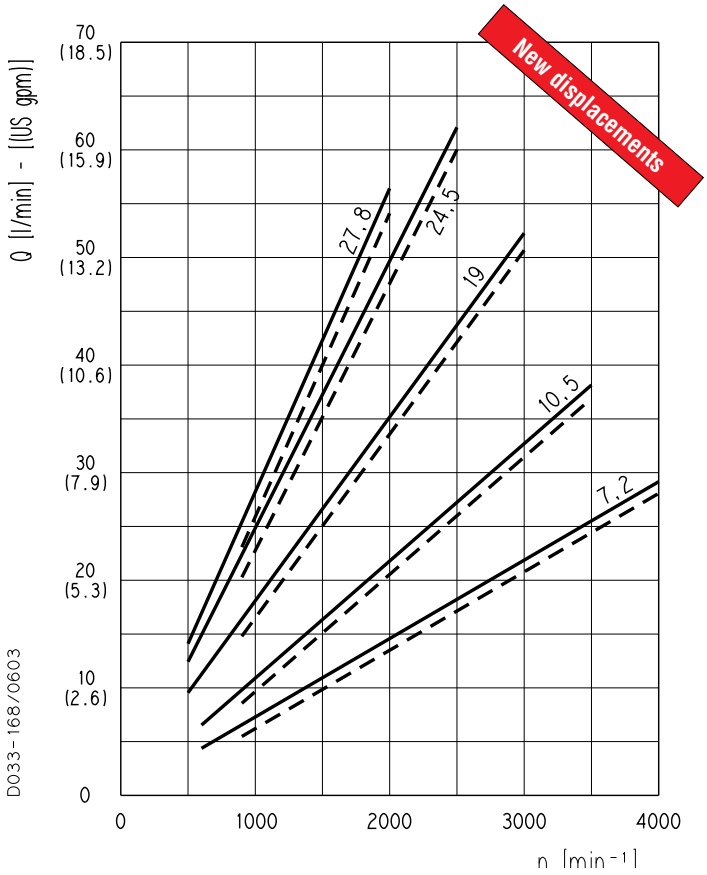
PLP 20 POLARIS 20 GEAR PUMPS PERFORMANCE CURVES

PLP 20



Each curve has been obtained at 122 °F (50°C), using oil with viscosity 168 SSU (36 cSt) at 104 °F (40°C) and at these pressures.

PLP 20•4	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLP 20•6,3	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLP 20•8	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLP 20•9	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLP 20•11,2	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLP 20•14	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLP 20•16	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLP 20•20	——	290 psi (20 bar)
	– –	2900 psi (200 bar)
PLP 20•25	——	290 psi (20 bar)
	– –	2465 psi (170 bar)
PLP 20•31,5	——	290 psi (20 bar)
	– –	1885 psi (130 bar)



PLP 20•7,2	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLP 20•10,5	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLP 20•19	——	290 psi (20 bar)
	– –	2900 psi (200 bar)
PLP 20•24,5	——	290 psi (20 bar)
	– –	2465 psi (170 bar)
PLP 20•27,8	——	290 psi (20 bar)
	– –	1885 psi (130 bar)

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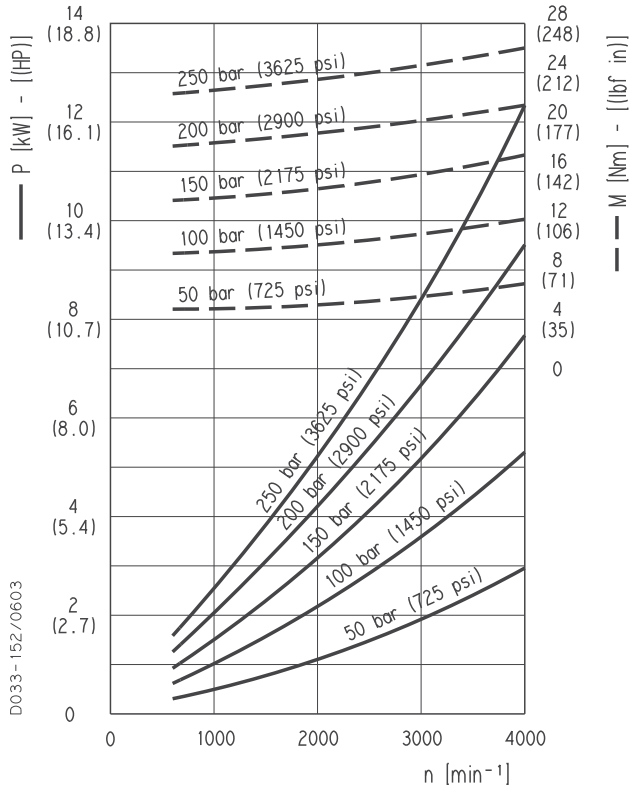
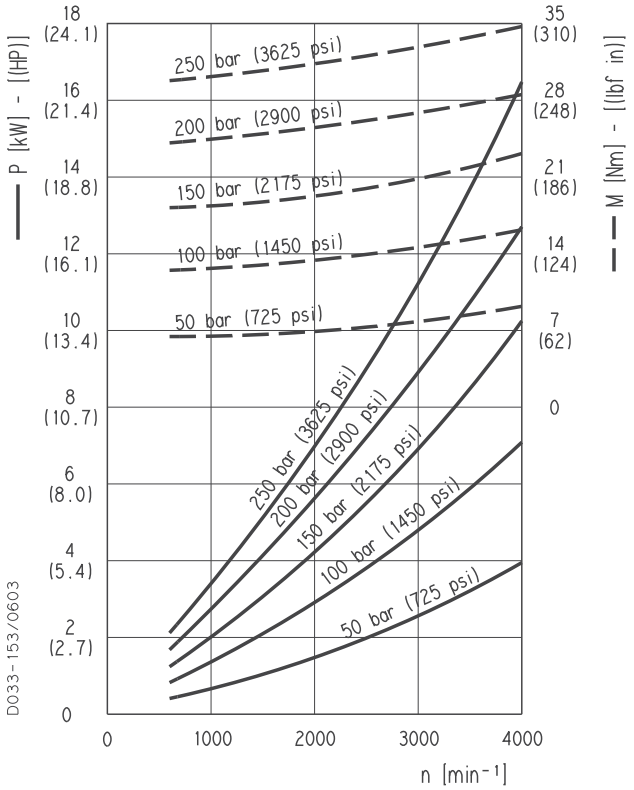
PLP 20 POLARIS 20 GEAR PUMPS PERFORMANCE CURVES

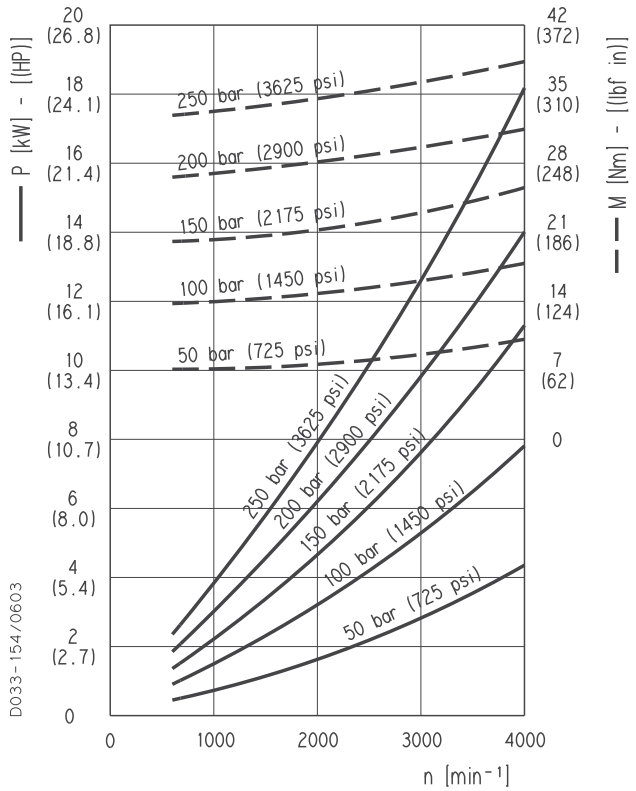
PLP 20•4



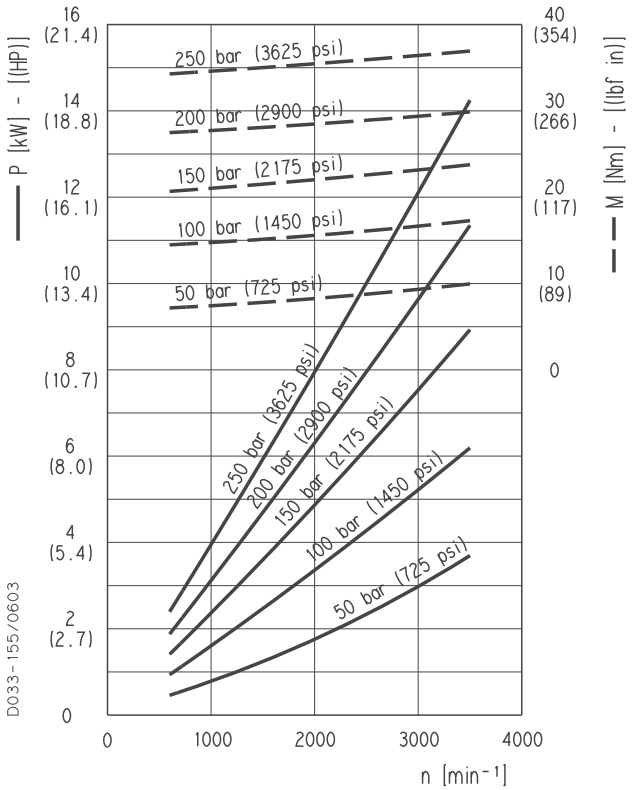
PLP 20•6,3



PLP 20•7,2



PLP 20•8



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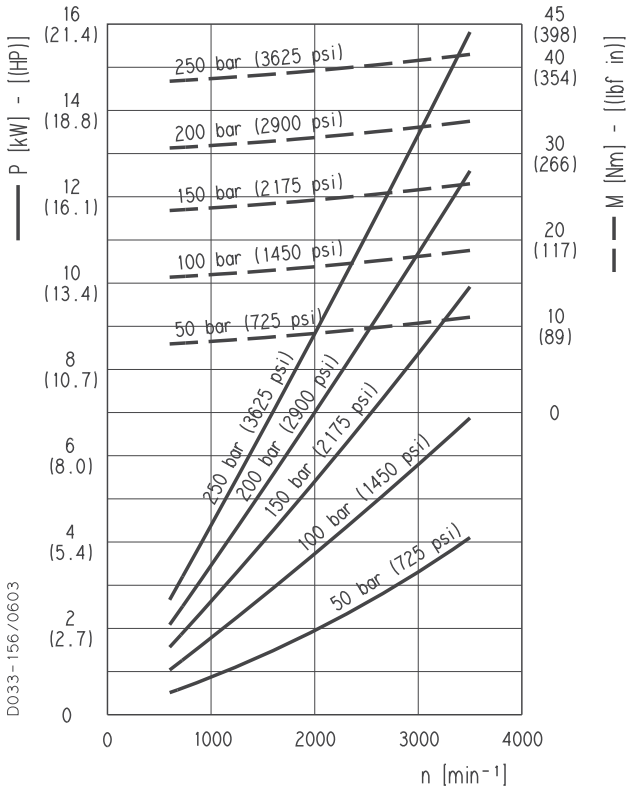
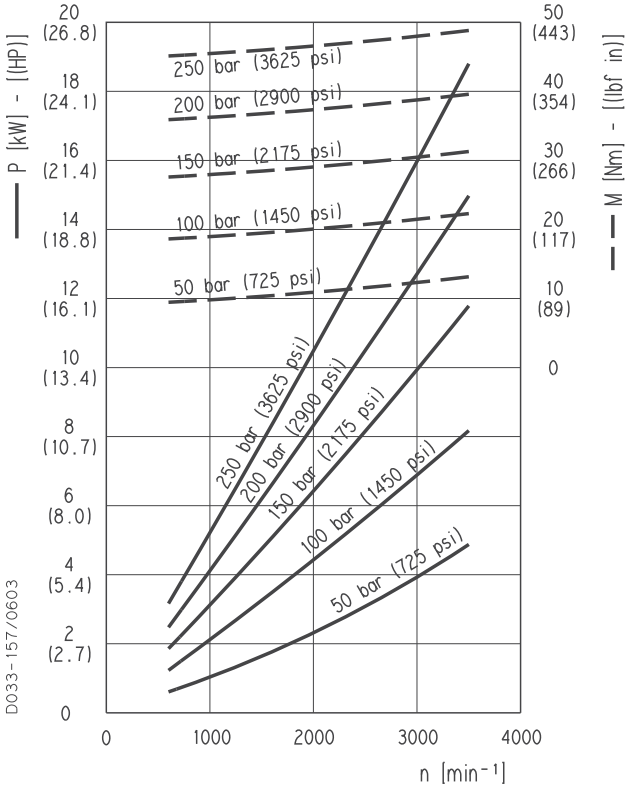
PLP 20 POLARIS 20 GEAR PUMPS PERFORMANCE CURVES

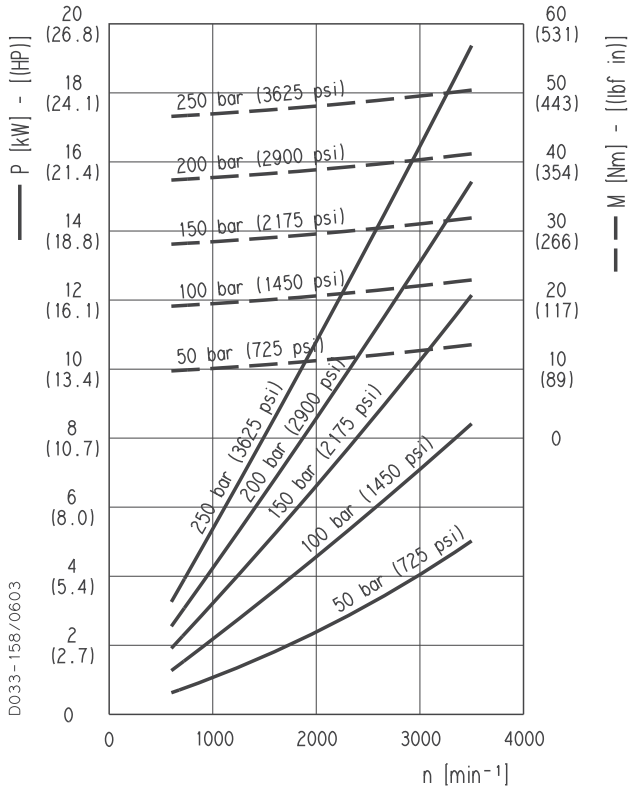
PLP 20•9



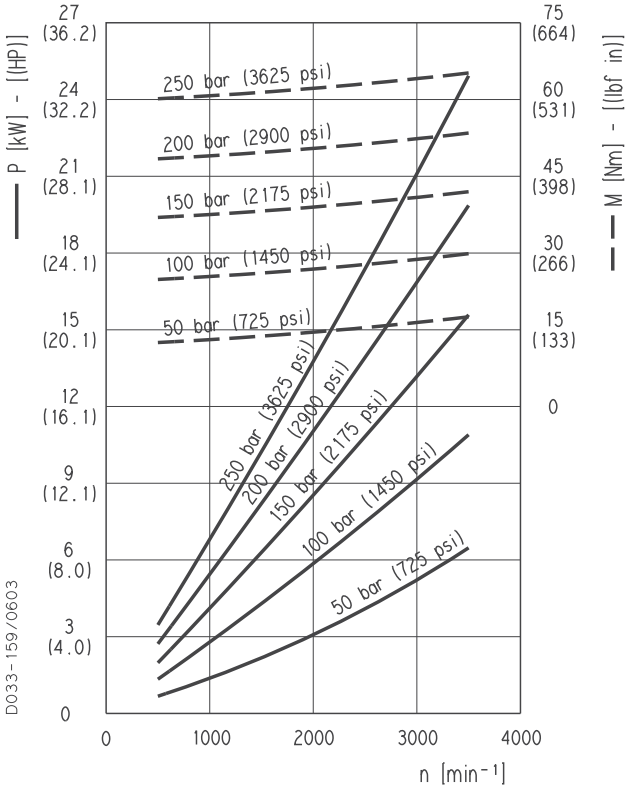
PLP 20•10,5



PLP 20•11,2



PLP 20•14



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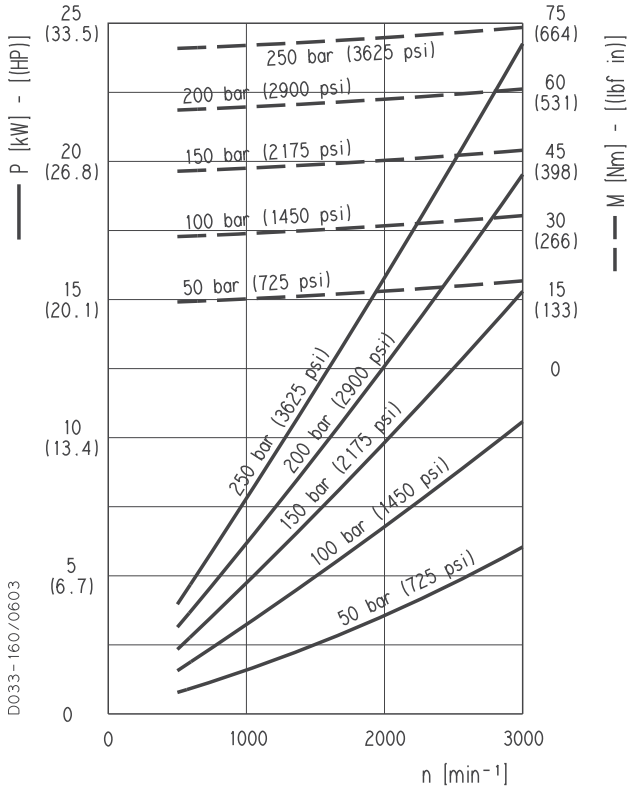
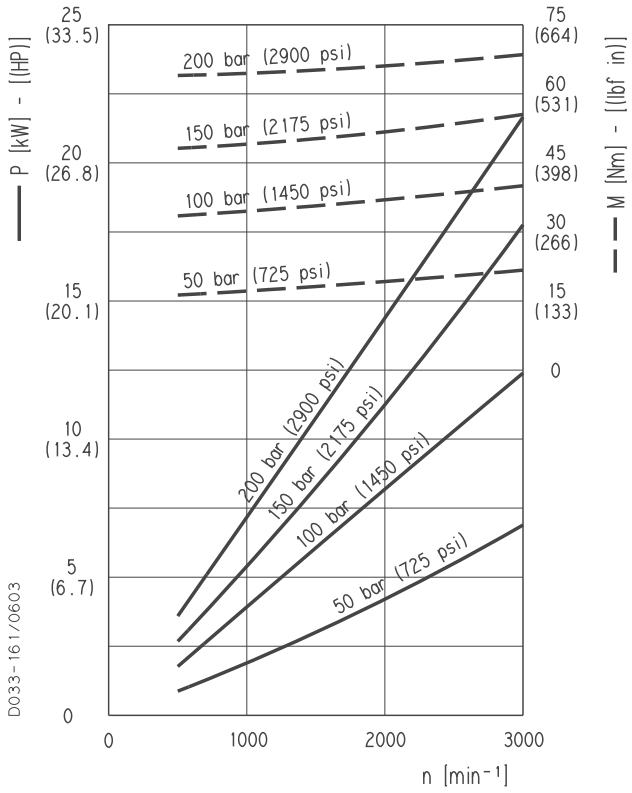
PLP 20 POLARIS 20 GEAR PUMPS PERFORMANCE CURVES

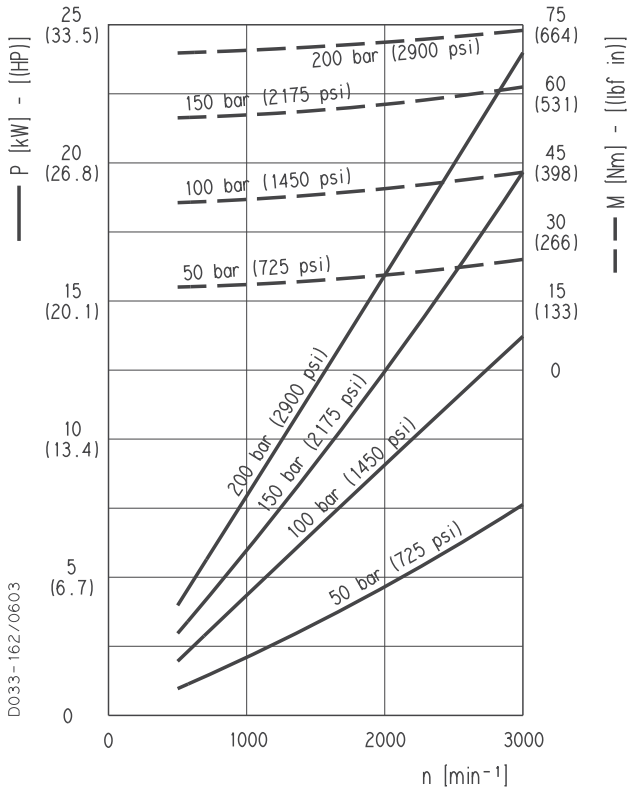
PLP 20•16



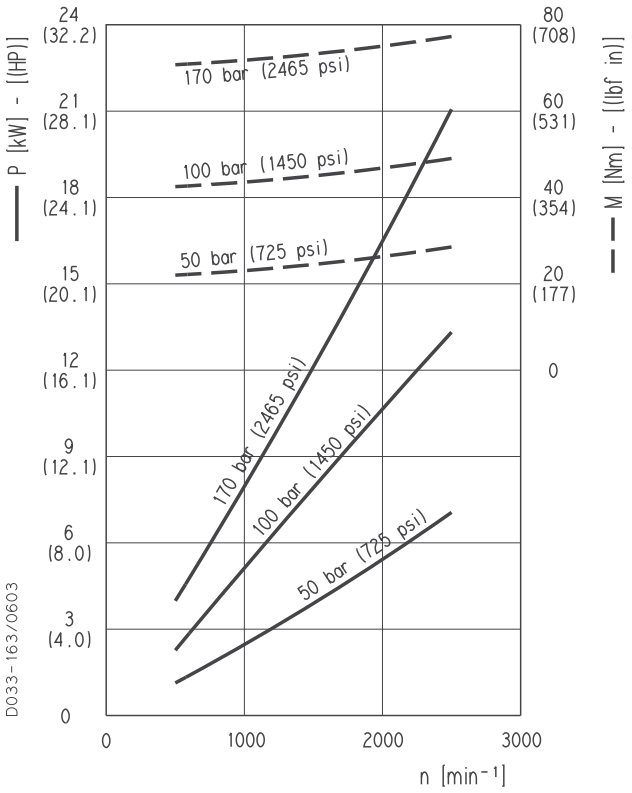
PLP 20•19



PLP 20•20



PLP 20•24,5



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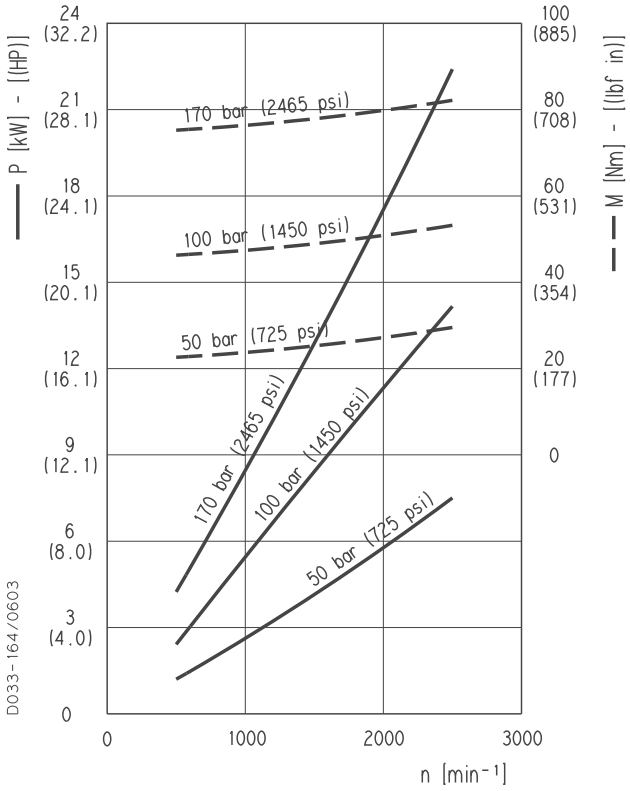
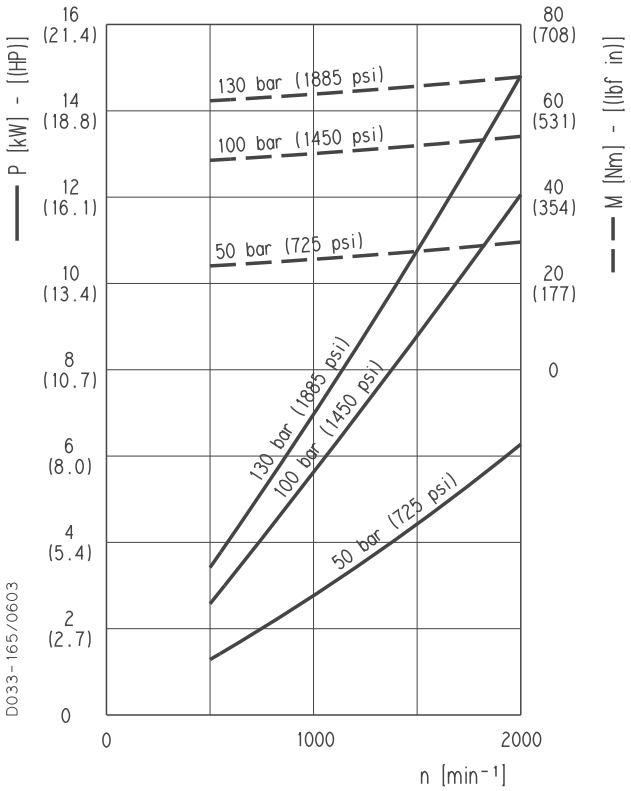
PLP 20 POLARIS 20 GEAR PUMPS PERFORMANCE CURVES

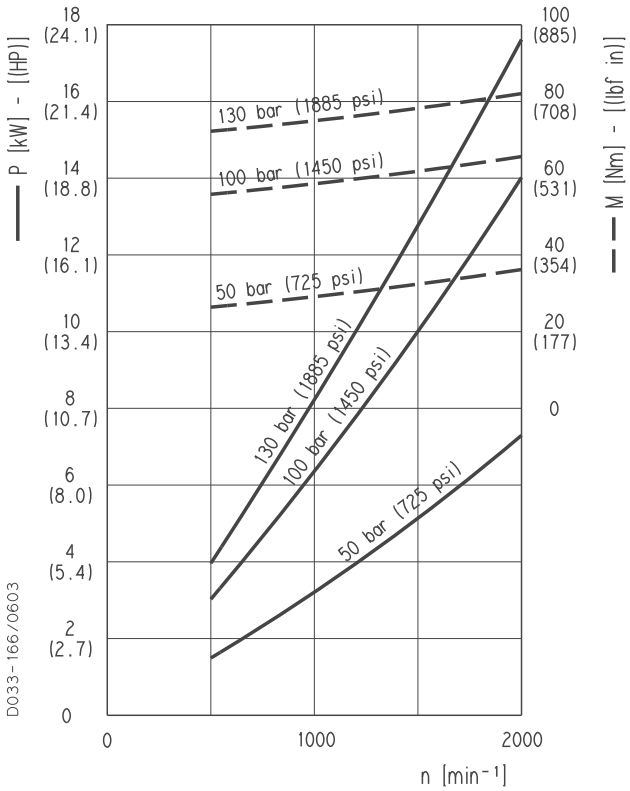
PLP 20•25



PLP 20•27,8



PLP 20•31,5



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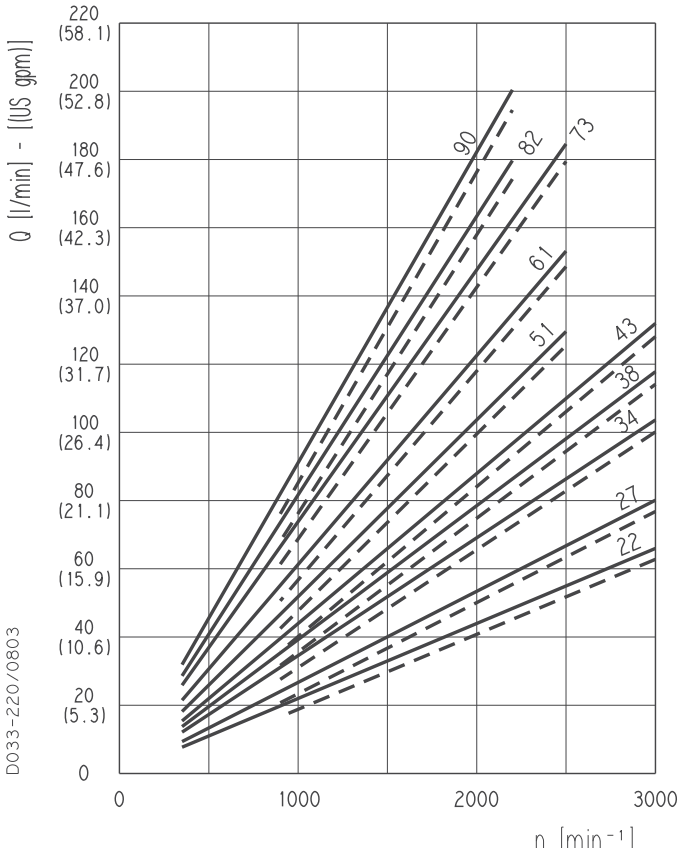
PLP 30 POLARIS 30 GEAR PUMPS PERFORMANCE CURVES

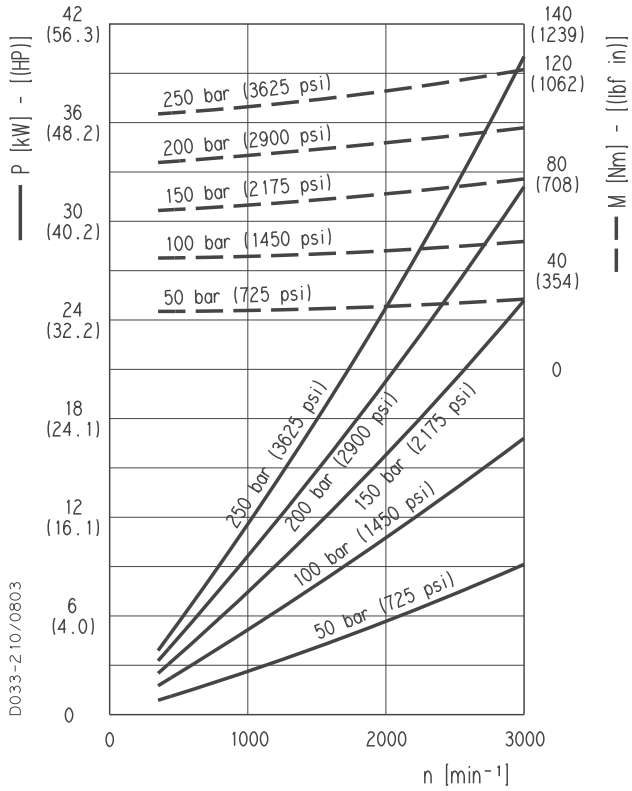
PLP 30



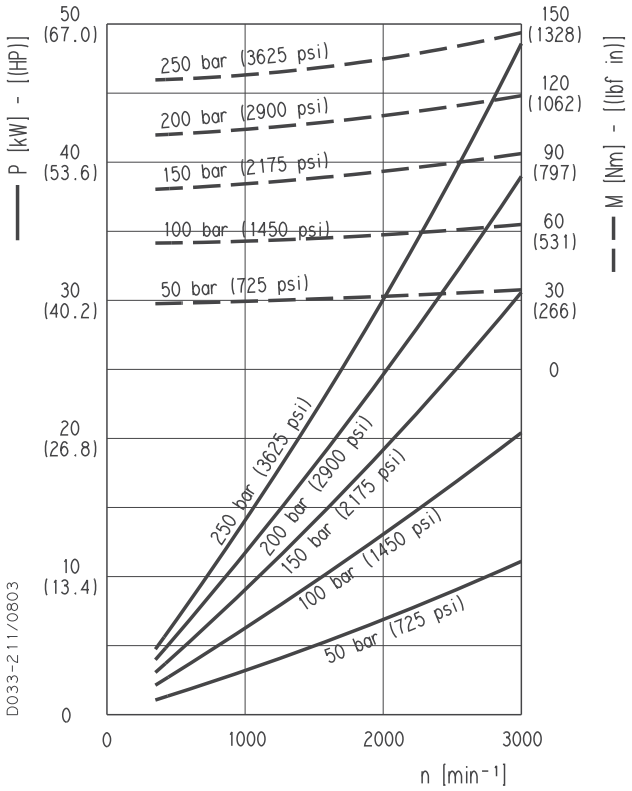
Each curve has been obtained at 122 °F (50°C), using oil with viscosity 168 SSU (36 cSt) at 104 °F (40°C) and at these pressures.

PLP 30•22	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLP 30•27	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLP 30•34	——	290 psi (20 bar)
	– –	3480 psi (240 bar)
PLP 30•38	——	290 psi (20 bar)
	– –	3480 psi (240 bar)
PLP 30•43	——	290 psi (20 bar)
	– –	3335 psi (230 bar)
PLP 30•51	——	290 psi (20 bar)
	– –	3045 psi (210 bar)
PLP 30•61	——	290 psi (20 bar)
	– –	2775 psi (190 bar)
PLP 30•73	——	290 psi (20 bar)
	– –	2465 psi (170 bar)
PLP 30•82	——	290 psi (20 bar)
	– –	2320 psi (160 bar)
PLP 30•90	——	290 psi (20 bar)
		2175 psi (150 bar)

PLP 30•22



PLP 30•27



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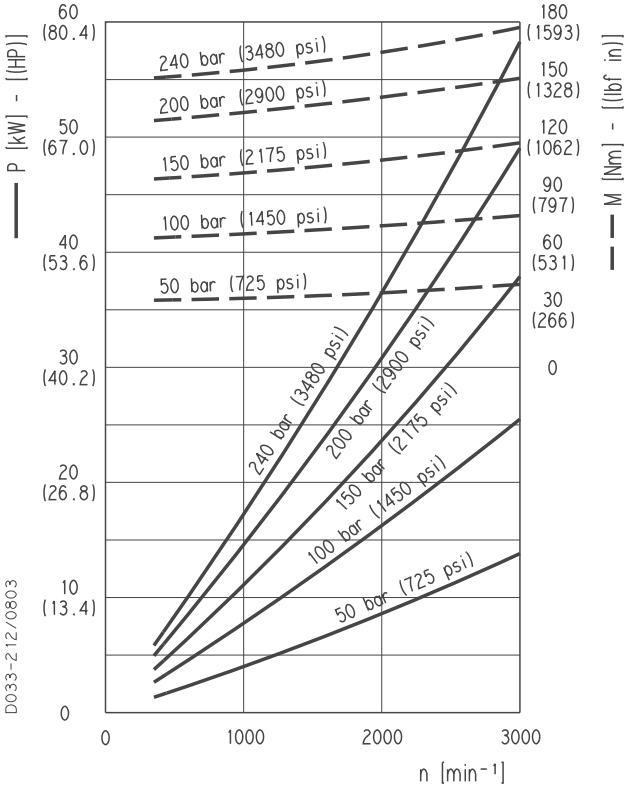
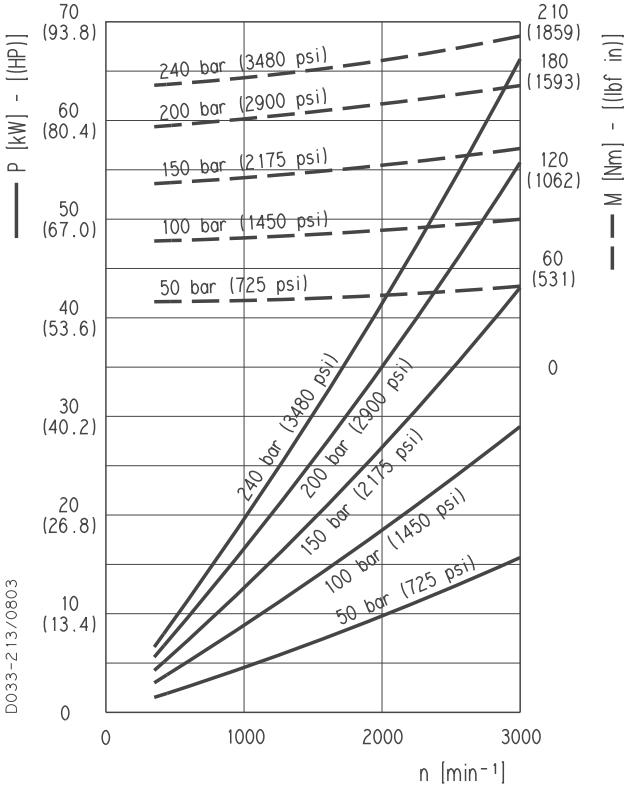
PLP 30 POLARIS 30 GEAR PUMPS PERFORMANCE CURVES

