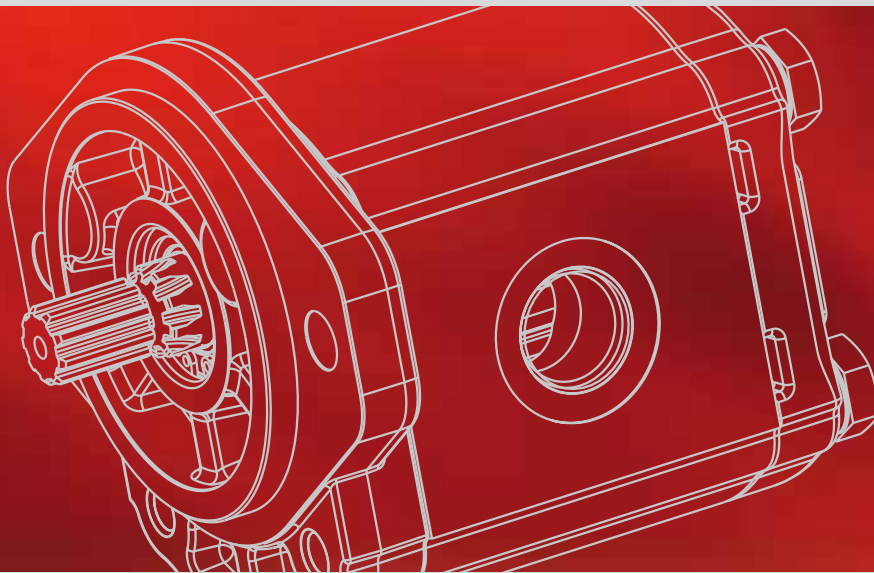




HYDRAULIC GEAR
PUMPS AND
MOTORS

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 development 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 in³/rev (1,07 cm³/rev)

To 5.56 in³/rev (91,10 cm³/rev)

PRESSURE

Max. Continuous 3770 psi (260 bar)

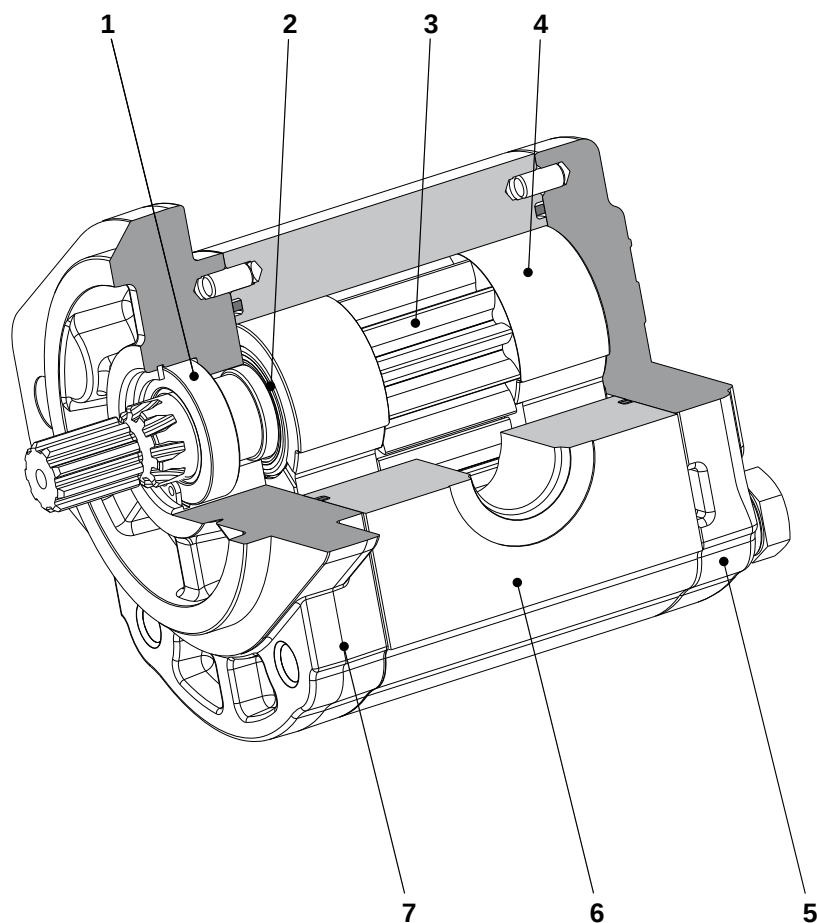
Max. Intermittent 4060 psi (280 bar)

Max. Peak 4350 psi (300 bar)

MAX. SPEED

Max. 4000 min⁻¹

- Group 1, 2 and 3 with displacements from 0.07 in³/rev (1,07 cm³/rev) to 5.56 in³/rev (91.10 cm³/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 flange

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 mm ² /s (cSt)] recommended
	Up to 3410 SSU [750 mm ² /s (cSt)] permitted
Filtering requirement	See table (2) page 5

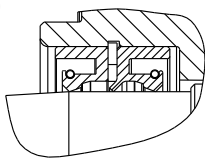
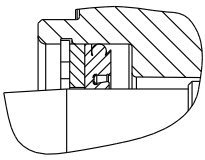
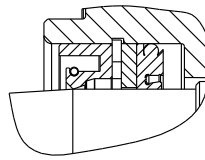
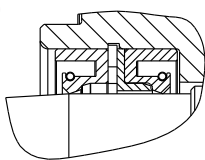
Replaces: 01/10.03

Tab. 1


Type	Fluid composition	Max pressure psi - (bar)	Max speed min ⁻¹	Temperature °F - (°C)			Seals (●)	Special shaft seals (◆)
				Min	Max continuous	Max peak		
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
	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 pumps			
	Max 44 psi (3 bar)  DCAT_033_038		
Single rotation motors Reversible rotation pumps and motors			

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

02/07.2006

FEATURES

FILTRATION

Tab. 2



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

Casappa recommends to use its own production filters:



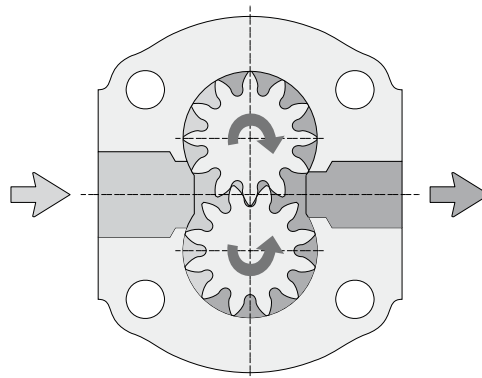
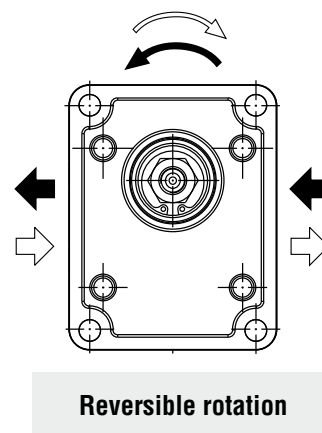
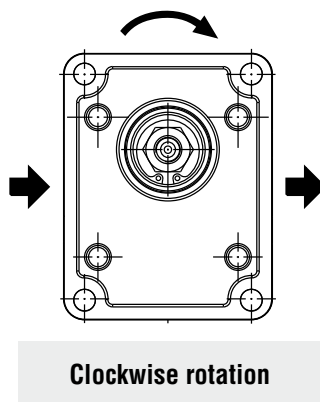
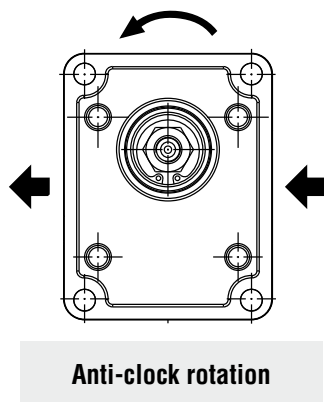
Replaces: 02/07.2006

GENERAL NOTES

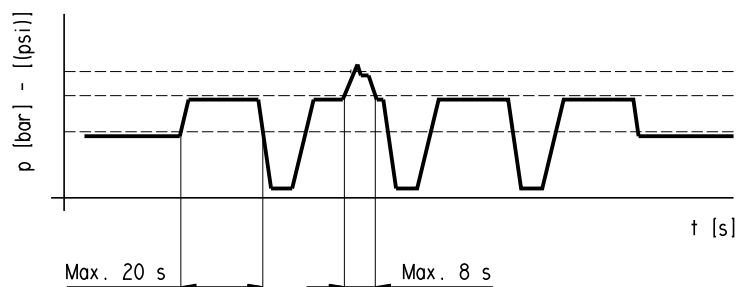
Available with different inlet and outlet ports.

For more information please consult our technical sales department.

DEFINITION OF ROTATION DIRECTION LOOKING AT THE DRIVE SHAFT



PRESSURE DEFINITION



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

03/02.2012

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		
		in³/rev (cm³/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

p₁= Max. continuous pressure

p₂= Max. intermittent pressure

p₃= 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.

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	in³/rev (cm³/rev)	Displacement
n	min⁻¹	Speed
Δp	psi (bar)	Pressure

Efficiencies

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

Design calculations for pump ○

$$Q = Q_{\text{theor.}} \cdot \eta_v$$

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

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

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

$$P_{\text{IN}} = \frac{P_{\text{OUT}}}{\eta_t} \quad [\text{kW}]$$

$$P_{\text{OUT}} = \frac{\Delta p \text{ (bar)} \cdot Q \text{ (l/min)}}{600}$$

Design calculations for motor ○

$$Q = \frac{Q_{\text{theor.}}}{\eta_v} \quad [\text{l/min}]$$

$$Q_{\text{theor.}} = \frac{V \text{ (cm}^3\text{/rev)} \cdot n \text{ (min}^{-1}\text{)}}{1000}$$

$$M = M_{\text{teor.}} \cdot \eta_{hm} \quad [\text{Nm}]$$

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

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

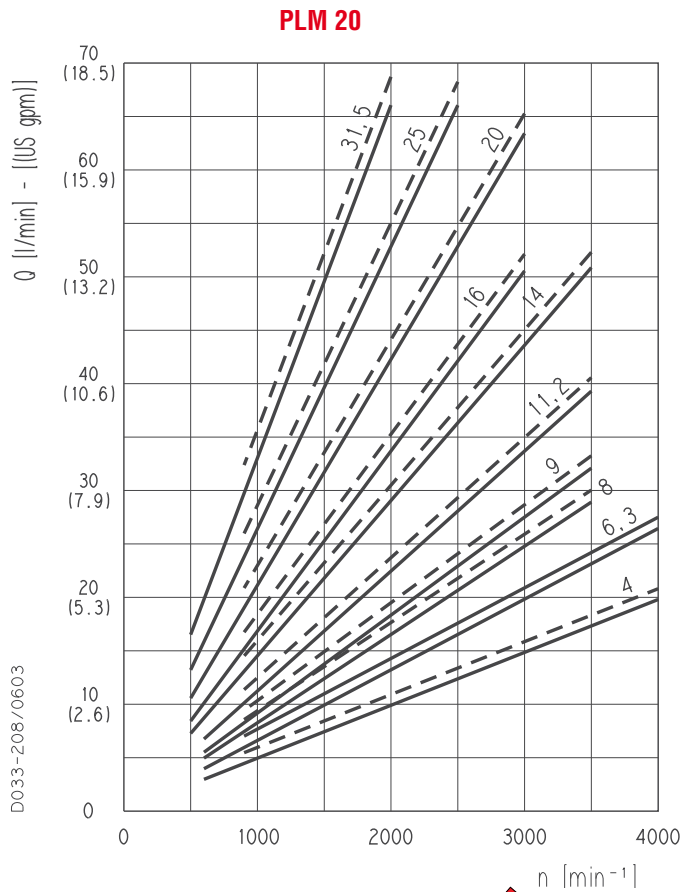
$$P_{\text{OUT}} = P_{\text{IN}} \cdot \eta_t$$