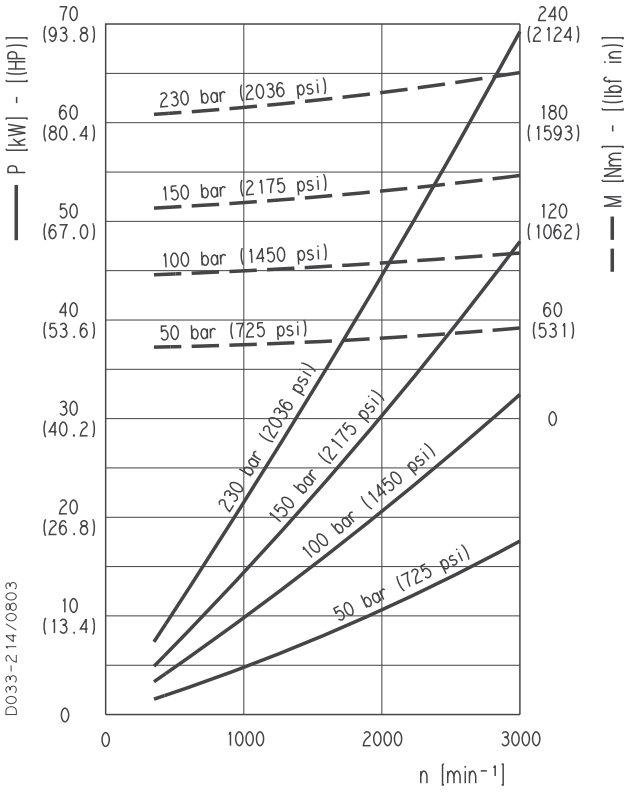
PLP 30•34



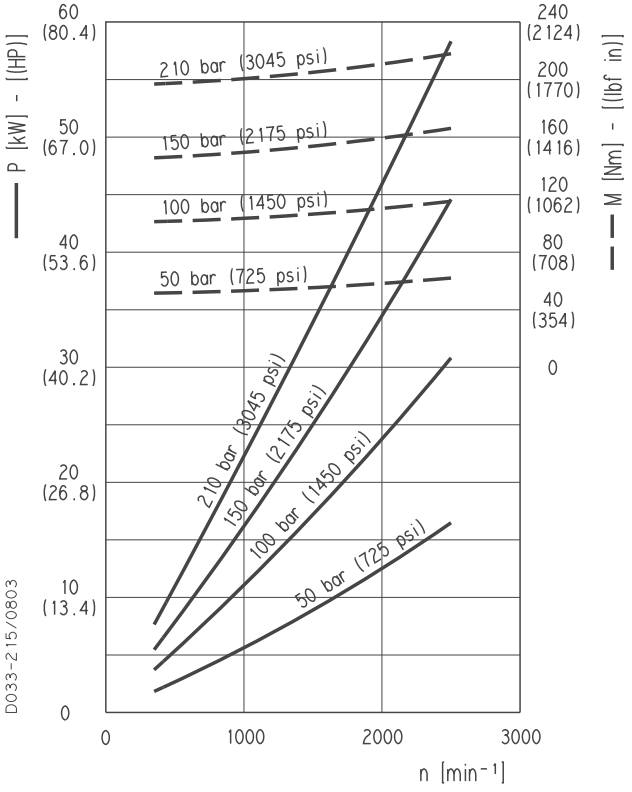
PLP 30•38



PLP 30•43



PLP 30•51



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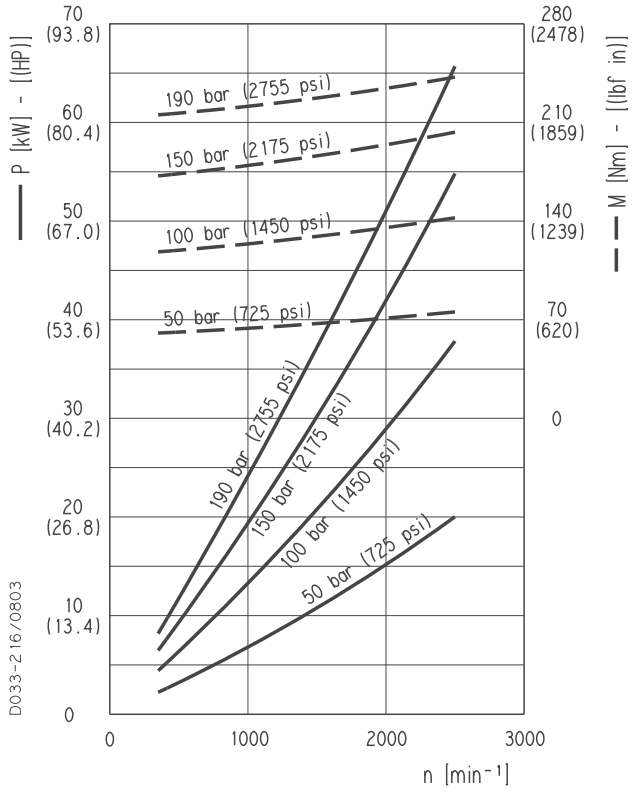
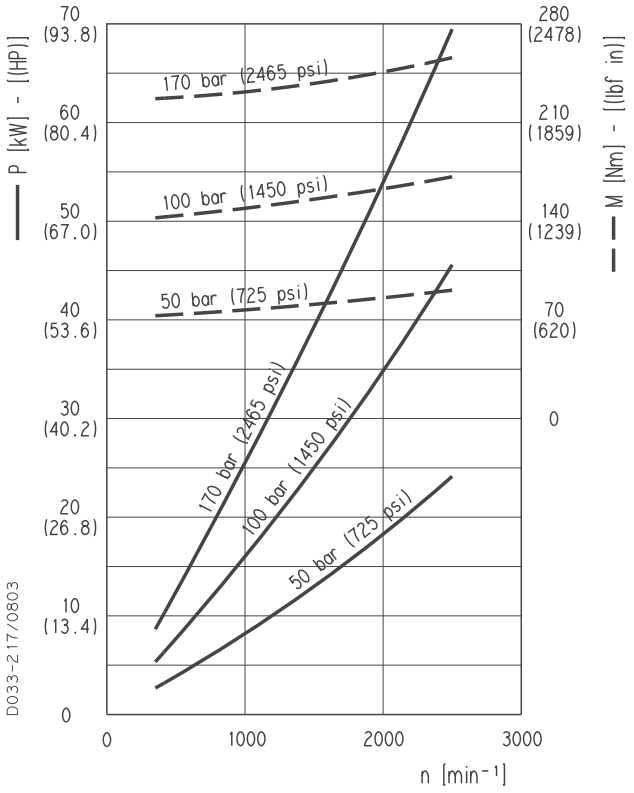
PLP 30 POLARIS 30 GEAR PUMPS PERFORMANCE CURVES

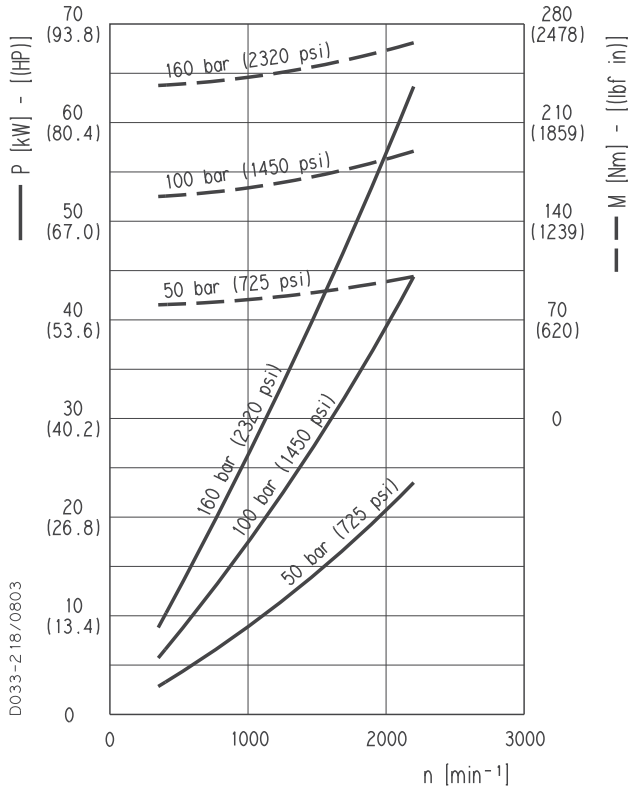
PLP 30•61



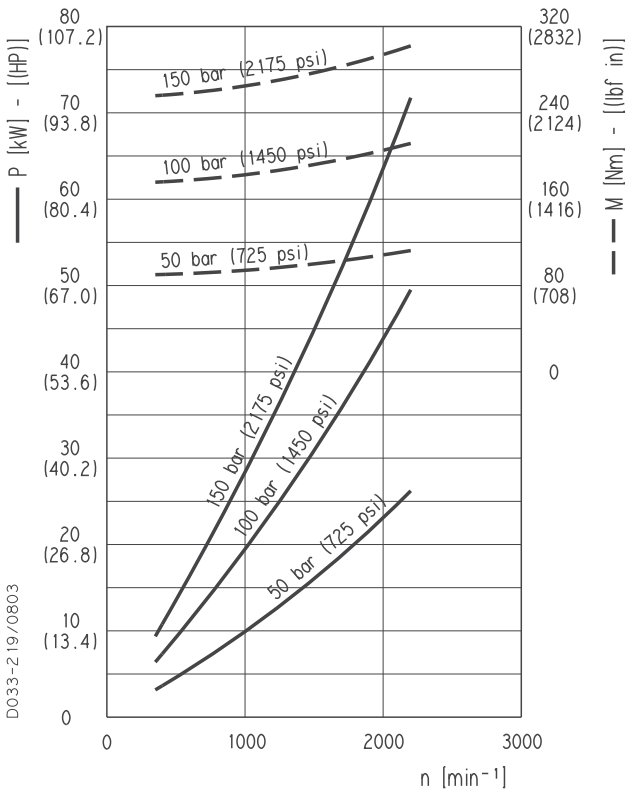
PLP 30•73



PLP 30•82



PLP 30•90



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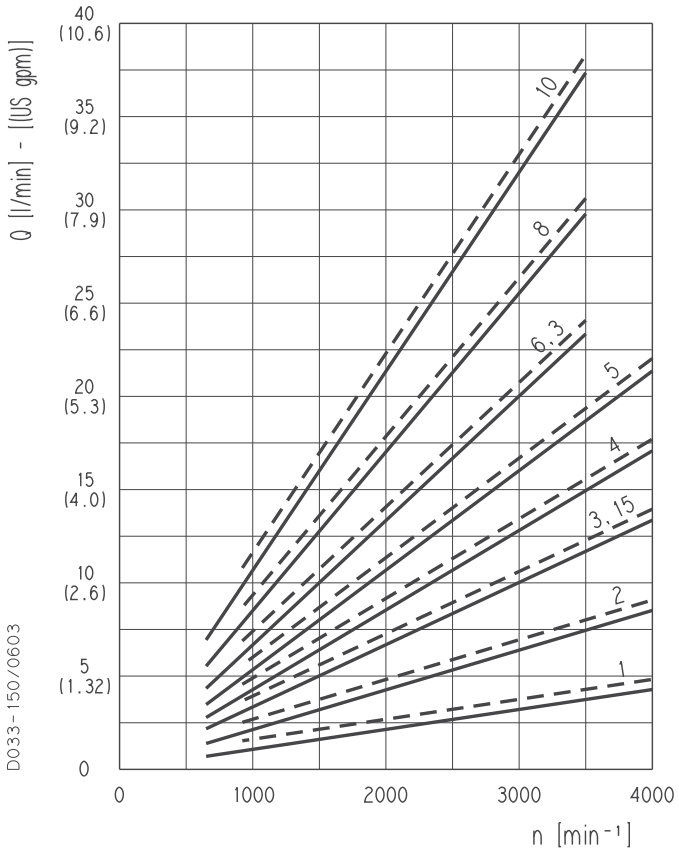
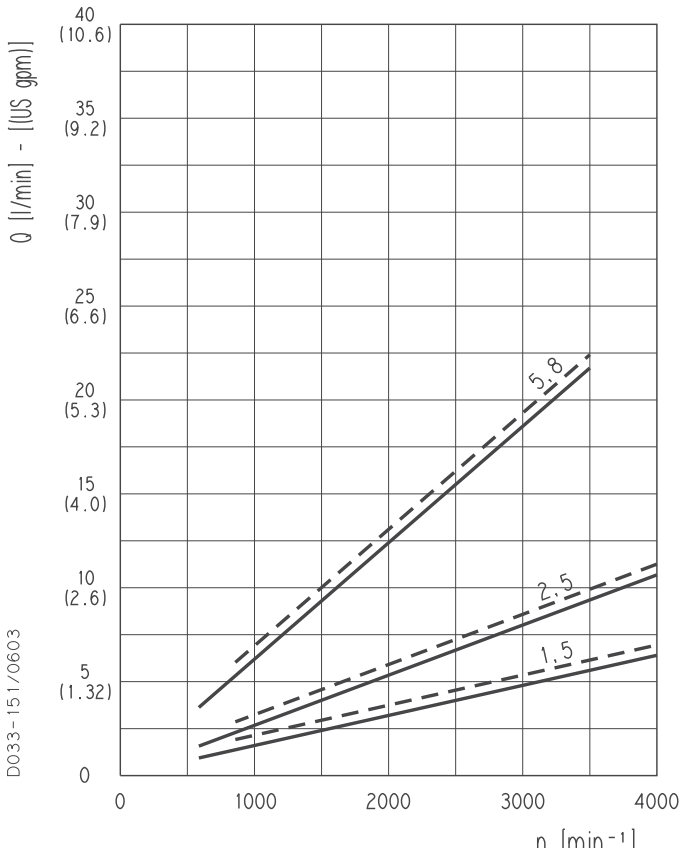
PLM 10 POLARIS 10 GEAR MOTORS PERFORMANCE CURVES

PLM 10



Each curve has been obtained at 122 °F (50°C), using oil with viscosity 168 SSU (36 cSt) at 104 °F (40°C) and at these pressures.

PLM 10•1	——	290 psi (20 bar)
	– –	3770 psi (260 bar)
PLM 10•2	——	290 psi (20 bar)
	– –	3770 psi (260 bar)
PLM 10•3,15	——	290 psi (20 bar)
	– –	3770 psi (260 bar)
PLM 10•4	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLM 10•5	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLM 10•6,3	——	290 psi (20 bar)
	– –	3335 psi (230 bar)
PLM 10•8	——	290 psi (20 bar)
	– –	2610 psi (180 bar)
PLM 10•10	——	290 psi (20 bar)
	– –	2030 psi (140 bar)



PLM 10•1,5	——	290 psi (20 bar)
	– –	3770 psi (260 bar)
PLM 10•2,5	——	290 psi (20 bar)
	– –	3770 psi (260 bar)
PLM 10•5,8	——	290 psi (20 bar)
	– –	3335 psi (230 bar)

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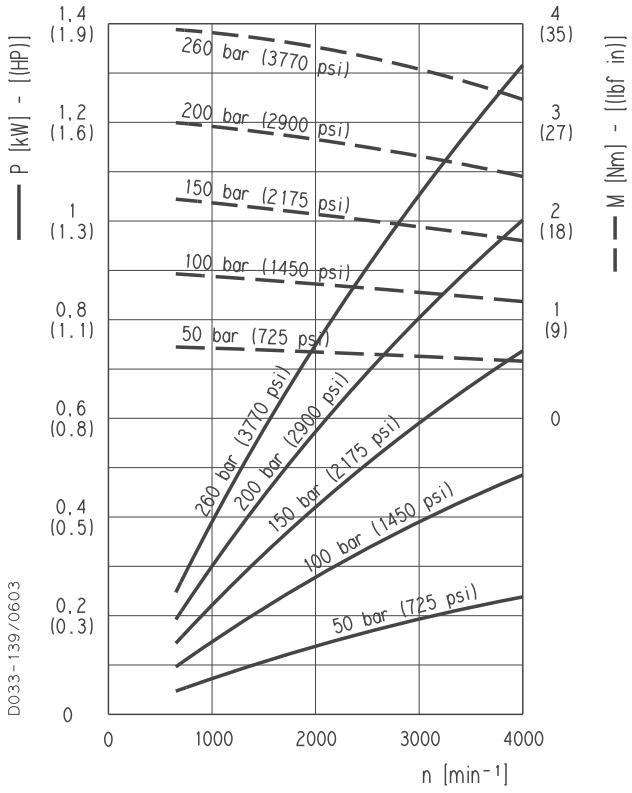
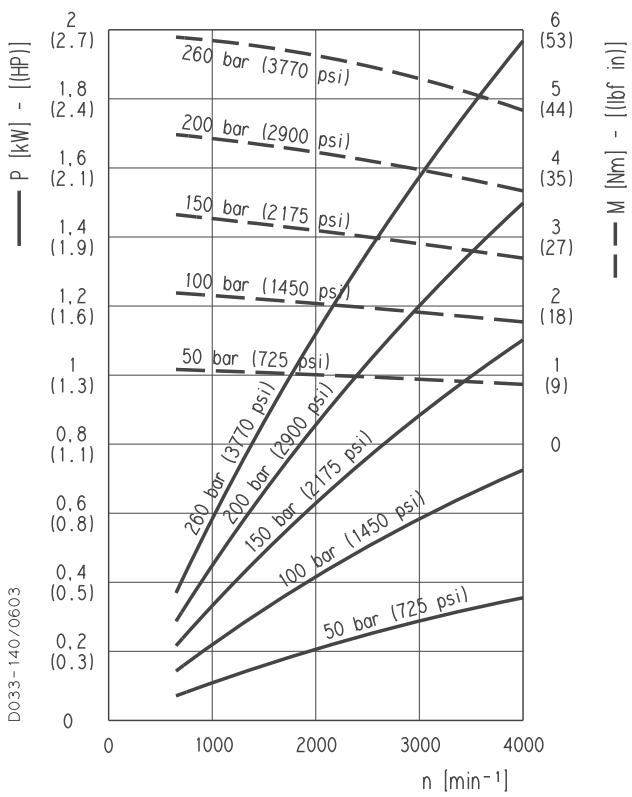
PLM 10 POLARIS 10 GEAR MOTORS PERFORMANCE CURVES

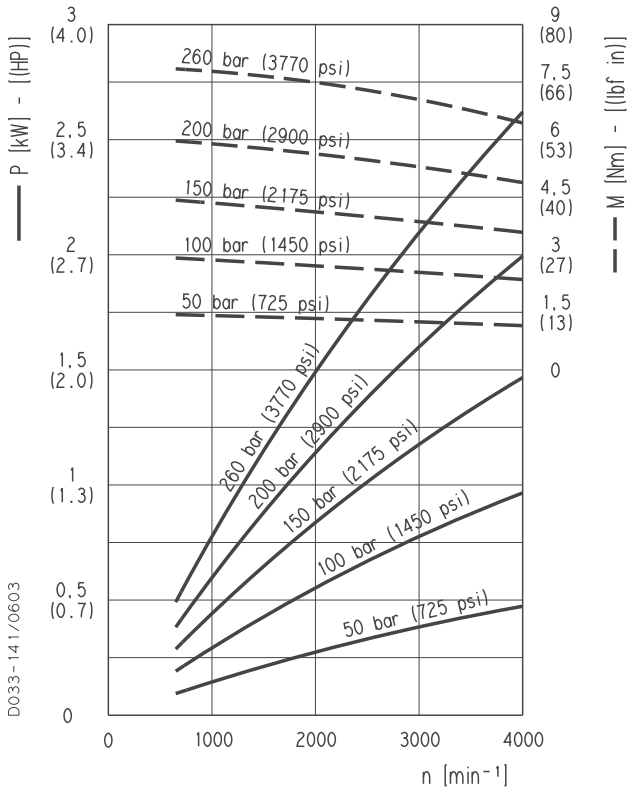
PLM 10•1



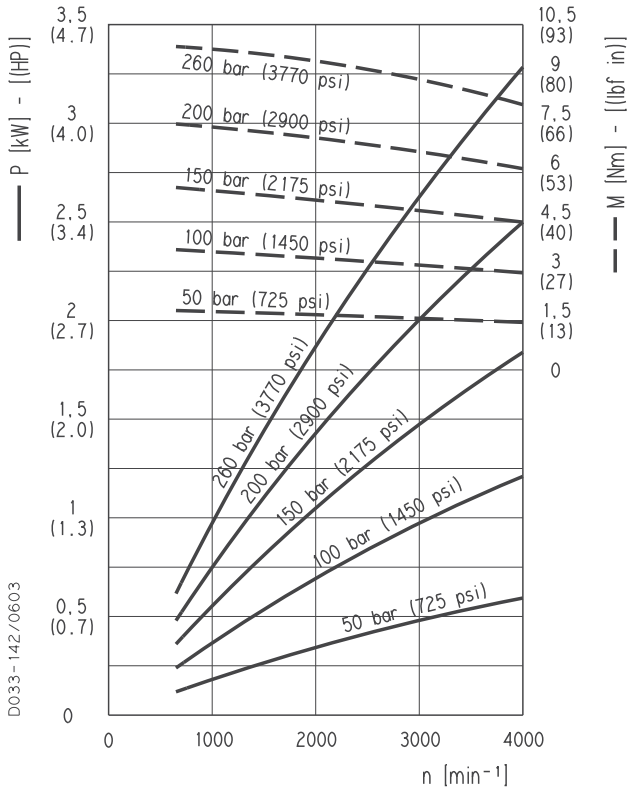
PLM 10•1,5



PLM 10•2



PLM 10•2,5



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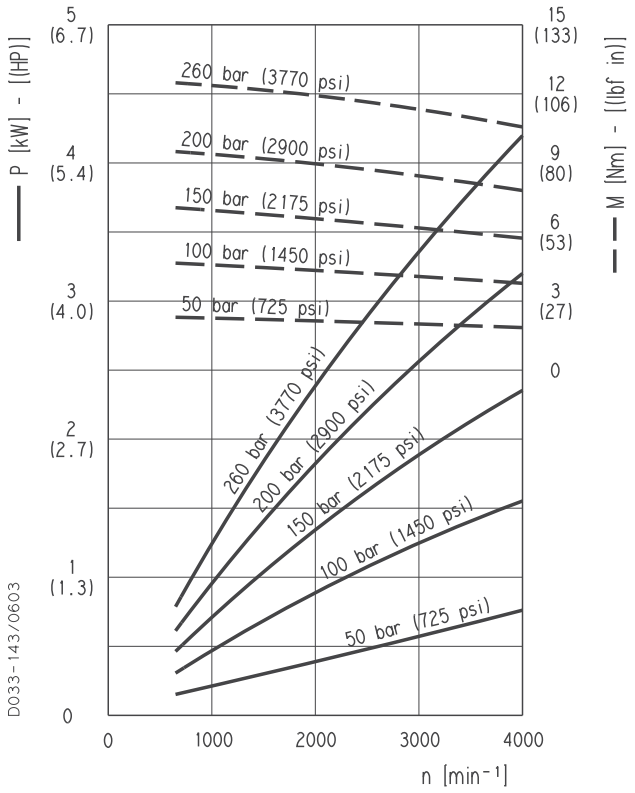
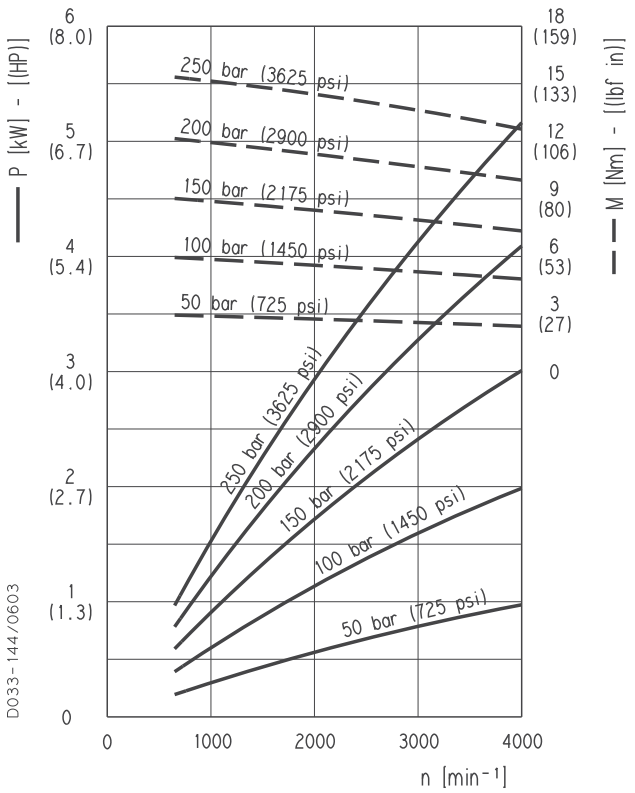
PLM 10 POLARIS 10 GEAR MOTORS PERFORMANCE CURVES

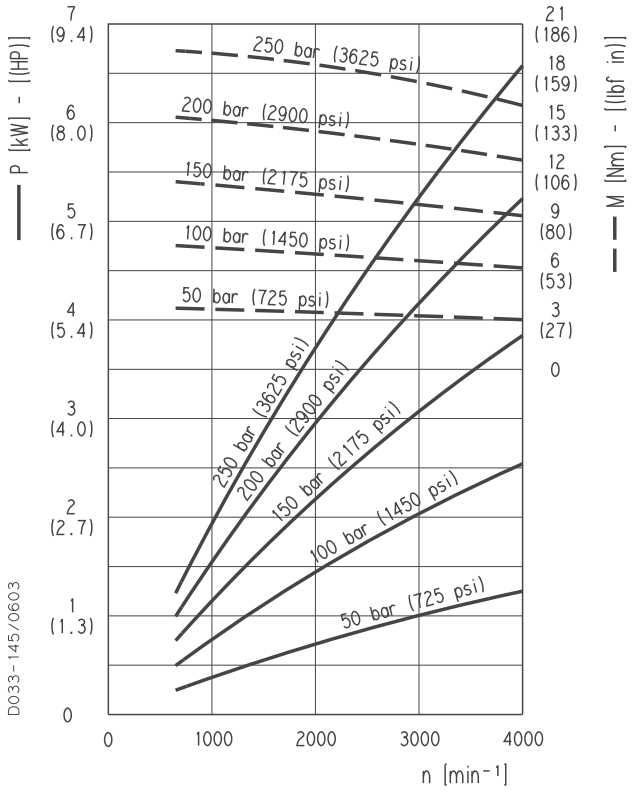
PLM 10•3,15



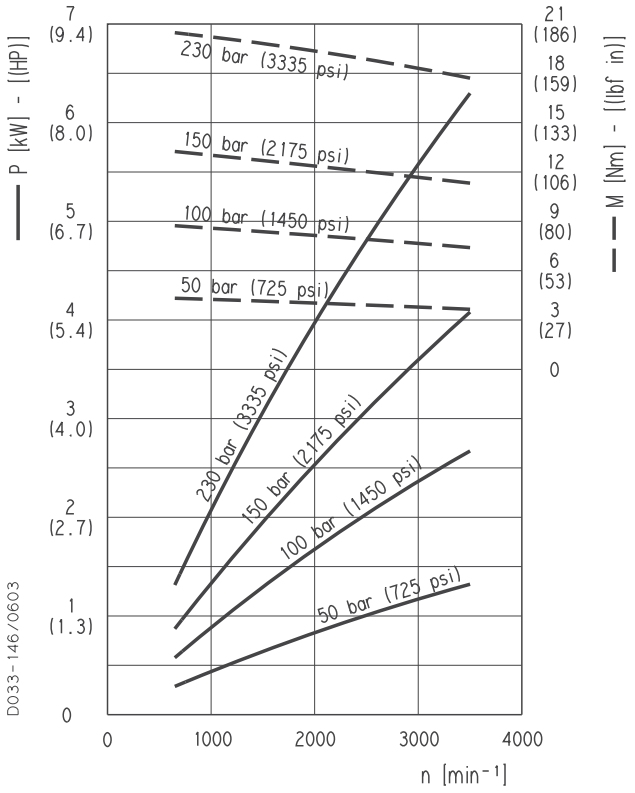
PLM 10•4



PLM 10•5



PLM 10•5,8



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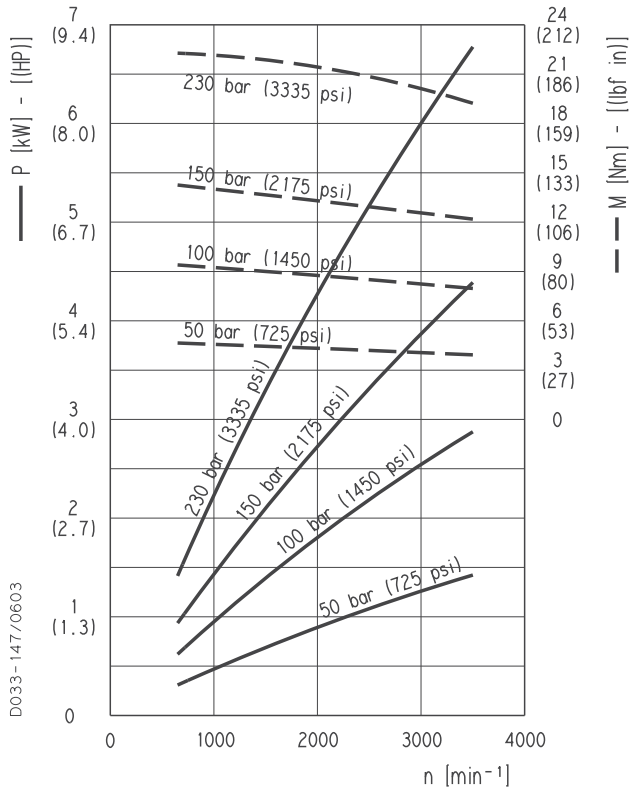
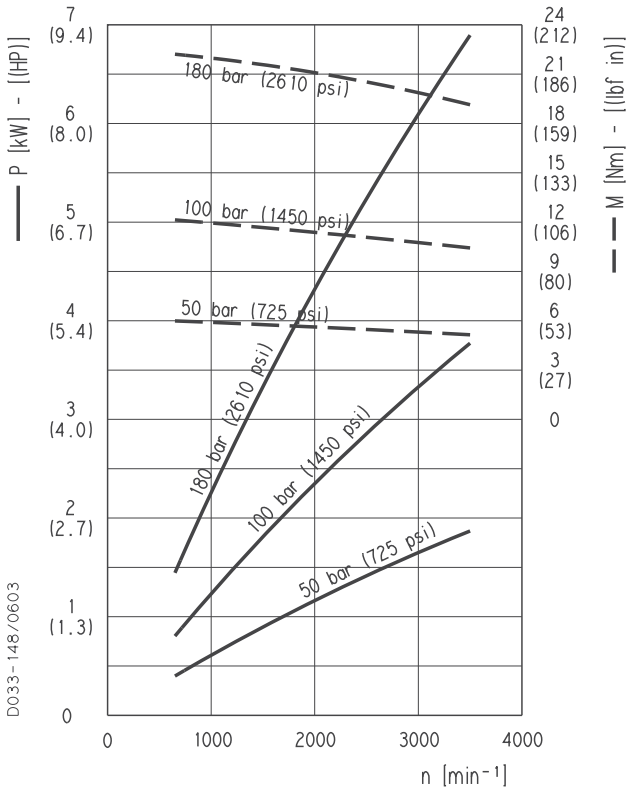
PLM 10 POLARIS 10 GEAR MOTORS PERFORMANCE CURVES

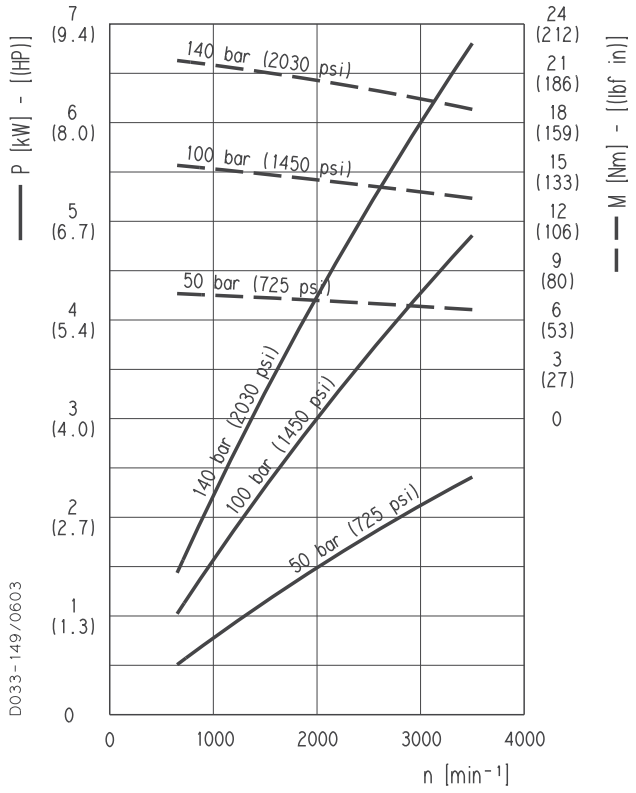
PLM 10•6,3



PLM 10•8



PLM 10•10



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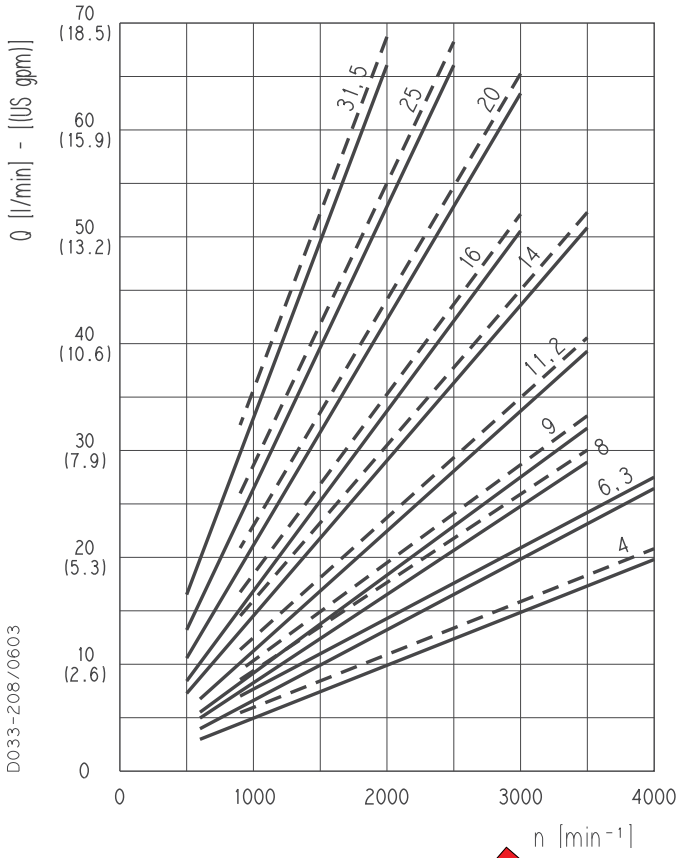
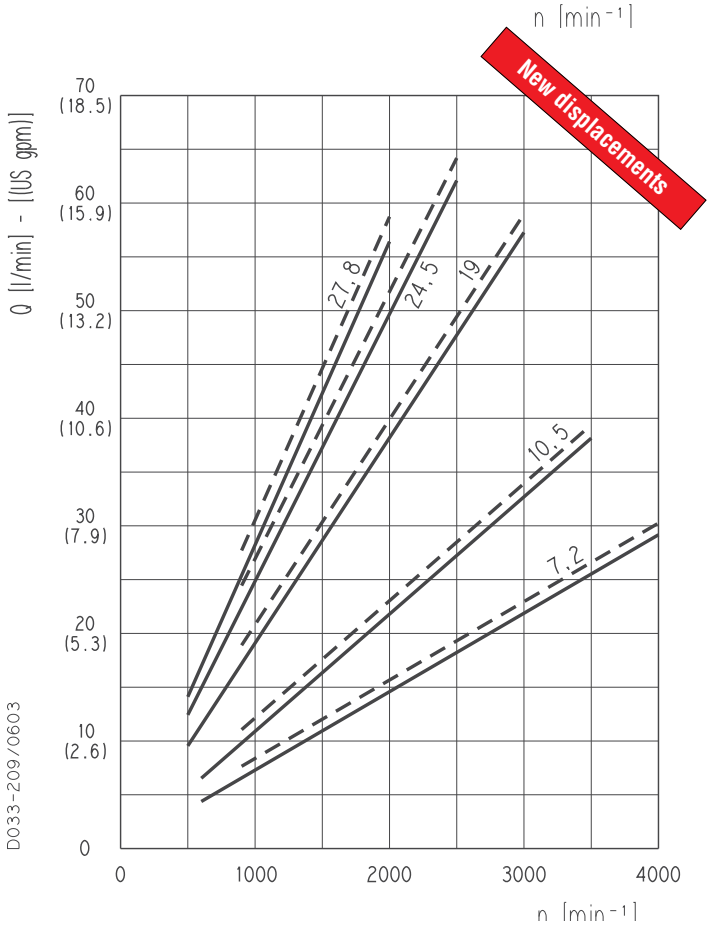
PLM 20 POLARIS 20 GEAR MOTORS PERFORMANCE CURVES

PLM 20



Each curve has been obtained at 122 °F (50°C), using oil with viscosity 168 SSU (36 cSt) at 104 °F (40°C) and at these pressures.

PLM 20•4	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLM 20•6,3	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLM 20•8	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLM 20•9	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLM 20•11,2	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLM 20•14	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLM 20•16	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLM 20•20	——	290 psi (20 bar)
	– –	2900 psi (200 bar)
PLM 20•25	——	290 psi (20 bar)
	– –	2465 psi (170 bar)
PLM 20•31,5	——	290 psi (20 bar)
	– –	1885 psi (130 bar)



PLM 20•7,2	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLM 20•10,5	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLM 20•19	——	290 psi (20 bar)
	– –	2900 psi (200 bar)
PLM 20•24,5	——	290 psi (20 bar)
	– –	2465 psi (170 bar)
PLM 20•27,8	——	290 psi (20 bar)
	– –	1885 psi (130 bar)

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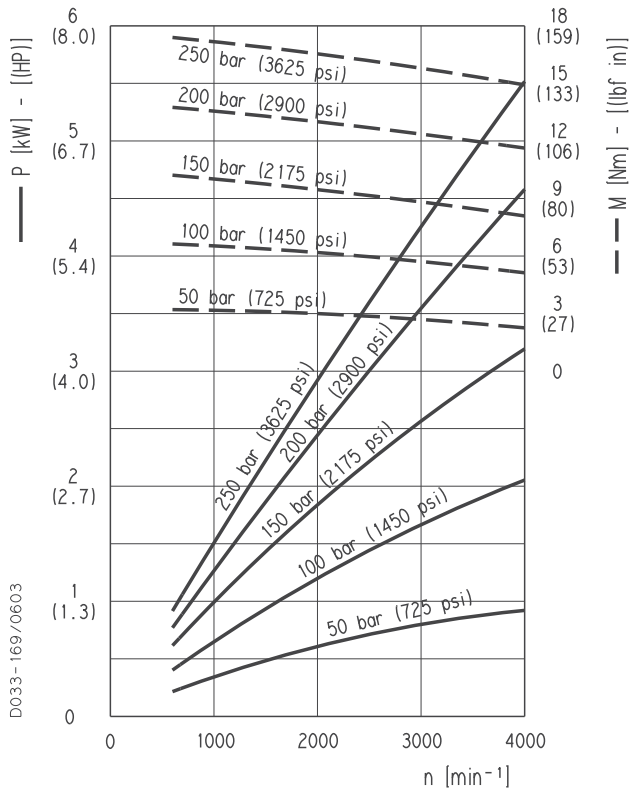
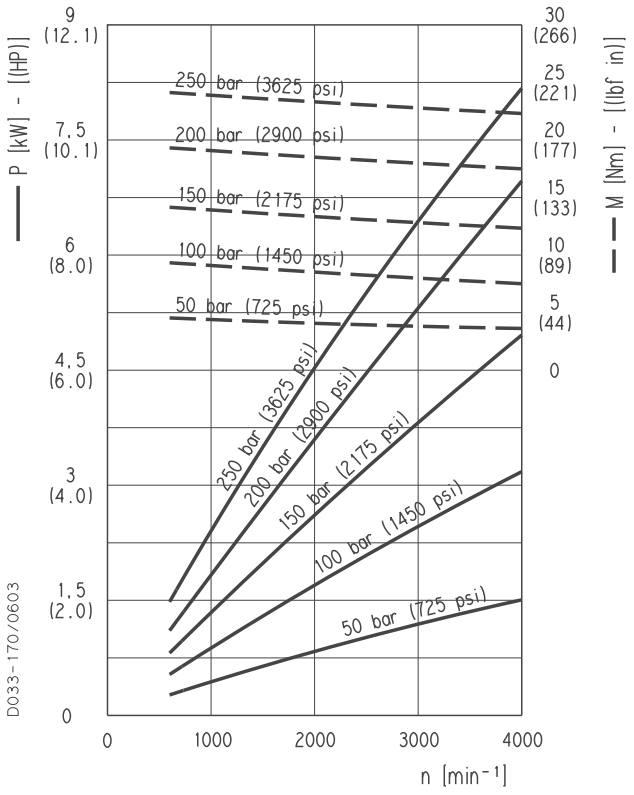
PLM 20 POLARIS 20 GEAR MOTORS PERFORMANCE CURVES

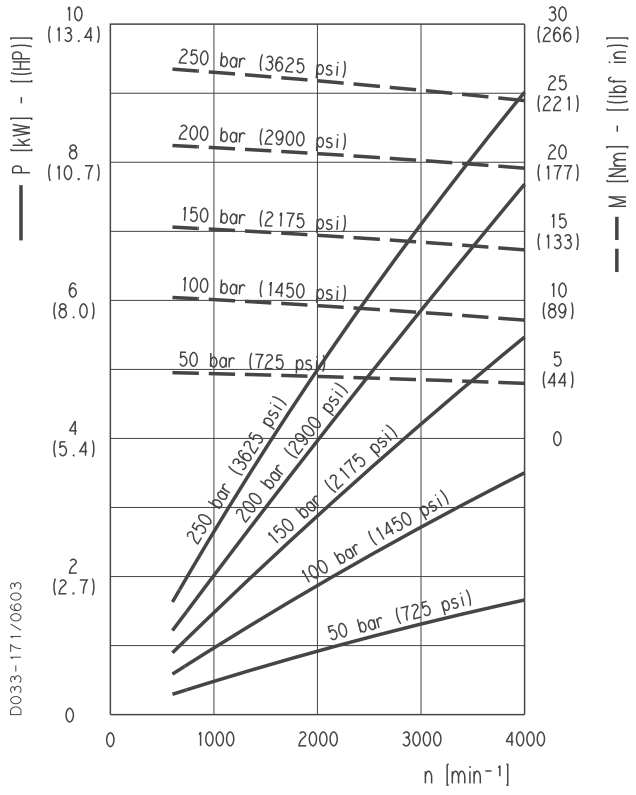
PLM 20•4



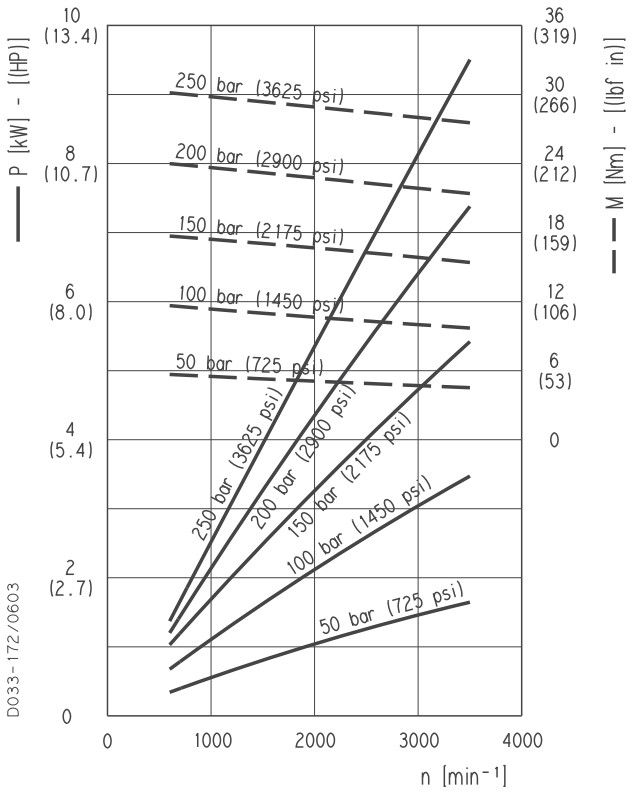
PLM 20•6,3



PLM 20•7,2



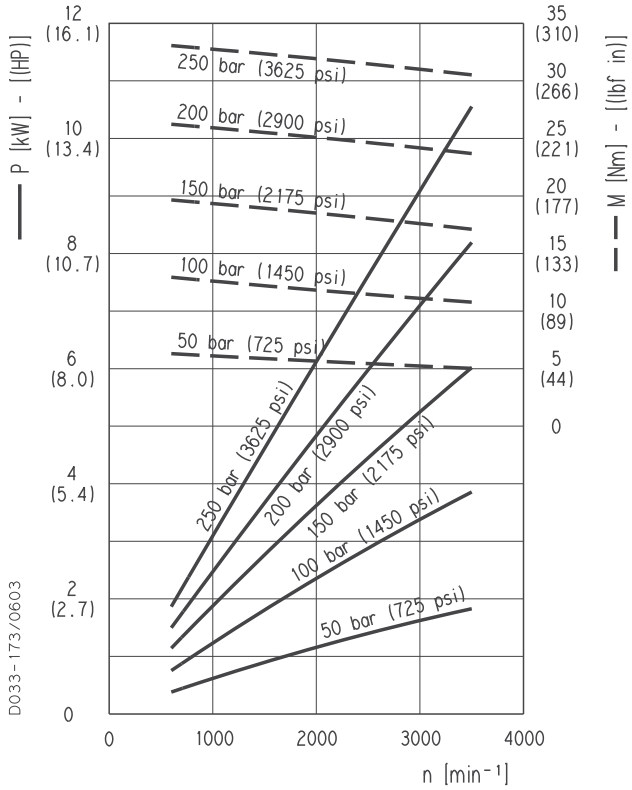
PLM 20•8



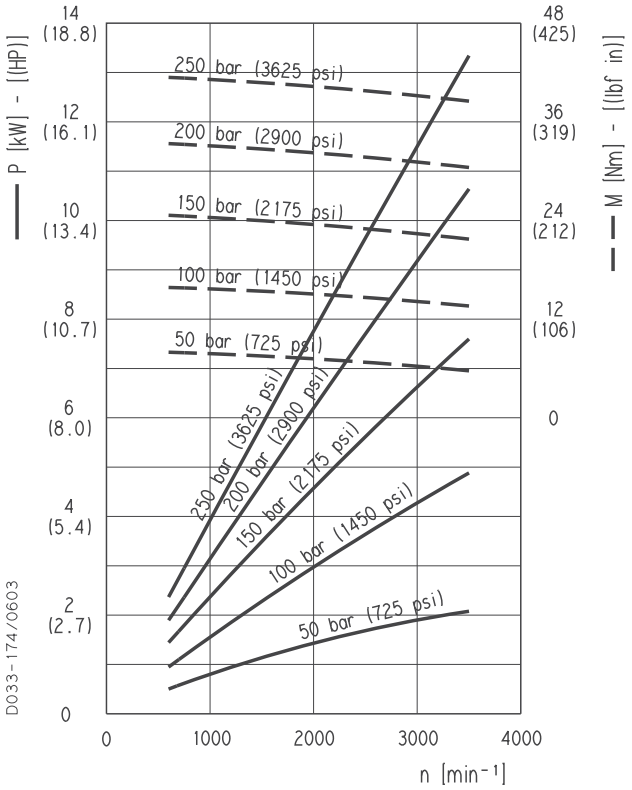
01/10.03

PLM 20 POLARIS 20 GEAR MOTORS PERFORMANCE CURVES

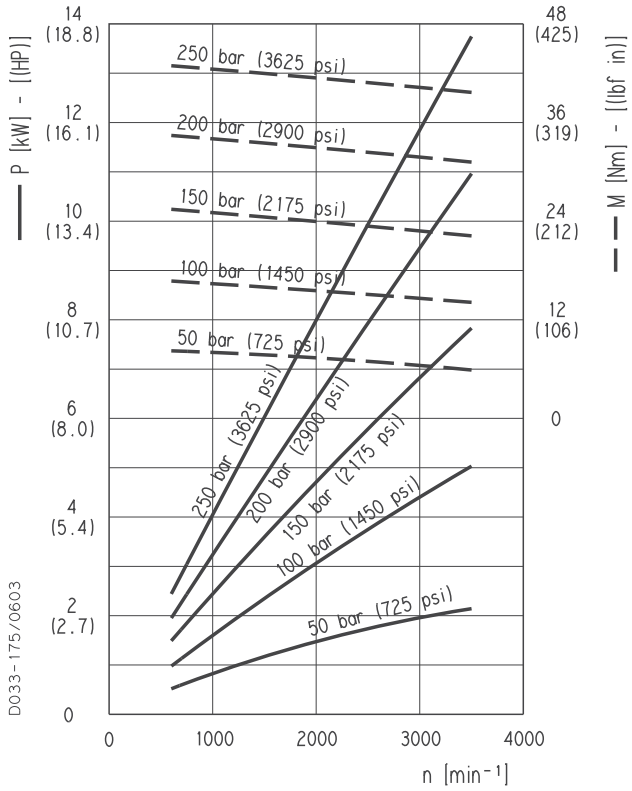
PLM 20•9



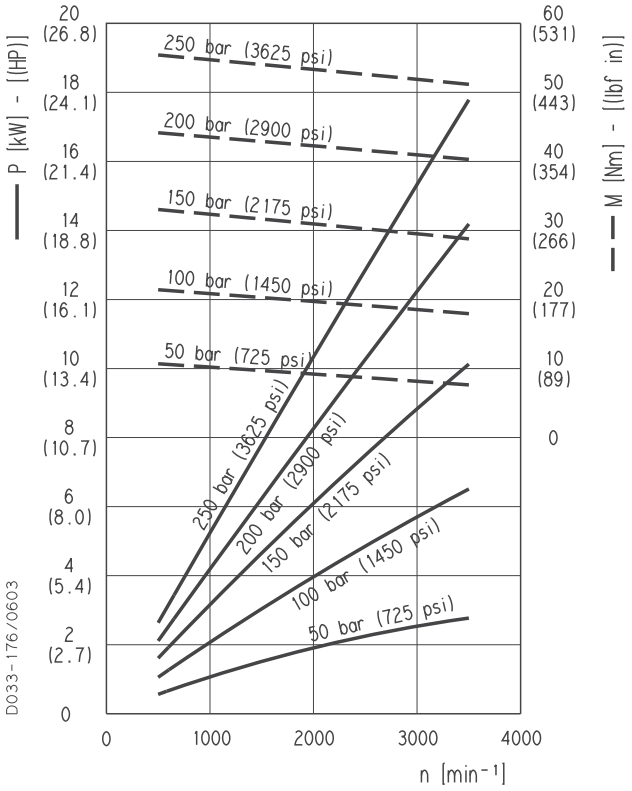
PLM 20•10,5



PLM 20•11,2



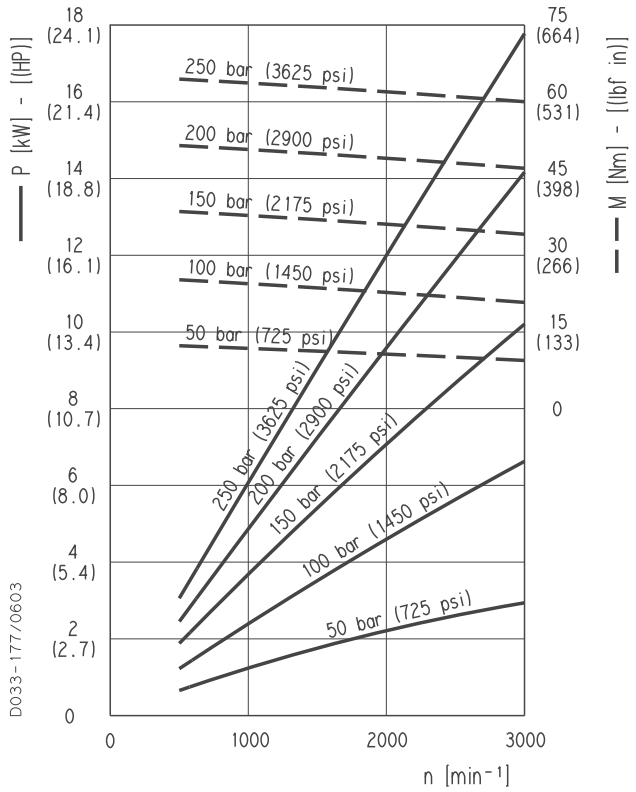
PLM 20•14



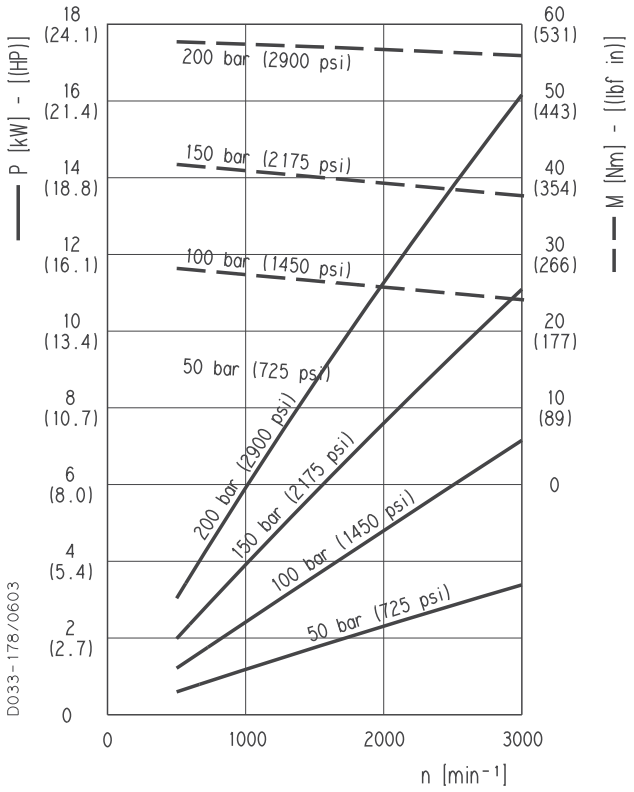
01/10.03

PLM 20 POLARIS 20 GEAR MOTORS PERFORMANCE CURVES

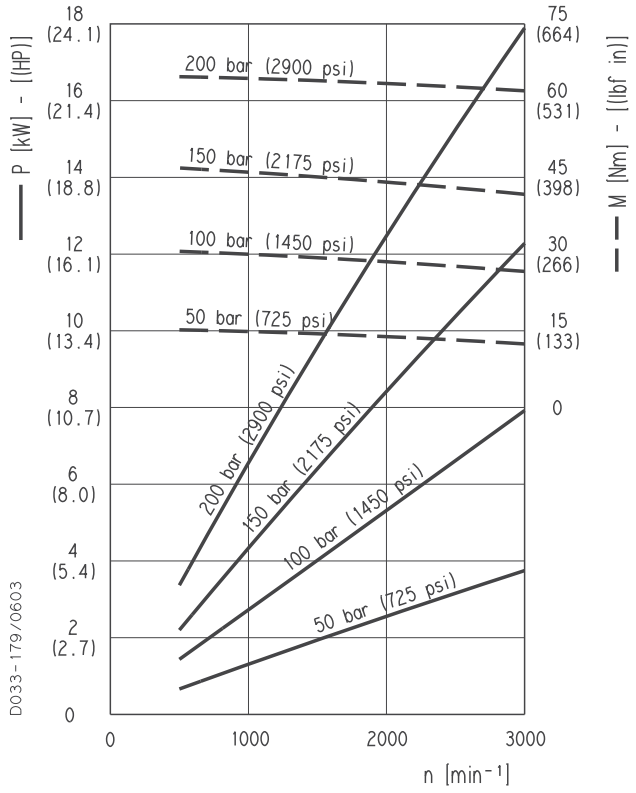
PLM 20•16



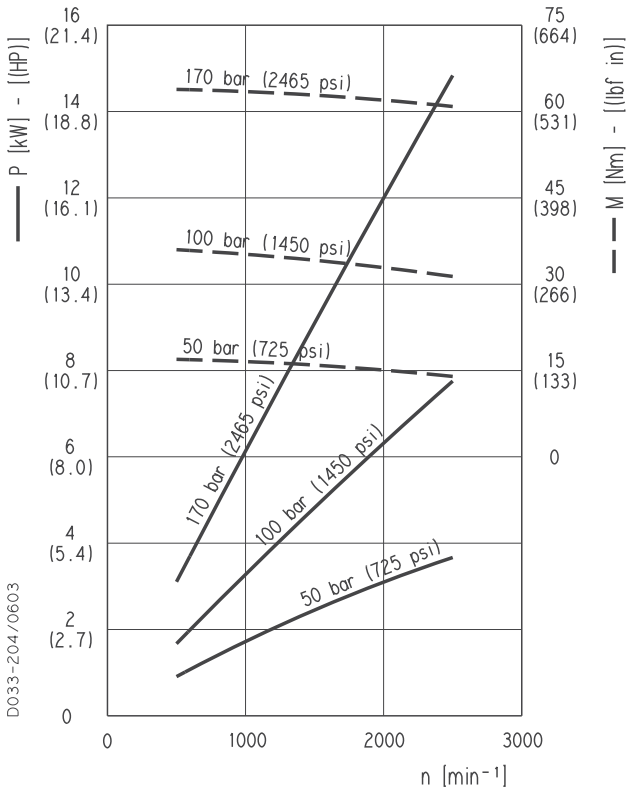
PLM 20•19



PLM 20•20



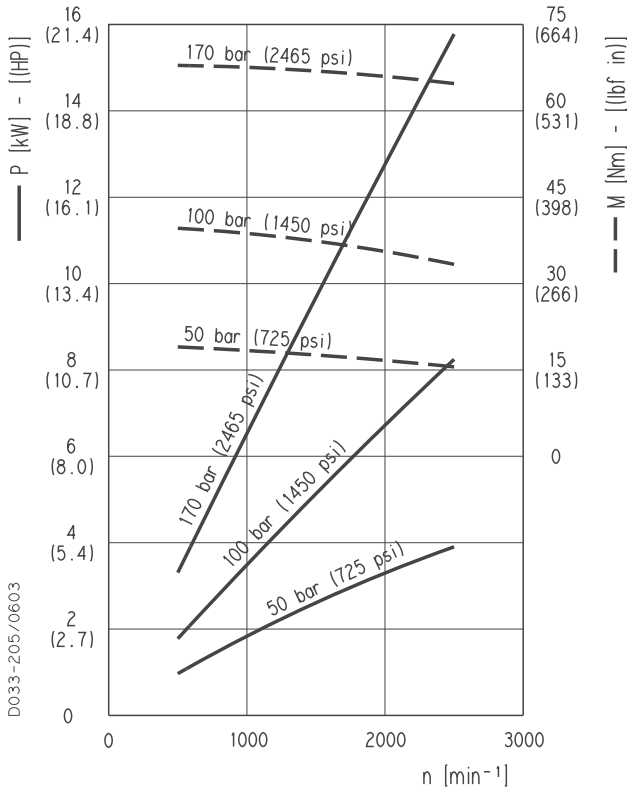
PLM 20•24,5



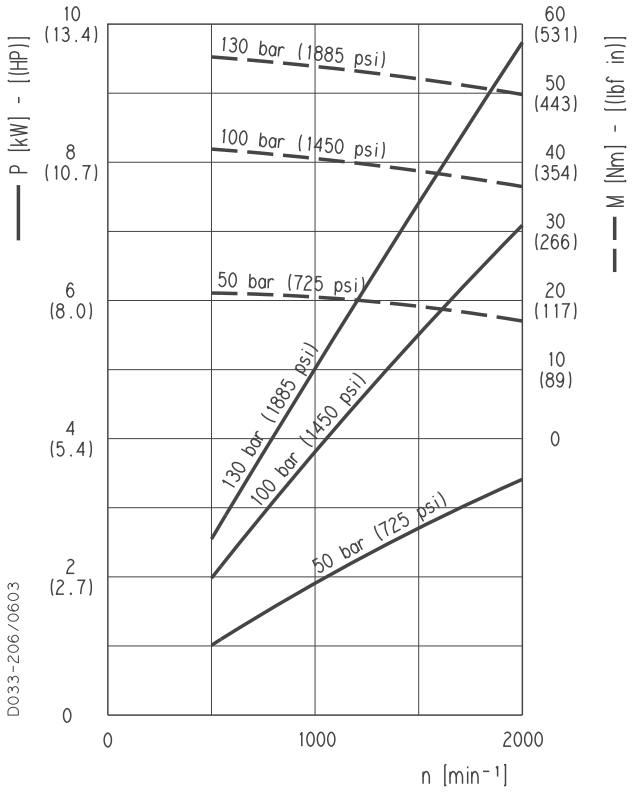
01/10.03

PLM 20 POLARIS 20 GEAR MOTORS PERFORMANCE CURVES

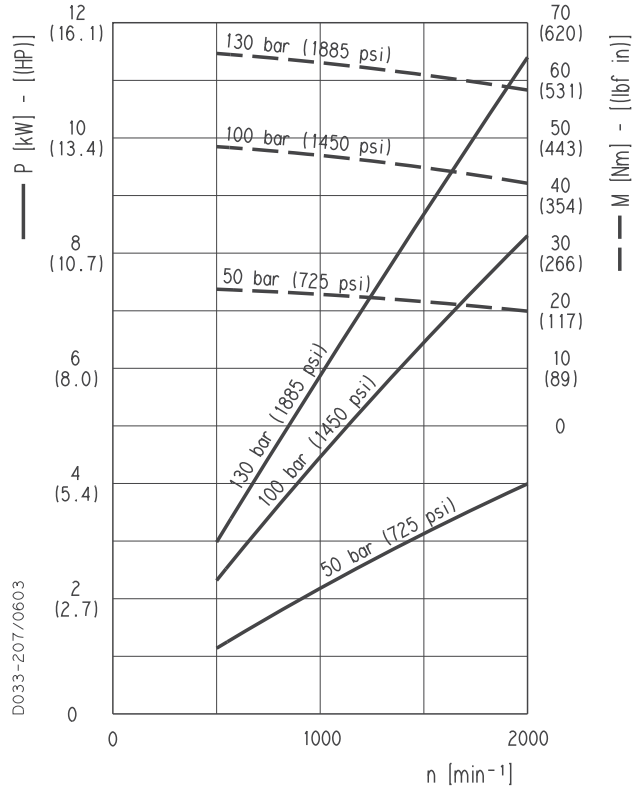
PLM 20•25



PLM 20•27,8



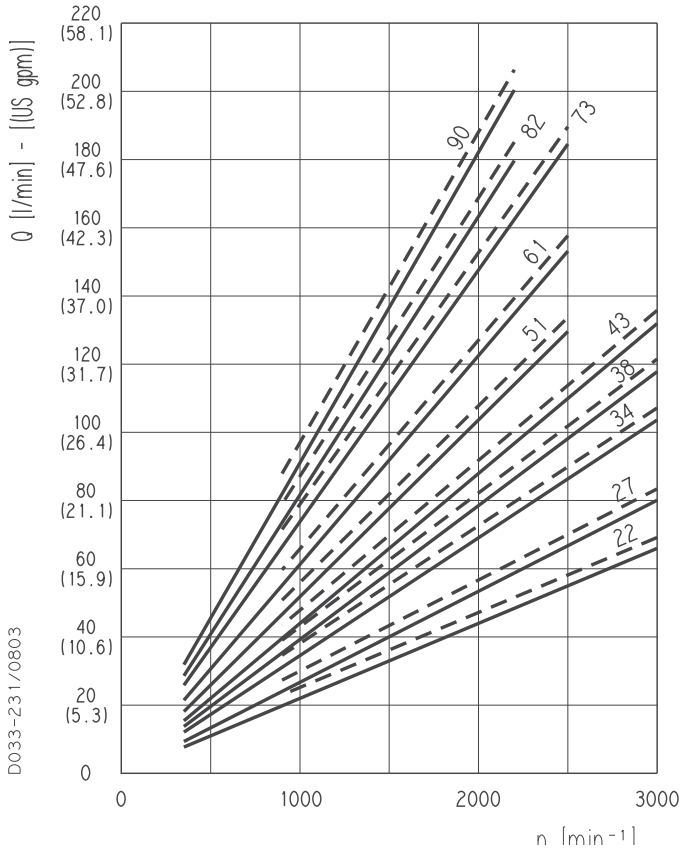
PLM 20•31,5



01/10.03

PLM 30 POLARIS 30 GEAR MOTORS PERFORMANCE CURVES

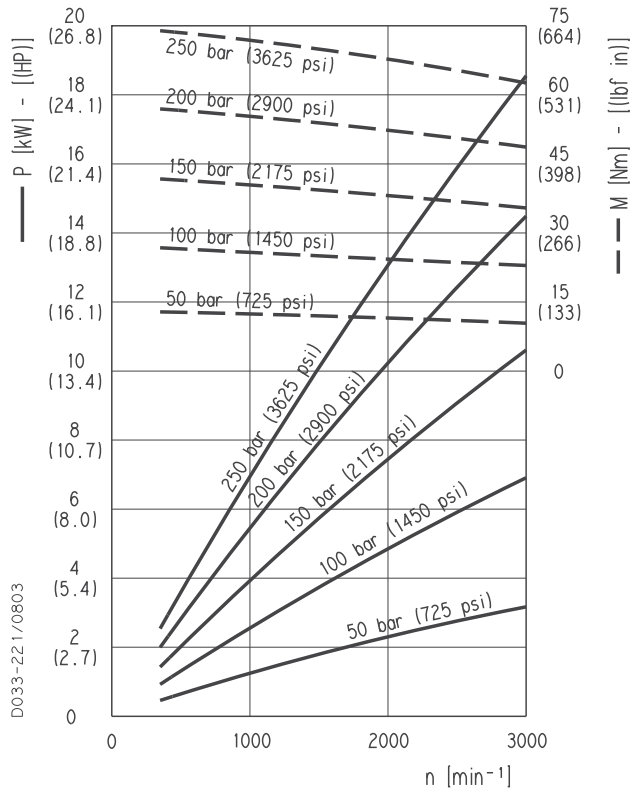
PLM 30



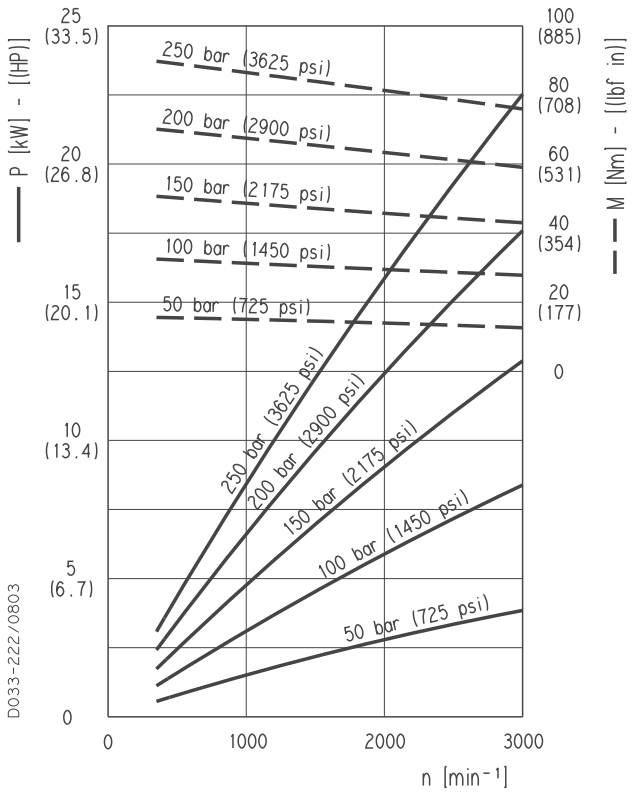
Each curve has been obtained at 122 °F (50°C), using oil with viscosity 168 SSU (36 cSt) at 104 °F (40°C) and at these pressures.

PLM 30•22	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLM 30•27	——	290 psi (20 bar)
	– –	3625 psi (250 bar)
PLM 30•34	——	290 psi (20 bar)
	– –	3480 psi (240 bar)
PLM 30•38	——	290 psi (20 bar)
	– –	3480 psi (240 bar)
PLM 30•43	——	290 psi (20 bar)
	– –	3335 psi (230 bar)
PLM 30•51	——	290 psi (20 bar)
	– –	3045 psi (210 bar)
PLM 30•61	——	290 psi (20 bar)
	– –	2775 psi (190 bar)
PLM 30•73	——	290 psi (20 bar)
	– –	2465 psi (170 bar)
PLM 30•82	——	290 psi (20 bar)
	– –	2320 psi (160 bar)
PLM 30•90	——	290 psi (20 bar)
	– –	2175 psi (150 bar)

PLM 30•22



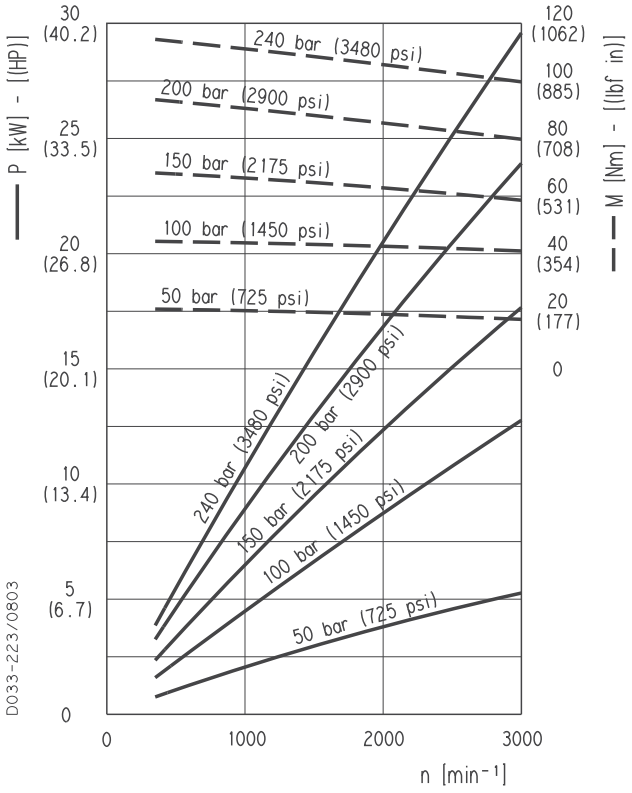
PLM 30•27



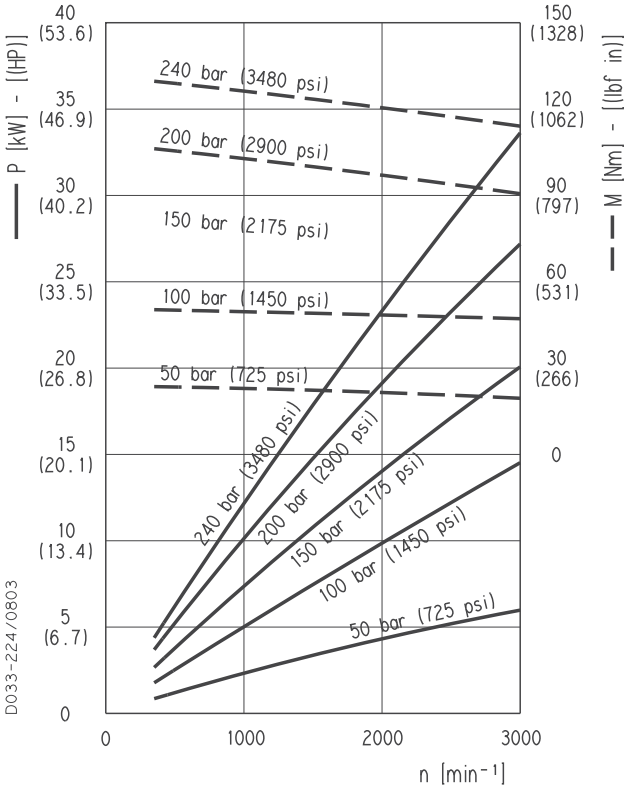
01/10.03

PLM 30 POLARIS 30 GEAR MOTORS PERFORMANCE CURVES

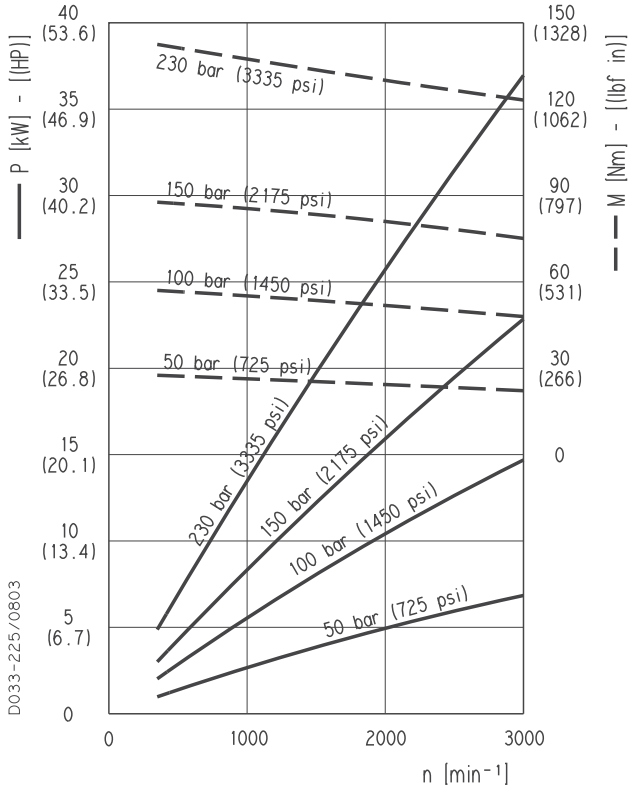
PLM 30•34



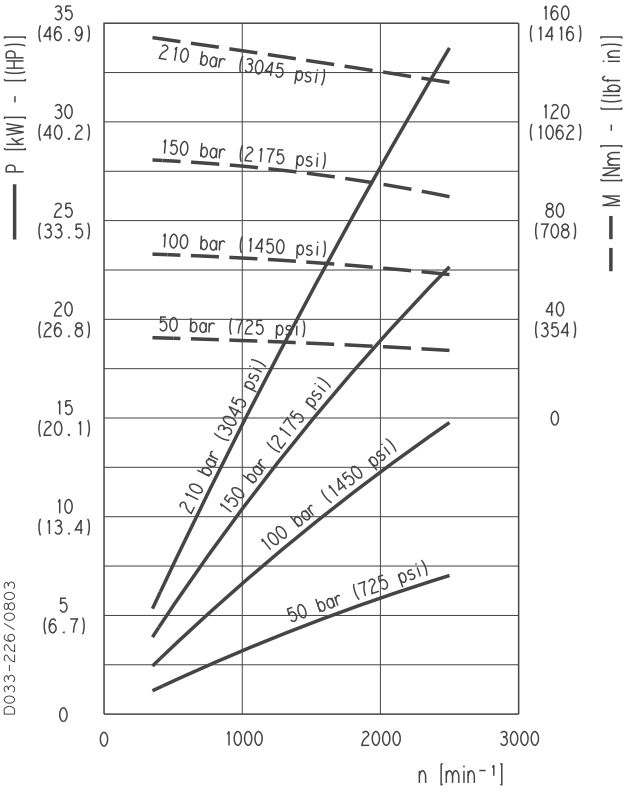
PLM 30•38



PLM 30•43



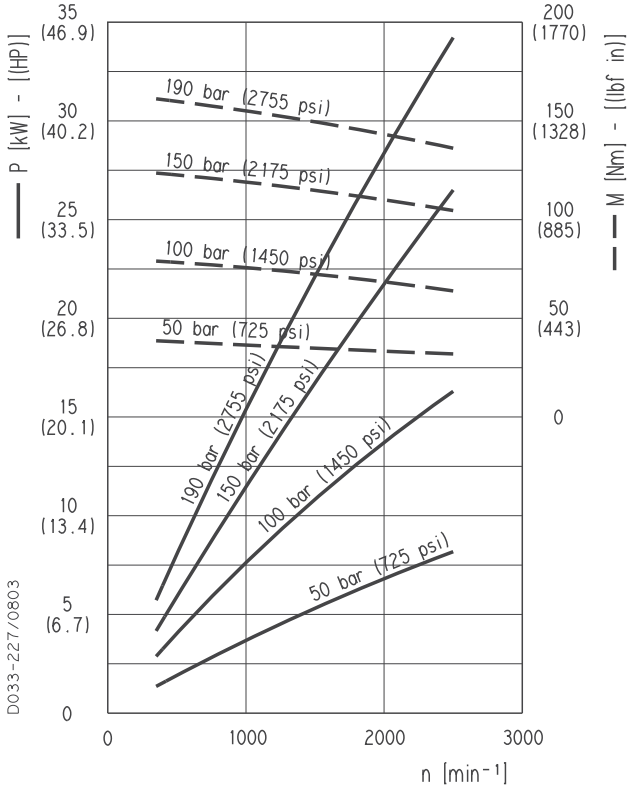
PLM 30•51



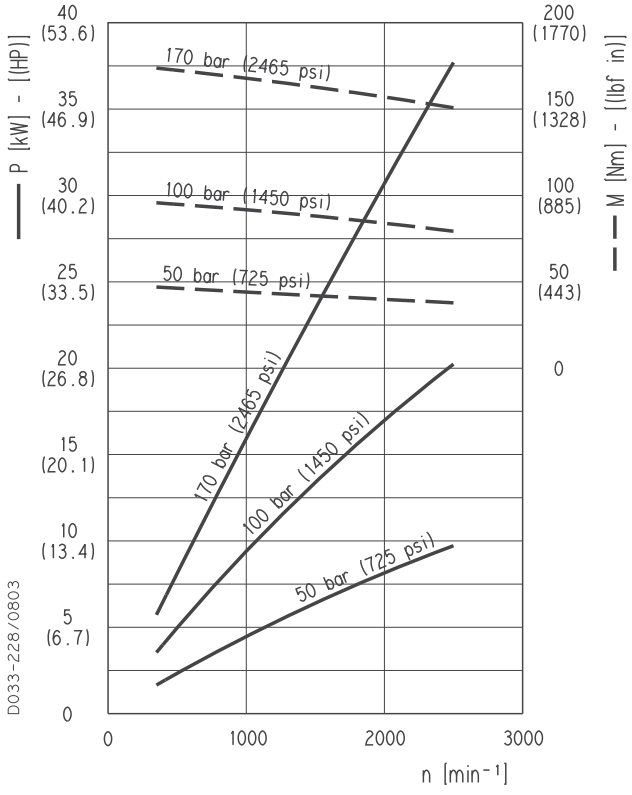
01/10.03

PLM 30 POLARIS 30 GEAR MOTORS PERFORMANCE CURVES

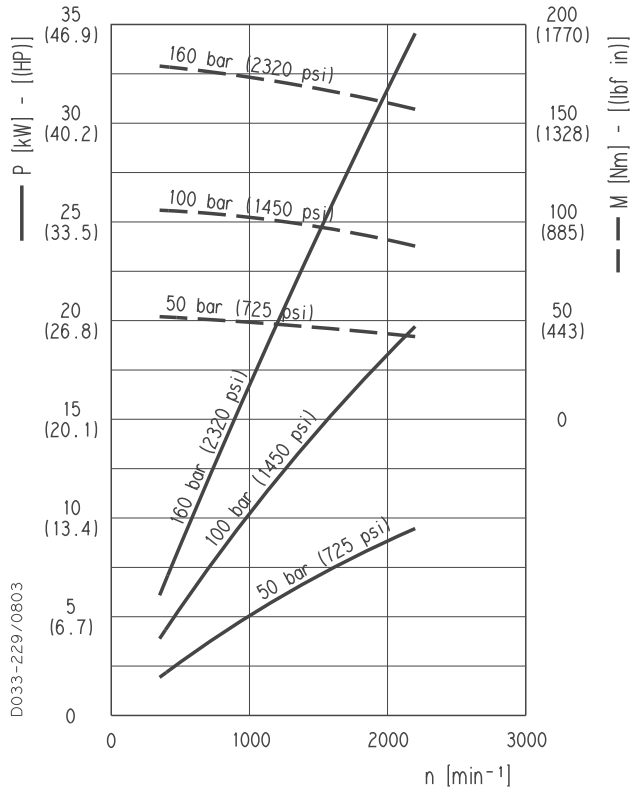
PLM 30•61



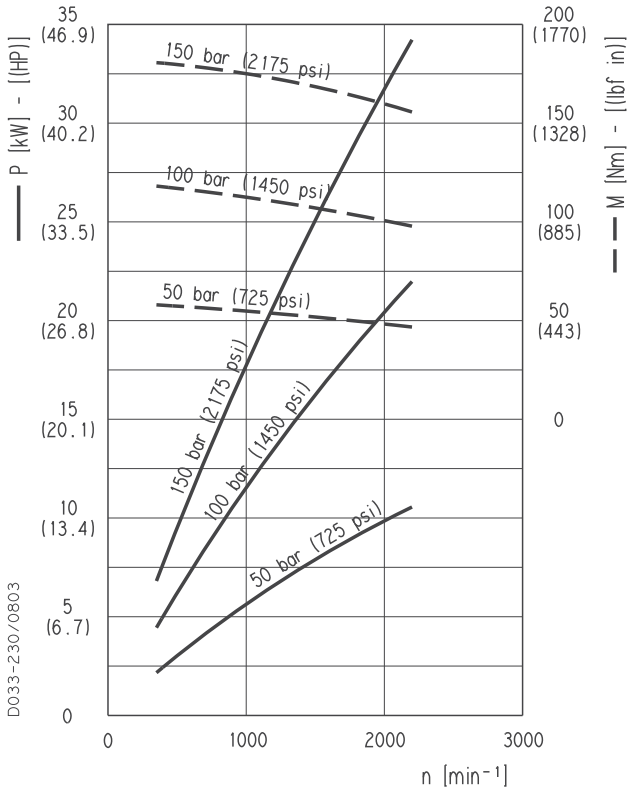
PLM 30•73



PLM 30•82

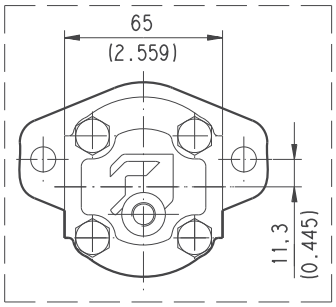


PLM 30•90

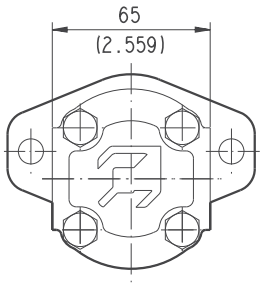


01/10.03

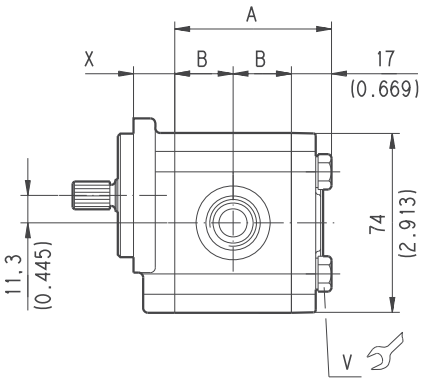
POLARIS 10 — SINGLE UNITS SIDE PORTS — L

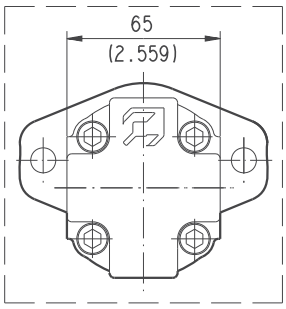


Reversible R

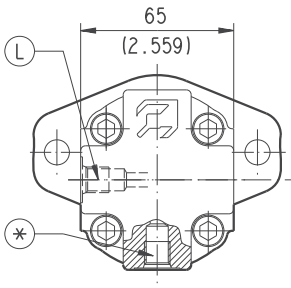


Single rotation S - D

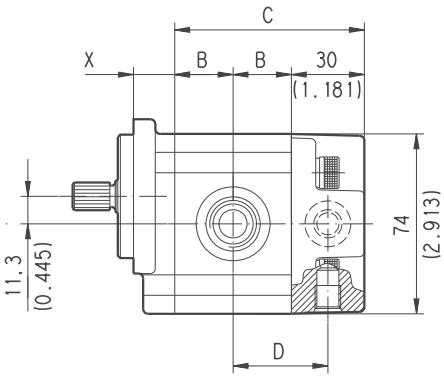




Reversible B



Reversible L



D033-180/0903

Replaces: 01/10.03

Mounting flange type version 0	X
	mm (inch)
E1	14 (0.5512)
E7	14 (0.5512)
E8	14 (0.5512)
B1	14 (0.5512)
K2	11,8 (0.4646)
S0	17 (0.6693)
R8	41 (1.6142)
R9	41 (1.6142)
W9	41 (1.6142)

O For single rotation S - D and reversible rotation R the rear cover is available in cast iron and aluminium.
For reversible rotation B and L the rear cover is in aluminium only.