○ 03/02.2012

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

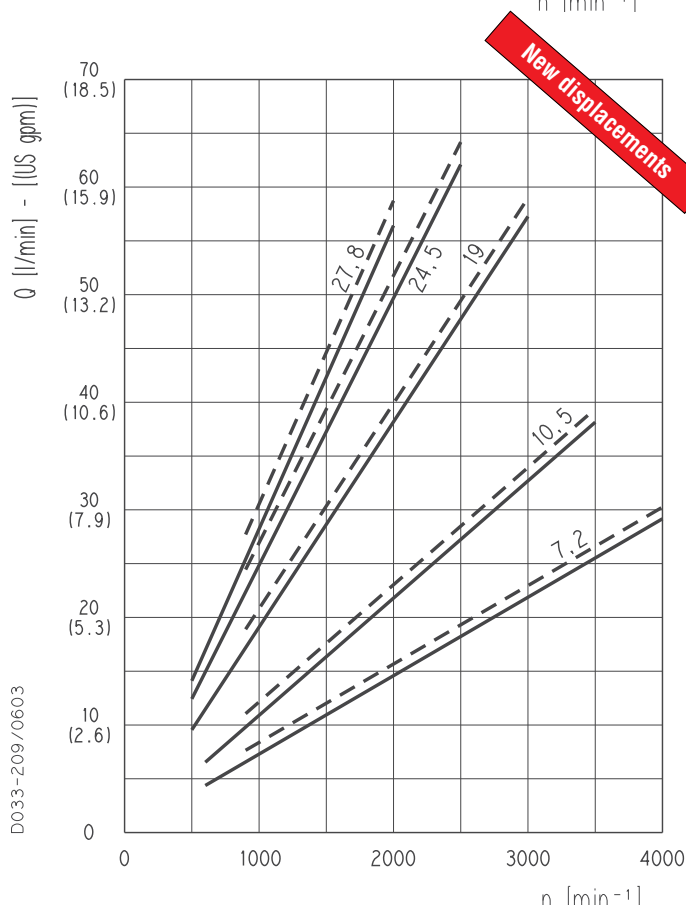
PLM 20

POLARIS 20 GEAR MOTORS PERFORMANCE CURVES



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)



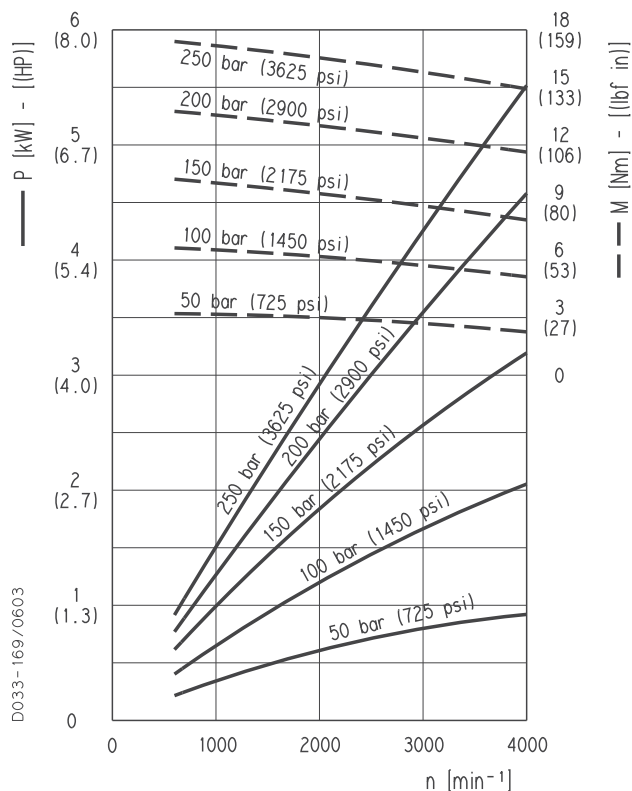
PLM 20•7,2	—	290 psi (20 bar)
	- -	3625 psi (250 bar)
PLM 20•10,5	—	290 psi (20 bar)
	- -	3625 psi (250 bar)
PLM 20•19	—	290 psi (20 bar)
	- -	2900 psi (200 bar)
PLM 20•24,5	—	290 psi (20 bar)
	- -	2465 psi (170 bar)
PLM 20•27,8	—	290 psi (20 bar)
	- -	1885 psi (130 bar)

01/10.03

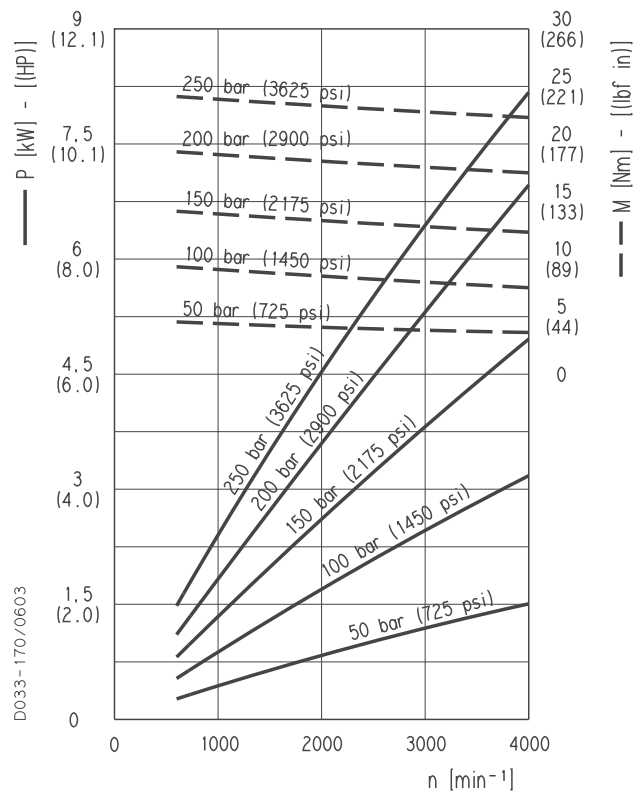
PLM 20

POLARIS 20 GEAR MOTORS PERFORMANCE CURVES

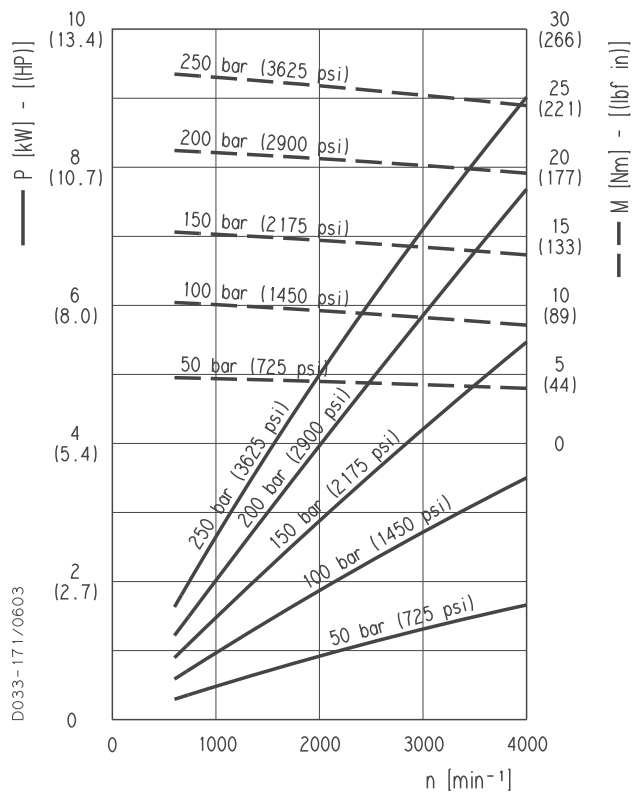
PLM 20•4



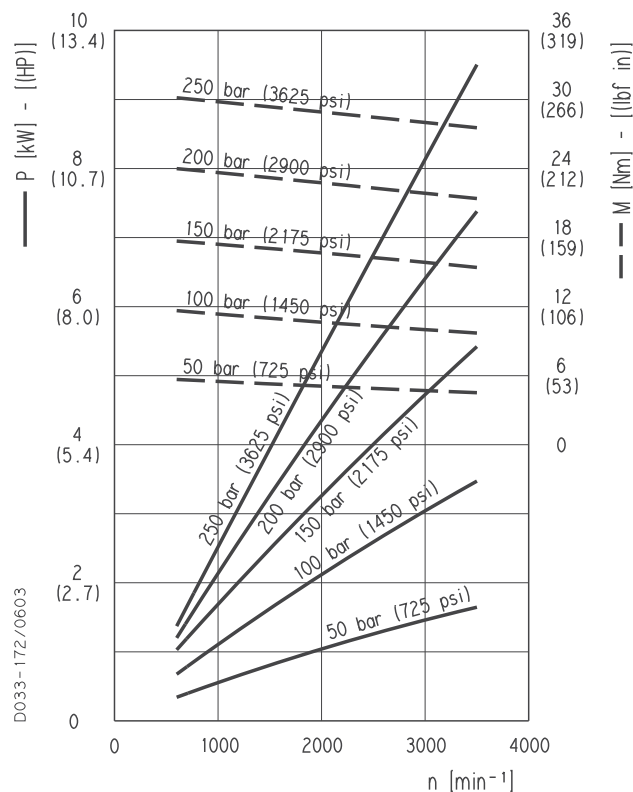
PLM 20•6,3



PLM 20•7,2



PLM 20•8

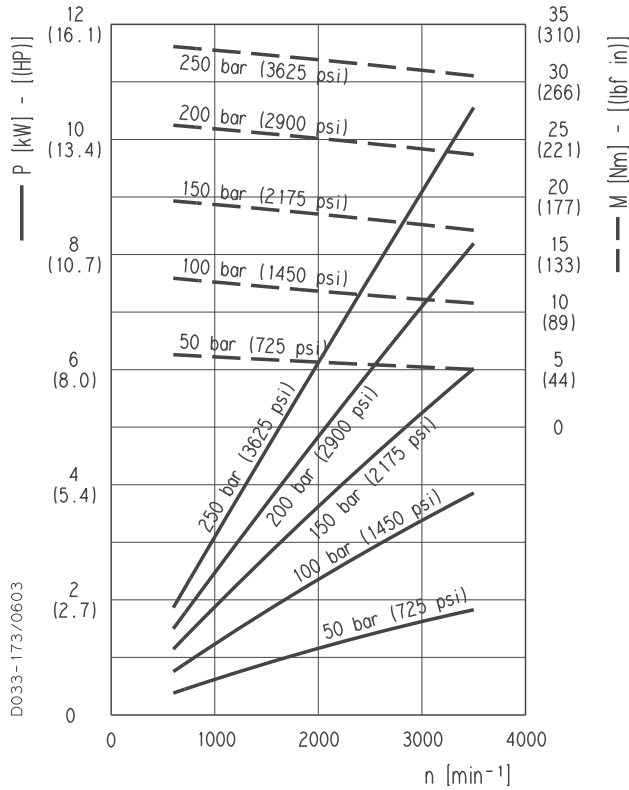


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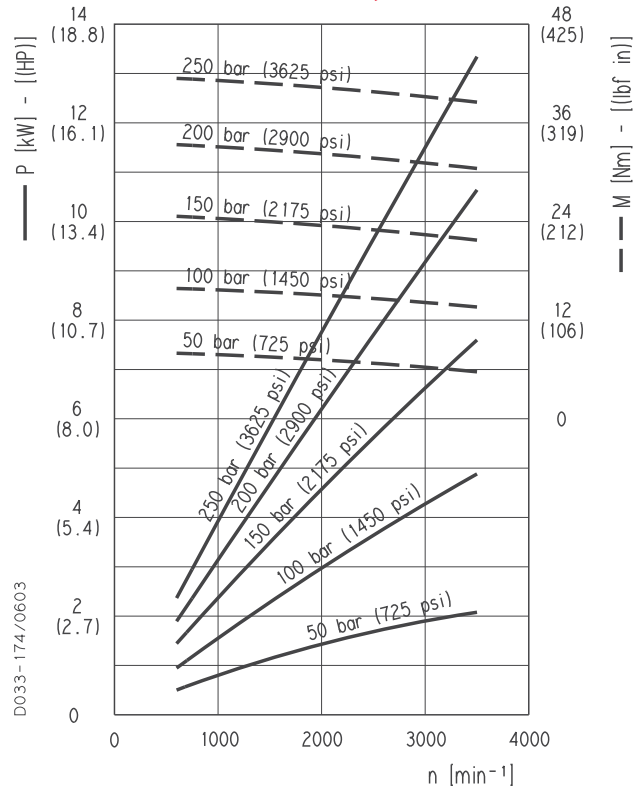
PLM 20