DRAIN PORTS POSITION
L = Side * = Bottom

DRIVE SHAFTS: see page 52
MOUNTING FLANGE: see page 58 ÷ 60
PORTS: see page. 69 ÷ 74

Mounting flange material	Screw tightening torque O Nm (lbf in)
	V
Aluminium	25 ±2,5 (199 ÷ 243)
Cast iron	

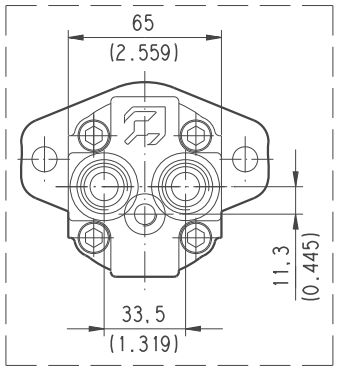
Pump type Motor type	A	B	C	D
	mm (inch)	mm (inch)	mm (inch)	mm (inch)
PL. 10•1	52,2 (2.0551)	17,6 (0.6929)	65,2 (2.5669)	32,6 (1.2835)
PL. 10•1,5	53,8 (2.1181)	18,4 (0.7244)	66,8 (2.6299)	33,4 (1.3150)
PL. 10•2	55,4 (2.1811)	19,2 (0.7559)	68,4 (2.6929)	34,2 (1.3465)
PL. 10•2,5	57 (2.2441)	20 (0.7874)	70 (2.7559)	35 (1.3780)
PL. 10•3,15	59 (2.3228)	21 (0.8268)	72 (2.8346)	36 (1.4173)
PL. 10•4	61,8 (2.4331)	22,4 (0.8819)	74,8 (2.9449)	37,4 (1.4724)
PL. 10•5	65 (2.5591)	24 (0.9449)	78 (3.0709)	39 (1.5354)
PL. 10•5,8	67,6 (2.6614)	25,3 (0.9961)	80,6 (3.1732)	40,3 (1.5866)
PL. 10•6,3	69 (2.7165)	26 (1.0236)	82 (3.2283)	41 (1.6142)
PL. 10•8	74,5 (2.9331)	28,75 (1.1319)	87,5 (3.4449)	43,75 (1.7224)
PL. 10•10	81 (3.1890)	32 (1.2598)	94 (3.7008)	47 (1.8504)

O 02/07.2006

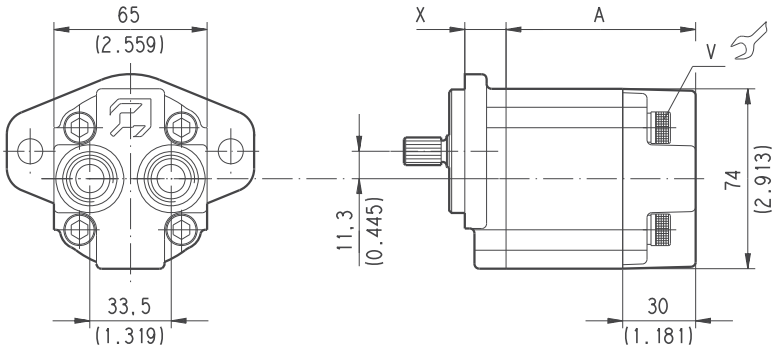
POLARIS 10 — SINGLE UNITS REAR PORTS — P

Replaces: 01/10.03

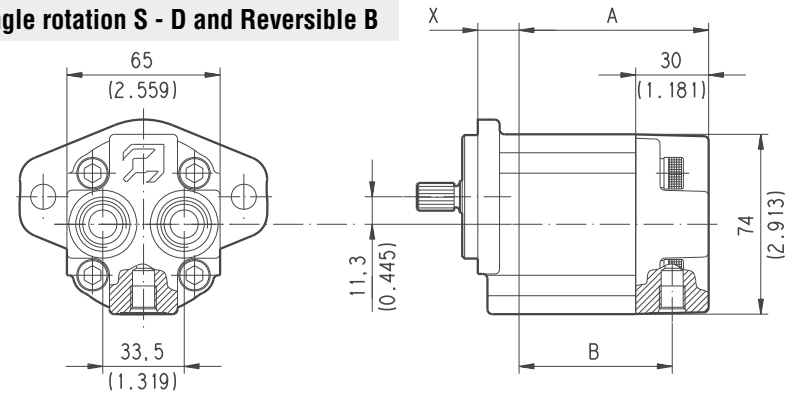
D033-181/0903



Reversible R



Single rotation S - D and Reversible B



Reversible L

Mounting flange type version 0	X
	mm (inch)
E1	14 (0.5512)
E7	14 (0.5512)
E8	14 (0.5512)
B1	14 (0.5512)
K2	11,8 (0.4646)
S0	17 (0.6693)
R8	41 (1.6142)
R9	41 (1.6142)
W9	41 (1.6142)

O Rear cover in aluminium only.

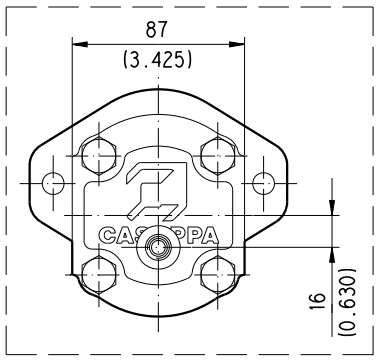
DRIVE SHAFTS: see page 52
MOUNTING FLANGE: see page 58 ÷ 60
PORTS: see page 69 ÷ 74

Mounting flange material	O Screw tightening torque Nm (lbf in)
	V
Aluminium	25 $^{\pm 2,5}$ (199 ÷ 243)
Cast iron	

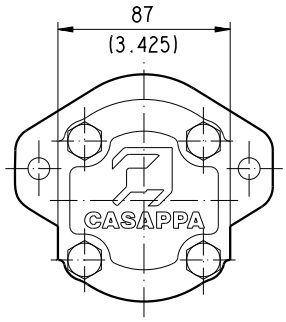
O 02/07.2006

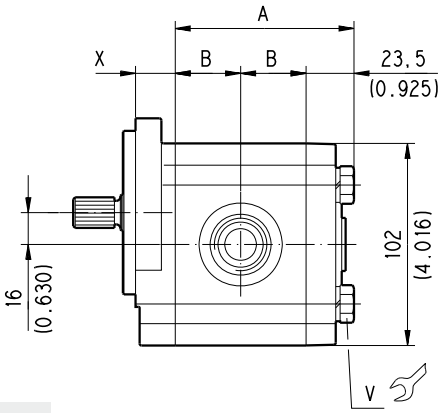
Pump type Motor type	A	B
	mm (inch)	mm (inch)
PL. 10•1	65,2 (2.5669)	50,2 (1.9764)
PL. 10•1,5	66,8 (2.6299)	51,8 (2.0394)
PL. 10•2	68,4 (2.6929)	53,4 (2.0124)
PL. 10•2,5	70 (2.7559)	55 (2.1654)
PL. 10•3,15	72 (2.8346)	57 (2.2441)
PL. 10•4	74,8 (2.9449)	59,8 (2.3543)
PL. 10•5	78 (3.0709)	63 (2.4803)
PL. 10•5,8	80,6 (3.1732)	65,6 (2.5827)
PL. 10•6,3	82 (3.2283)	67 (2.6378)
PL. 10•8	87,5 (3.4449)	72,5 (2.8543)
PL. 10•10	94 (3.7008)	79 (3.1102)

POLARIS 20 — SINGLE UNITS SIDE PORTS — L

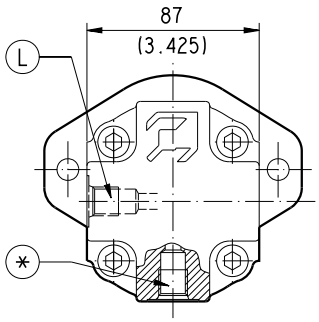


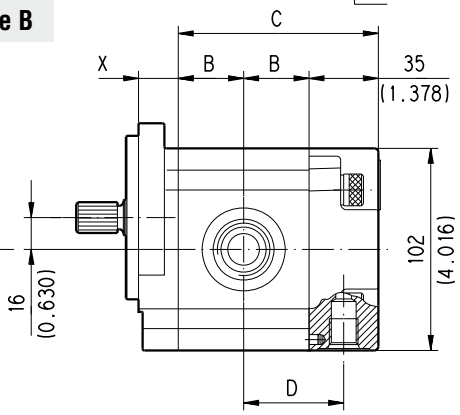
Reversible R





Single rotation S - D and Reversible B





Reversible L

D033-182/0903

Mounting flange type version 0	X
	mm (inch)
E2	18 (0.7087)
B2	18,8 (0.7402)
B4	16 (0.6299)
B5	16 (0.6299)
B6	17,7 (0.6969)
S1	20 (0.7874)
S2	20 (0.7874)
S9	20 (0.7874)
S5	20 (0.7874)
W8	32,1 (1.2638)

O For single rotation S - D and reversible rotation R and B the rear cover is available in cast iron and aluminium. For reversible rotation L the rear cover is in aluminium only.

DRAIN PORTS POSITION
L = Side * = Bottom

DRIVE SHAFTS: see page 53 ÷ 55
MOUNTING FLANGE: see page 61 ÷ 65
PORTS: see page. 69 ÷ 74

Mounting flange material	Screw tightening torque O Nm (lbf in)
	V
Aluminium	45 ±4,5 (358 ÷ 438)
Cast iron	70 ±7 (558 ÷ 682)

Pump type Motor type	A	B	C	D
	mm (inch)	mm (inch)	mm (inch)	mm (inch)
PL. 20•4	75 (2.9528)	25,75 (1.0138)	86,5 (3.4055)	43,25 (1.7028)
PL. 20•6,3	77,5 (3.0512)	27 (1.0630)	89 (3.5039)	44,5 (1.7520)
PL. 20•7,2	78,5 (3.0905)	27,5 (1.0826)	90 (3.5433)	45 (1.7716)
PL. 20•8	80 (3.1496)	28,25 (1.1122)	91,5 (3.6024)	45,75 (1.8012)
PL. 20•9	81,3 (3.2008)	28,9 (1.1378)	92,8 (3.6535)	46,4 (1.8268)
PL. 20•10,5	84 (3.3070)	30,25 (1.1909)	95,5 (3.7598)	47,75 (1.8799)
PL. 20•11,2	84,5 (3.3268)	30,5 (1.2008)	96 (3.7795)	48 (1.8898)
PL. 20•14	89,5 (3.5236)	33 (1.2992)	101 (3.9764)	50,5 (1.9882)
PL. 20•16	93 (3.6614)	34,75 (1.3681)	104,5 (4.1142)	52,25 (2.0571)
PL. 20•19	96,4 (3.7952)	36,45 (1.4350)	107,9 (4.2480)	53,45 (2.1043)
PL. 20•20	99,5 (3.9173)	38 (1.4961)	111 (4.3701)	55,5 (2.1850)
PL. 20•24,5	105,1 (4.1378)	40,8 (1.6063)	116,6 (4.5905)	58,3 (2.2953)
PL. 20•25	107,5 (4.2323)	42 (1.6535)	119 (4.6850)	59,5 (2.3425)
PL. 20•27,8	110,2 (4.3386)	43,35 (1.7067)	121,7 (4.7913)	60,85 (2.3957)
PL. 20•31,5	117,5 (4.6260)	47 (1.8504)	129 (5.0787)	64,5 (2.5394)

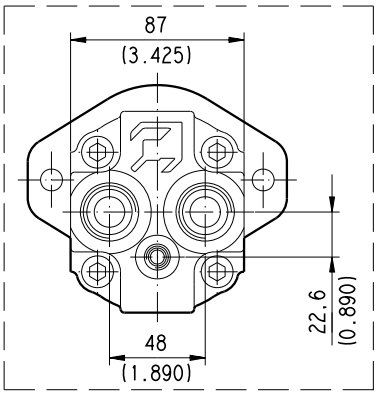
Replaces: 01/10.03

O 02/07.2006

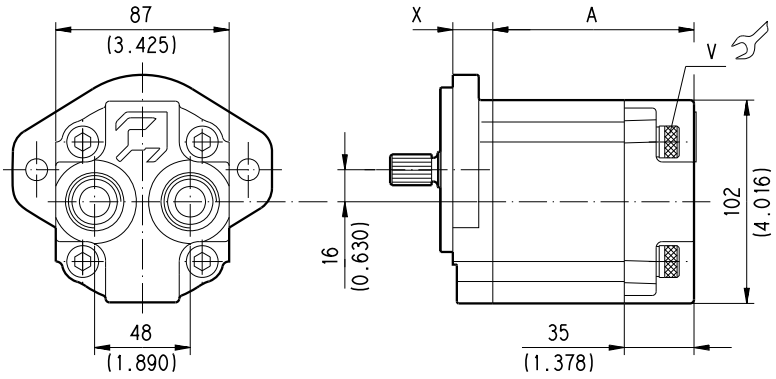
POLARIS 20 — SINGLE UNITS REAR PORTS — P

Replaces: 01/10.03

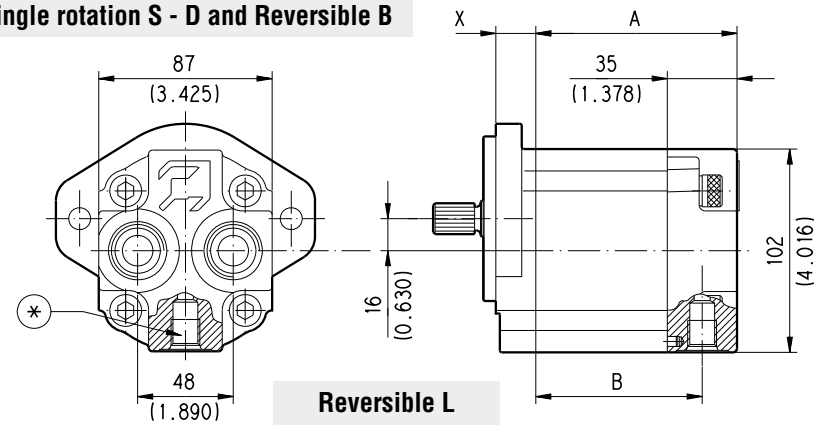
D033-183/0903



Reversible R



Single rotation S - D and Reversible B



Reversible L

Mounting flange type version 0	X
	mm (inch)
E2	18 (0.7087)
B2	18,8 (0.7402)
B4	16 (0.6299)
B5	16 (0.6299)
B6	17,7 (0.6969)
S1	20 (0.7874)
S2	20 (0.7874)
S9	20 (0.7874)
S5	20 (0.7874)
W8	32,1 (1.2638)

O Rear cover in aluminium only.

DRAIN PORTS POSITION
L = Side * = Bottom

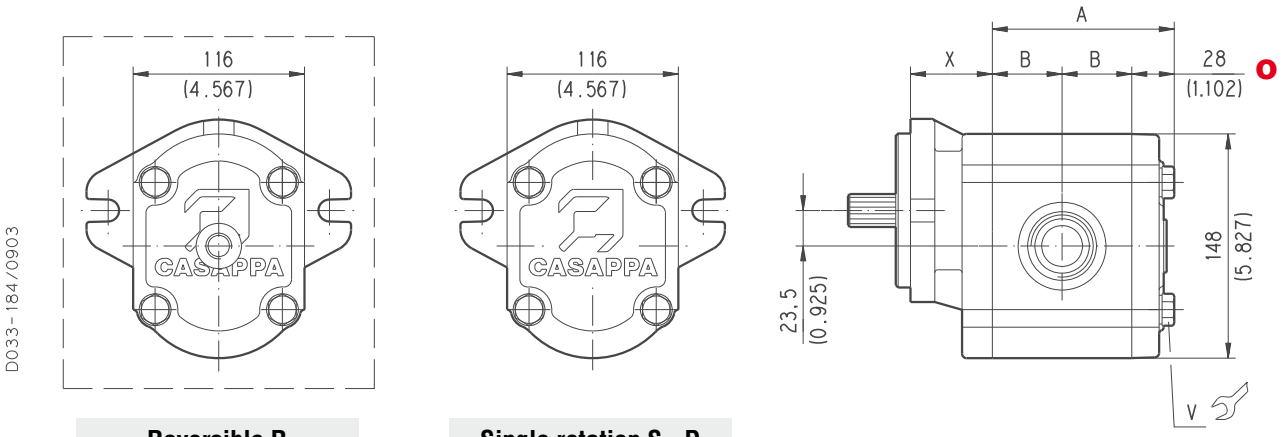
DRIVE SHAFTS: see page 53 ÷ 55
MOUNTING FLANGE: see page 61 ÷ 65
PORTS: see page. 69 ÷ 74

Mounting flange material	Screw tightening torque O Nm (lbf in)
	V
Aluminium	45 ±4,5 (358 ÷ 438)
Cast iron	70 ±7 (558 ÷ 682)

O 02/07.2006

Pump type Motor type	A	B
	mm (inch)	mm (inch)
PL. 20•4	86,5 (3.4055)	69 (2.71765)
PL. 20•6,3	89 (3.5039)	71,5 (2.8150)
PL. 20•7,2	90 (3.5433)	72,5 (2.8543)
PL. 20•8	91,5 (3.6024)	74 (2.9134)
PL. 20•9	92,8 (3.6535)	75,3 (2.9646)
PL. 20•10,5	95,5 (3.7598)	78 (3.0708)
PL. 20•11,2	96 (3.7795)	78,5 (3.0906)
PL. 20•14	101 (3.9764)	83,5 (3.2784)
PL. 20•16	104,5 (4.1142)	87 (3.4252)
PL. 20•19	107,9 (4.2480)	89,9 (3.5393)
PL. 20•20	111 (4.3701)	93,5 (3.6811)
PL. 20•24,5	116,6 (4.5905)	99,1 (3.9016)
PL. 20•25	119 (4.6850)	101,5 (3.9961)
PL. 20•27,8	121,7 (4.7913)	104,2 (4.1024)
PL. 20•31,5	129 (5.0787)	111,5 (4.3898)

POLARIS 30 — SINGLE UNITS SIDE PORTS — L



Reversible R

Single rotation S - D

Replaces: 02/07.2006

Mounting flange type version 0	X
	mm (inch)
E3	24 (0.945)
E4	25 (0.984)
B3	28 (1.102)
S5	54 (2.1260)
U3	20,8 (0.819)

Rear cover in cast iron only.

DRIVE SHAFTS:
see page 56 and page 57
MOUNTING FLANGE:
see page 66 ÷ 68
PORTS: see page. 69 ÷ 74

Mounting flange material	Screw tightening torque Nm (lbf in)
	V
Cast iron	100 $^{\pm 10}$ (797 ÷ 974)

Pump type Motor type	A	B
	mm (inch)	mm (inch)
PL. 30•22	106 (4.1732)	39 (1.5354)
PL. 30•27	109 (4.2913)	40,5 (1.5945)
PL. 30•34	114 (4.4882)	43 (1.6929)
PL. 30•38	117 (4.6063)	44,5 (1.7520)
PL. 30•43	120 (4.7244)	46 (1.8110)
PL. 30•51	125 (4.9212)	48,5 (1.9094)
PL. 30•61	131 (5.1575)	51,5 (2.0276)
PL. 30•73	139 (5.4724)	55,5 (2.1850)
PL. 30•82	144 (5.6693)	58 (2.2835)
PL. 30•90	150 (5.9055)	61 (2.4016)

O 03/02.2012

MULTIPLE PUMPS

POLARIS series pumps can be coupled together in combination. Where the input power requirements of each section varies, that with the greater requirement must be at the drive shaft end, and progressively smaller to the rear.

Features and performances are the same as the corresponding single pumps, but pressures must be limited by the transmissible torque of the drive and connecting shafts. To have appropriate data, use the formula below.

The maximum rotational speed is that of the lowest rated speed of the single units incorporated.

Available with common inlet and separated stages. For more information please consult our technical sales department.

Replaces: 01/10.03

M	lbf in [Nm]	Torque
V	in^3/rev [cm^3/rev]	Displacement
Δp	psi [bar]	Pressure
$\eta_{hm} = \eta_m (V, \Delta p, n)$	(≈ 0,88)	Hydro-mechanical efficiency

$$M = \frac{M_{theor.}}{\eta_{hm}} \quad [Nm]$$

$$M_{theor.} = \frac{\Delta p\ (bar) \bullet V\ (cm^3/rev)}{62,83}$$

DRIVE SHAFT SELECTION

The torque absorbed from the shaft of the first pump results from the sum of the torques due to all single stages. The achieved value must not exceed the maximum torque limit given for the shaft of the first pump. Diagrams providing approximate selection data will be found on page 38.

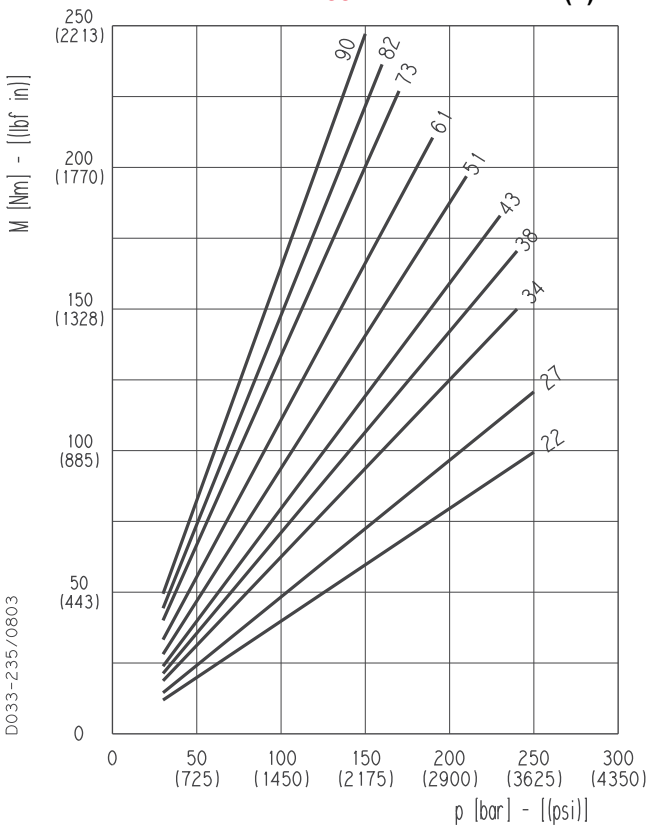
03/02.2012

Example

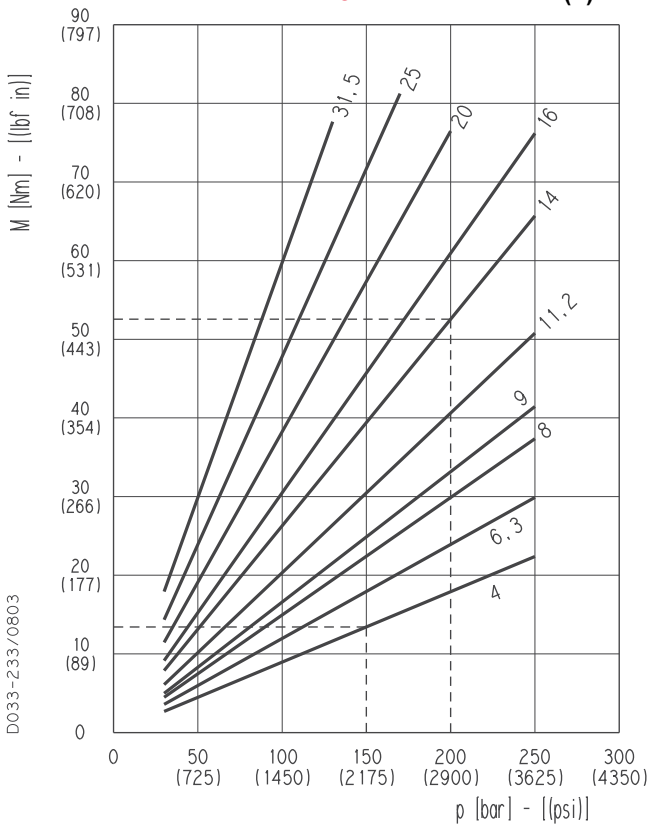
Let us consider a double pump PLP20•14 + PLP20•4. If we suppose that we have to work with the first pump at a pressure of 2900 psi (200 bar) and the second pump at a pressure of 2175 psi (150 bar), the graph **(2)** shows that the torque absorbed by PLP20•14 is 469 lbf in (53 Nm) and the PLP20•4 absorbs 115 lbf in (13 Nm) (acceptable value because it doesn't exceed the maximum drive shaft torque that is 973 lbf in (110 Nm), see page 40). The torque to be transmitted by the first drive shaft will thus be 469+115= 584 lbf in (53+13= 66 Nm), this value must not exceed the shaft's maximum rated value.

ABSORBED TORQUE

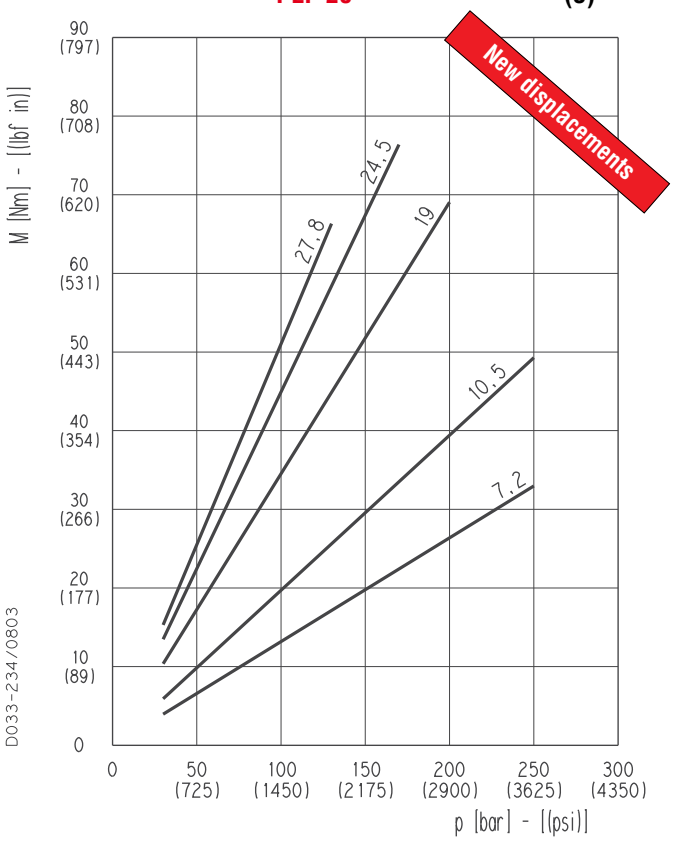
PLP 30 (1)



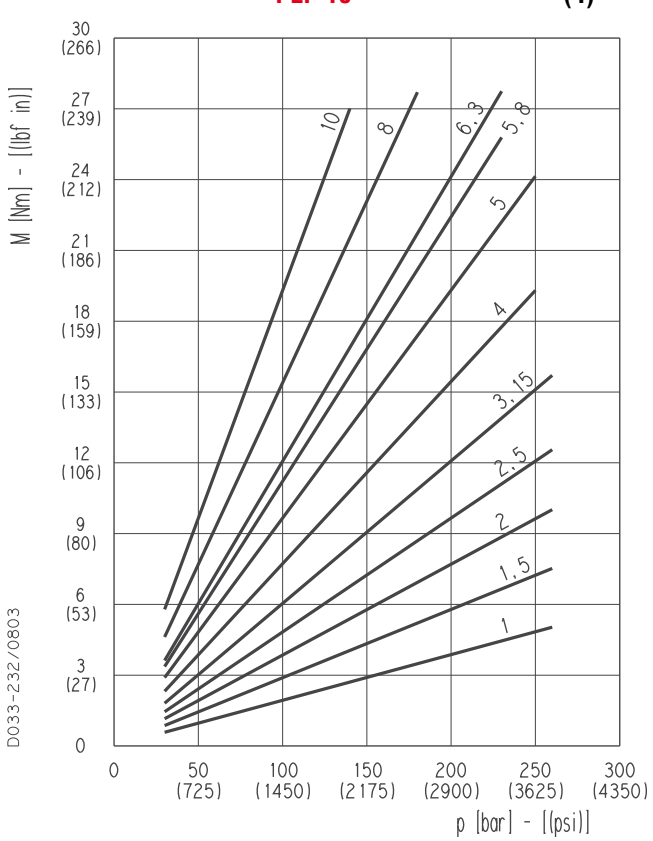
PLP 20 (2)



PLP 20 (3)



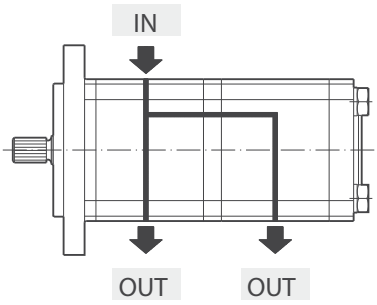
PLP 10 (4)

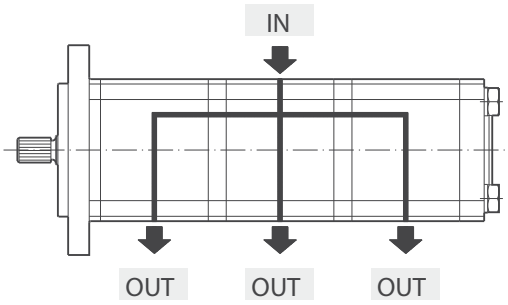


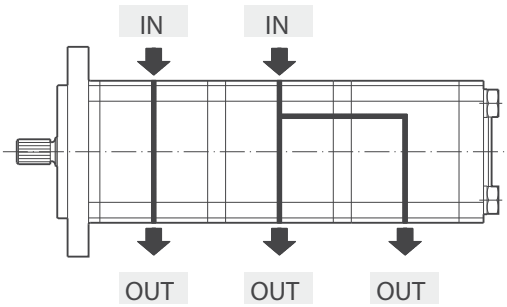
01/10.03

COMMON INLET - PORTS POSITION PLP

Replaces: 01/10.03







Reduced inlets provide overall systems savings by reducing the cost of redundant inlet hose and fittings.

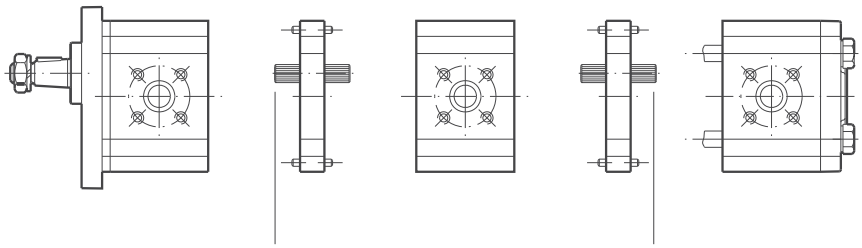
For other combinations please consult our sales department.

MULTIPLE PUMPS COMBINATION PLP 10

Polaris 10/10	**STANDARD VERSION**	**V6**
Polaris 10/10	**COMMON INLET VERSION**	**V7**

O 02/07.2006
D033-112/0603

Front **Intermediate** **Rear**

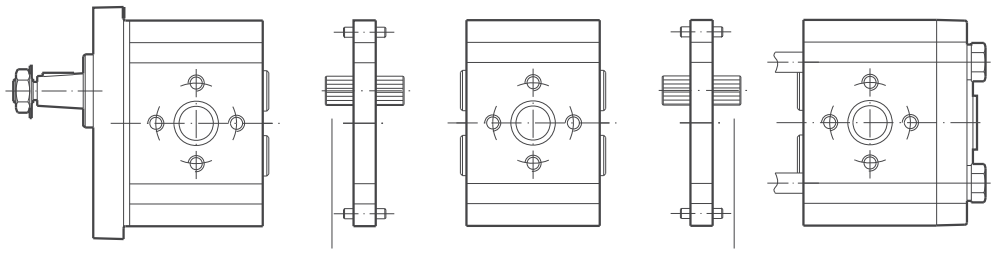


O **88** MAX 30 Nm (266 lbf in) **88** MAX 30 Nm (266 lbf in)

MULTIPLE PUMPS COMBINATION PLP 20

Polaris 20/20	**STANDARD VERSION**	**S6**
Polaris 20/20	**COMMON INLET VERSION**	**S7**

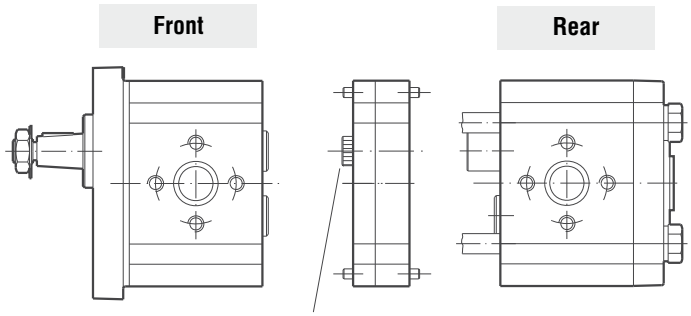
D033-106/0603



O 86 MAX 110 Nm (974 lbf in) 86 MAX 110 Nm (974 lbf in)

Polaris 20/20	**SEPARATED STAGES VERSION**	**Z6**

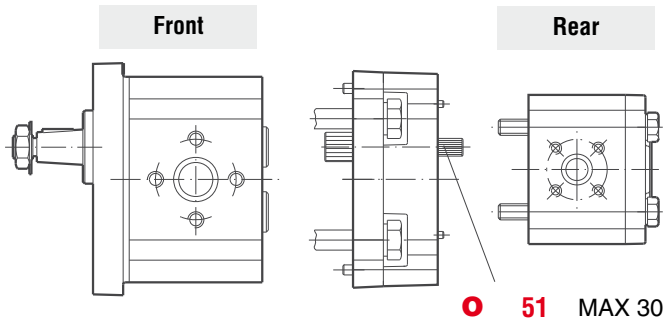
D033-110/0603



O 86 MAX 110 Nm (974 lbf in)

Polaris 20/10	**STANDARD VERSION**	**T6**
Polaris 20/10	**COMMON INLET VERSION**	**T7**

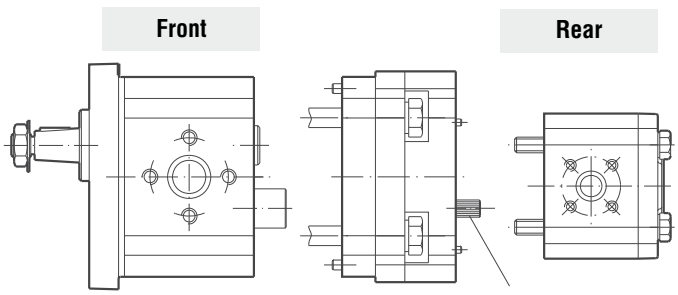
D033-107/0603



O 51 MAX 30 Nm (266 lbf in)

Polaris 20/10	**SEPARATED STAGES VERSION**	**Z6**

D033-111/0603



O 51 MAX 30 Nm (266 lbf in)

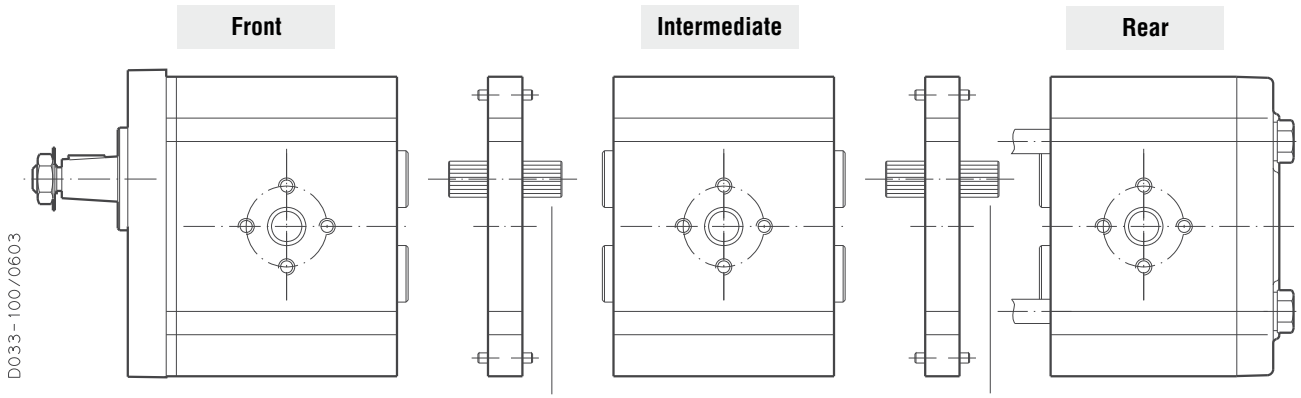
Replaces: 01/10.03

O 02/07.2006

MULTIPLE PUMPS COMBINATION PLP 30

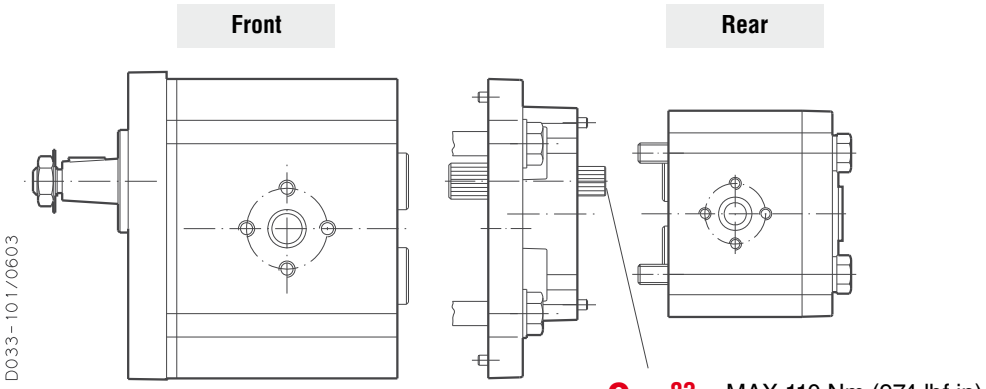
Replaces: 01/10.03

Polaris 30/30	STANDARD VERSION	M6



O 65 MAX 180 Nm (1593 lbf in) 65 MAX 180 Nm (1593 lbf in)

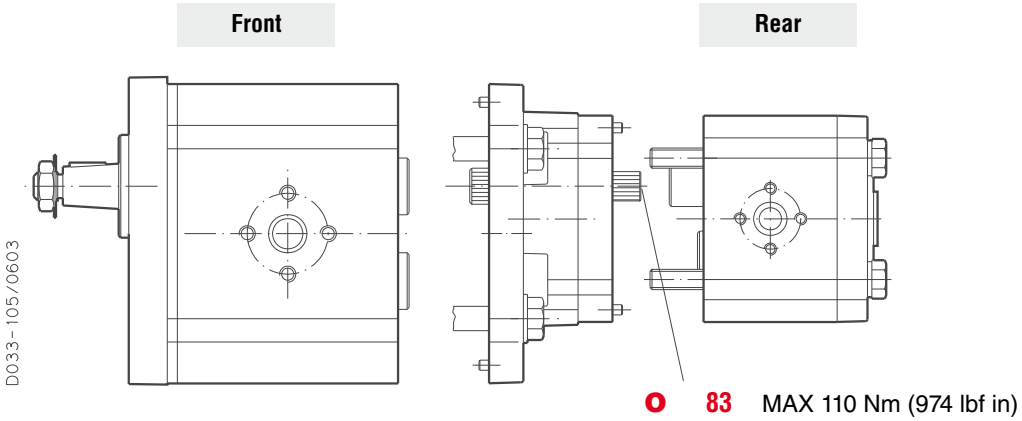
Polaris 30/20	STANDARD VERSION	N6
Polaris 30/20	COMMON INLET VERSION	N7



O 83 MAX 110 Nm (974 lbf in)

Polaris 30/20	SEPARATED STAGES VERSION	Z6

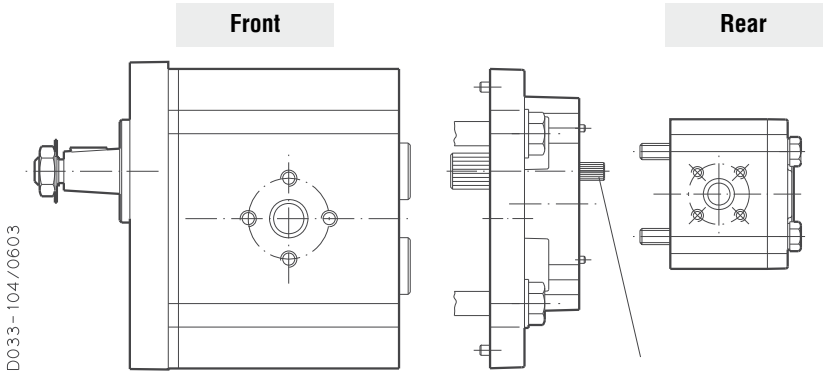
O 02/07.2006



O 83 MAX 110 Nm (974 lbf in)

MULTIPLE PUMPS COMBINATION PLP 30

Polaris 30/10	**STANDARD VERSION**	**Q6**
Polaris 30/10	**COMMON INLET VERSION**	**Q7**



O **52** MAX 30 Nm (266 lbf in)

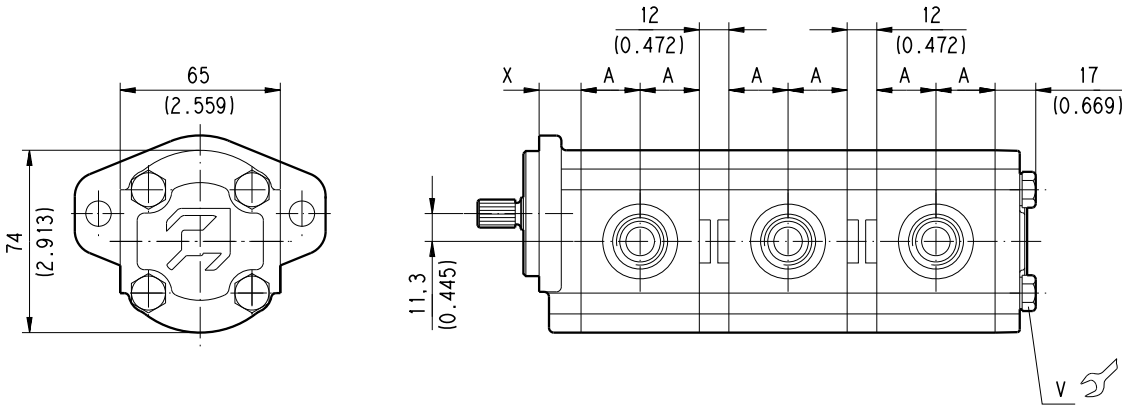
Replaces: 01/10.03

O 02/07.2006

POLARIS 10 — MULTIPLE PUMPS — PLP 10/10

Replaces: 01/10.03

D033-190/0903



O Rear cover available in cast iron and aluminium.