POLARIS 20 GEAR MOTORS PERFORMANCE CURVES

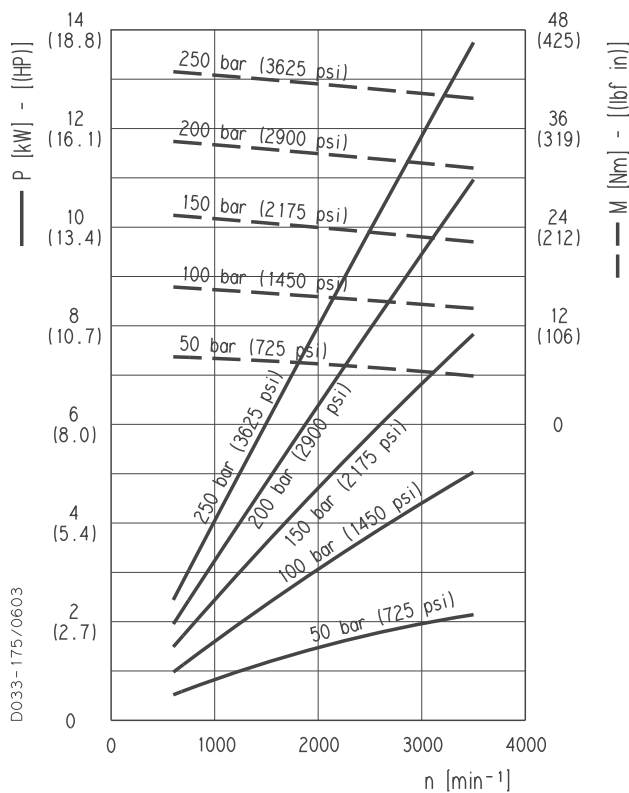
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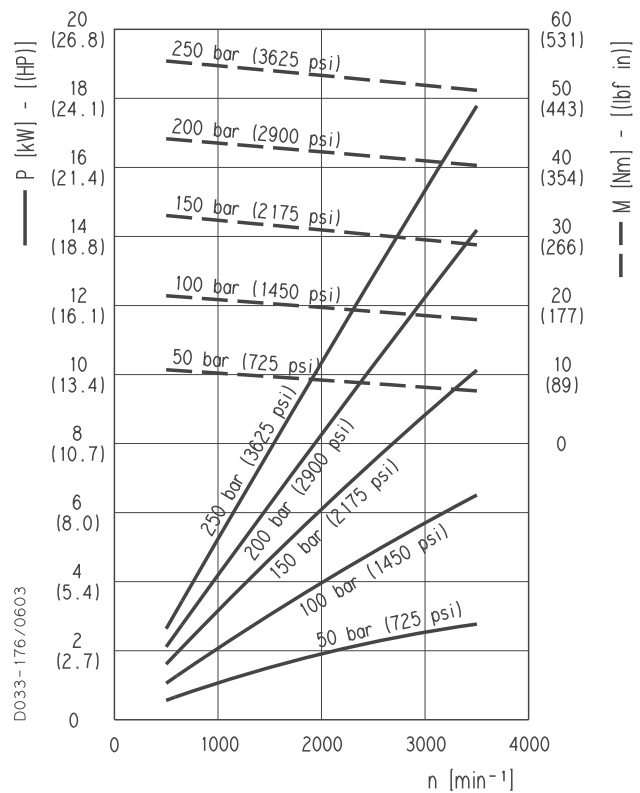
PLM 20•10,5



PLM 20•11,2



PLM 20•14

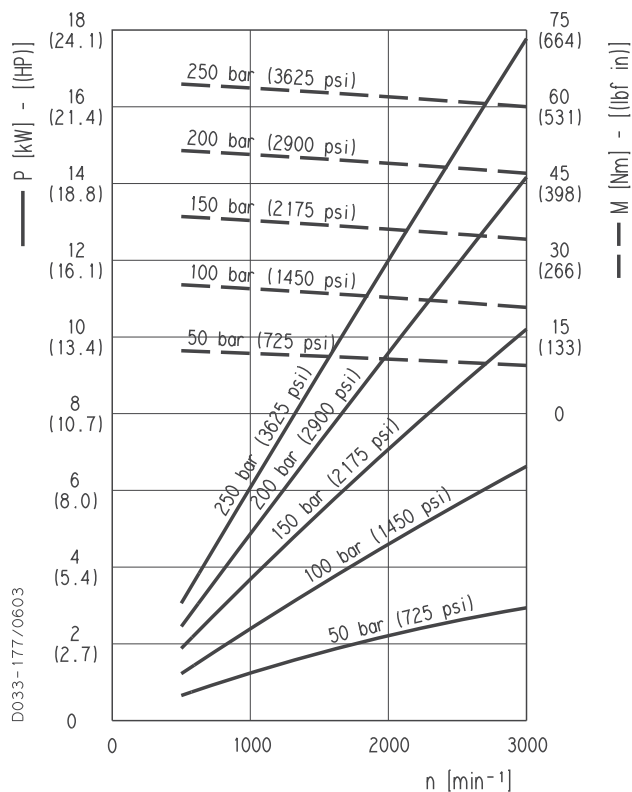


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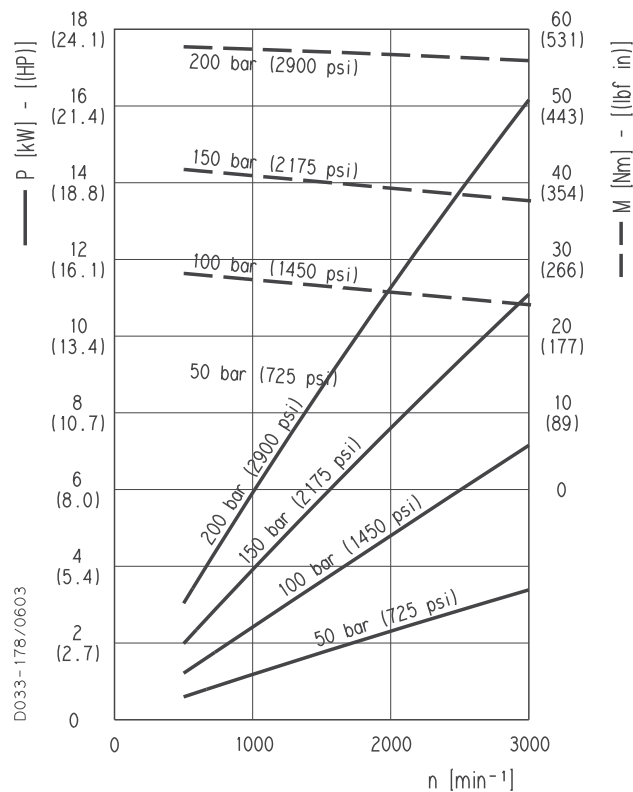
PLM 20

POLARIS 20 GEAR MOTORS PERFORMANCE CURVES

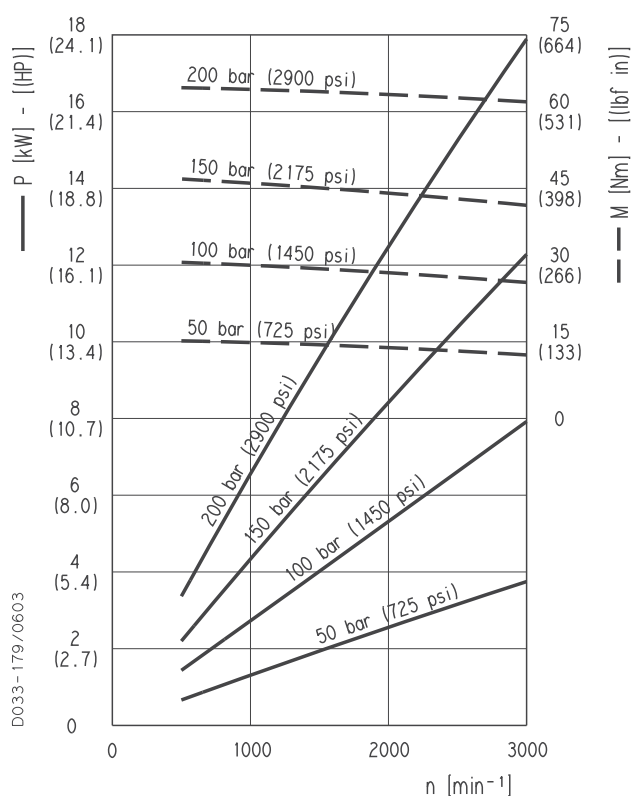
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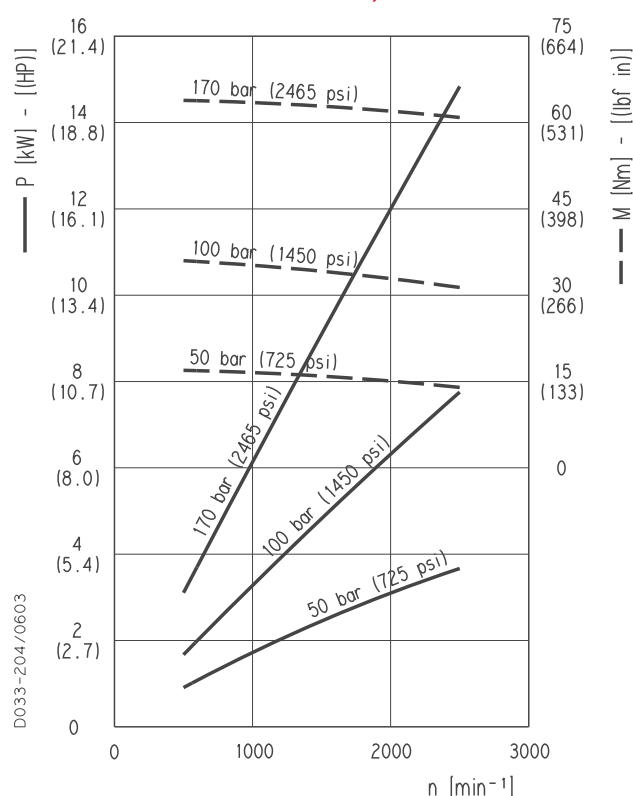
PLM 20•19