DRIVE SHAFTS: see page 52
MOUNTING FLANGE: see page 58 ÷ 60
PORTS: see page. 69 ÷ 74

Mounting flange material	O Screw tightening torque Nm (lbf in)
	V
Aluminium	25 $^{\pm 2,5}$ (199 ÷ 243)
Cast iron	

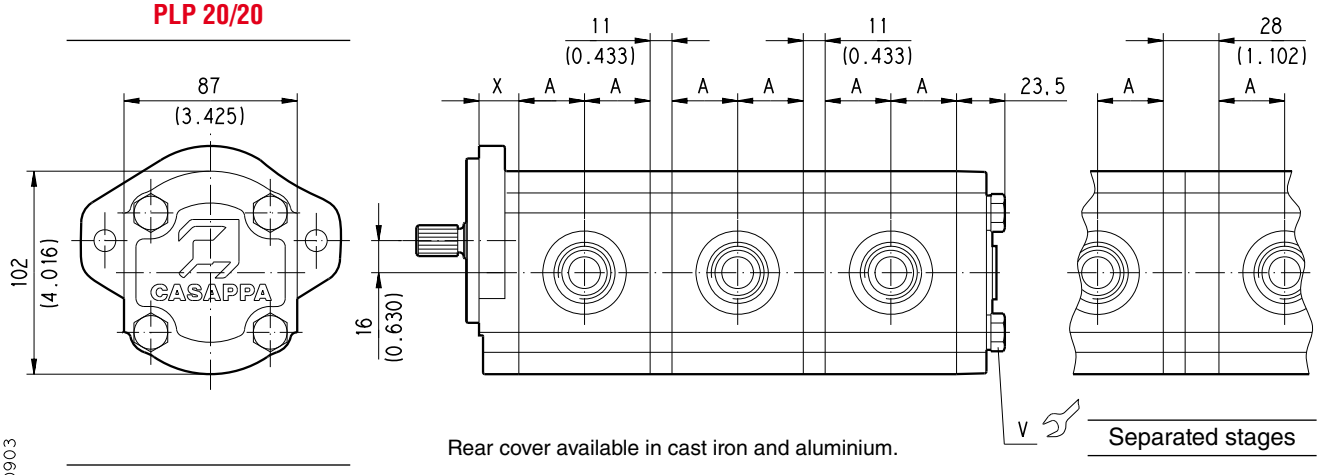
O 02/07.2006

Pump type	A
	mm (inch)
PLP 10•1	17,6 (0.6929)
PLP 10•1,5	18,4 (0.7244)
PLP 10•2	19,2 (0.7559)
PLP 10•2,5	20 (0.7874)
PLP 10•3,15	21 (0.8268)
PLP 10•4	22,4 (0.8819)
PLP 10•5	24 (0.9449)
PLP 10•5,8	25,3 (0.9961)
PLP 10•6,3	26 (1.0236)
PLP 10•8	28,75 (1.1319)
PLP 10•10	32 (1.2598)

Mounting flange type version 0	X
	mm (inch)
E1	14 (0.5512)
E7	14 (0.5512)
E8	14 (0.5512)
B1	14 (0.5512)
K2	11,8 (0.4646)
S0	17 (0.6693)
R8	41 (1.6142)
R9	41 (1.6142)
W9	41 (1.6142)

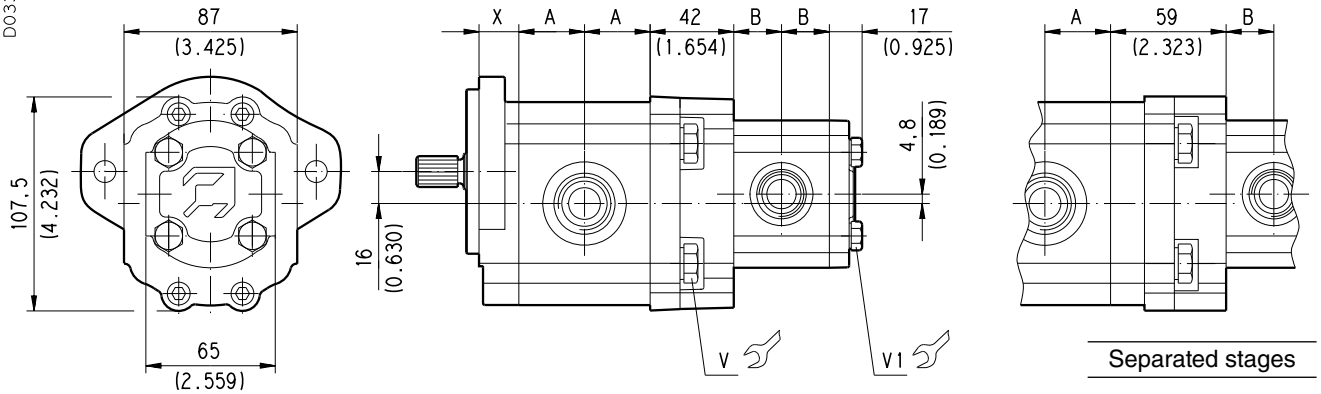
POLARIS 20 — MULTIPLE PUMPS — PLP 20

PLP 20/20



Rear cover available in cast iron and aluminium.

PLP 20/10



O Rear cover available in cast iron and aluminium.

DRIVE SHAFTS:
see page 53 ÷ 55

MOUNTING FLANGE:
see page 61 ÷ 65

PORTS:
see page. 69 ÷ 74

Mounting flange material	O Screw tightening torque Nm (lbf in)	
	V	V1
Aluminium	45 ±4,5 (358 ÷ 438)	25 ±2,5 (199 ÷ 243)
Cast iron	70 ±7 (558 ÷ 682)	

Pump type	A mm (inch)
PLP 20•4	25,75 (1.0138)
PLP 20•6,3	27 (1.0630)
PLP 20•7,2	27,5 (1.0826)
PLP 20•8	28,25 (1.1122)
PLP 20•9	28,9 (1.1378)
PLP 20•10,5	30,25 (1.1909)
PLP 20•11,2	30,5 (1.2008)
PLP 20•14	33 (1.2992)
PLP 20•16	34,75 (1.3681)
PLP 20•19	36,45 (1.4350)
PLP 20•20	38 (1.4961)
PLP 20•24,5	40,8 (1.6063)
PLP 20•25	42 (1.6535)
PLP 20•27,5	43,35 (1.7067)
PLP 20•31,5	47 (1.8504)

Pump type	B mm (inch)
PLP 10•1	17,6 (0.6929)
PLP 10•1,5	18,4 (0.7244)
PLP 10•2	19,2 (0.7559)
PLP 10•2,5	20 (0.7874)
PLP 10•3,15	21 (0.8268)
PLP 10•4	22,4 (0.8819)
PLP 10•5	24 (0.9449)
PLP 10•5,8	25,3 (0.9961)
PLP 10•6,3	26 (1.0236)
PLP 10•8	28,75 (1.1319)
PLP 10•10	32 (1.2598)

Mounting flange type version 0	X mm (inch)
E2	18 (0.7087)
B2	18,8 (0.7402)
B4	16 (0.6299)
B5	16 (0.6299)
B6	17,7 (0.6969)
S1	20 (0.7874)
S2	20 (0.7874)
S9	20 (0.7874)
S5	20 (0.7874)
W8	32,1 (1.2638)

Replaces: 01/10.03

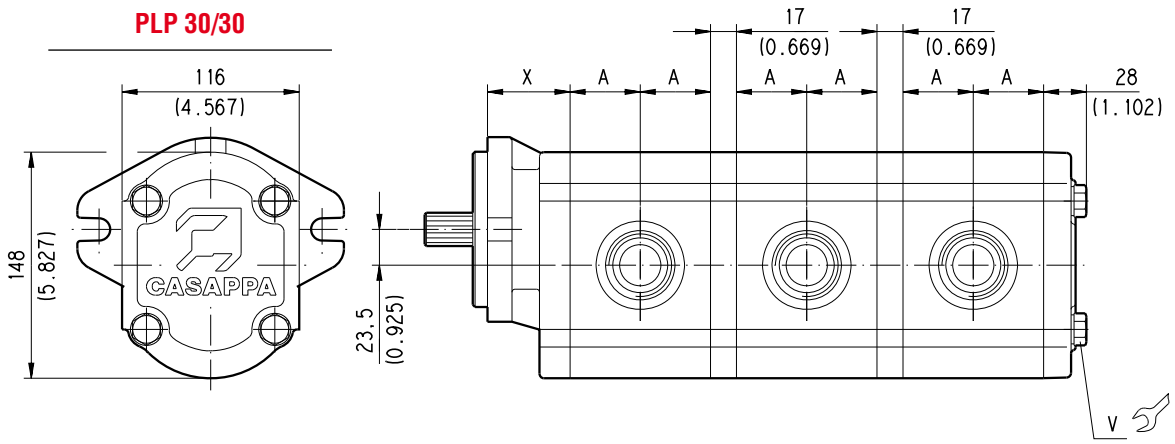
O 02/07.2006

D033-261/0903

POLARIS 30 — MULTIPLE PUMPS — PLP30

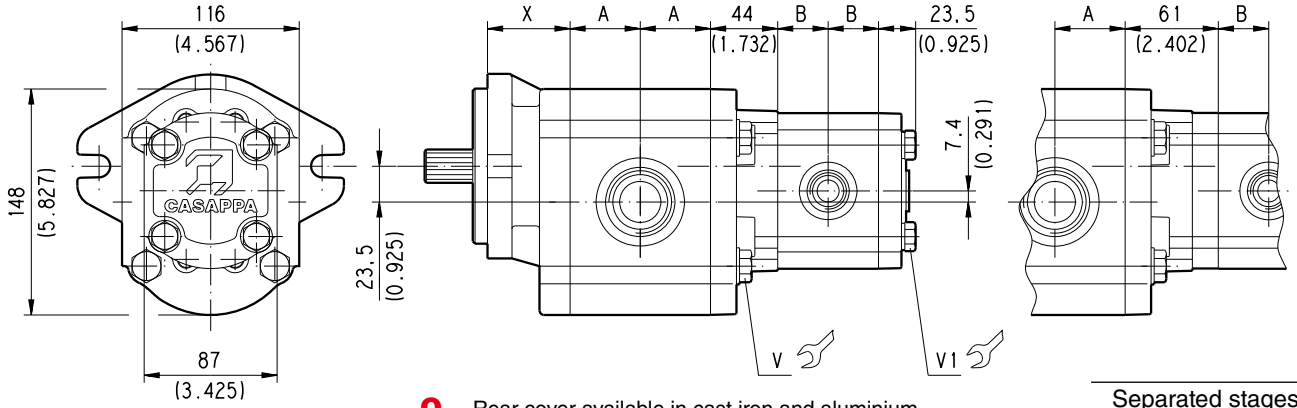
Replaces: 01/10.03

PLP 30/30



- Rear cover in cast iron only.

PLP 30/20

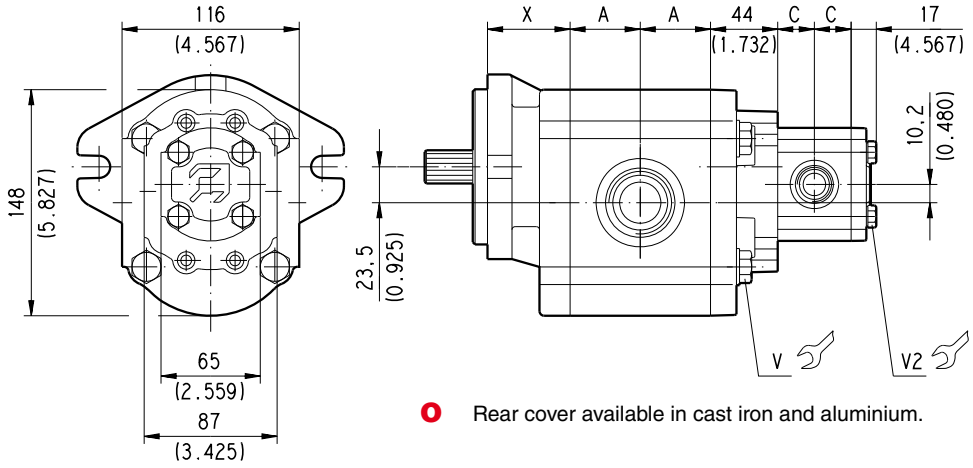


- Rear cover available in cast iron and aluminium.

Separated stages

D033-260/0903

PLP 30/10



- Rear cover available in cast iron and aluminium.

02/07.2006

POLARIS 30 MULTIPLE PUMPS PLP 30

Pump type	A mm (inch)
PLP 30•22	39 (1.5354)
PLP 30•27	40,5 (1.5945)
PLP 30•34	43 (1.6929)
PLP 30•38	44,5 (1.7520)
PLP 30•43	46 (1.8110)
PLP 30•51	48,5 (1.9094)
PLP 30•61	51,5 (2.0276)
PLP 30•73	55,5 (2.1850)
PLP 30•82	58 (2.2835)
PLP 30•90	61 (2.4016)

Pump type	B mm (inch)
PLP 20•4	25,75 (1.0138)
PLP 20•6,3	27 (1.0630)
PLP 20•7,2	27,5 (1.0826)
PLP 20•8	28,25 (1.1122)
PLP 20•9	28,9 (1.1378)
PLP 20•10,5	30,25 (1.1909)
PLP 20•11,2	30,5 (1.2008)
PLP 20•14	33 (1.2992)
PLP 20•16	34,75 (1.3681)
PLP 20•19	36,45 (1.4350)
PLP 20•20	38 (1.4961)
PLP 20•24,5	40,8 (1.6063)
PLP 20•25	42 (1.6535)
PLP 20•27,5	43,35 (1.7067)
PLP 20•31,5	47 (1.8504)

Pump type	C mm (inch)
PLP 10•1	17,6 (0.6929)
PLP 10•1,5	18,4 (0.7244)
PLP 10•2	19,2 (0.7559)
PLP 10•2,5	20 (0.7874)
PLP 10•3,15	21 (0.8268)
PLP 10•4	22,4 (0.8819)
PLP 10•5	24 (0.9449)
PLP 10•5,8	25,3 (0.9961)
PLP 10•6,3	26 (1.0236)
PLP 10•8	28,75 (1.1319)
PLP 10•10	32 (1.2598)

Replaces: 01/10.03

DRIVE SHAFTS:
see page 56 and page 57

MOUNTING FLANGE:
see page 66 ÷ 68

PORTS:
see page. 69 ÷ 74

Mounting flange type version 0	X mm (inch)
E3	24 (0.945)
E4	25 (0.984)
B3	28 (1.102)
S5	54 (2.1260)
U3	20,8 (0.819)

Mounting flange material	O Screw tightening torque Nm (lbf in)		
	V	V1	V2
Aluminium		45 $^{\pm 4,5}$ (358 ÷ 438)	25 $^{\pm 2,5}$ (199 ÷ 243)
Cast iron	100 $^{\pm 10}$ (797 ÷ 974)		

O 02/07.2006

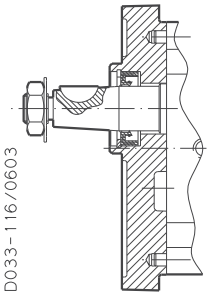
VERSIONS

For each version, the possible combination between drive shafts and mounting flanges are shown on pages 58 ÷ 68.

VERSION 0

Available for group:

10 20 30

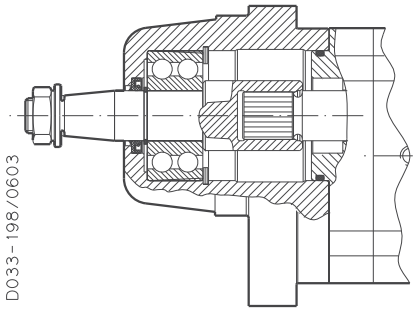


Version for applications without radial and axial load on the drive shaft.

VERSION W8

Available for group:

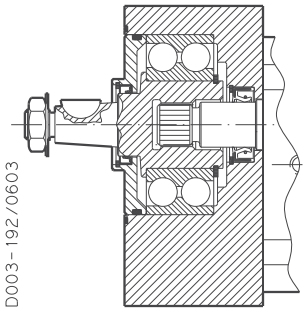
20



VERSION 4

Available for group:

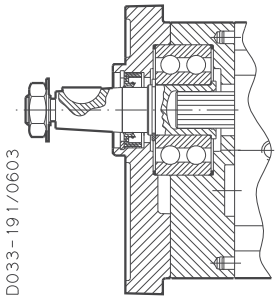
20



VERSION 5

Available for group:

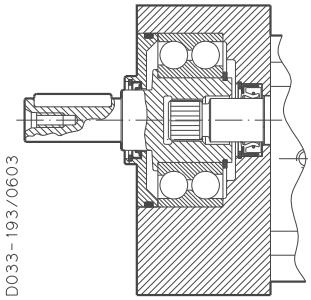
20



VERSION 6

Available for group:

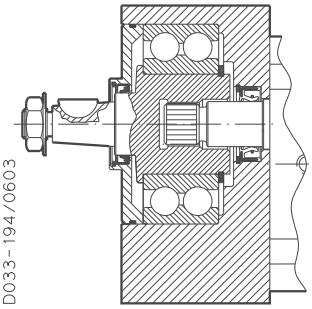
20



VERSION 7

Available for group:

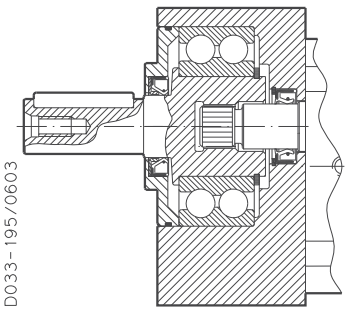
20



VERSION 8

Available for group:

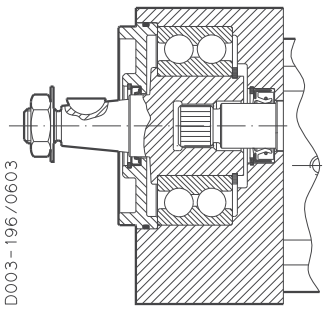
20



VERSION 9

Available for group:

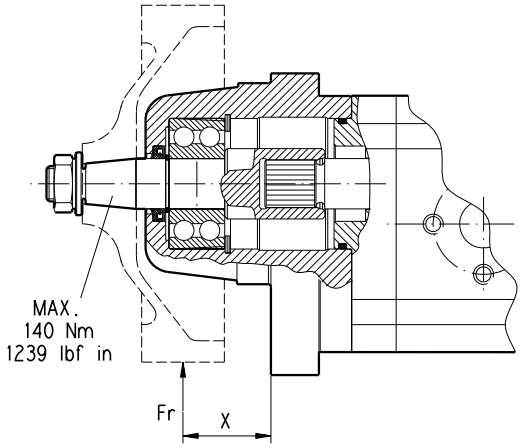
20



For the outboard bearing life expectancy, diagrams providing approximate selection data well be found on subsequent pages.
For particular applications please consult our technical sales department.

01/10.03

POLARIS 20 — VERSION WITH OUTBOARD BEARINGS — W8



D033-197/0603

X = Distance of the radial load result from the mounting flange [mm (in)].

Each curve has been obtained at:

Lubricant oil ISO VG 46

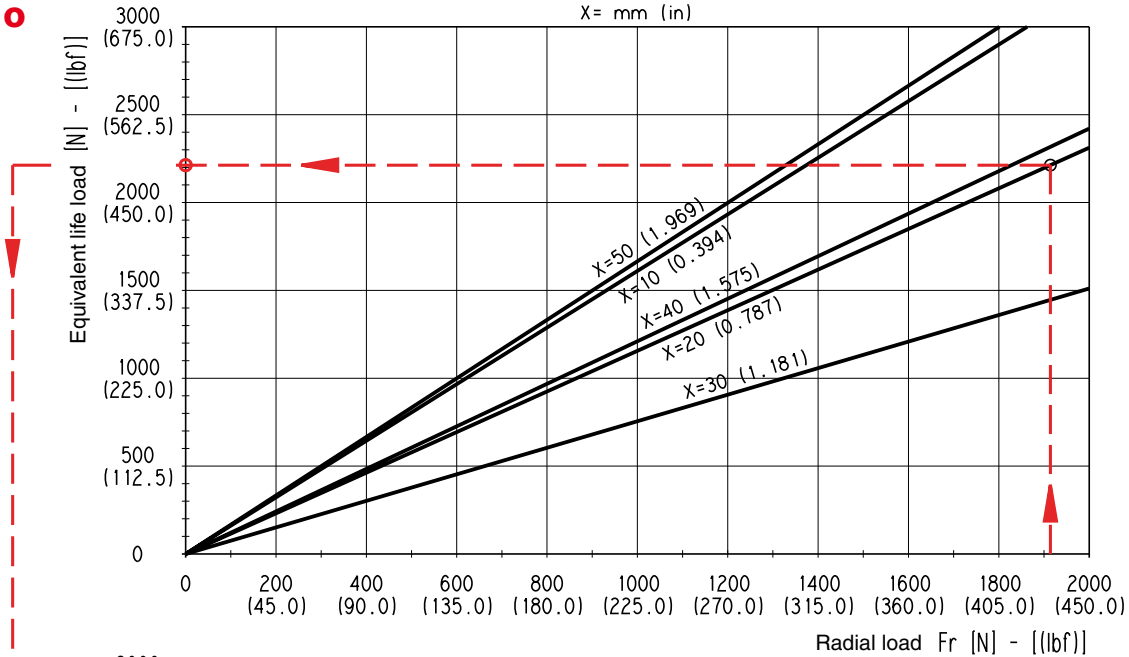
Temperature 60 °C (140 °F)

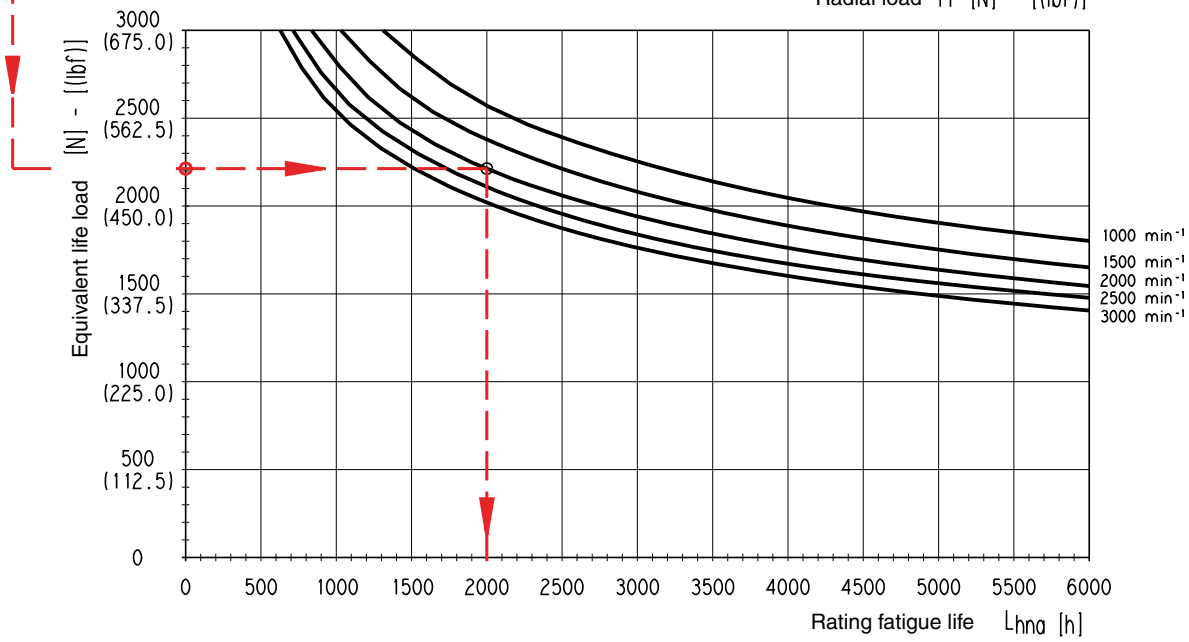
Without or with very low axial load

Example

Fr Radial load	1915 N (430.88 lbf)
X	20 mm (0.7874 in)
Speed	2000 min^{-1}
Rating fatigue life	≈ 2000 h

Replaces: 01/10.03



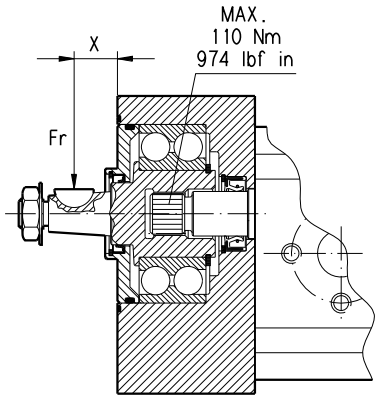


D033-124/0606

02/07.2006

POLARIS 20 VERSION WITH OUTBOARD BEARINGS 4 - 6

Replaces: 01/10.03



D003-114/0603

X = Distance of the radial load result from the mounting flange [mm (in)].

Each curve has been obtained at:

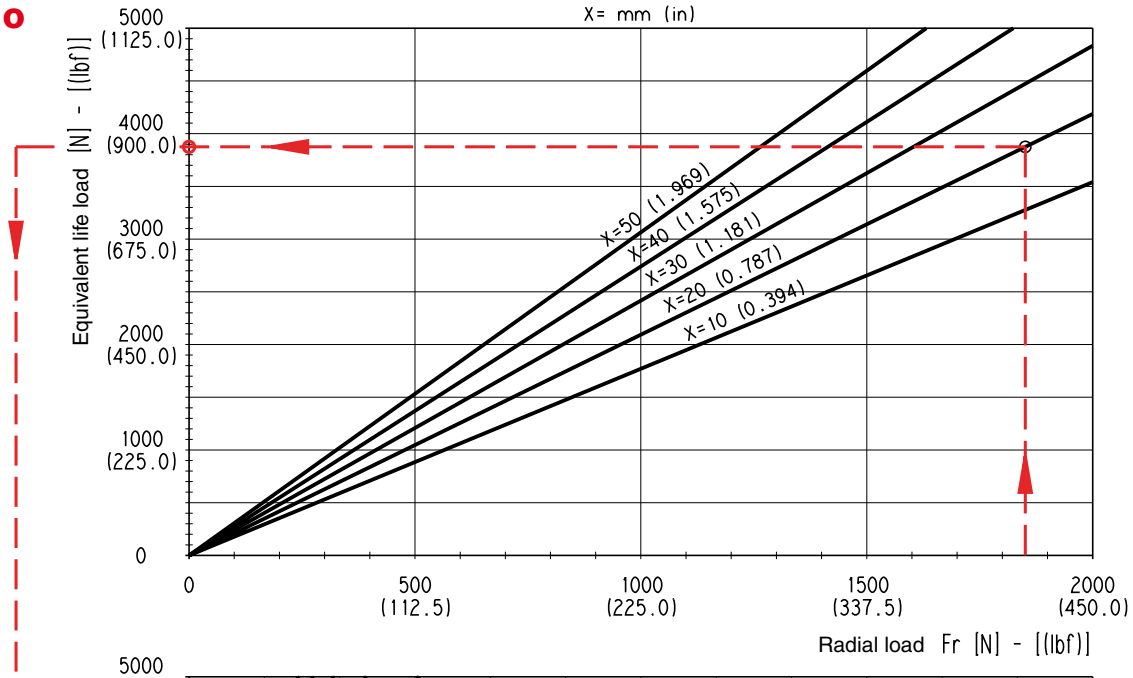
Lubricant oil ISO VG 46

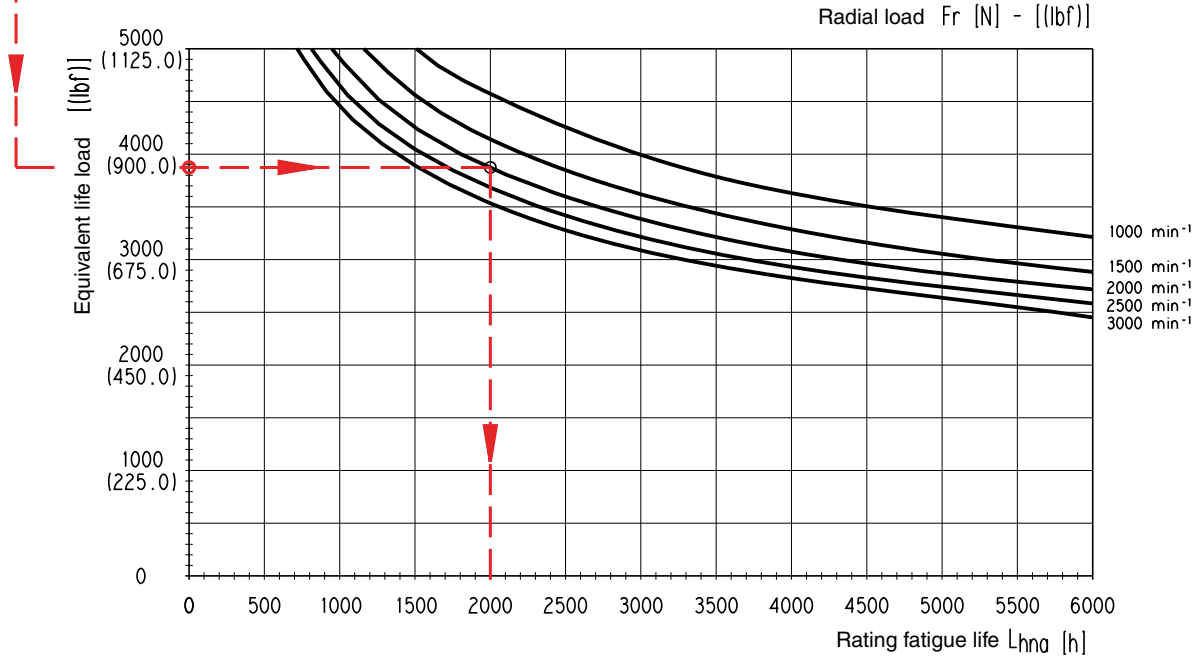
Temperature 60 °C (140 °F)

Without or with very low axial load

Example

Fr Radial load	1850 N (416.25 lbf)
X	20 mm (0.7874 in)
Speed	2000 min^{-1}
Rating fatigue life	≈ 2000 h

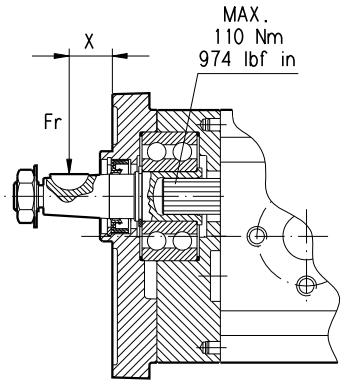




D033-122/0606

02/07.2006

POLARIS 20 VERSION WITH OUTBOARD BEARINGS 5



D033-115/0603

X = Distance of the radial load result from the mounting flange [mm (in)].

Each curve has been obtained at:

Lubricant oil ISO VG 46

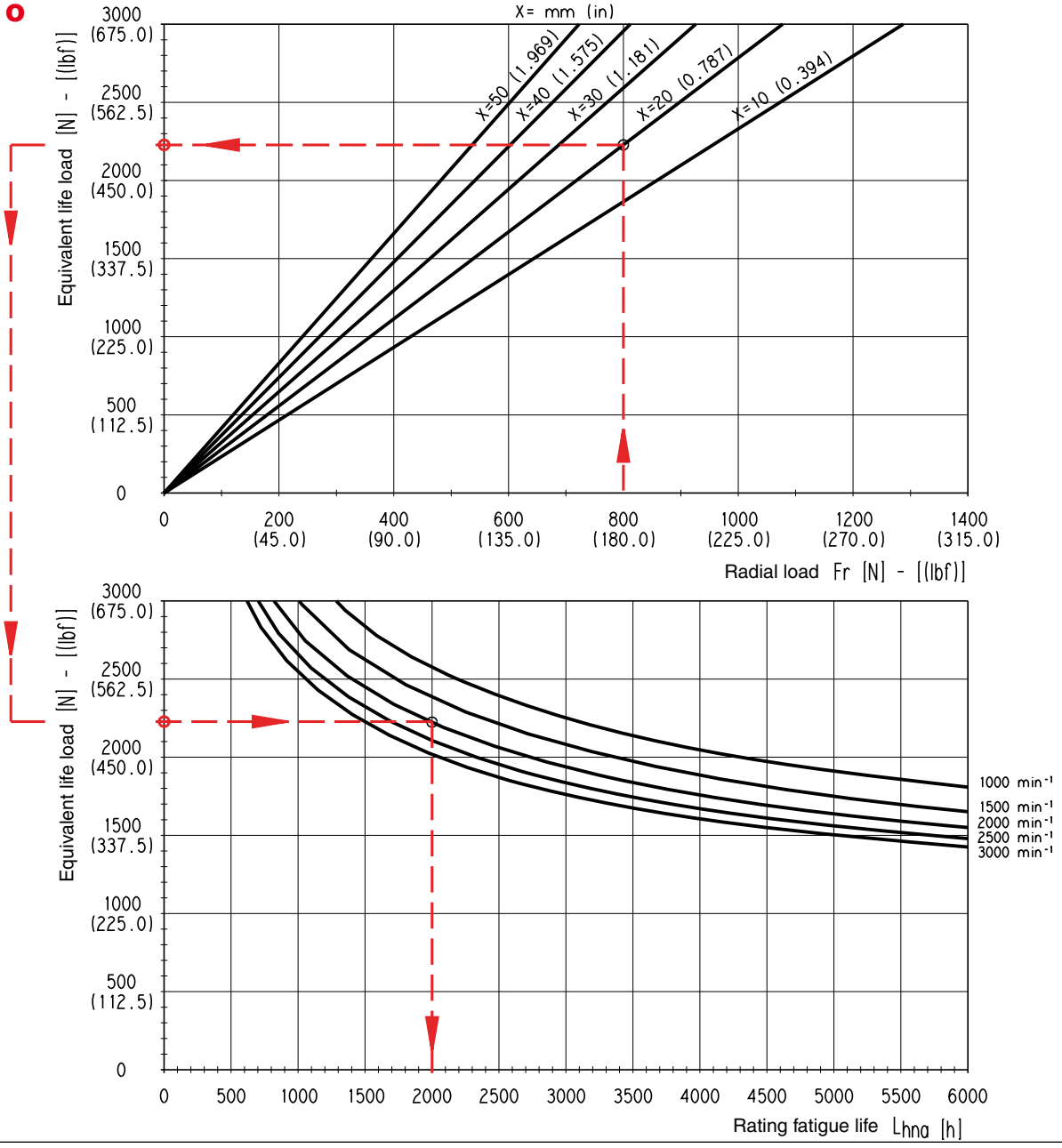
Temperature 60 °C (140 °F)

Without or with very low axial load

Example

Fr Radial load	800 N (180 lbf)
X	20 mm (0.7874 in)
Speed	2000 min^{-1}
Rating fatigue life	≈ 2000 h

Replaces: 01/10.03

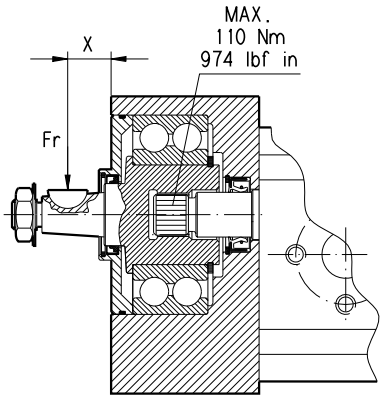


D033-121/0606

02/07.2006

POLARIS 20 VERSION WITH OUTBOARD BEARINGS 7 - 8 - 9

Replaces: 01/10.03



D033-118/0603

X = Distance of the radial load result from the mounting flange [mm (in)].

Each curve has been obtained at:

Lubricant oil ISO VG 46

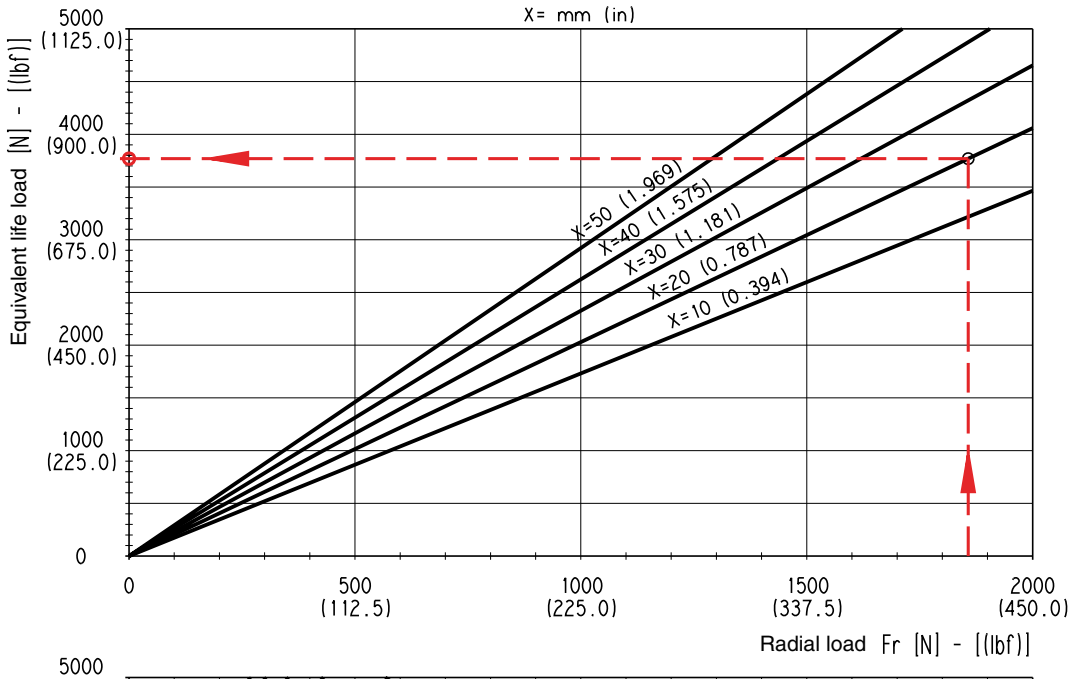
Temperature 60 °C (140 °F)

Without or with very low axial load

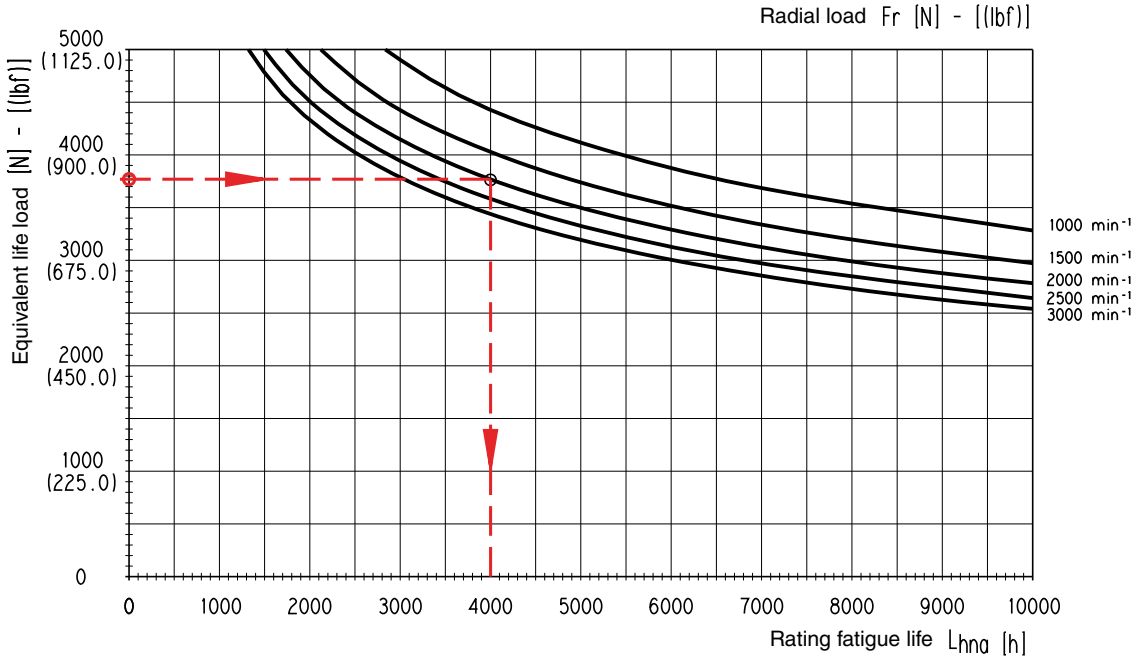
Example

Fr Radial load	1858 N (418.05 lbf)
X	20 mm (0.7874 in)
Speed	2000 min^{-1}
Rating fatigue life	≈ 2000 h

o



o 02/07.2006

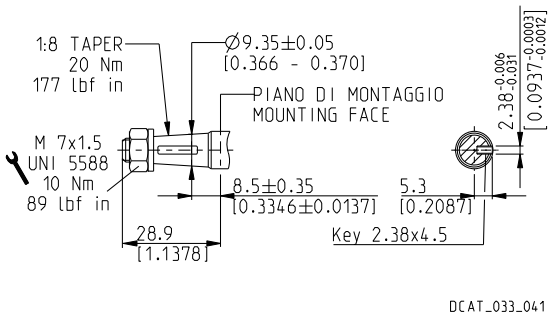


D033-123/0606

POLARIS 10 DRIVE SHAFTS

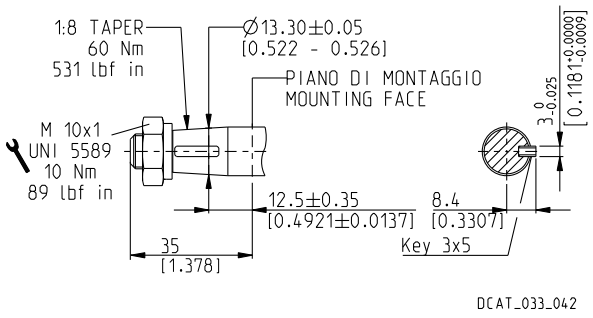
EUROPEAN TAPERED 1:8 81

Mounting face refer to flange code **E1**



EUROPEAN TAPERED 1:8 86

Mounting face refer to flange code **E7**

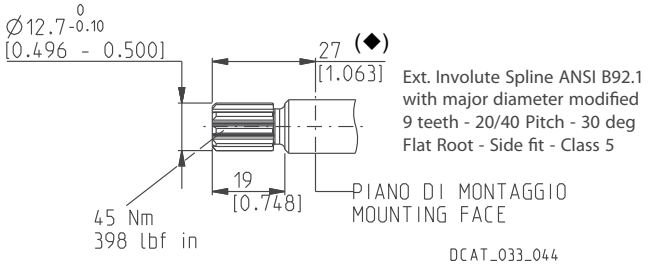


SAE "AA" SPLINE 02

Not available with size:

10•8	With flange: E1, E8, K2, S0
10•1,5 - 10•2,5 - 10•5,8	With flange: R8, R9

Mounting face refer to flange code **R9**



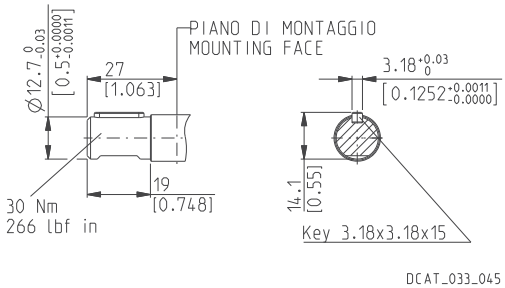
(◆) 24 (0.9449) with flange code S0

SAE "AA" STRAIGHT 30

Not available with size:

10•1,5 - 10•2,5 - 10•5,8	With flange: E7, B1, K2, R8, R9
10•2,5 - 10•5,8	With flange: S0

Mounting face refer to flange code **S0**

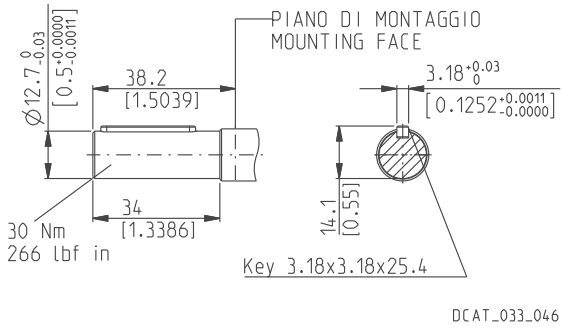


SAE STRAIGHT 36

Not available with size:

10•1,5 **10•2,5**

Mounting face refer to flange code **R8**

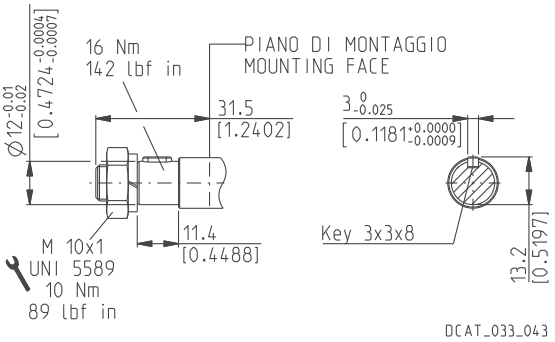


STRAIGHT 29

Not available with size:

10•5,8

Mounting face refer to flange code **E8**



01/10.03

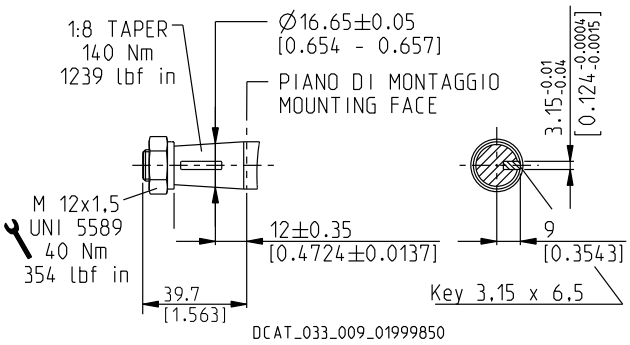
POLARIS 20 DRIVE SHAFTS

EUROPEAN TAPARED 1:8 82

Not available with size:

20•10,5 20•24,5 20•27,8

Mounting face refer to flange code **E2**

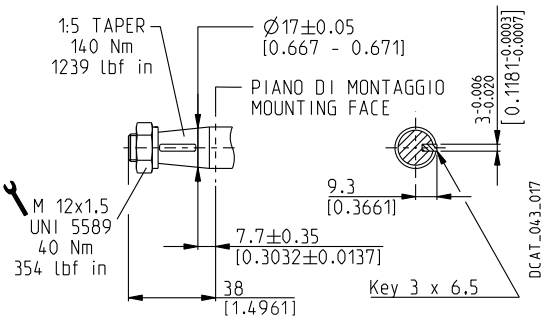


GERMAN TAPERED 1:5 54

Not available with size:

20•7,2 20•10,5 20•19 20•24,5 20•27,8 20•31,5

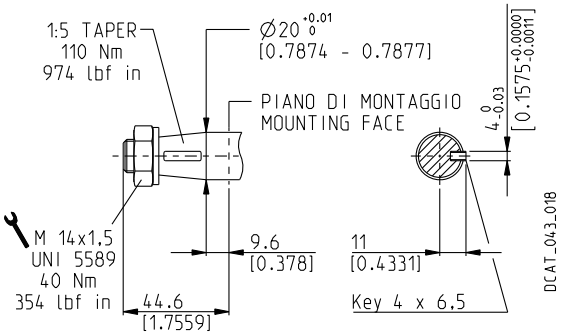
Mounting face refer to flange code **B2**



GERMAN TAPARED 1:5 55

Only for version **5**, **9** and **W8** with outboard bearing

Mounting face refer to flange code **B2**

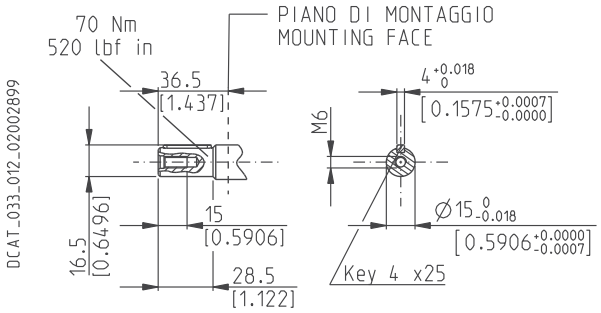


STRAIGHT 46

Not available with size:

20•7,2 20•10,5 20•19 20•24,5 20•25 20•27,8 20•31,5

Mounting face refer to flange code **E2**

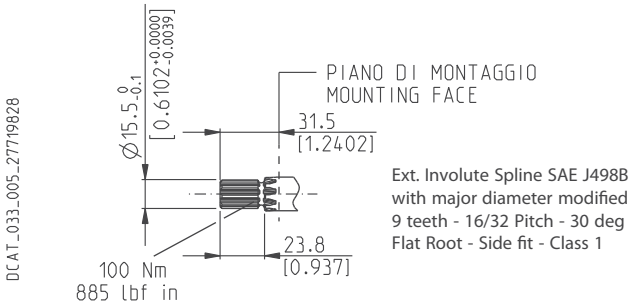


SAE "A" SPLINE 03

Not available with size:

20•24,5 20•27,8

Mounting face refer to flange code **S1**

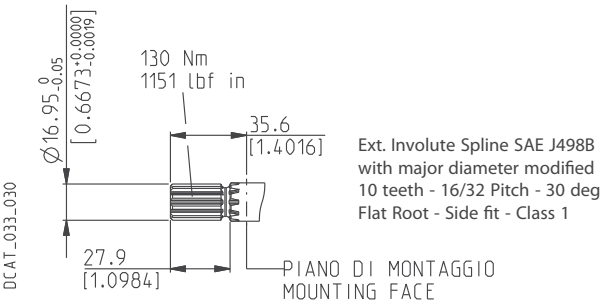


SPLINE 01

Not available with size:

20•6,3 20•9 20•10,5 20•19

Mounting face refer to flange code **S1**



01/10.03

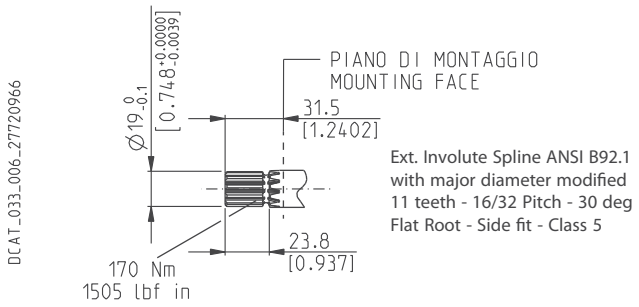
POLARIS 20 DRIVE SHAFTS

SAE SPLINE 07

Not available with size:

20•7,2	20•10,5	20•19	20•24,5	20•27,8

Mounting face refer to flange code **S1**

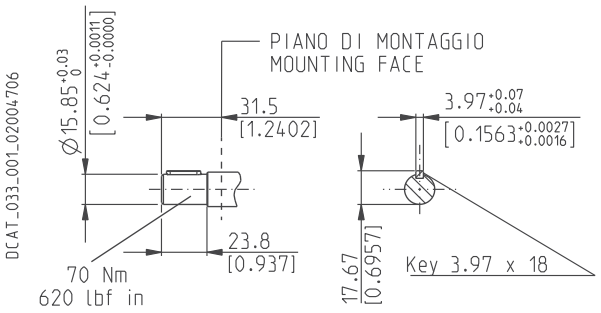


SAE "A" STRAIGHT 31

Not available with size:

20•10,5	20•19	20•24,5	20•27,8	

Mounting face refer to flange code **S1**

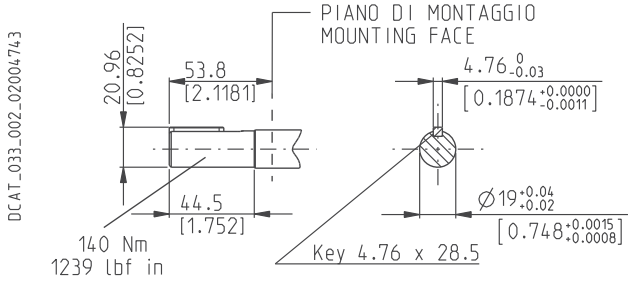


STRAIGHT 49

Not available with size:

20•7,2	20•19	20•24,5	

Mounting face refer to flange code **S1**

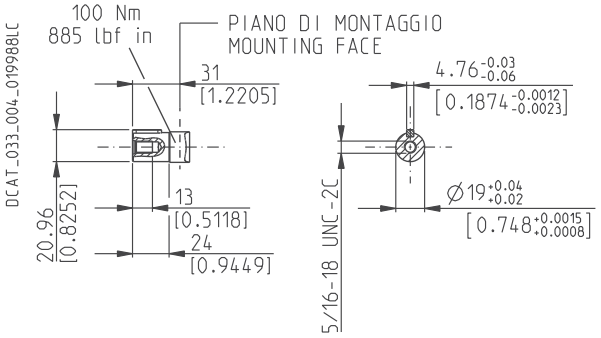


STRAIGHT 50

Not available with size:

20•7,2	20•10,5	20•19	20•24,5	20•27,8

Mounting face refer to flange code **S1**

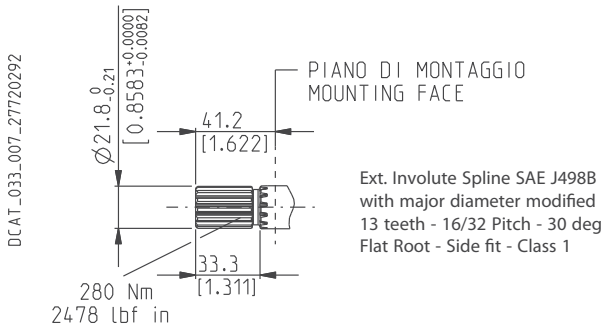


SAE "B" SPLINE 04

Not available with size:

20•4	20•7,2	20•10,5	20•24,5	20•27,8

Mounting face refer to flange code **S5**

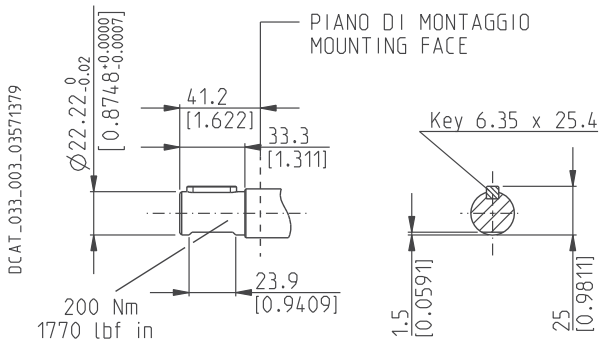


SAE "B" STRAIGHT 32

Not available with size:

20•4	20•7,2	20•8	20•10,5	20•11,2	20•19	20•24,5	20•27,8

Mounting face refer to flange code **S5**



01/10.03

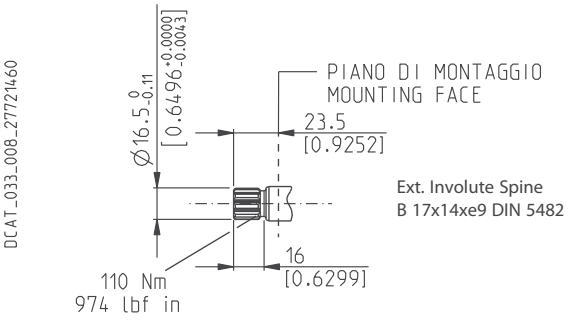
POLARIS 20 DRIVE SHAFTS

DIN 5482 SPLINE 12

Not available with size:

20•10,5	**20•19**	**20•24,5**	**20•27,8**

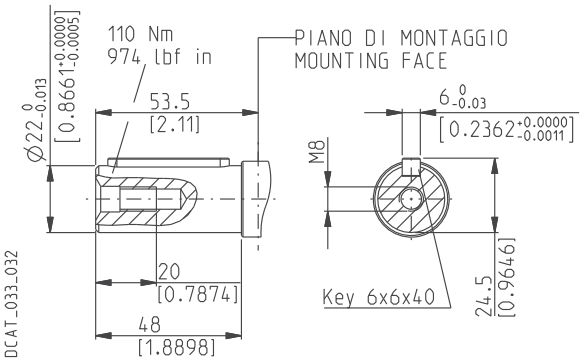
Mounting face refer to flange code **B2**



STRAIGHT B1

Only for version **8** and **5** with outboard bearing

Mounting face refer to flange code **E2**



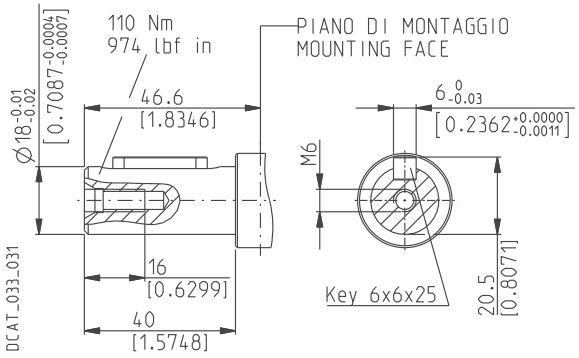
STRAIGHT 48

Only for version **6** with outboard bearing

Available in 0 version only with size:

20•20

Mounting face refer to flange code **E2**

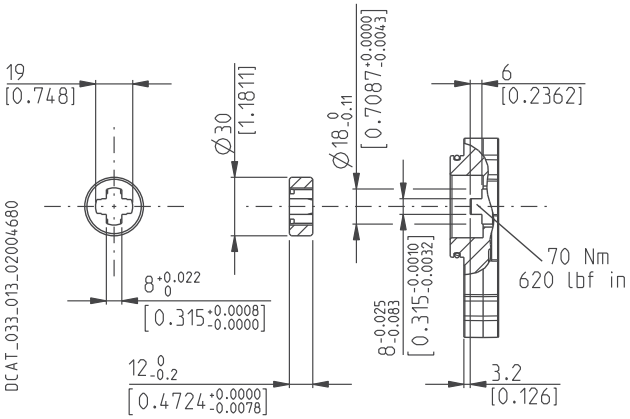


TANG 95

Not available with size:

20•7,2	**20•10,5**	**20•19**	**20•24,5**	**20•27,8**

Mounting face refer to flange code **B6**



01/10.03

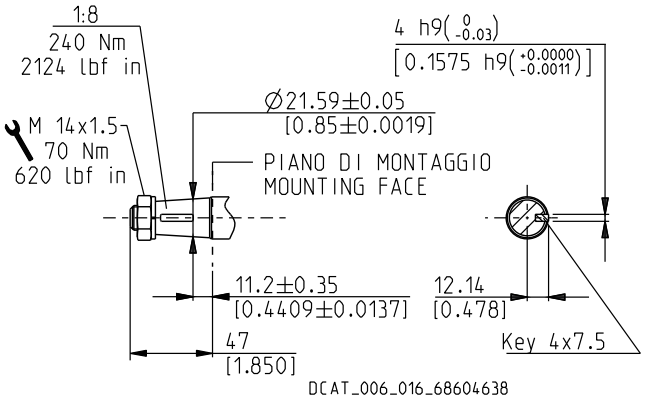
POLARIS 30 DRIVE SHAFTS

EUROPEAN TAPERED 1:8 — 83

Not available with size:

30•82 **30•90**

Mounting face refer to flange code **E3**

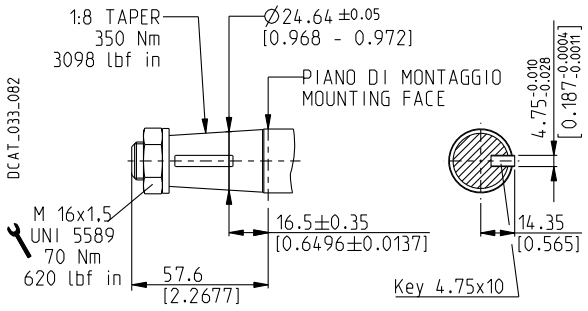


EUROPEAN TAPERED 1:8 — 84

Not available with size:

30•22 **30•27** **30•34** **30•38**

Mounting face refer to flange code **E4**

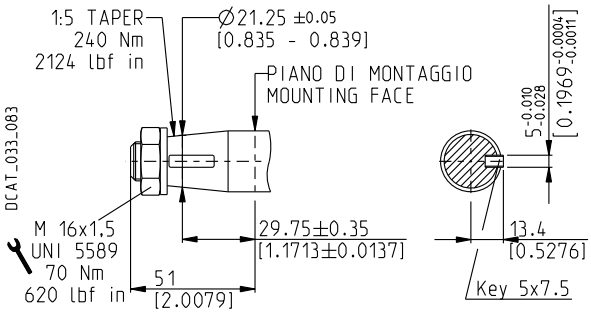


GERMAN TAPERED 1:5 — 56

Not available with size:

30•61 **30•73** **30•82** **30•90**

Mounting face refer to flange code **B3**

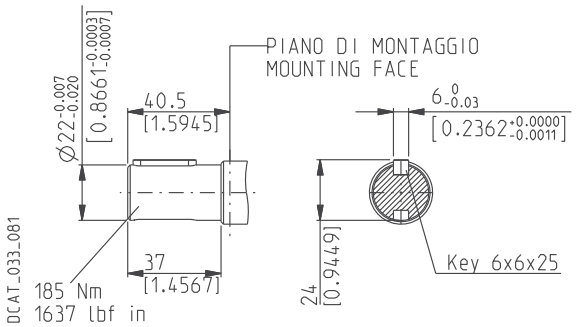


STRAIGHT — 41

Not available with size:

30•82 **30•90**

Mounting face refer to flange code **E3**

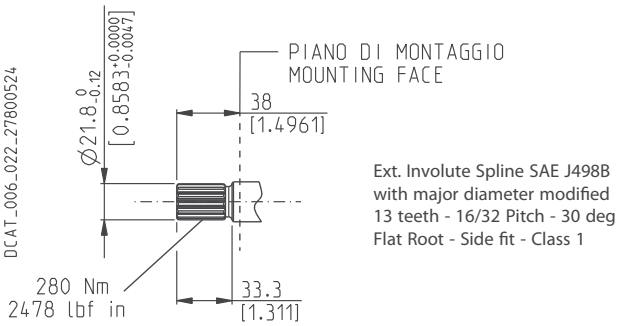


SAE "B" SPLINE — A8

Not available with size:

30•82 **30•90**

Mounting face refer to flange code **U3**

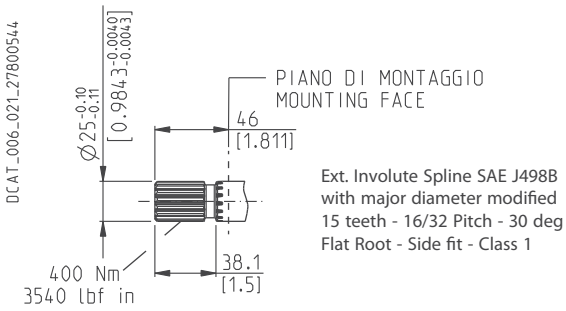


SAE "BB" SPLINE — A5

Not available with size:

30•22 **30•38** **30•82** **30•90**

Mounting face refer to flange code **U3**

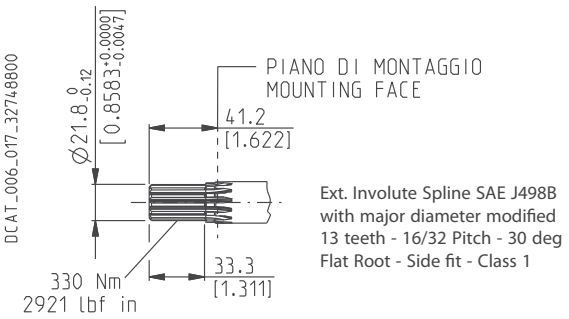


01/10.03

POLARIS 30 DRIVE SHAFTS

SAE “B” SPLINE 04

Mounting face refer to flange code **S5**

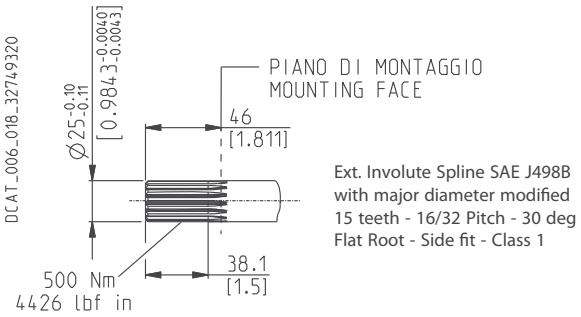


SAE “BB” SPLINE 05

Not available with size:

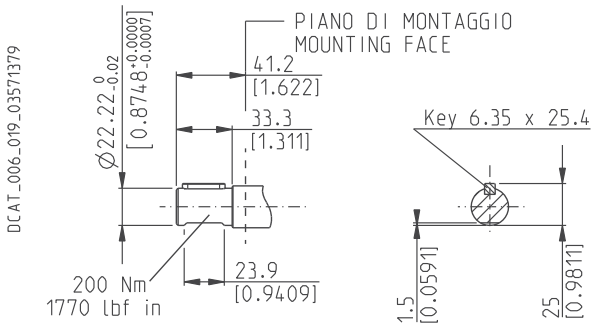
30•90

Mounting face refer to flange code **S5**



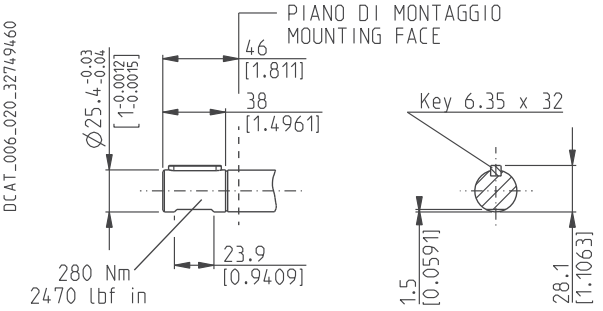
SAE “B” STRAIGHT 32

Mounting face refer to flange code **S5**



SAE “B” STRAIGHT 33

Mounting face refer to flange code **S5**

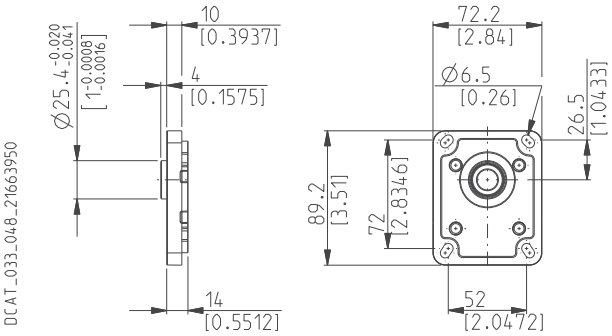


01/10.03

POLARIS 10 MOUNTING FLANGES AND TABLE OF COMPATIBILITY

EUROPEAN E1

Material: cast iron and aluminium O

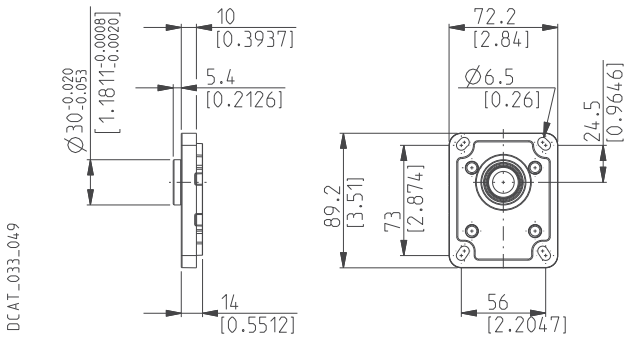


VERSIONS See page 47	DRIVE SHAFTS See page 52 81	02	29	86
0	#	x	x	x

Standard combination
x Available combination

EUROPEAN E7

Material: cast iron and aluminium O

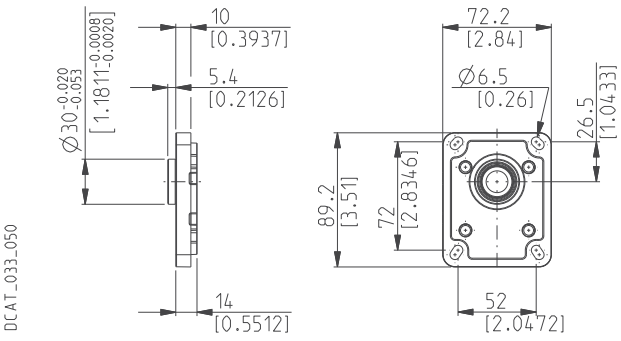


VERSIONS See page 47	DRIVE SHAFTS See page 52 86	29	30
0	#	x	x

Standard combination
x Available combination

EUROPEAN E8

Material: cast iron and aluminium O

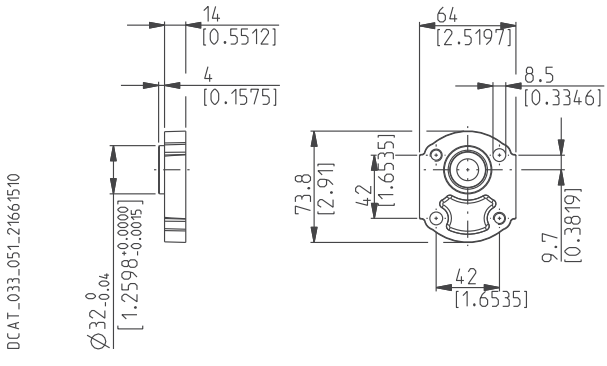


VERSIONS See page 47	DRIVE SHAFTS See page 52 29	02
0	#	x

Standard combination
x Available combination

GERMAN 2 BOLTS B1

Material: aluminium O



VERSIONS See page 47	DRIVE SHAFTS See page 52 30	86
0	#	x

Standard combination
x Available combination

Replaces: 01/10.03

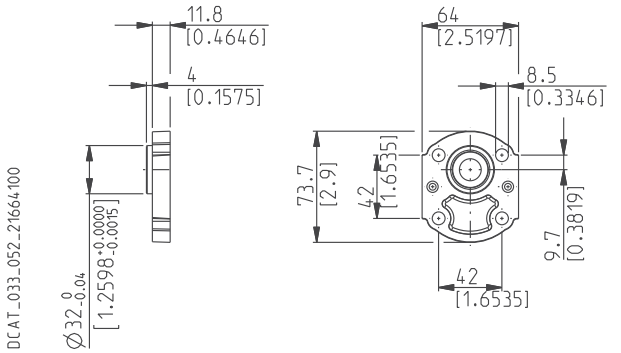
O 02/07.2006

POLARIS 10 MOUNTING FLANGES AND TABLE OF COMPATIBILITY

Replaces: 01/10.03

GERMAN 4 BOLTS K2

Material: aluminium O

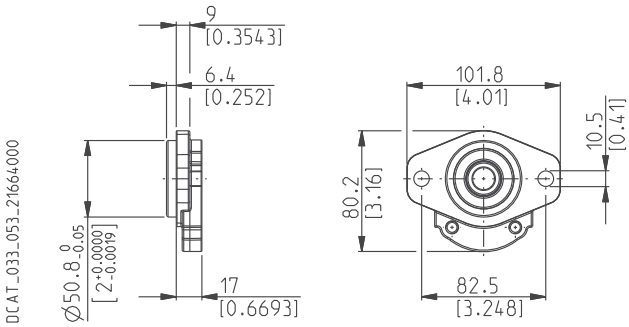


VERSIONS See page 47	DRIVE SHAFTS See page 52 02	30
0	x	x

Standard combination
x Available combination

SAE "A-A" 2 BOLTS S0

Material: cast iron and aluminium O



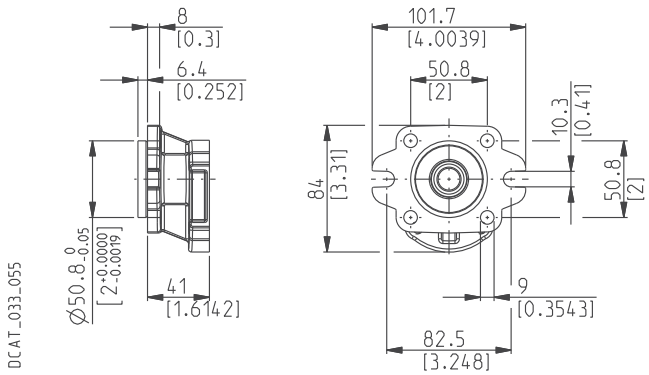
VERSIONS See page 47	DRIVE SHAFTS See page 52 30	02	86
0	#	x	x

Standard combination
x Available combination

O 02/07.2006

SAE "A-A" 2-4 BOLTS R9

Material: cast iron O

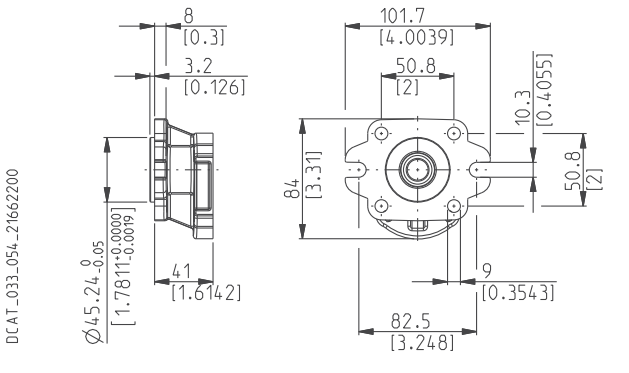


VERSIONS See page 47	DRIVE SHAFTS See page 52 02	30	36
0	#	x	#

Standard combination
x Available combination

SAE 2-4 BOLTS R8

Material: cast iron O



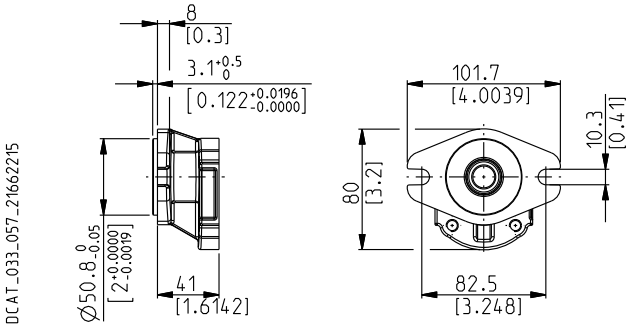
VERSIONS See page 47	DRIVE SHAFTS See page 52 02	30	36
0	#	x	#