PLM 20•20



PLM 20•24,5

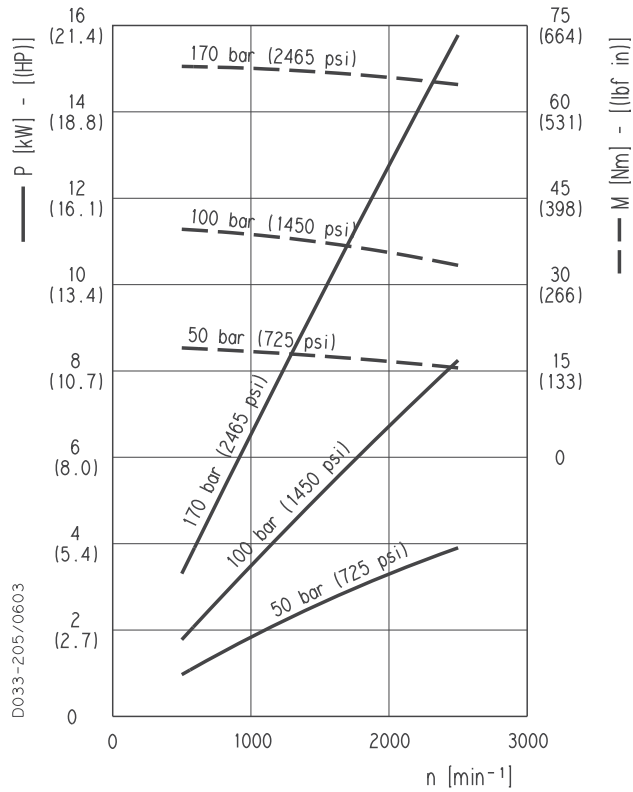


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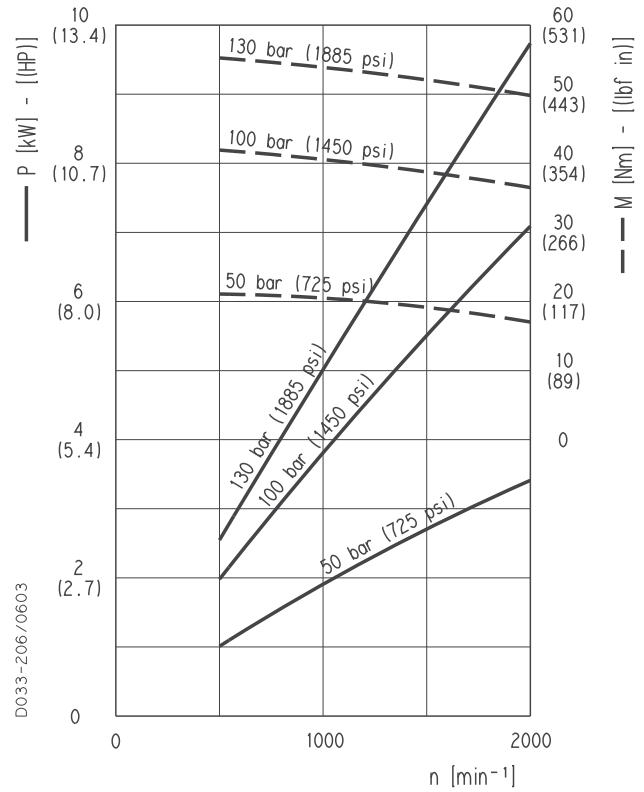
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POLARIS 20 GEAR MOTORS PERFORMANCE CURVES

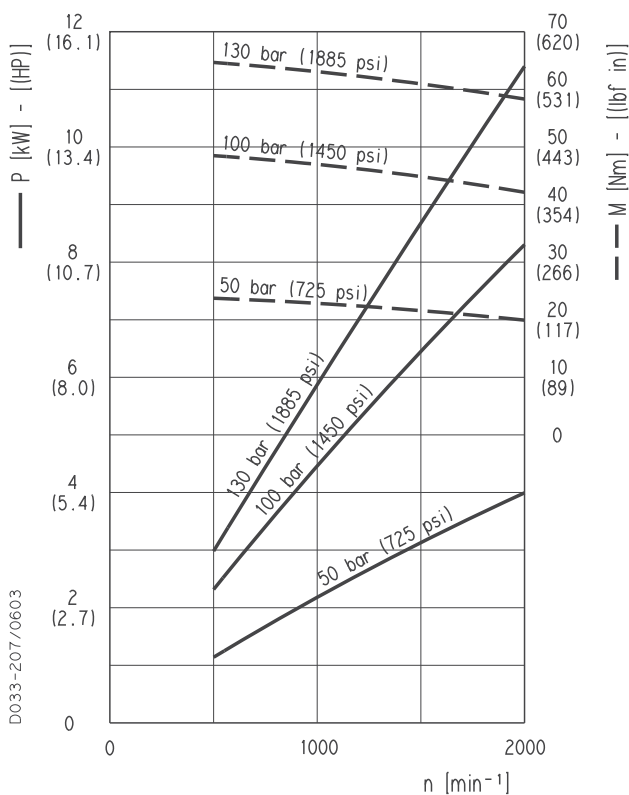
PLM 20•25



PLM 20•27,8



PLM 20•31,5

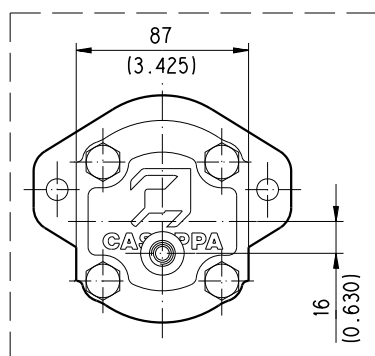


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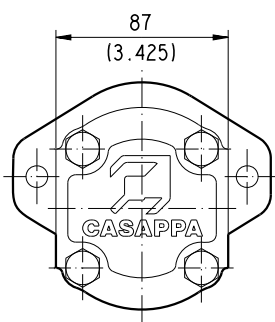
POLARIS 20

SINGLE UNITS SIDE PORTS

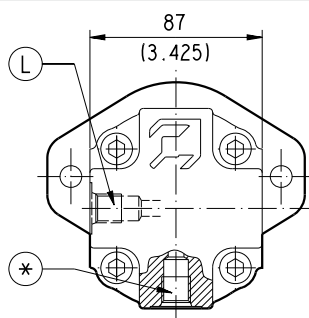
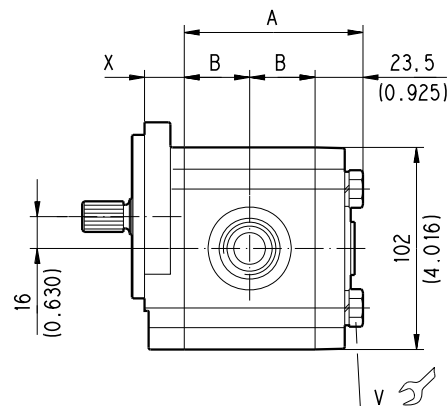
L



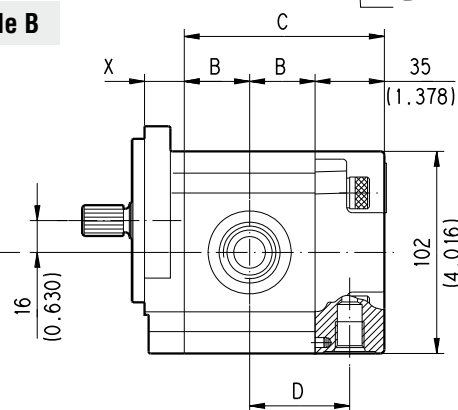
Reversible R



Single rotation S - D and Reversible B



Reversible L



- 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 type version 0	Screw tightening torque Nm (lbf in)	
	V	
Aluminium	45 ^{±4,5}	(358 ÷ 438)
Cast iron	70 ^{±7}	(558 ÷ 682)

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)

Pump type Motor type	A mm (inch)	B mm (inch)	C mm (inch)	D 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

02/07.2006

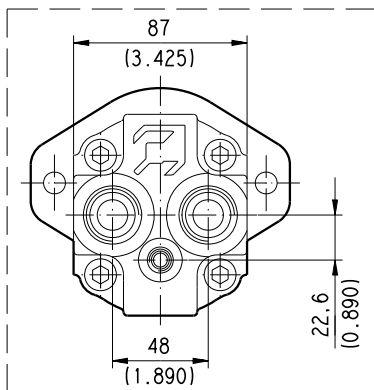
POLARIS 20

SINGLE UNITS REAR PORTS

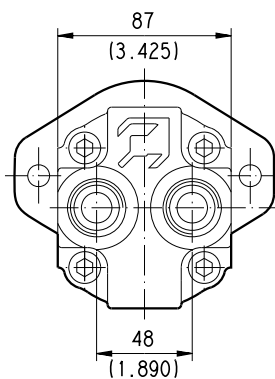
P

Replaces: 01/10.03

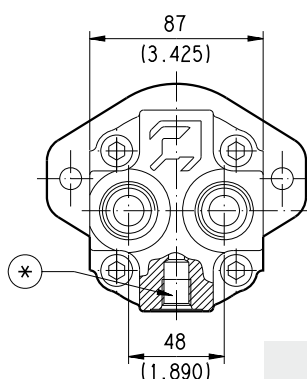
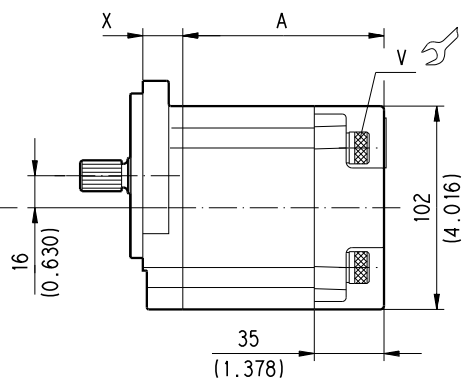
D033-183/0903



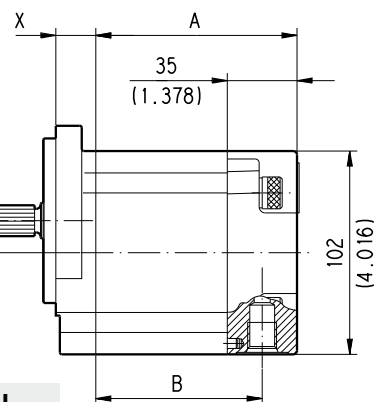
Reversible R



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)

● 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 Nm (lbf in)
	V
Aluminium	45 ^{±4,5} (358 ÷ 438)
Cast iron	70 ^{±7} (558 ÷ 682)

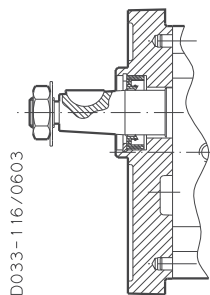
● 02/07.2006

Pump type	A	B
Motor type	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)

VERSIONS

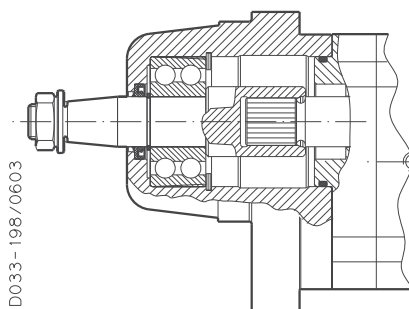
For each version, the possible combination between drive shafts and mounting flanges are shown on pages 58 ÷ 68.

VERSION	0
Available for group:	
10	20 30

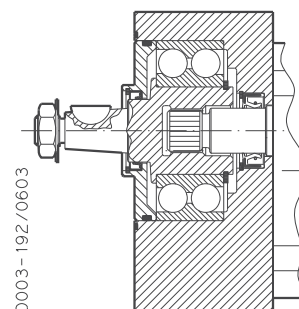


Version for applications without radial and axial load on the drive shaft.

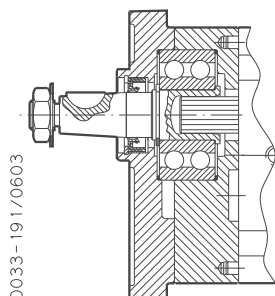
VERSION	W8
Available for group:	
20	



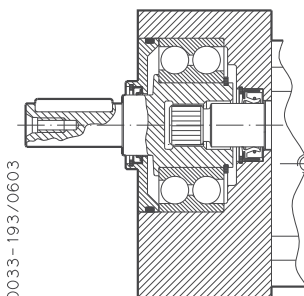
VERSION	4
Available for group:	
20	



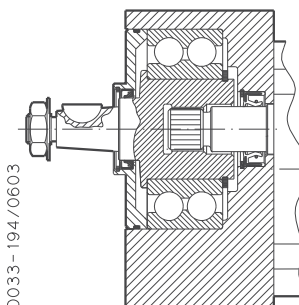
VERSION	5
Available for group:	
20	



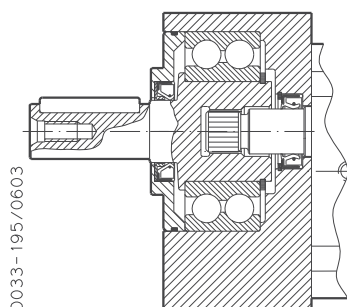
VERSION	6
Available for group:	
20	



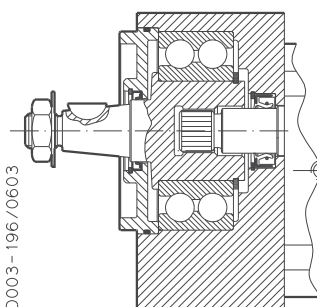
VERSION	7
Available for group:	
20	



VERSION	8
Available for group:	
20	



VERSION	9
Available for group:	
20	



01/10.03

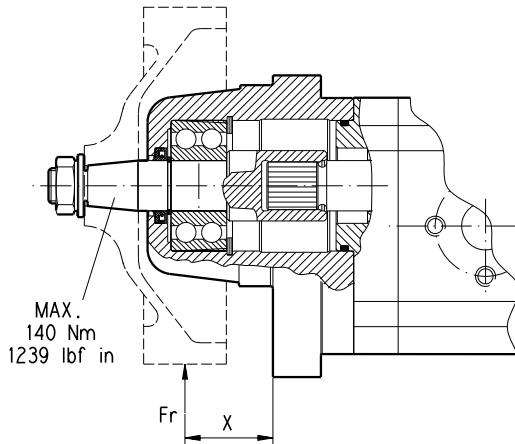
For the outboard bearing life expectancy, diagrams providing approximate selection data will be found on subsequent pages. For particular applications please consult our technical sales department.

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

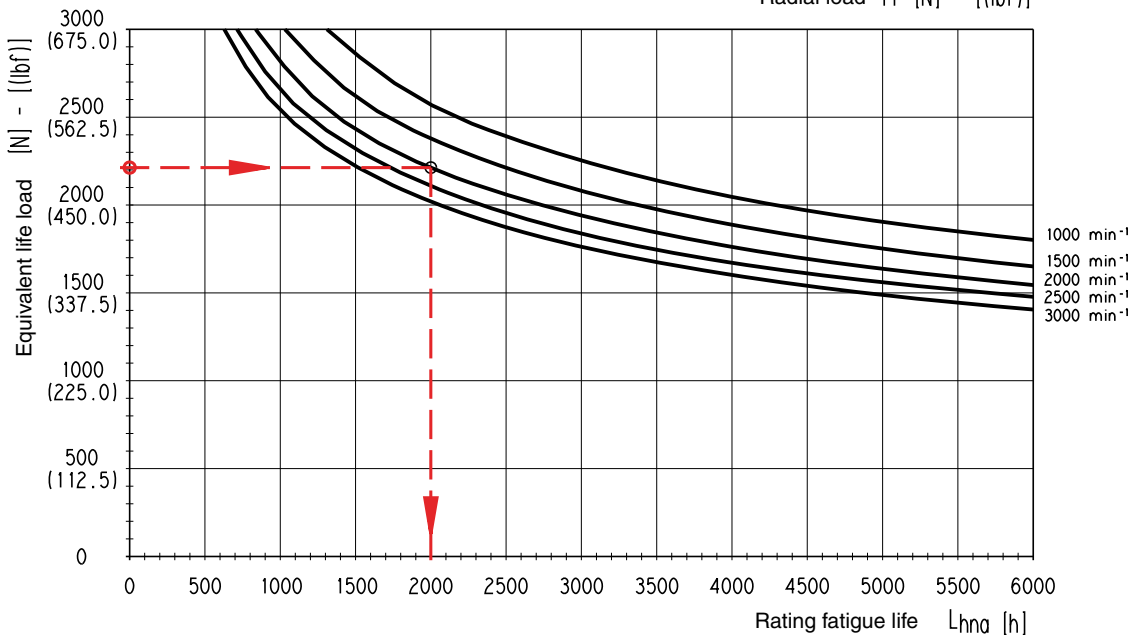
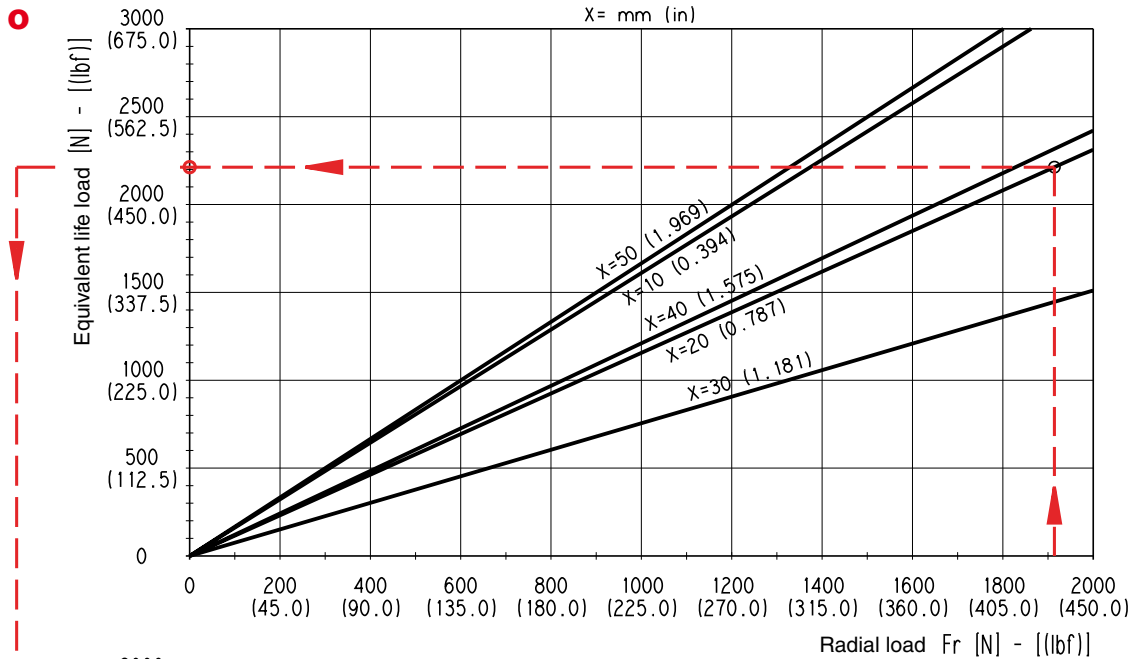
Temperature 60 °C (140 °F)

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

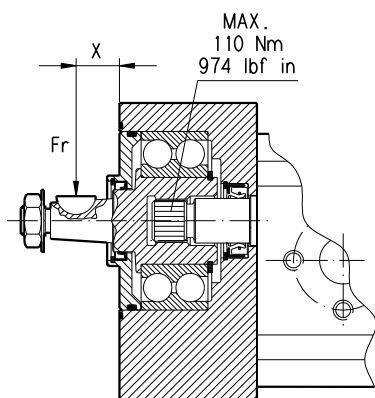
POLARIS 20

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:

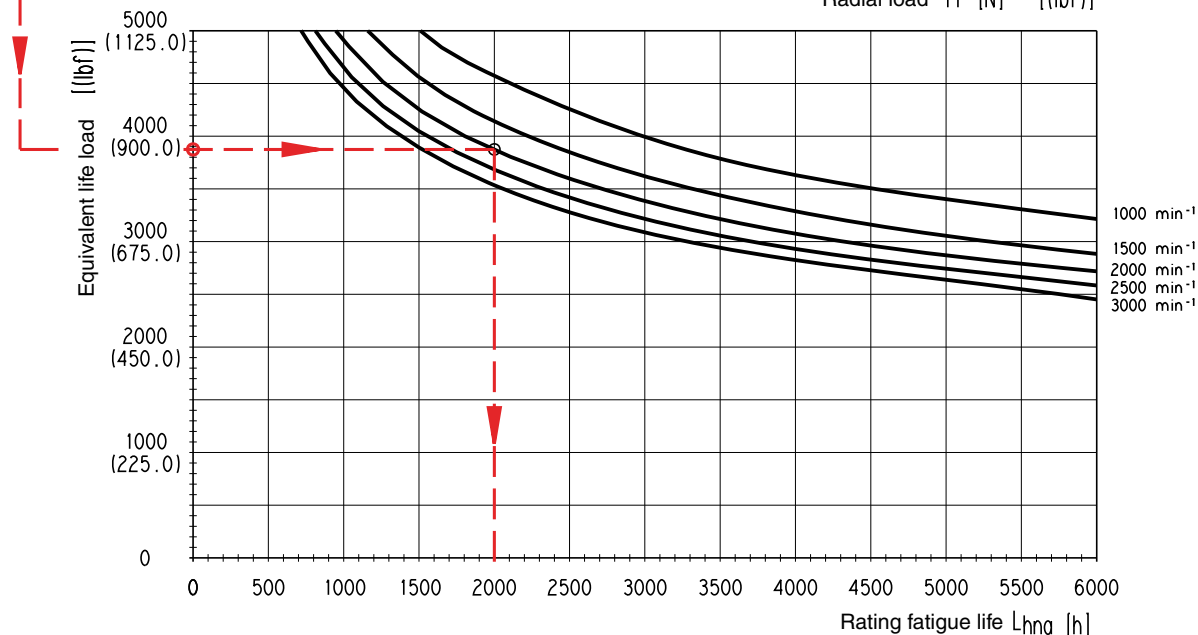
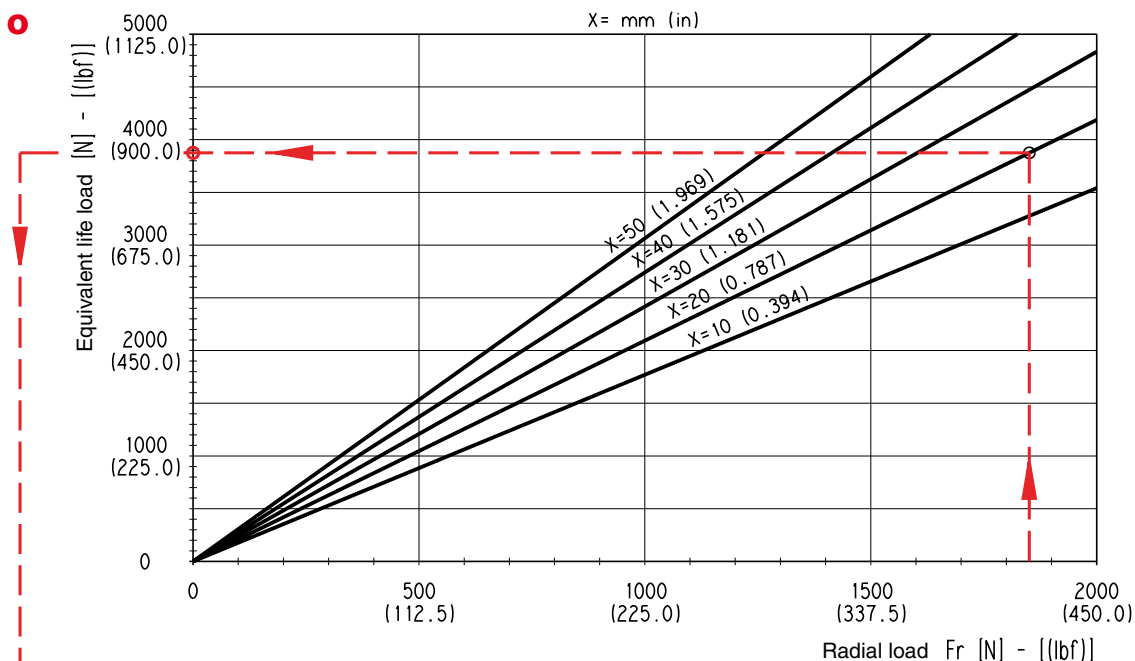
Lubricant oil ISO VG 46