Standard combination
x Available combination

POLARIS 10 MOUNTING FLANGES AND TABLE OF COMPATIBILITY

SAE 2 BOLTS W9

Material: cast iron O



	DRIVE SHAFTS See page 52
VERSIONS See page 47	36
O	#

Standard combination

X Available combination

Replaces: 01/10.03

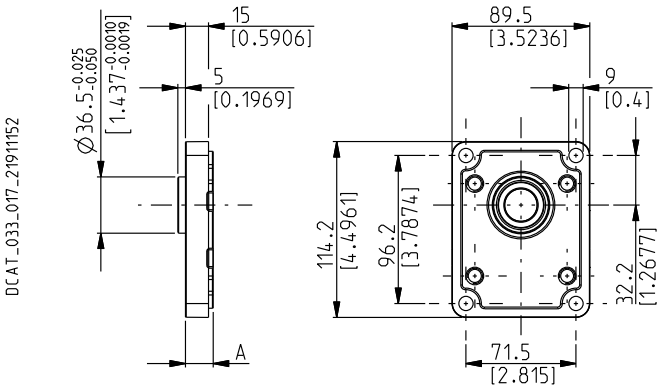
O 02/07.2006

POLARIS 20 MOUNTING FLANGES AND TABLE OF COMPATIBILITY

Replaces: 01/10.03

EUROPEAN E2

Material: cast iron and aluminium O



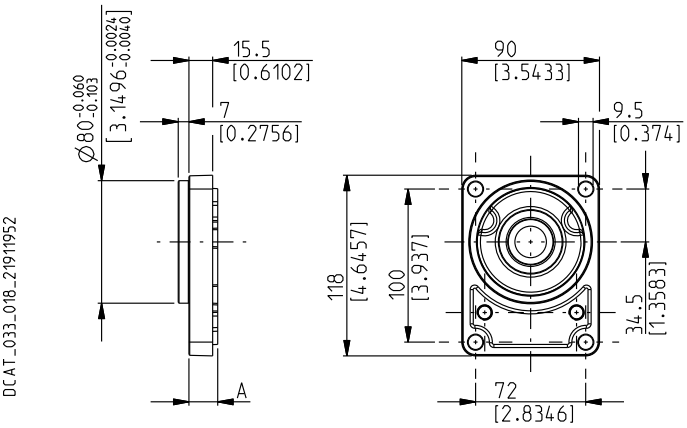
VERSIONS See page 47	A mm (in)	DRIVE SHAFTS See page 53 ÷ 55 82	46	B1	03	04	07	12	31	48	49	50	54
0	18 (0.7087)	#	#		x	x	x	x	x	x	x	x	x
4	55,4 (2.1811)	#											
5	43,6 (1.7165)	#		x	x						x	x	x
6	55,4 (2.1811)									#			
7	59,4 (2.3386)	#											
8	59,4 (2.3386)			#									

Standard combination

x Available combination

GERMAN B2

Material: cast iron and aluminium O



O 02/07.2006

VERSIONS See page 47	A mm (in)	DRIVE SHAFTS See page 53 ÷ 55 12	54	55	01	03	31	46	49	82
0	18,8 (0.7402)	#	#		x	x	x	x	x	x
5	44,4 (1.7480)		x	x		x			x	x
9	59,4 (1.7441)			x						

Standard combination

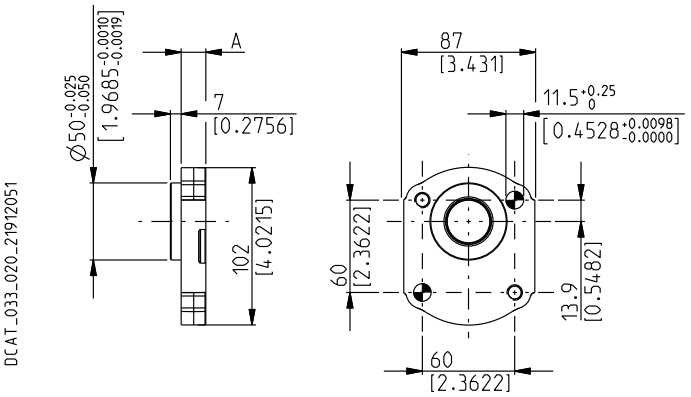
x Available combination

POLARIS 20 MOUNTING FLANGES AND TABLE OF COMPATIBILITY

GERMAN 2 BOLTS B4

Material: cast iron and aluminium

O



Replaces: 01/10.03

VERSIONS See page 47	A mm (in)	DRIVE SHAFTS See page 53 ÷ 55						
		54	03	12	31	49	54	82
0	16 (0.63)	#	x	x	x	x	x	x
5	41,6 (1.6378)	x	x			x	x	x

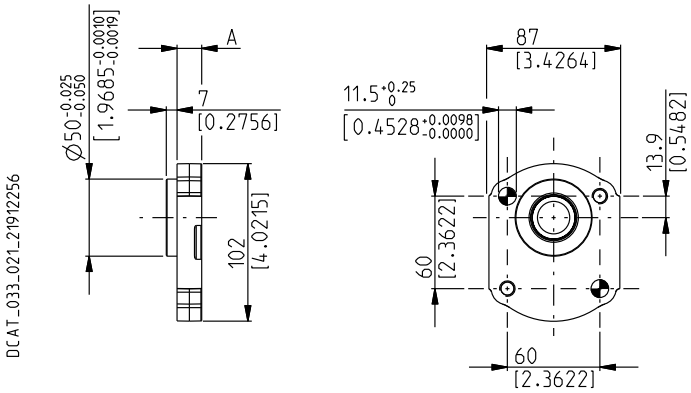
Standard combination

x Available combination

GERMAN 2 BOLTS B5

Material: cast iron and aluminium

O



O 02/07.2006

VERSIONS See page 47	A mm (in)	DRIVE SHAFTS See page 53 ÷ 55						
		54	03	12	31	49	54	82
0	16 (0.63)	#	x	x	x	x	x	x
5	41,6 (1.6378)	x	x			x	x	x

Standard combination

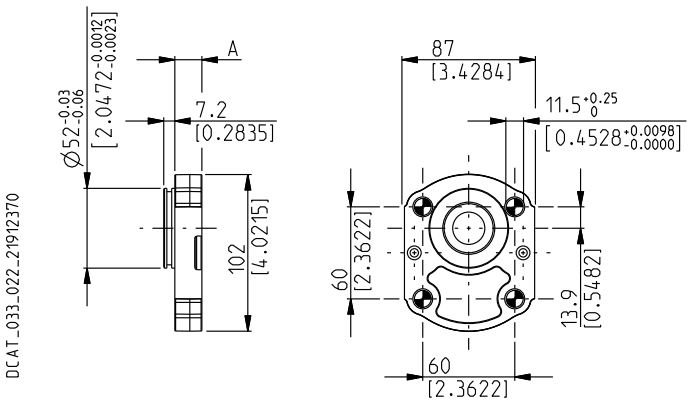
x Available combination

POLARIS 20 MOUNTING FLANGES AND TABLE OF COMPATIBILITY

Replaces: 01/10.03

GERMAN 4 BOLTS — B6

Material: cast iron and aluminium — O



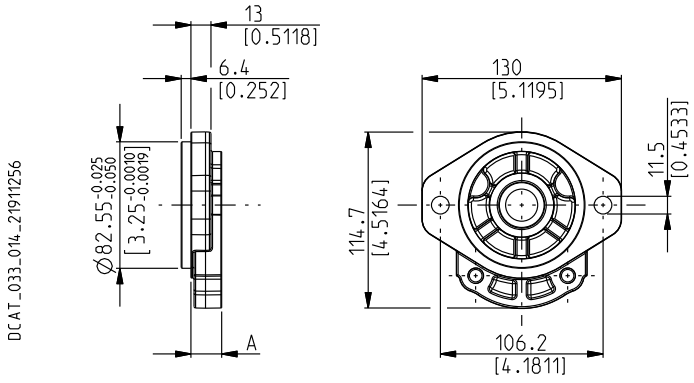
VERSIONS See page 47	A mm (in)	DRIVE SHAFTS See page 53 ÷ 55 95	07	12
0	17,7 (0.6968)	#	x	x
5	43,3 (1.747)	x		

Standard combination

x Available combination

SAE “A” 2 BOLTS — S1

Material: cast iron and aluminium — O



O 02/07.2006

VERSIONS See page 47	A mm (in)	DRIVE SHAFTS See page 53 ÷ 55 01	03	04	07	12	31	32	46	49	50	54	82
0	20 (0.787)	#	#	x	#	x	#	x	x	#	x	x	x
5	45,6 (1.7953)		x							x	x	x	x

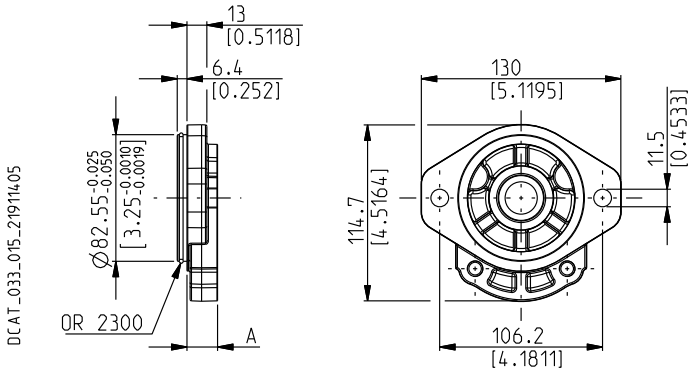
Standard combination

x Available combination

POLARIS 20 MOUNTING FLANGES AND TABLE OF COMPATIBILITY

SAE "A" 2 BOLTS — S2

Material: cast iron and aluminium



Replaces: 01/10.03

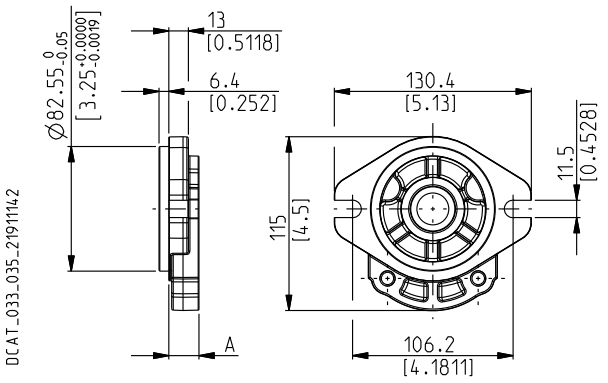
VERSIONS See page 47	A mm (in)	DRIVE SHAFTS See page 53 ÷ 55 01	03	04	07	12	31	32	46	49	50	54	82
0	20 (0.7874)	#	#	x	#	x	#	x	x	#	x	x	x
5	45,6 (1.7953)		x							x	x	x	x

Standard combination

x Available combination

SAE "A" 2 BOLTS — S9

Material: cast iron and aluminium



02/07.2006

VERSIONS See page 47	A mm (in)	DRIVE SHAFTS See page 53 ÷ 55 01	03	04	07	12	31	32	46	49	50	54	82
0	20 (0.7874)	#	#	x	#	x	#	x	x	#	x	x	x
5	45,6 (1.7953)		x							x	x	x	x

Standard combination

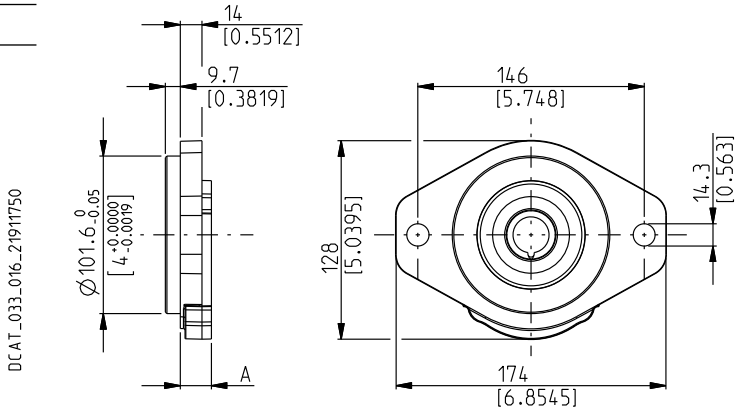
x Available combination

POLARIS 20 MOUNTING FLANGES AND TABLE OF COMPATIBILITY

Replaces: 01/10.03

SAE "B" 2 BOLTS — S5

Material: cast iron — O



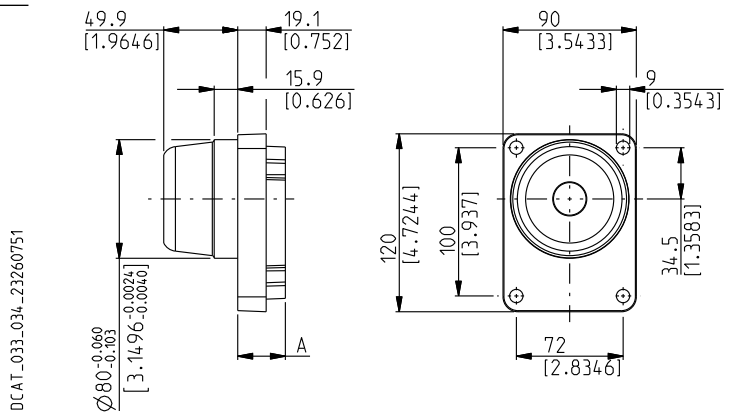
VERSIONS See page 47	A mm (in)	DRIVE SHAFTS See page 53 ÷ 55 04	32	49
0	20 (0.7874)	#	#	x
5	45,6 (1.7953)			x

Standard combination

x Available combination

GERMAN — W8

Material: cast iron — O



O 02/07.2006

VERSIONS See page 47	A mm (in)	DRIVE SHAFTS See page 53 ÷ 55 55
W8	32,1 (1.2638)	#

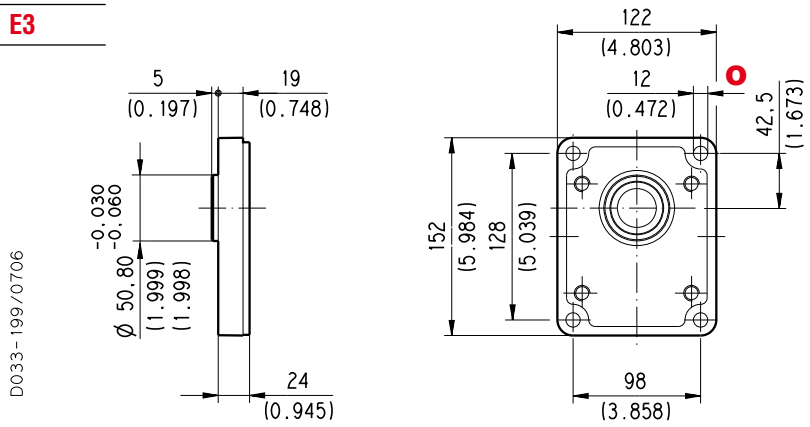
Standard combination

x Available combination

POLARIS 30 MOUNTING FLANGES AND TABLE OF COMPATIBILITY

EUROPEAN E3

Material: cast iron O



Replaces: 01/10.03

DRIVE SHAFTS
See page 56 and 57

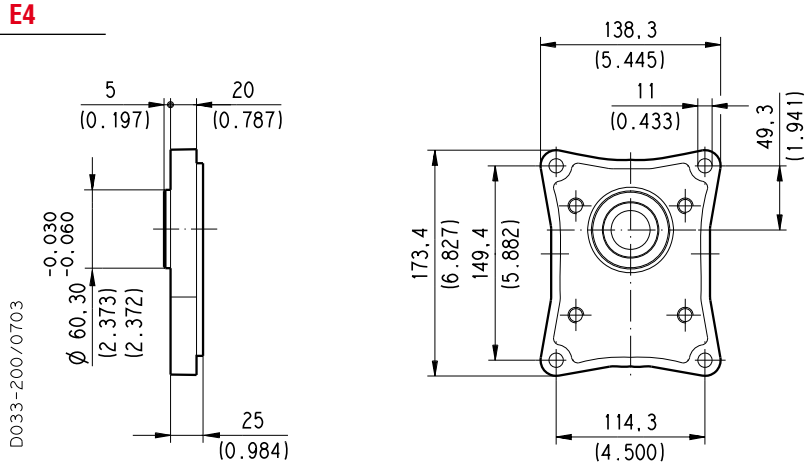
VERSIONS See page 47	83	41	04	05	32	33	A5	A8
0	#	#	x	x	x	x	x	x

Standard combination

x Available combination

EUROPEAN E4

Material: cast iron O



O 02/07.2006

DRIVE SHAFTS
See page 56 and 57

VERSIONS See page 47	84	41	A5	A8
0	#	x	x	x

Standard combination

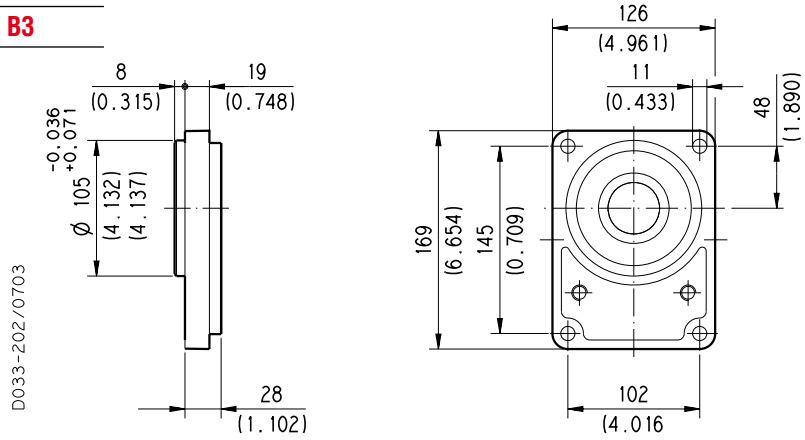
x Available combination

POLARIS 30 MOUNTING FLANGES AND TABLE OF COMPATIBILITY

Replaces: 01/10.03

GERMAN — B3

Material: cast iron — O



DRIVE SHAFTS
See page 56 and 57

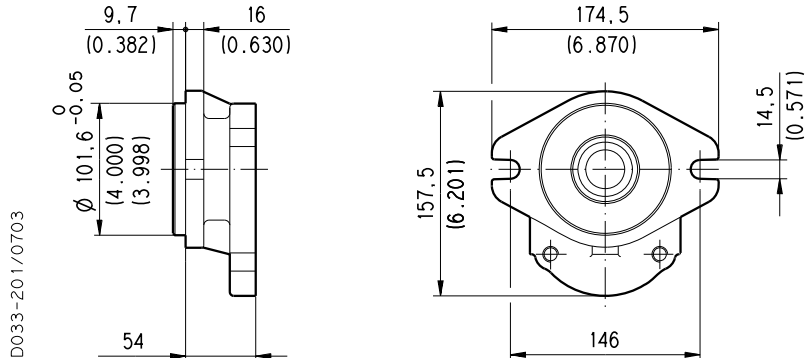
VERSIONS See page 47	56	83	A5	A8
0	#	x	x	x

Standard combination

x Available combination

SAE “B” 2 BOLTS — S5

Material: cast iron — O



O 02/07.2006

DRIVE SHAFTS
See page 56 and 57

VERSIONS See page 47	04	05	32	33
0	#	#	#	#

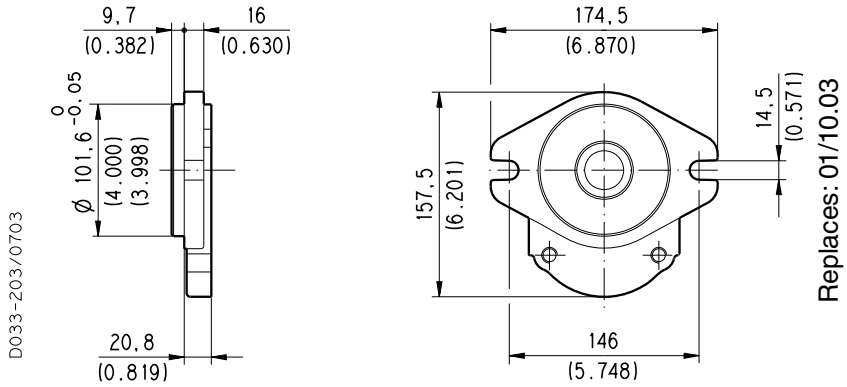
Standard combination

x Available combination

POLARIS 30 MOUNTING FLANGES AND TABLE OF COMPATIBILITY

SAE “B” 2 BOLTS	U3

Material: cast iron O



Replaces: 01/10.03

DRIVE SHAFTS
See page 56 and 57

VERSIONS See page 47	A5	A8	83
0	#	#	x

Standard combination

x Available combination

O 02/07.2006

IN/OUT PORTS TYPE

	SIDE PORTS												REAR PORTS			
PORTS TYPE	German		European		Split SSM		Spit SSS		Gas BSPP		SAE ODT		Gas BSPP		SAE ODT	
Pump type	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Motor type	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN
PL. 10•1	BB	BA							GC	GC	OB	OA	GC	GC	OB	OA
PL. 10•1,5	BB	BA							GC	GC	OB	OA	GC	GC	OB	OA
PL. 10•2	BB	BA							GC	GC	OB	OA	GC	GC	OB	OA
PL. 10•2,5	BB	BA							GC	GC	OB	OA	GC	GC	OB	OA
PL. 10•3,15	BB	BA							GC	GC	OB	OA	GC	GC	OB	OA
PL. 10•4	BB	BA							GC	GC	OB	OA	GC	GC	OB	OA
PL. 10•5	BB	BA							GD	GD	OB	OA	GD	GD	OB	OA
PL. 10•5,8	BB	BA							GD	GD	OB	OA	GD	GD	OB	OA
PL. 10•6,3	BB	BA							GD	GD	OB	OA	GD	GD	OB	OA
PL. 10•8	BB	BA							GD	GD	OC	OB	GD	GD	OB	OB
PL. 10•10	BB	BA							GD	GD	OC	OB	GD	GD	OB	OB
PL. 20•4	BE	BC	EA	EA	MA	MA	SA	SA	GD	GD	OC	OC	GD	GD	OC	OC
PL. 20•6,3	BE	BC	EA	EA	MA	MA	SA	SA	GD	GD	OC	OC	GD	GD	OC	OC
PL. 20•7,2	BE	BC	EA	EA	MA	MA	SA	SA	GD	GD	OC	OC	GD	GD	OC	OC
PL. 20•8	BE	BC	EA	EA	MA	MA	SA	SA	GD	GD	OC	OC	GD	GD	OC	OC
PL. 20•9	BE	BC	EA	EA	MA	MA	SA	SA	GD	GD	OC	OC	GD	GD	OC	OC
PL. 20•10,5	BE	BC	EA	EA	MA	MA	SA	SA	GD	GD	OC	OC	GD	GD	OC	OC
PL. 20•11,2	BE	BC	EA	EA	MA	MA	SA	SA	GD	GD	OC	OC	GD	GD	OC	OC
PL. 20•14	BE	BC	EB	EA	MB	MA	SB	SA	GE	GD	OD	OC	GE	GD	OD	OC
PL. 20•16	BE	BC	EB	EA	MB	MA	SB	SA	GE	GD	OD	OC	GE	GD	OD	OC
PL. 20•19	BE	BC	EB	EA	MB	MA	SB	SA	GE	GD	OD	OC	GE	GD	OD	OC
PL. 20•20	BE	BC	EB	EA	MB	MA	SB	SA	GE	GD	OD	OC	GE	GD	OD	OC
PL. 20•24,5	BE	BC	EB	EA	MC	MB	SC	SB	GE	GD	OD	OC	GE	GD	OD	OC
PL. 20•25	BE	BC	EB	EA	MC	MB	SC	SB	GE	GD	OD	OC	GE	GD	OD	OC
PL. 20•27,8	BE	BC	EB	EA	MC	MB	SC	SB	GE	GD	OD	OC	GE	GD	OD	OC
PL. 20•31,5	BE	BC	EB	EA	MC	MB	SC	SB	GE	GD	OD	OC	GE	GD	OD	OC
PL. 30•22	BM	BL	ED	EB	MB	MA	SB	SA	GF	GF	OF	OD				
PL. 30•27	BM	BL	ED	EB	MC	MB	SC	SB	GF	GF	OF	OD				
PL. 30•34	BM	BL	ED	EB	MC	MB	SC	SB	GF	GF	OF	OD				
PL. 30•38	BM	BL	ED	EB	MD	MC	SD	SC	GF	GF	OG	OF				
PL. 30•43	BM	BL	ED	EB	MD	MC	SD	SC	GF	GF	OG	OF				
PL. 30•46	BM	BL	ED	EB	MD	MC	SD	SC	GF	GF	OG	OF				
PL. 30•51	BM	BL	ED	EB	MD	MC	SD	SC	GF	GF	OG	OF				
PL. 30•61	BM	BL	ED	EB	ME	MD	SE	SD	GG	GF	OH	OG				
PL. 30•73	BM	BL	EF	ED	ME	MD	SE	SD	GG	GF	OH	OG				
PL. 30•82	BM	BL	EF	ED	ME	MD	SE	SD	GH	GG	OH	OG				
PL. 30•90	BM	BL	EF	ED	MF	ME	SF	SE	GH	GG	OH	OG				

01/10.03

EXTERNAL DRAIN PORTS

	SIDE PORTS						REAR PORTS	
IN/OUT PORTS TYPE	German	European	Split SSM	Spit SSS	Gas BSPP	SAE ODT	Gas BSPP	SAE ODT
PL. 10	GA	-	-	-	GA	03	GA	03
PL. 20	TA	GB	GB	03	GB	03	GB	03
PL. 30	GC	GC	GC	OA	GC	OA	-	-

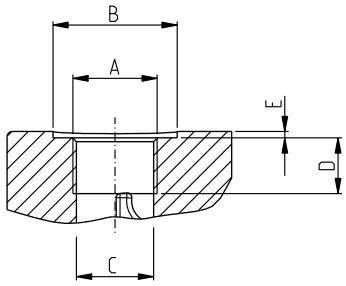
DRAIN PORTS SIZES

Tightening torque for low pressure side port

GAS STRAIGHT THREAD PORTS — BSPP

British standard pipe parallel (55°) conforms to UNI - ISO 228

CODE	NOMINAL SIZE	A	Ø B	Ø C	D	E	
			mm (in)	mm (in)	mm (in)	mm (in)	Nm (lbf in)
GA	1/8"	G 1/8	16,5 (0.6496)	8,75 (0.3444)	12 (0.4724)	1 (0.0394)	5 $^{+0,25}$ (44 ÷ 46)
GB	1/4"	G 1/4	21,5 (0.8465)	12 (0.4724)	15 (0.5906)	1,5 (0.0591)	15 $^{+1}$ (133 ÷ 142)



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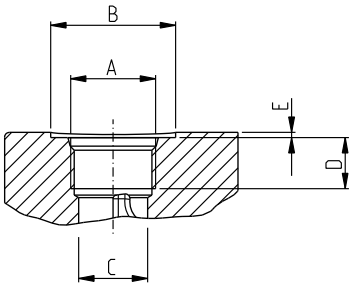
METRIC STRAIGHT THREAD PORTS ISO 6149 — METRIC

Metric thread ISO 60° conforms to ISO/R 262

CODE	A	Ø B	Ø C	D	E	
		mm (in)	mm (in)	mm (in)	mm (in)	Nm (lbf in)
TA	M 10x1	22 (0.8661)	9 (0.3543)	13 (0.5118)	0,5 (0.0197)	10 $^{+0,5}$ (89 ÷ 93)



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SAE STRAIGHT THREAD PORTS J514 — ODT

American straight UNC-UNF 60° conforms to ANSI B 1.1

CODE	A	Ø B	Ø C	D	E	
		mm (in)	mm (in)	mm (in)	mm (in)	Nm (lbf in)
03	7/16"-20 UNF-2B	21 (0.8267)	9,5 (0.3740)	14 (0.5512)	1 (0.0394)	12 $^{+1}$ (106 ÷ 115)

Other drain ports are shown on subsequent pages.

01/10.03

PORTS SIZE

Tightening torque for low pressure side port

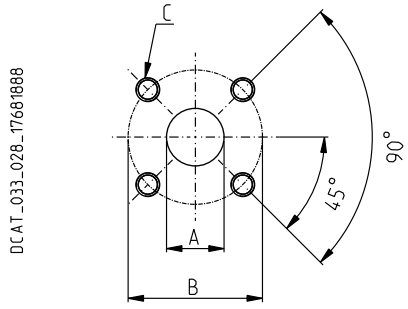
Tightening torque for high pressure side port [values obtained at 5075 psi (350 bar)]

For reversible rotation, please consult only the tightening torque for high pressure side port

GERMAN FLANGED PORTS - 4 Bolts — GERMAN

Metric thread ISO 60° conforms to ISO/R 262

CODE	A	B	C		
	mm (in)	mm (in)	Thread Depth mm (in)	Nm (lbf in)	Nm (lbf in)
BA	8 (0.3150)	30 (1.1811)	M6 12 (0.4724)	8 +0,5 (71 ÷ 75)	8 +0,5 (71 ÷ 75)
BB	13 (0.5118)	30 (1.1811)	M6 12 (0.4724)	8 +0,5 (71 ÷ 75)	8 +0,5 (71 ÷ 75)
BC	15 (0.5906)	35 (1.3780)	M6 12 (0.4724)	8 +0,5 (71 ÷ 75)	8 +0,5 (71 ÷ 75)
BE	20 (0.7874)	40 (1.5748)	M6 12 (0.4724)	8 +0,5 (71 ÷ 75)	8 +0,5 (71 ÷ 75)
BL	19 (0.7480)	55 (2.1654)	M8 18 (0.7087)	15 +1 (133 ÷ 142)	20 +1 (177 ÷ 186)
BM	27 (1.0630)	55 (2.1654)	M8 18 (0.7087)	15 +1 (133 ÷ 142)	20 +1 (177 ÷ 186)



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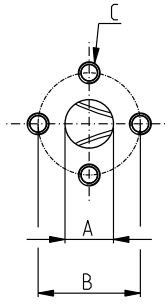
EUROPEAN FLANGED PORTS - 4 Bolts — EUROPEAN

Metric thread ISO 60° conforms to ISO/R 262

CODE	A	B	C		
	mm (in)	mm (in)	Thread Depth mm (in)	Nm (lbf in)	Nm (lbf in)
EA	13 (0.5118)	30 (1.1811)	M 6 13 (0.5118)	8 +0,5 (71 ÷ 75)	8 +0,5 (71 ÷ 75)
EB	19 (0.7480)	40 (1.5748)	M 8 14 (0.5512)	15 +1 (133 ÷ 142)	15 +1 (133 ÷ 142)
			M 8 (◆) 18 (0.7087)	15 +1 (◆) (133 ÷ 142)	15 +1 (◆) (133 ÷ 142)
ED	27 (1.0630)	51 (2.0079)	M 10 18 (0.7087)	20 +1 (177 ÷ 186)	30 +2,5 (266 ÷ 288)
EF	33 (1.2992)	62 (2.4409)	M 12 18 (0.7087)	25 +1 (221 ÷ 230)	50 +2,5 (443 ÷ 465)

(◆) For POLARIS 30



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01/10.03

PORTS SIZES

Tightening torque for low pressure side port

Tightening torque for high pressure side port [values obtained at 5075 psi (350 bar)]

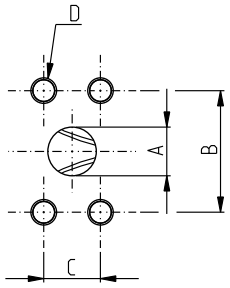
For reversible rotation, please consult only the tightening torque for high pressure side port

SAE FLANGED PORTS J518 - Standard pressure series 3000 PSI — SSM

Metric thread ISO 60° to ISO/R 262

CODE	A mm (in)	B mm (in)	C mm (in)	D Thread Depth mm (in)	Nm (lbf in)	Nm (lbf in)
MA	12,5 (0.4921)	38,1 (1.50)	17,5 (0.6890)	M 8 14 (0.5512)	15 +1 (133 ÷ 142)	15 +1 (133 ÷ 142)
				M 8 (◆) 22 (0.8661)	20 +1 (◆) (177 ÷ 186)	20 +1 (◆) (177 ÷ 186)
MB	19 (0.7480)	47,6 (1.8740)	22,2 (0.8740)	M 10 14 (0.5512)	20 +1 (177 ÷ 186)	25 +1 (266 ÷ 288)
				M 10 (◆) 22 (0.8661)	20 +1 (◆) (177 ÷ 186)	35 +2,5 (◆) (310 ÷ 332)
MC	25,4 (1.0000)	52,4 (2.0630)	26,2 (1.0315)	M 10 14 (0.5512)	20 +1 (177 ÷ 186)	25 +1 (266 ÷ 288)
				M 10 (◆) 22 (0.8661)	20 +1 (◆) (177 ÷ 186)	35 +2,5 (◆) (310 ÷ 332)
MD	30,5 (1.2008)	58,7 (2.3110)	30,2 (1.1890)	M 10 15 (0.5906)	20 +1 (177 ÷ 186)	30 +2,5 (266 ÷ 288)
				M 10 (◆) 22 (0.8661)	20 +1 (◆) (177 ÷ 186)	35 +2,5 (◆) (310 ÷ 332)
ME	39,3 (1.5472)	69,8 (2.7480)	35,7 (1.4055)	M 12 22 (0.8661)	30 +2,5 (266 ÷ 288)	60 +5 (531 ÷ 575)
MF	51 (2.0079)	77,8 (3.0630)	42,9 (1.6890)	M 12 22 (0.8661)	30 +2,5 (266 ÷ 288)	60 +5 (531 ÷ 575)

(◆) For POLARIS 30



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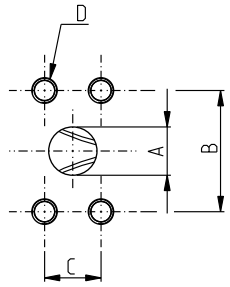
SAE FLANGED PORTS J518 - Standard pressure series 3000 PSI — SSS

American straight thread UNC-UNF 60° conforms to ANSI B 1.1

CODE	A mm (in)	B mm (in)	C mm (in)	D Thread Depth mm (in)	Nm (lbf in)	Nm (lbf in)
SA	12,5 (0.4921)	38,1 (1.50)	17,5 (0.6890)	5/16-18 UNC-2B 14 (0.5512)	15 +1 (133 ÷ 142)	15 +1 (133 ÷ 142)
				5/16-18 UNC-2B (◆) 22 (0.8661)	20 +1 (◆) (177 ÷ 186)	20 +1 (◆) (177 ÷ 186)
SB	19 (0.7480)	47,6 (1.8740)	22,2 (0.8740)	3/8-16 UNC-2B 14 (0.5512)	20 +1 (177 ÷ 186)	20 +1 (177 ÷ 186)
				3/8-16 UNC-2B (◆) 22 (0.8661)	30 +2,5 (◆) (266 ÷ 288)	20 +1 (◆) (177 ÷ 186)
SC	25,4 (1.0000)	52,4 (2.0630)	26,2 (1.0315)	3/8-16 UNC-2B 14 (0.5512)	20 +1 (177 ÷ 186)	25 +1 (221 ÷ 230)
				3/8-16 UNC-2B (◆) 22 (0.8661)	20 +1 (◆) (177 ÷ 186)	30 +2,5 (◆) (266 ÷ 288)
SD	30,5 (1.2008)	58,7 (2.3110)	30,2 (1.1890)	7/16-14 UNC-2B 22 (0.8661)	20 +1 (177 ÷ 186)	45 +2,5 (398 ÷ 420)
SE	39,3 (1.5472)	69,8 (2.7480)	35,7 (1.4055)	1/2-13 UNC-2B 22 (0.8661)	30 +2,5 (266 ÷ 288)	70 +5 (620 ÷ 664)
SF	51 (2.0079)	77,8 (3.0630)	42,9 (1.6890)	1/2-13 UNC-2B 22 (0.8661)	30 +2,5 (◆) (266 ÷ 288)	70 +5 (620 ÷ 664)

(◆) For POLARIS 30



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01/10.03

PORTS SIZES

Tightening torque for low pressure side port

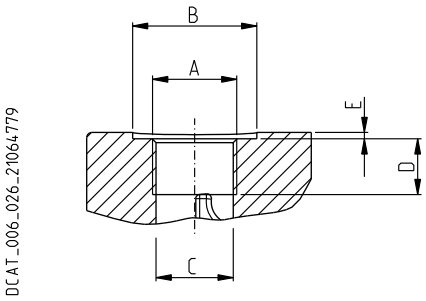
Tightening torque for high pressure side port [values obtained at 5075 psi (350 bar)]

For reversible rotation, please consult only the tightening torque for high pressure side port

Replaces: 01/10.03

GAS STRAIGHT THREAD PORTS — BSPP

British standard pipe parallel (55°) conforms to UNI - ISO 228



CODE	Nominal size	A	Ø B	Ø C	D	E		
			mm (in)	mm (in)	mm (in)	mm (in)	Nm (lbf in)	Nm (lbf in)
GC O	3/8”	G 3/8	30 (#) (1.1811)	15 (0.5906)	10 (#) (0.3937)	2 (#) (0.0787)	15 +1 (#) (133 ÷ 142)	—
			—		14 (0.5512)	—	15 +1 (133 ÷ 142)	25 +1 (221 ÷ 230)
GD O	1/2”	G 1/2	—	19 (0.7480)	14 (0.5512)	—	20 +1 (177 ÷ 186)	50 +2,5 (443 ÷ 465)
					17 (◆) (0.6693)			
GE	3/4”	G 3/4	—	24,5 (0.9646)	18 (0.7087)	—	30 +2,5 (266 ÷ 288)	90 +5 (797 ÷ 841)
GF	1”	G 1	—	30,5 (1.2008)	18 (0.7086)	—	50 +2,5 (443 ÷ 465)	130 +10 (1151 ÷ 1239)
GG	1” 1/4	G 1 1/4	—	39 (1.5354)	22 (0.8661)	—	60 +5 (531 ÷ 575)	170 +10 (1505 ÷ 1593)
GH	1” 1/2	G 1 1/2	—	45 (1.7716)	24 (0.9448)	—	70 +5 (620 ÷ 664)	210 +15 (1859 ÷ 1992)

(#) = Drain port

(◆) For POLARIS 20

O 02/07.2006

PORTS SIZES

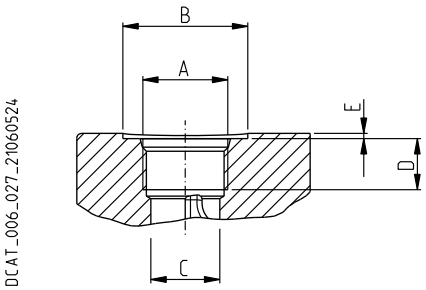
Tightening torque for low pressure side port

Tightening torque for high pressure side port [values obtained at 5075 psi (350 bar)]

For reversible rotation, please consult only the tightening torque for high pressure side port

SAE STRAIGHT THREAD PORTS J514 — ODT

American straight thread UNC-UNF 60° conforms to ANSI B 1.1



CODE	Nominal size	A	Ø B	Ø C	D	E		
			mm (in)	mm (in)	mm (in)	mm (in)	Nm (lbf in)	Nm (lbf in)
OA	3/8”	9/16” - 18 UNF - 2B	26 (1.0236)	13 (0.5118)	15 (0.5906)	1 (0.03934)	15 +1 (133 ÷ 142)	25 +1 (221 ÷ 230)
						2 (#) (0.0787)	15 +1 (#) (133 ÷ 142)	—
OB	1/2”	3/4” - 16 UNF - 2B	32 (1.2598)	17,5 (0.690)	15 (0.5906)	—	20 +1 (177 ÷ 186)	45 +2,5 (398 ÷ 420)
OC	5/8”	7/8” - 14 UNF - 2B	35 (1.3780)	20,5 (0.8071)	15 (◆) (0.5906)	0,5 (0.0197)	30 +2,5 (266 ÷ 288)	70 +5 (620 ÷ 664)
					17 (0.6693)			
OD	3/4”	1 1/16” - 12 UNF - 2B	42 (1.6535)	24,8 (0.9764)	20 (0.7874)	0,5 (0.0197)	40 +2,5 (354 ÷ 376)	120 +10 (1062 ÷ 1151)
OF	1”	1 5/16” - 12 UNF - 2B	49 (1.9291)	30,5 (1.2008)	20 (0.7874)	0,5 (0.0197)	60 +5 (531 ÷ 575)	170 +10 (1505 ÷ 1593)
OG	1” 1/4	1 5/8” - 12 UNF - 2B	58 (2.2835)	39,1 (1.5394)	20 (0.7874)	0,5 (0.0197)	70 +5 (620 ÷ 664)	200 +15 (1770 ÷ 1858)
OH	1” 1/2	1 7/8” - 12 UNF - 2B	65 (2.5591)	45 (1.7717)	20 (0.7874)	0,5 (0.0197)	100 +5 (885 ÷ 929)	270 +15 (2389 ÷ 2522)

(#) = Drain port

(◆) For POLARIS 10

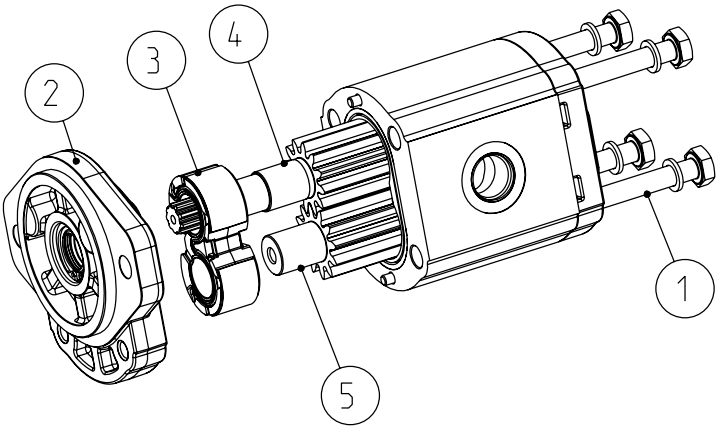
01/10.03

CHANGING ROTATION

Example of changing rotation: from PLP20 pump clockwise to counterclockwise

To change rotation of Polaris unidirectional pumps and motors it is necessary to operate in the following way:

1. Clean the pump externally with care.
2. Loosen, and remove, the clamp bolts (1).
3. Coat the sharp edges of the drive shaft (4) with adhesive tape and smear a layer of clean grease on the shaft end extension to avoid damaging the lip of the shaft seal when removing the mounting flange.
4. Remove the mounting flange (2), taking care to keep the flange as straight as possible during removal. If the flange is stuck, tap around the edge with a fibre or rubber mallet in order to break away from the body. Ensure that while removing the front mounting flange, the drive shaft and other components remain in position.



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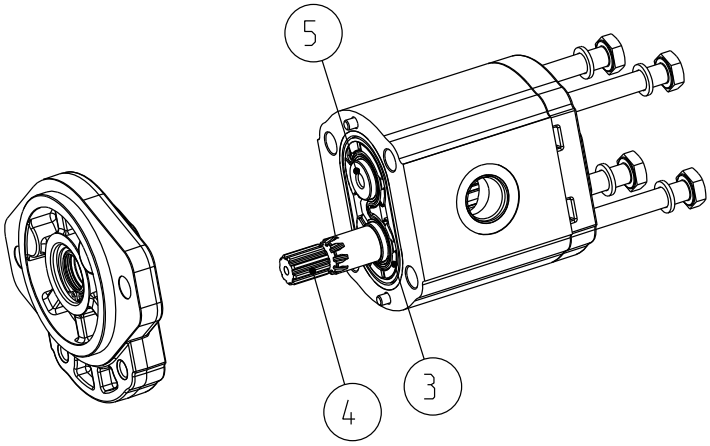
5. Ease the drive gear (4) up to facilitate removal the front plate (3), taking care that the precision ground surfaces do not become damaged, and remove the drive gear.
6. Remove the driven gear (5) without overturning. The rear plate has not to be removed.



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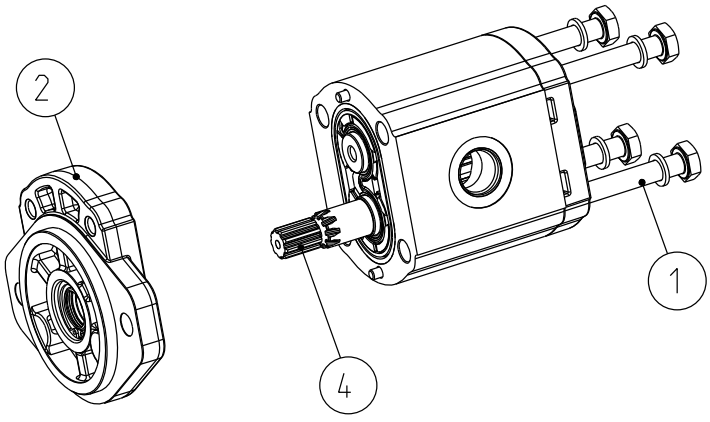
7. Re-locate the driven gear (5) in the position previously occupied by the drive gear (4)
8. Re-locate the drive gear (4) in the position previously occupied by the driven gear (5).
9. Replace the front plate (3) in its original position.
10. Gently wipe the machined surface of the mounting flange (2) and the body with a flat hand stone.
11. Refit the front mounting flange (2) turned 180° from its original position.
12. Refit the clamp bolts (1) with the washers and tighten in a crisscross pattern with the following torque value:
    70 $^{+5}$ Nm (620 ÷ 664 lbf in) with cast iron cover.
    45 $^{+5}$ Nm (398 ÷ 443 lbf in) with one or both cover in aluminium.
13. Check that the pump rotates freely when the drive shaft (4) is turned by hand. If not a pressure plate seal may be pinched.
14. The pump is ready for installation with the original rotation reversed.



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01/10.03

INSTRUCTIONS

INSTALLATION

Pump

The direction of rotation of single-rotation pumps must be the same as that of the drive shaft. Check that the coupling flange correctly aligns the transmission shaft and the pump shaft.
Flexible couplings should be used (never rigid fittings) which will not generate an axial or radial load on the pump shaft.

Motor

The direction of rotation of single-rotation motors must match circuit connections. Check that the coupling flange correctly aligns the transmission shaft and the motor shaft. Flexible couplings should be used (never rigid fittings) wich will not generate an axial or radial load on the motor shaft.

TANK

Tank capacity must be sufficient for the system's operating conditions (~ 3 times the amount of oil in circulation) to avoid overheating of the fluid. A heat exchanger should be installed if necessary. The intake and return lines in the tank must be spaced apart (by inserting a vertical divider) to prevent the return-line oil from being taken up again immediately.

LINES

The lines must have a major diameter which is at least as large as the diameter of pump or motor ports, and must be perfectly sealed. To reduce loss of power, the lines should be as short as possible, reducing the sources of hydraulic resistance (elbow, throttling, gate valves, etc.) to a minimum. A length of flexible tubing is recommended to reduce the transmission of vibrations. All return lines must end below the minimum oil level, to prevent foaming. Before connecting the lines, remove any plugs and make sure that the lines are perfectly clean.

FILTERS O

We recommend filtering the entire system flow. Filters on suction and return line must be fitted in according to the contamination class as indicated in the first pages of the catalogue.
Casappa recommends to use its own production filters:

IKRON® Fluid Filtration

HYDRAULIC FLUID

Use hydraulic fluid conforming to ISO/DIN standards, having viscosity as specified in the first pages of the catalogue. Avoid using mixtures of different oils which could result in decomposition and reduction of the oil's lubricating power.

STARTING UP

Check that all circuit connections are tight and that the entire system is completely clean. Insert the oil in the tank, using a filter. Bleed the circuit to assist in filling. Set the pressure relief valves to the lowest possible setting. Turn on the system for a few moments at minimum speed, then bleed the circuit again and check the level of oil in the tank. In the difference between pump or motor temperature and fluid temperature exceeds 50°F (10 °C), rapidly switch the system on and off to heat it up gradually. Then gradually increase the pressure and speed of rotation until the pre-set operating levels as specified in the catalogue are attained.

PERIODICAL CHECKS - MAINTENANCE

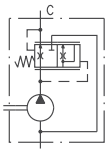
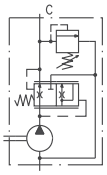
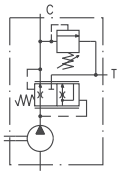
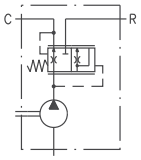
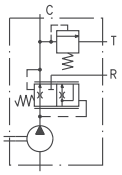
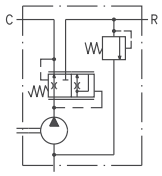
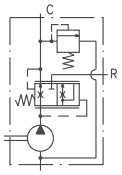
Keep the outside surface clean especially in the area of the drive shaft seal. In fact, abrasive powder can accelerate wear on the seal and cause leakage. Replace filters regularly to keep the fluid clean. The oil level must be checked and oil replaced periodically depending on the system's operating conditions.

Replaces: 01/10.03

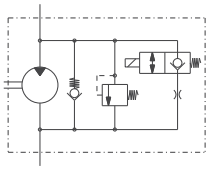
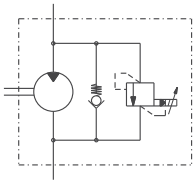
O 02/07.2006

VALVE OPTIONS (◆)

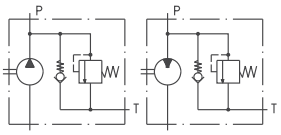
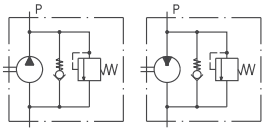
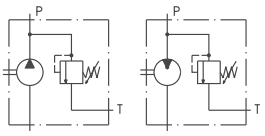
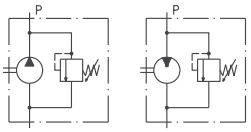
PRIORITY VALVE

P1	Costant delivery and internal recirculation of excess flow.	
P2	Costant delivery at controlled pressure. Internal recirculation of excess flow and drain valve.	
P3	Costant delivery at controlled pressure. Excess flow and drain valve must be connected to tank.	
P4	Costant delivery and excess flow can both be used under load.	
P5T	Costant delivery at controlled pressure with drain valve connected to tank. Excess flow can be used under load.	
P7	Costant delivery. Excess flow at controlled pressure can be used under load. Internal recirculation of drain valve.	
P9	Costant delivery at controlled pressure. Internal recirculation of valve drain. Excess flow can be used under load.	

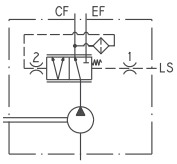
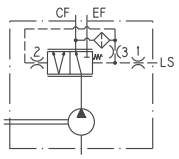
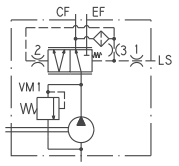
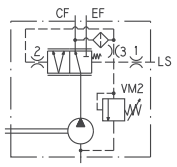
ELECTRIC VALVE FOR MOTORS

EC08..	By-pass valve normally closed with max. pressure relief valve and anti-cavitation valve.	
DBVSA..	Proportional relief valve and anti-cavitation valve.	

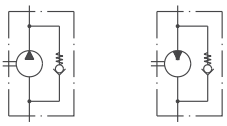
MAX PRESSURE RELIEF VALVE

VPEF..	Fixed setting with external drain.	
VPIF..	Fixed setting with internal drain.	
VPER..	Adjustable setting with external drain.	
VPIR..	Adjustable setting with internal drain.	

LOAD SENSING VALVE

...	Static.	
...	Dynamic.	
...	Dynamic with relief valve fitted on the main line.	
...	Dynamic with relief valve fitted on controlled line.	

CHECK VALVE

V8	Anti-cavitation valve.	

(◆) For more information please consult our technical sales department.

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HOW TO ORDER POLARIS 10 SINGLE UNITS

1	2	3		4	5		6	7		8		9		10		11	12		13
PLP 10-1	L	0	-	81	E1	-	L	BB/BA	-	N	-	EL	-	C	-	L	GA	-	FS

1 Type	Pump type	Motor type
0.07 in³/rev (1,07 cm³/rev)	PLP 10-1	PLM 10-1
0.10 in³/rev (1,60 cm³/rev)	PLP 10-1,5	PLM 10-1,5
0.13 in³/rev (2,13 cm³/rev)	PLP 10-2	PLM 10-2
0.16 in³/rev (2,67 cm³/rev)	PLP 10-2,5	PLM 10-2,5
0.20 in³/rev (3,34 cm³/rev)	PLP 10-3,15	PLM 10-3,15
0.26 in³/rev (4,27 cm³/rev)	PLP 10-4	PLM 10-4
0.33 in³/rev (5,34 cm³/rev)	PLP 10-5	PLM 10-5
0.38 in³/rev (6,20 cm³/rev)	PLP 10-5,8	PLM 10-5,8
0.41 in³/rev (6,67 cm³/rev)	PLP 10-6,3	PLM 10-6,3
0.52 in³/rev (8,51 cm³/rev)	PLP 10-8	PLM 10-8
0.65 in³/rev (10,67 cm³/rev)	PLP 10-10	PLP 10-10

2 Rotation	Code
Left	S
Right	D
Reversible rear external drain	R
Reversible side external drain	L
Reversible internal drain	B

3 Version	Code
Without outboard bearing	0

4 Drive shaft	Code
European tapered 1:8	81
European tapered 1:8	86
SAE "AA" spline (9 teeth)	02
SAE "AA" straight	30
SAE straight	36
Straight	29

5 Mounting flange	Code
European	E1
European	E7
European	E8
German 2 bolt	B1
German 4 bolt	K2
SAE "AA" 2 bolt	S0
SAE "AA" 2-4 bolt	R9
SAE 2-4 bolt	R8
SAE 2 bolt	W9

Code	6 Ports position
L	Side
P	Rear

Code	7 Ports IN/OUT		
GERMAN FLANGED PORTS			
Side	Rear		Type
BB/BA		PLP 10	1-1,5-2-2,5-3,15 4-5-5,8-6,3-8-10
BA/BB		PLM 10	
GAS STRAIGHT THREAD PORTS (BSPP)			
Side	Rear		Type
GC/GC	GC/GC	PLP 10	1-1,5-2-2,5-3,15-4
		PLM 10	
GD/GD	GD/GD	PLP 10	5-5,8-6,3-8-10
		PLM 10	
SAE STRAIGHT THREAD PORTS (ODT)			
Side	Rear		Type
OB/OA	OB/OA	PLP 10	1-1,5-2-2,5-3,15-4 5-5,8-6,3
OA/OB	OA/OB	PLM 10	
OC/OB	OB/OB	PLP 10	8-10
OB/OC	OB/OB	PLM 10	

Code	8 Seals (a)
N	Buna (standard)
V	Viton

Code	9 Cover options (b)
	Cast iron mounting flange and rear cover (standard - no code)
E	Aluminium mounting flange and cast iron rear cover
L	Cast iron mounting flange and aluminium rear cover
EL	Aluminium mounting flange and rear cover

Code	10 Shaft seal options
C	High back pressure seal with wiper seal
D	Standard seal with wiper seal
H	High back pressure seal

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HOW TO ORDER POLARIS 10 SINGLE UNITS

11	Drain port position - Rev. Rotation L	Code
Side drain with side port position		L
Side drain with bottom port position		*

12	Drain port		Code
IN/OUT GERMAN FLANGED PORTS			
Type		Side	Rear
1-1,5-2-2,5-3,15 4-5-5,8-6,3-8-10	PLP 10 PLM 10	GA	
IN/OUT GAS STRAIGHT THREAD PORTS (BSPP)			
Type		Side	Rear
1-1,5-2-2,5-3,15 4-5-5,8-6,3-8-10	PLP 10 PLM 10	GA	GA
IN/OUT SAE STRAIGHT THREAD PORTS (ODT)			
Type		Side	Rear
1-1,5-2-2,5-3,15 4-5-5,8-6,3-8-10	PLP 10 PLM 10	03	03

13	Shaft arrangement	Code
Female spline		FS

(a) Choose the seals according to the temperature shown on page 4.

(b) Mounting flange material on page 58 ÷ 60
Rear cover material on page 32 ÷ 33

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HOW TO ORDER POLARIS 20 SINGLE UNITS

1	2	3		4	5		6	7		8		9		10		11		12		13
PLP 20·4	L	0	-	82	E2	-	L	EA/EA	-	N	-	EL	-	C	-	*		GB	-	FS

1 Type	Pump type	Motor type
0.30 in³/rev (4,95 cm³/rev)	PLP 20·4	PLM 20·4
0.40 in³/rev (6,61 cm³/rev)	PLP 20·6,3	PLM 20·6,3
0.44 in³/rev (7,29 cm³/rev)	PLP 20·7,2	PLM 20·7,2
0.50 in³/rev (8,26 cm³/rev)	PLP 20·8	PLM 20·8
0.56 in³/rev (9,17 cm³/rev)	PLP 20·9	PLM 20·9
0.66 in³/rev (10,9 cm³/rev)	PLP 20·10,5	PLM 20·10,5
0.69 in³/rev (11,23 cm³/rev)	PLP 20·11,2	PLM 20·11,2
0.89 in³/rev (14,53 cm³/rev)	PLP 20·14	PLM 20·14
1.03 in³/rev (16,85 cm³/rev)	PLP 20·16	PLM 20·16
1.16 in³/rev (19,09 cm³/rev)	PLP 20·19	PLM 20·19
1.29 in³/rev (21,14 cm³/rev)	PLP 20·20	PLM 20·20
1.52 in³/rev (24,84 cm³/rev)	PLP 20·24,5	PLM 20·24,5
1.61 in³/rev (26,42 cm³/rev)	PLP 20·25	PLM 20·25
1.72 in³/rev (28,21 cm³/rev)	PLP 20·27,8	PLM 20·27,8
2.01 in³/rev (33,03 cm³/rev)	PLP 20·31,5	PLM 20·31,5

2 Rotation	Code
Left	S
Right	D
Reversible rear external drain	R
Reversible side external drain	L
Reversible internal drain	B

3 Version	Code
Without outboard bearing	0
With outboard bearing	W8
With outboard bearing	4
With outboard bearing	5
With outboard bearing	6
With outboard bearing	7
With outboard bearing	8
With outboard bearing	9

4 Drive shaft	Code
European tapered 1:8	82
German tapered 1:5	54
German tapered 1:5	55
Straight	46
SAE "A" spline (9 teeth)	03
SAE spline (10 teeth)	01
SAE "A" spline (11 teeth)	07
SAE "A" straight	31

Code	Drive shaft 4
49	Straight
50	Straight
04	SAE "B" spline
32	SAE "B" straight
12	DIN 54 82
48	Straight (only for version 6)
B1	Straight (only for version 8)
95	Tang

Code	Mounting flange 5
E2	European
B2	German
B4	German 2 bolt
B5	German 2 bolt
B6	German 4 bolt
S1	SAE "A" 2 bolt
S2	SAE "A" 2 bolt
S9	SAE "A" 2 bolt
S5	SAE "B" 2 bolt
W8	German

Code	Ports position 6
L	Side
P	Rear

Code	Ports IN/OUT 7		
GERMAN FLANGED PORTS			
Side	Rear		Type
BE/BC		PLP 20	4-6,3-7,2-8-9-10,5-11,2 14-16-19-20-24,5-25 27,8-31,5
BC/BE		PLM 20	
EUROPEAN FLANGED PORTS			
Side	Rear		Type
EA/EA		PLP 20	4-6,3-7,2-8-9-10,5-11,2
		PLM 20	
EB/EA		PLP 20	14-16-19-20-24,5-25 27,8-31,5
EA/EB		PLM 20	

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HOW TO ORDER POLARIS 20 SINGLE UNITS

Replaces: 01/10.03

7	Ports IN/OUT		Code
SAE FLANGED PORTS (SSM)			
Type		Side	Rear
4-6,3-7,2-8-9-10,5-11,2	PLP 20 / PLM 20	MA/MA	
14-16-19-20	PLP 20	MB/MA	
	PLM 20	MA/MB	
24,5-25-27,8-31,5	PLP 20	MC/MB	
	PLM 20	MB/MC	
SAE FLANGED PORTS (SSS)			
Type		Side	Rear
4-6,3-7,2-8-9-10,5-11,2	PLP 20 / PLM 20	SA/SA	
14-16-19-20	PLP 20	SB/SA	
	PLM 20	SA/SB	
24,5-25-27,8-31,5	PLP 20	SC/SB	
	PLM 20	SB/SC	
GAS STRAIGHT THREAD PORTS (BSPP)			
Type		Side	Rear
4-6,3-7,2-8-9 10,5-11,2	PLP 20 / PLM 20	GD/GD	GD/GD
14-16-19-20-24,5-25 27,8-31,5	PLP 20	GE/GD	GE/GD
	PLM 20	GD/GE	GD/GE
SAE STRAIGHT THREAD PORTS (ODT)			
Type		Side	Rear
4-6,3-7,2-8-9-10,5-11,2	PLP 20 / PLM 20	OC/OC	OC/OC
14-16-19-20-24,5-25 27,8-31,5	PLP 20	OD/OC	OD/OC
	PLM 20	OC/OD	OC/OD

8	Seals (a)	Code
Buna (standard)		N
Viton		V

9	Cover options (b)	O	Code
Cast iron mounting flange and rear cover (standard - no code)			
Aluminium mounting flange and cast iron rear cover			E
Cast iron mounting flange and aluminium rear cover			L
Aluminium mounting flange and rear cover			EL

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10	Shaft seal options	Code
High back pressure seal with wiper seal		C
Standard seal with wiper seal		D
High back pressure seal		H

Code	Drain port position - Rev. rotation L	11
L	Side drain with side port position	
*	Side drain with bottom port position	

Code	Drain port		12
IN/OUT GERMAN FLANGED PORTS			
Side	Rear		Type
TA		PLP 20 / PLM 20	4-6,3-7,2-8-9-10,5-11,2 24,5-25-27,8-31,5
IN/OUT EUROPEAN FLANGED PORTS			
Side	Rear		Type
GB		PLP 20 / PLM 20	4-6,3-7,2-8-9-10,5-11,2 24,5-25-27,8-31,5
IN/OUT SAE FLANGED PORTS (SSM)			
Side	Rear		Type
GB		PLP 20 / PLM20	4-6,3-7,2-8-9-10,5-11,2 24,5-25-27,8-31,5
IN/OUT SAE FLANGED PORTS (SSS)			
Side	Rear		Type
03		PLP 20 / PLM 20	4-6,3-7,2-8-9-10,5-11,2 24,5-25-27,8-31,5
IN/OUT GAS STRAIGHT THREAD PORTS (BSPP)			
Side	Rear		Type
GB	GB	PLP 20 / PLM 20	4-6,3-7,2-8-9-10,5-11,2 24,5-25-27,8-31,5
IN/OUT SAE STRAIGHT THREAD PORTS (ODT)			
Side	Rear		Type
03	03	PLP 20 / PLM 20	4-6,3-7,2-8-9-10,5-11,2 24,5-25-27,8-31,5

Code	Shaft arrangement	13
FS	Female spline	

(a) Choose the seals according to the temperature shown on page 4.

(b) Mounting flange material on page 61 ÷ 65
Rear cover material on page 34 ÷ 35

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HOW TO ORDER POLARIS 30 SINGLE UNITS

1	2	3		4	5		6	7		8		9		10
PLP 30-22	R	0	-	83	E3	-	L	ED/EB	-	N	-	C	-	FS

1 Type	Pump type	Motor type
1.34 in³/rev (21,99 cm³/rev)	PLP 30-22	PLM 30-22
1.63 in³/rev (26,70 cm³/rev)	PLP 30-27	PLM 30-27
2.11 in³/rev (34,55 cm³/rev)	PLP 30-34	PLM 30-34
2.40 in³/rev (39,27 cm³/rev)	PLP 30-38	PLM 30-38
2.68 in³/rev (43,98 cm³/rev)	PLP 30-43	PLM 30-43
3.16 in³/rev (51,83 cm³/rev)	PLP 30-51	PLM 30-51
3.74 in³/rev (61,26 cm³/rev)	PLP 30-61	PLM 30-61
4.50 in³/rev (73,82 cm³/rev)	PLP 30-73	PLM 30-73
4.98 in³/rev (81,68 cm³/rev)	PLP 30-82	PLM 30-82
5.56 in³/rev (91,10 cm³/rev)	PLP 30-90	PLM 30-90

2 Rotation	Code
Left	S
Right	D
Reversible rear external drain	R

3 Version	Code
Without outboard bearing	0

4 Drive shaft	Code
European tapered 1:8	83
European tapered 1:8	84
German tapered 1:5	56
Straight	41
SAE “B” spline	A8
SAE “BB” spline	A5
SAE “B” spline	04
SAE “BB” spline	05
SAE “B” straight	32
SAE “BB” straight	33

5 Mounting flange	Code
European	E3
European	E4
German	B3
SAE “B” 2 bolt	S5
SAE “B” 2 bolt	U3

6 Ports position	Code
Side	L

Code	7 Ports IN/OUT	
GERMAN FLANGED PORTS		
Side		Type
BM/BL	PLP 30	22-27-34-38-43 46-51-61-73-82-90
BL/BM	PLM 30	
EUROPEAN FLANGED PORTS		
Side		Type
ED/EB	PLP 30	22-27-34-38-43 46-51-61
EB/ED	PLM 30	
EF/ED	PLP 30	73-82-90
ED/EF	PLM 30	
SAE FLANGED PORTS (SSM)		
Side		Type
MB/MA	PLP 30	22
MA/MB	PLM 30	
MC/MB	PLP 30	27-34
MB/MC	PLM 30	
MD/MC	PLP 30	38-43-46-51
MC/MD	PLM 30	
ME/MD	PLP 30	61-73-82
MD/ME	PLM 30	
MF/ME	PLP 30	90
ME/MF	PLM 30	
SAE FLANGED PORTS (SSS)		
Side		Type
SB/SA	PLP 30	22
SA/SB	PLM 30	
SC/SB	PLP 30	27-34
SB/SC	PLM 30	
SD/SC	PLP 30	38-43-46-51
SC/SB	PLM 30	
SE/SD	PLP 30	61-73-82
SD/SE	PLM 30	
SF/SE	PLP 30	90
SE/SF	PLM 30	
GAS STRAIGHT THREAD PORTS (BSPP)		
Side		Type
GF/GF	PLP 30	22-27-34-38-43-46-51
	PLM 30	
GG/GF	PLP 30	61-73
GF/GG	PLM 30	
GH/GG	PLP 30	82-90
GG/GH	PLM 30	

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HOW TO ORDER POLARIS 30 SINGLE UNITS

7	Ports IN/OUT	Code
SAE STRAIGHT THREAD PORTS (ODT)		
Type		Rear
22-27-34	PLP 30	**OF/OD**
	PLM 30	**OD/OF**
38-43-46-51	PLP 30	**OG/OF**
	PLM 30	**OF/OG**
61-73-82-90	PLP 30	**OH/OG**
	PLM 30	**OG/OH**

8	Seals (a)	Code
Buna (standard)		**N**
Viton		**V**

9	Shaft seal options	Code
High back pressure seal with wiper seal		**C**
Standard seal with wiper seal		**D**
High back pressure seal		**H**

10	Shaft arrangement	Code
Female spline		**FS**

(a) Choose the seals according to the temperature shown on page 4.

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HOW TO ORDER POLARIS 10 MULTIPLE PUMPS

1	2	3	4	5	6	7	8	9	10	11	12
PLP 10·1	-	81	E1	-	L	BA/BA	/				
Front section											
10·1	-				L	BA/BA	/				
Intermediate section											
10·1	-				L	**/BA	-	V7	-	S	0	-	N	-	EL	-	C	/	FS
Rear section											

Replaces: 01/10.03

1 Type	Pump type
0.07 in³/rev (1,07 cm³/rev)	PLP 10·1
0.10 in³/rev (1,60 cm³/rev)	PLP 10·1,5
0.13 in³/rev (2,13 cm³/rev)	PLP 10·2
0.16 in³/rev (2,67 cm³/rev)	PLP 10·2,5
0.20 in³/rev (3,34 cm³/rev)	PLP 10·3,15
0.26 in³/rev (4,27 cm³/rev)	PLP 10·4
0.33 in³/rev (5,34 cm³/rev)	PLP 10·5
0.38 in³/rev (6,20 cm³/rev)	PLP 10·5,8
0.41 in³/rev (6,67 cm³/rev)	PLP 10·6,3
0.52 in³/rev (8,51 cm³/rev)	PLP 10·8
0.65 in³/rev (10,67 cm³/rev)	PLP 10·10

2 Drive shaft	Code
European tapered 1:8	81
European tapered 1:8	86
SAE "AA" spline (9 teeth)	02
SAE "AA" straight	30
SAE straight	36
Straight	29

3 Mounting flange	Code
European	E1
European	E7
European	E8
German 2 bolts	B1
German 4 bolts	K2
SAE "AA" 2 bolt	S0
SAE "AA" 2-4 bolt	R9
SAE 2-4 bolt	R8
SAE 2 bolt	W9

4 Ports position	Code
Side	L

Code	5 Ports IN/OUT	
GERMAN FLANGED PORTS		
Side		Type
BB/BA	PLP 10	1-1,5-2-2,5-3,15-4-5-5,8-6,3-8-10
GAS STRAIGHT THREAD PORTS (BSPP)		
Side		Type
GC/GC	PLP 10	1-1,5-2-2,5-3,15-4
GD/GD	PLP 10	5-5,8-6,3-8-10
SAE STRAIGHT THREAD PORTS (ODT)		
Side		Type
OB/OA	PLP 10	1-1,5-2-2,5-3,15-4-5-5,8-6,3
OC/OB	PLP 10	8-10

Code	6 Combination type
V6	Standard
V7	Common inlet

Code	7 Rotation
S	Left
D	Right

Code	8 Version
0	Without outboard bearing (standard) no code

Code	9 Seals (a)
N	Buna N (standard)
V	Viton

Code	O 10 Cover options (b)
	Cast iron mounting flange and rear cover (standard - no code)
E	Aluminium mounting flange and cast iron rear cover
L	Cast iron mounting flange and aluminium rear cover
EL	Aluminium mounting flange and rear cover

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HOW TO ORDER POLARIS 10 MULTIPLE PUMPS

11	**Shaft seal options**	Code
High back pressure seal with wiper seal		**C**
Standard seal with wiper seal		**D**
High back pressure seal		**H**

12	**Shaft arrangement**	Code
Female spline		**FS**

(a) Choose the seals according to the temperature shown on page 4.

(b) Mounting flange material on page 58 ÷ 60
Rear cover material on page 43

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Replaces: 01/10.03

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HOW TO ORDER POLARIS 20 MULTIPLE PUMPS

1	2	3	4	5	6	7	8	9	10	11	12
PLP 20·4 -	82	E2	-	L	EA/EA	/					
Front section											
20·4 -				L	EA/EA	/					
Intermediate section											
20·4 -				L	**/EA -	S7 -	S	0 -	N -	EL -	C / FS
Rear section											

1	**Type**	Pump Type
0.30 in³/rev (4,95 cm³/rev)		PLP 20·4
0.40 in³/rev (6,61 cm³/rev)		PLP 20·6,3
0.44 in³/rev (7,29 cm³/rev)		PLP 20·7,2
0.50 in³/rev (8,26 cm³/rev)		PLP 20·8
0.56 in³/rev (9,17 cm³/rev)		PLP 20·9
0.66 in³/rev (10,9 cm³/rev)		PLP 20·10,5
0.69 in³/rev (11,23 cm³/rev)		PLP 20·11,2
0.89 in³/rev (14,53 cm³/rev)		PLP 20·14
1.03 in³/rev (16,85 cm³/rev)		PLP 20·16
1.16 in³/rev (19,09 cm³/rev)		PLP 20·19
1.29 in³/rev (21,14 cm³/rev)		PLP 20·20
1.52 in³/rev (24,84 cm³/rev)		PLP 20·24,5
1.61 in³/rev (26,42 cm³/rev)		PLP 20·25
1.72 in³/rev (28,21 cm³/rev)		PLP 20·27,8
2.01 in³/rev (33,03 cm³/rev)		PLP 20·31,5

2	**Drive shaft**	Code
European tapered 1:8		82
German tapered 1:5		54
German tapered 1:5		55
Straight		46
SAE "A" spline (9 teeth)		03
SAE spline (10 teeth)		01
SAE "A" spline (11 teeth)		07
SAE "A" straight		31
Straight		49
Straight		50
SAE "B" spline		04
SAE "B" straight		32
DIN 54 82 spline		12
Straight (only for version 6)		48
Straight (only for version 8)		B1
Tang		95

Code	**Mounting flange**	3
E2	European	
B2	German	
B4	German 2 bolt	
B5	German 2 bolt	
B6	German 4 bolt	
S1	SAE "A" 2 bolt	
S2	SAE "A" 2 bolt	
S9	SAE "A" 2 bolt	
S5	SAE "B" 2 bolt	
W8	German	

Code	**Ports position**	4
L	Side	

Code	**Ports IN/OUT**	5
GERMAN FLANGED PORTS		
Side		Type
BE/BC	PLP 20	4-6,3-7,2-8-9-10,5-11,2 14-16-19-20-24,5-25 27,8-31,5
EUROPEAN FLANGED PORTS		
Side		Type
EA/EA	PLP 20	4-6,3-7,2-8-9-10,5-11,2
EB/EA	PLP 20	14-16-19-20-24,5-25 27,8-31,5
SAE FLANGED PORTS (SSM)		
Side		Type
MA/MA	PLP 20	4-6,3-7,2-8-9-10,5-11,2
MB/MA	PLP 20	14-16-19-20
MC/MB	PLP 20	24,5-25-27,8-31,5
SAE FLANGED PORTS (SSS)		
Side		Type
SA/SA	PLP 20	4-6,3-7,2-8-9-10,5-11,2
SB/SA	PLP 20	14-16-19-20
SC/SB	PLP 20	24,5-25-27,8-31,5

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HOW TO ORDER POLARIS 20 MULTIPLE PUMPS

Replaces: 01/10.03

5	Ports IN/OUT	Code
GAS STRAIGHT THREAD PORTS (BSPP)		
Type		Rear
4-6,3-7,2-8-9-10,5-11,2	PLP 20	GD/GD
14-16-19-20-24,5-25-27,8-31,5	PLP 20	GE/GD
SAE STRAIGHT THREAD PORTS (ODT)		
Type		Rear
4-6,3-7,2-8-9-10,5-11,2	PLP 20	OC/OC
14-16-19-20-24,5 25-27,8-31,5	PLP 20	OD/OC

6	Combination type	Code
Standard		S6
Common inlet		S7
Separate stages		Z6

7	Rotation	Code
Left		S
Right		D

8	Version	Code
Without outboard bearing (standard) no code		0
With outboard bearing		W8
With outboard bearing		4
With outboard bearing		5
With outboard bearing		6
With outboard bearing		7
With outboard bearing		8
With outboard bearing		9

Code	Seals (a)	9
N	Buna (standard)	
V	Viton	

Code	O	Cover options (b)	10
		Cast iron mounting flange and rear cover (standard - no code)	
E		Aluminium mounting flange and cast iron rear cover	
L		Cast iron mounting flange and aluminium rear cover	
EL		Aluminium mounting flange and rear cover	

Code	Shaft seal options	11
C	High back pressure seal with wiper seal	
D	Standard shaft seals with wiper seal	
H	High back pressure seal	

Code	Shaft arrangement	12
FS	Female spline	

(a) Choose the seals according to the temperature shown on page 4.

(b) Mounting flange material on page 61 ÷ 65
Rear cover material on page 44

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HOW TO ORDER POLARIS 30 MULTIPLE PUMPS

1		2	3		4	5		6		7		8		9		10		11
PLP 30·22	-	83	E3	-	L	ED/EB	/											
Front section																		
30·22	-				L	ED/EB	/											
Intermediate section																		
30·22	-				L	ED/EB	-	M6	-	S		0	-	N	-	C	/	FS
Rear section																		

1 **Type**	Pump Type
1.34 in³/rev (21,99 cm³/rev)	PLP 30·22
1.63 in³/rev (26,70 cm³/rev)	PLP 30·27
2.11 in³/rev (34,55 cm³/rev)	PLP 30·34
2.40 in³/rev (39,27 cm³/rev)	PLP 30·38
2.68 in³/rev (43,98 cm³/rev)	PLP 30·43
3.16 in³/rev (51,83 cm³/rev)	PLP 30·51
3.74 in³/rev (61,26 cm³/rev)	PLP 30·61
4.50 in³/rev (73,82 cm³/rev)	PLP 30·73
4.98 in³/rev (81,68 cm³/rev)	PLP 30·82
5.56 in³/rev (91,10 cm³/rev)	PLP 30·90

2 **Drive shaft**	Code
European tapered 1:8	83
European tapered 1:8	84
German tapered 1:5	56
Straight	41
SAE “B” spline	A8
SAE “BB” spline	A5
SAE “B” spline	04
SAE “BB” spline	05
SAE “B” straight	32
SAE “BB” straight	33

3 **Mounting flange**	Code
European	E3
European	E4
German	B3
SAE “B” 2 bolt	S5
SAE “B” 2 bolt	U3

4 **Ports position**	Code
Side	L

Code	**Ports IN/OUT** 5	
GERMAN FLANGED PORTS		
Side		Type
BM/BL	PLP 30	22-27-34-38-43 46-51-61-73-82-90
EUROPEAN FLANGED PORTS		
Side		Type
ED/EB	PLP 30	22-27-34-38-43 46-51-61
EF/ED	PLP 30	73-82-90
SAE FLANGED PORTS (SSM)		
Side	Rear	Type
MB/MA	PLP 30	22
MC/MB	PLP 30	27-34
MD/MC	PLP 30	38-43-46-51
ME/MD	PLP 30	61-73-82
MF/ME	PLP 30	90
SAE FLANGED PORTS (SSS)		
Side	Rear	Type
SB/SA	PLP 30	22
SC/SB	PLP 30	27-34
SD/SC	PLP 30	38-43-46-51
SE/SD	PLP 30	61-73-82
SF/SE	PLP 30	90
GAS STRAIGHT THREAD PORTS (BSPP)		
Side	Rear	Type
GF/GF	PLP 30	22-27-34-38-43-46-51
GG/GF	PLP 30	61-73
GH/GG	PLP 30	82-90
SAE STRAIGHT THREAD PORTS (ODT)		
Side	Rear	Type
OF/OD	PLP 30	22-27-34
OG/OF	PLP 30	38-43-46-51
OH/OG	PLP 30	61-73-82-90

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HOW TO ORDER POLARIS 30 MULTIPLE PUMPS

6	**Combination type**	Code
Standard		**M6**

7	**Rotation**	Code
Left		**S**
Right		**D**

8	**Version**	Code
Without outboard bearing (standard) no code		**0**

9	**Seals (a)**	Code
Buna (standard)		**N**
Viton		**V**

10	**Shaft seal options**	Code
High back pressure seal with wiper seal		**C**
Standard seal with wiper seal		**D**
High back pressure seal		**H**

11	**Shaft arrangement**	Code
Female spline		**FS**

(a) Choose the seals according to the temperature shown on page 4.

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HOW TO ORDER POLARIS DOUBLE PUMPS DIFFERENT GROUPS

PLP30/PLP20

1	2	3	4	5	O	6	7	8	9	10	11
PLP 30·22	- 83	E3	- L	ED/EB		/					
Front section											
20·4	-		L	EA/EA			S	O	/ FS	- L	- N
Rear section											

PLP30/PLP10

1	2	3	4	5	6	7	8	9	10	11
PLP 30·22	- 83	E3	- L	ED/EB - 52	/					
Front section										
10·1	-		L	BB/BA -		S	O	/ FS	- L	- N
Rear section										

PLP20/PLP10

1	2	3	4	5	6	7	8	9	10	11
PLP 20·4	- 82	E2	- L	EA/EA - 51	/					
Front section										
10·1	-		L	BB/BA -		S	O	/ FS	- EL	- N
Rear section										

1	**Type**	Pump type
The same of multiple pumps		PLP ..

2	**Drive shaft**	Code
The same of multiple pumps		...

3	**Mounting flange**	Code
The same of multiple pumps		...

4	**Ports position**	Code
Side		L

5	**Ports IN/OUT**	Code
The same of multiple pumps		../..

6	**Combination type**	Code
PLP30/20 Standard - No code		N6
PLP30/20 Common inlet		N7
PLP30/20 Separate stages		Z6
PLP30/10 Standard - No code		Q6
PLP30/10 Common inlete		Q7
PLP20/10 Standard - No code		T6
PLP20/10 Common inlet		T7
PLP20/10 Separate stages		Z6

Code	**Rotation**	7
S	Left	
D	Right	

Code	**Version**	8
...	The same of multiple pumps	

Code	**Shaft arrangement**	9
FS	Female spline	

Code	O **Cover options (a)**	10
	Cast iron mounting flange and rear cover (standard - no code)	
E	Aluminium mounting flange and cast iron rear cover (only for PLP20/10)	
L	Cast iron mounting flange and aluminium rear cover	
EL	Aluminium mounting flange and rear cover (only for PLP20/10)	

Code	**Seals**	11
	The same of multiple pumps	

(a) Mounting flange material:
O PLP 20 on page 61 ÷ 65 - PLP 30 on page 66 ÷ 68
Rear cover material:
PLP 10 on page 43 - PLP 20 on page 44

Replaces: 01/10.03

O 02/07.2006

Our policy is one of continuous improvement in product. Specification of items may, therefore, be changed without notice.

PL 03 T A Edition: 03/02.2012 Replaces: PL 02 T A

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