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



02/07.2006

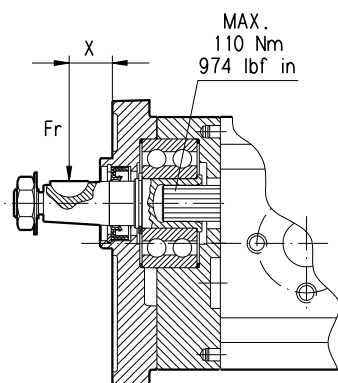
D033 - 122/0606

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

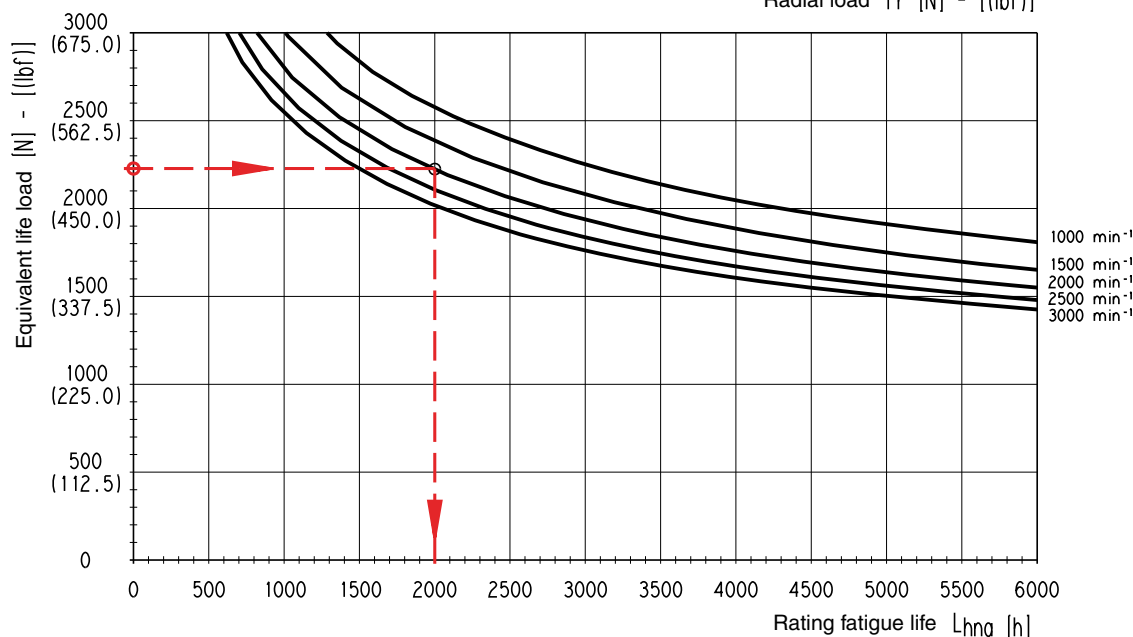
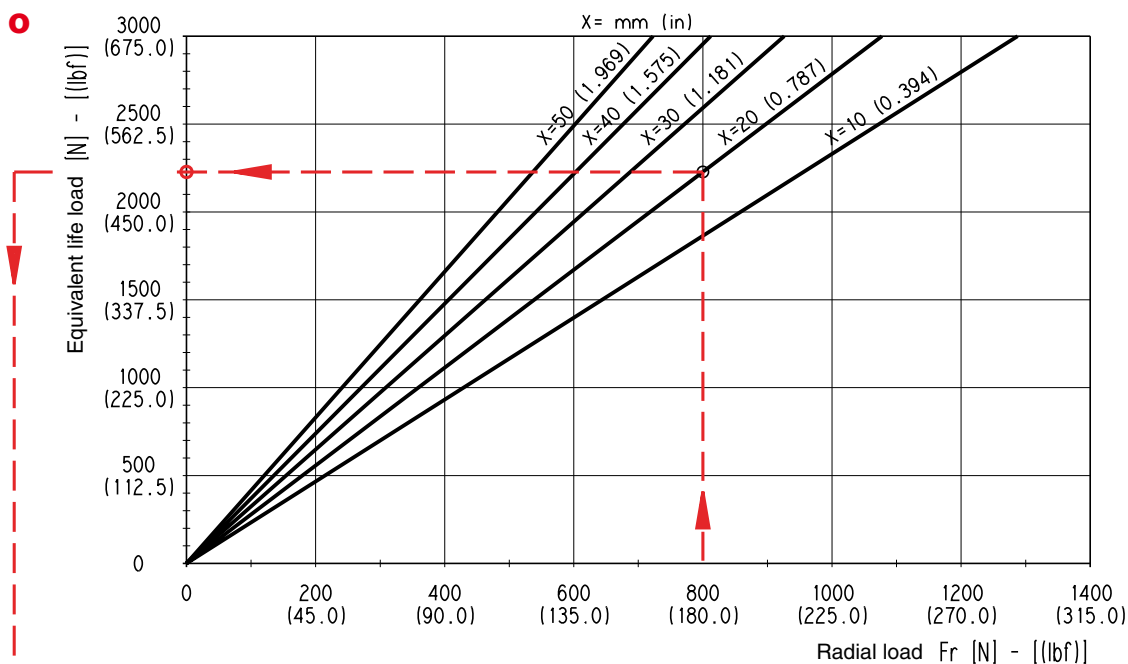
Temperature 60 °C (140 °F)

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

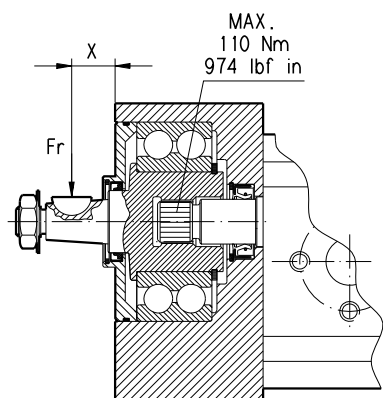
POLARIS 20

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:

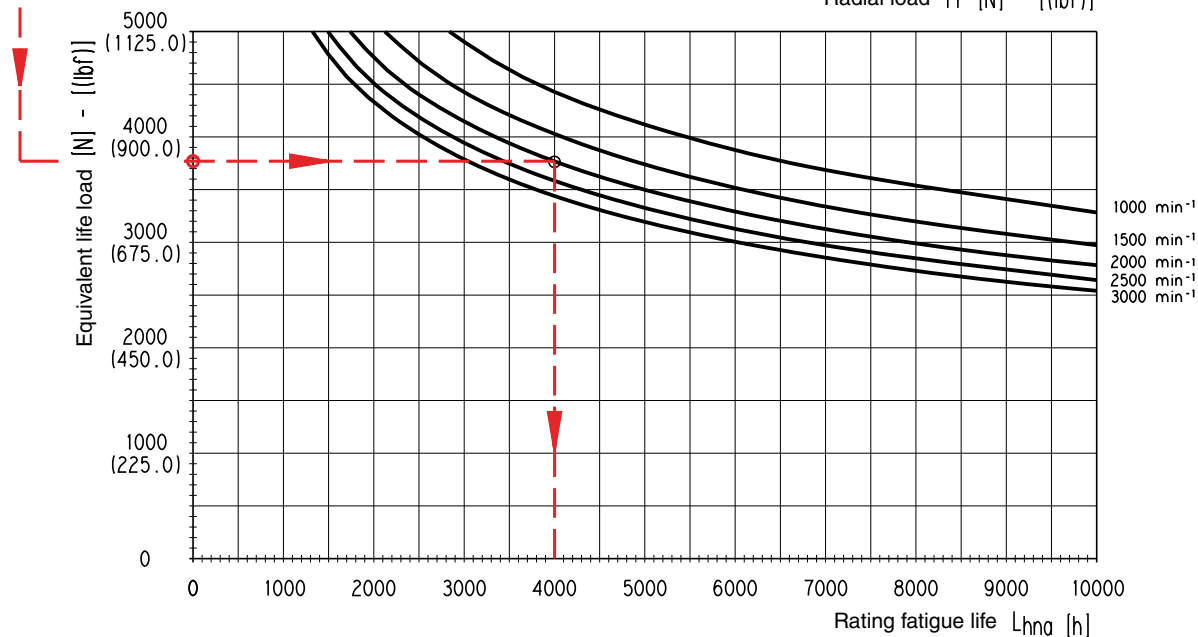
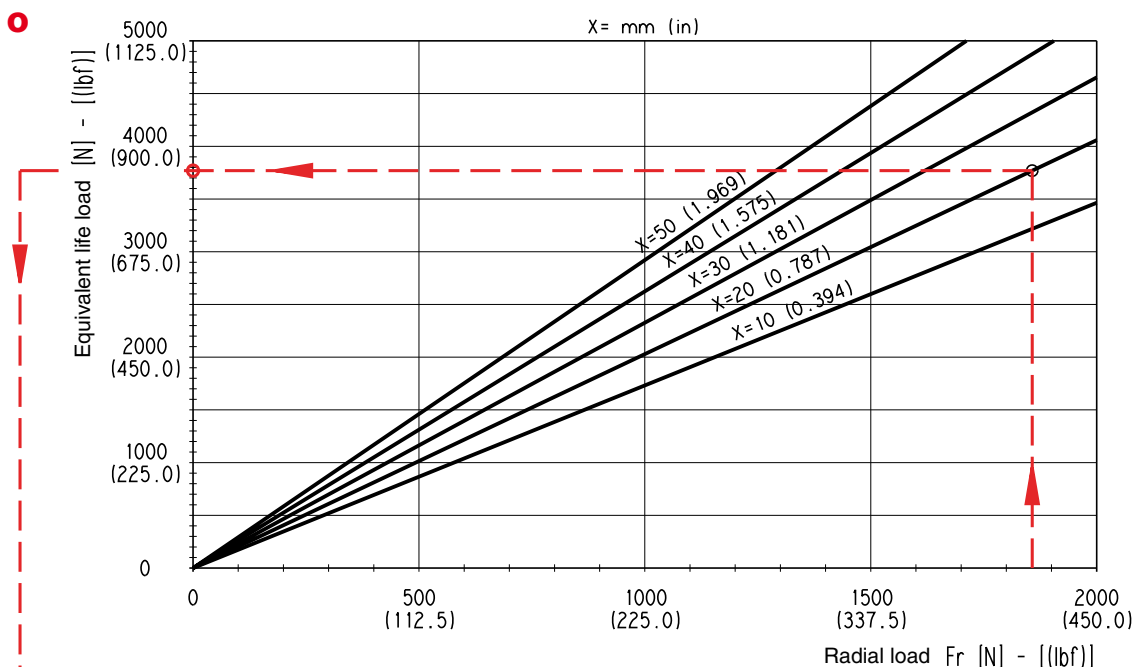
Lubricant oil ISO VG 46

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



02/07.2006

D033-123/0606

POLARIS 20

DRIVE SHAFTS

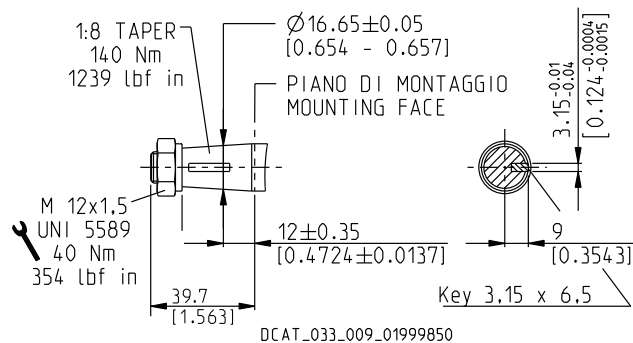
EUROPEAN TAPARED 1:8

82

Not available with size:

20•10,5 20•24,5 20•27,8

Mounting face refer to flange code **E2**

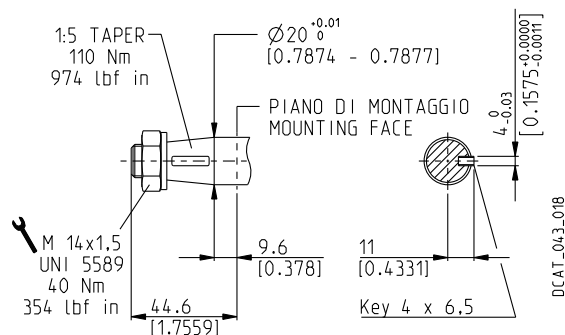


GERMAN TAPARED 1:5

55

Only for version 5, 9 and W8 with outboard bearing

Mounting face refer to flange code **B2**



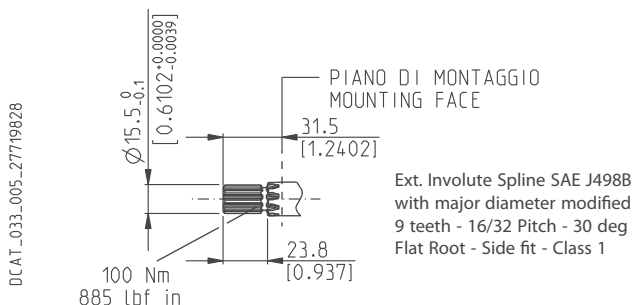
SAE "A" SPLINE

03

Not available with size:

20•24,5 20•27,8

Mounting face refer to flange code **S1**



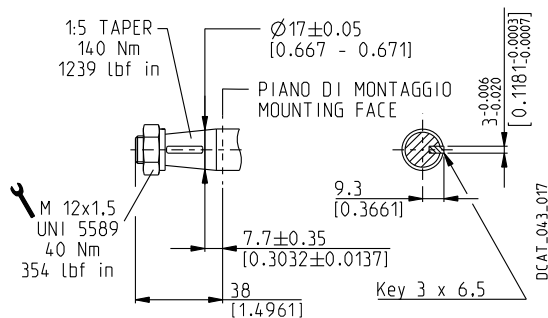
GERMAN TAPERED 1:5

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**



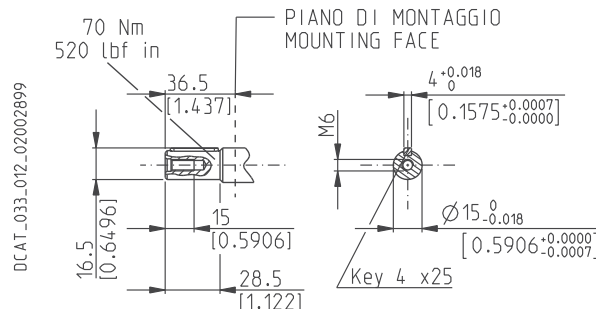
STRAIGHT

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**



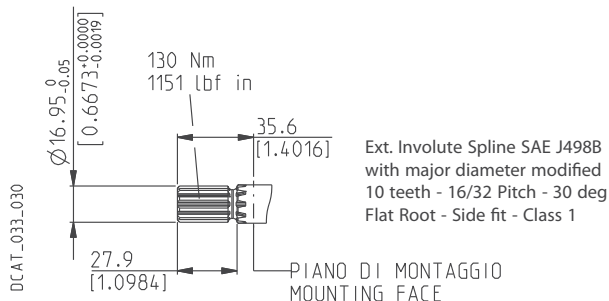
SPLINE

01

Not available with size:

20•6,3 20•9 20•10,5 20•19

Mounting face refer to flange code **S1**



Ext. Involute Spline SAE J498B with major diameter modified 10 teeth - 16/32 Pitch - 30 deg Flat Root - Side fit - Class 1

01/10.03

POLARIS 20

DRIVE SHAFTS

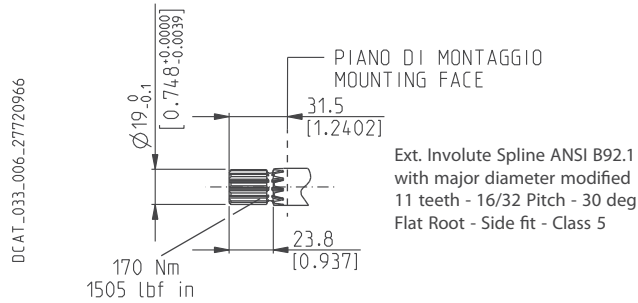
SAE SPLINE

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**



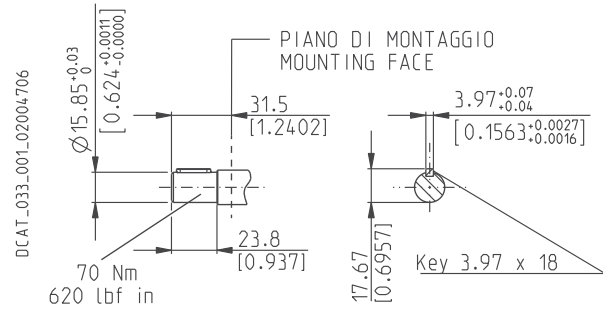
SAE "A" STRAIGHT

31

Not available with size:

20•10,5 20•19 20•24,5 20•27,8

Mounting face refer to flange code **S1**



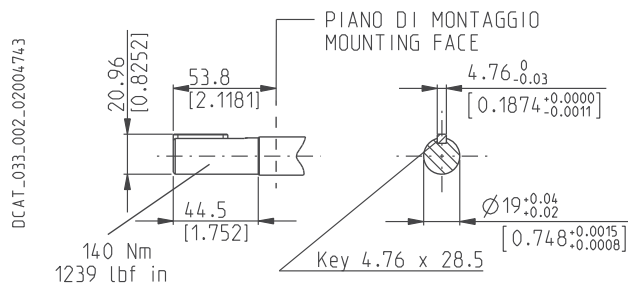
STRAIGHT

49

Not available with size:

20•7,2 20•19 20•24,5

Mounting face refer to flange code **S1**



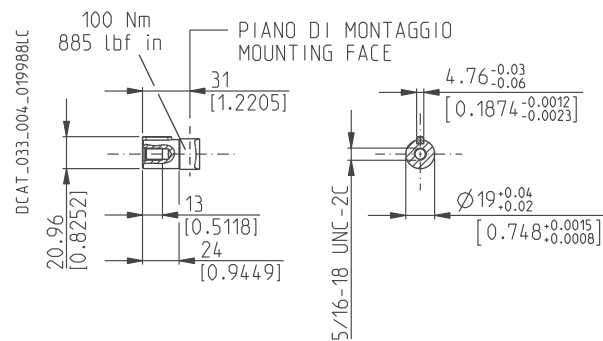
STRAIGHT

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**



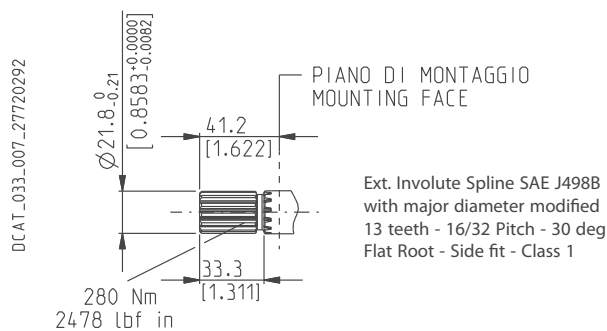
SAE "B" SPLINE

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**



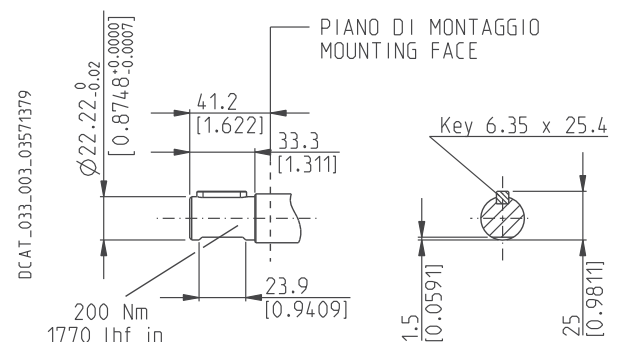
SAE "B" STRAIGHT

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

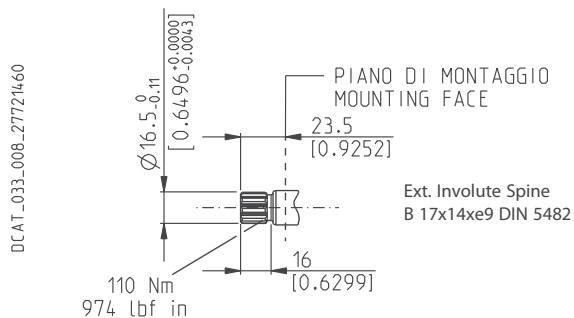
DIN 5482 SPLINE

12

Not available with size:

20•10,5 20•19 20•24,5 20•27,8

Mounting face refer to flange code **B2**

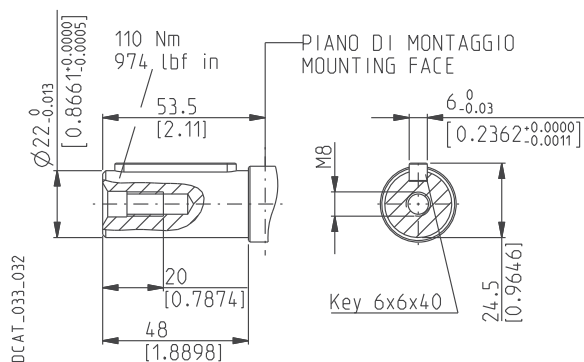


STRAIGHT

B1

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

Mounting face refer to flange code **E2**



STRAIGHT

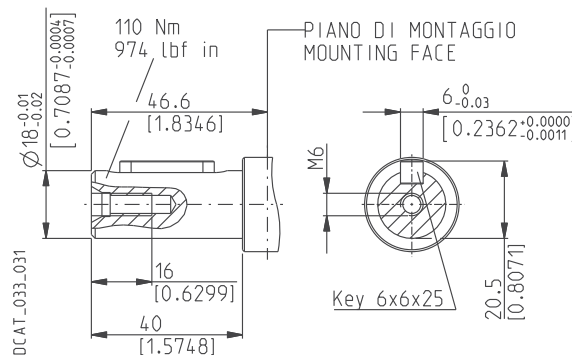
48

Only for version **6** with outboard bearing

Available in 0 version only with size:

20•20

Mounting face refer to flange code **E2**



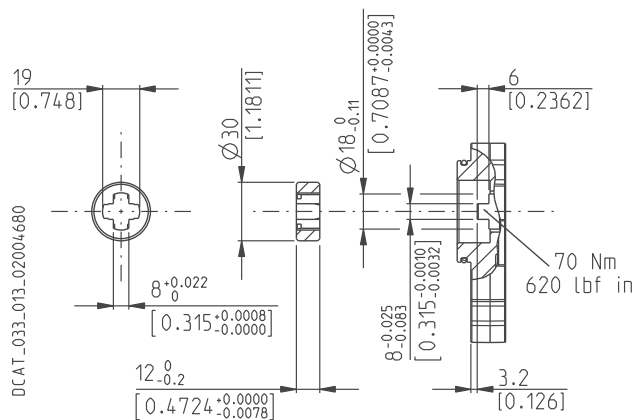
TANG

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 20

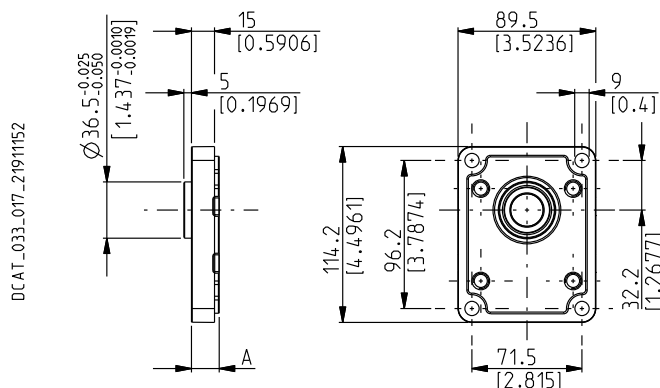
MOUNTING FLANGES AND TABLE OF COMPATIBILITY

Replaces: 01/10.03

EUROPEAN

E2

Material: cast iron and aluminium



DRIVE SHAFTS

See page 53 ÷ 55

VERSIONS See page 47	A mm (in)	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)			#									

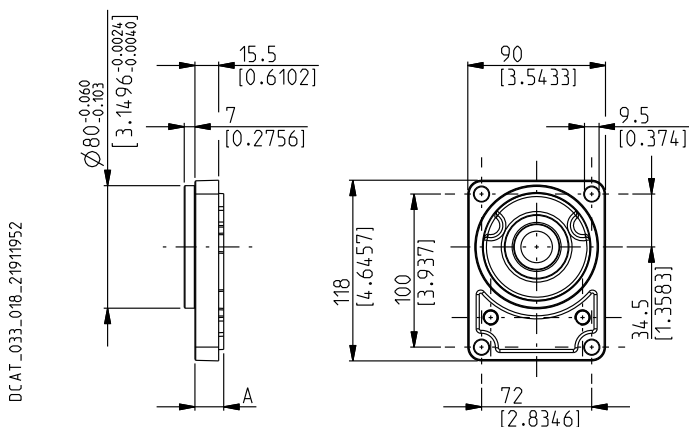
Standard combination

X Available combination

GERMAN

B2

Material: cast iron and aluminium



DRIVE SHAFTS

See page 53 ÷ 55

VERSIONS See page 47	A mm (in)	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

02/07.2006

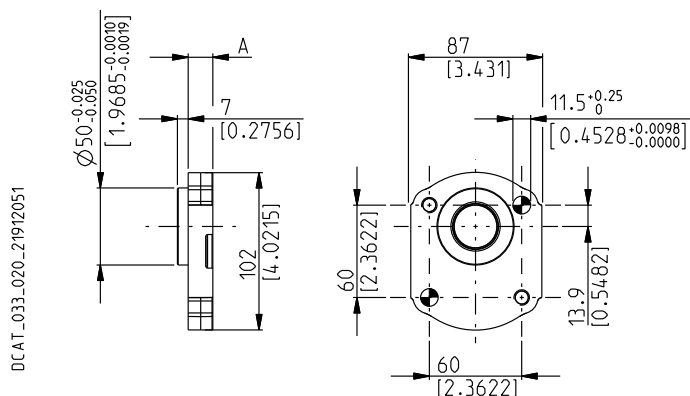
POLARIS 20

MOUNTING FLANGES AND TABLE OF COMPATIBILITY

GERMAN 2 BOLTS

B4

Material: cast iron and aluminium



Replaces: 01/10.03

DRIVE SHAFTS

See page 53 ÷ 55

VERSIONS See page 47	A mm (in)	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

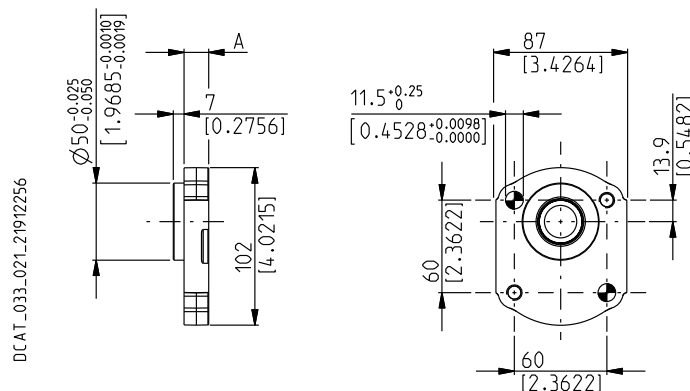
Standard combination

x Available combination

GERMAN 2 BOLTS

B5

Material: cast iron and aluminium



02/07.2006

DRIVE SHAFTS

See page 53 ÷ 55

VERSIONS See page 47	A mm (in)	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

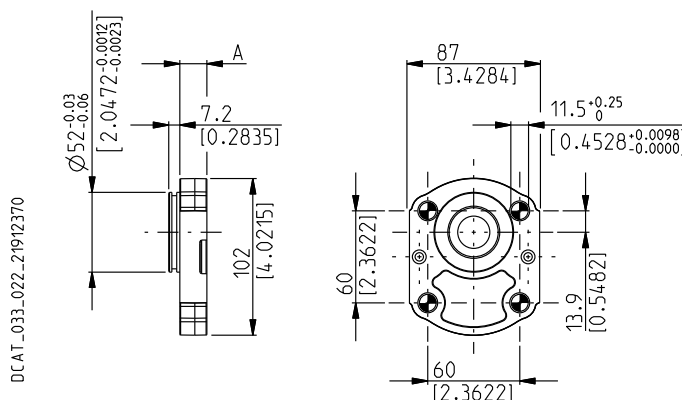
MOUNTING FLANGES AND TABLE OF COMPATIBILITY

Replaces: 01/10.03

GERMAN 4 BOLTS

B6

Material: cast iron and aluminium



DCAT_033_022_21912370

DRIVE SHAFTS

See page 53 ÷ 55

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

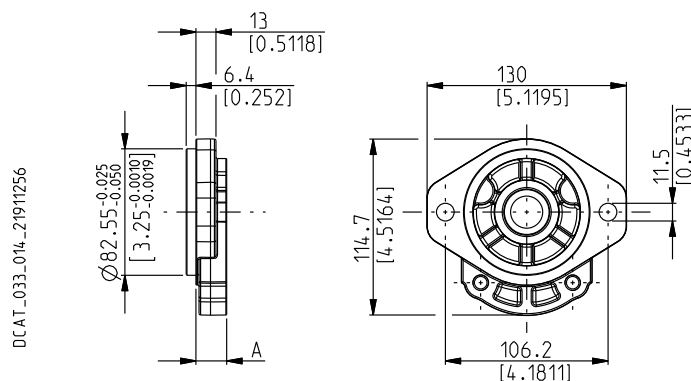
Standard combination

x Available combination

SAE "A" 2 BOLTS

S1

Material: cast iron and aluminium



DCAT_033_014_21911256

DRIVE SHAFTS

See page 53 ÷ 55

VERSIONS See page 47	A mm (in)	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

02/07.2006

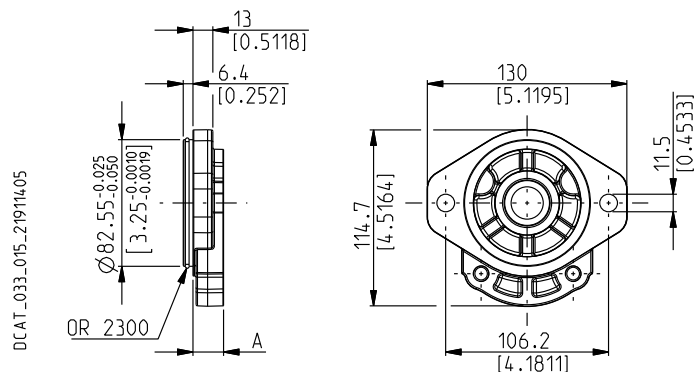
POLARIS 20

MOUNTING FLANGES AND TABLE OF COMPATIBILITY

SAE "A" 2 BOLTS

S2

Material: cast iron and aluminium



Replaces: 01/10.03

DRIVE SHAFTS

See page 53 ÷ 55

VERSIONS See page 47	A mm (in)	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

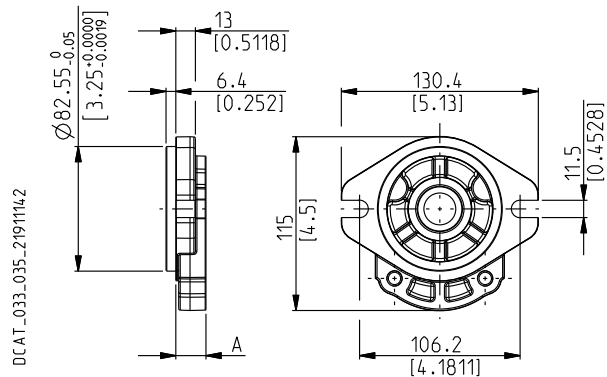
Standard combination

X Available combination

SAE "A" 2 BOLTS

S9

Material: cast iron and aluminium



02/07.2006

DRIVE SHAFTS

See page 53 ÷ 55

VERSIONS See page 47	A mm (in)	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

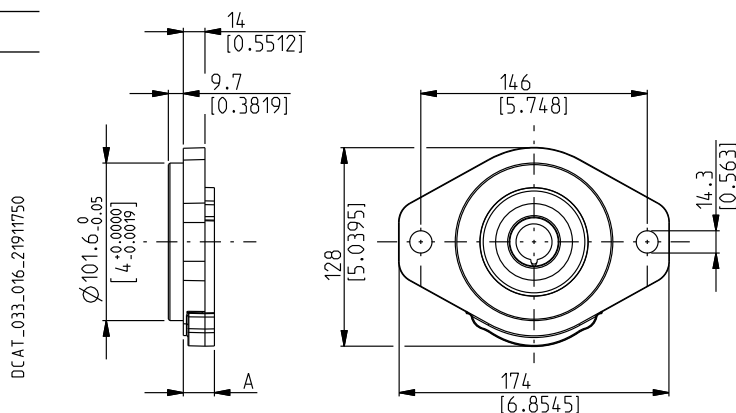
MOUNTING FLANGES AND TABLE OF COMPATIBILITY

Replaces: 01/10.03

SAE "B" 2 BOLTS

S5

Material: cast iron



DRIVE SHAFTS

See page 53 ÷ 55

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

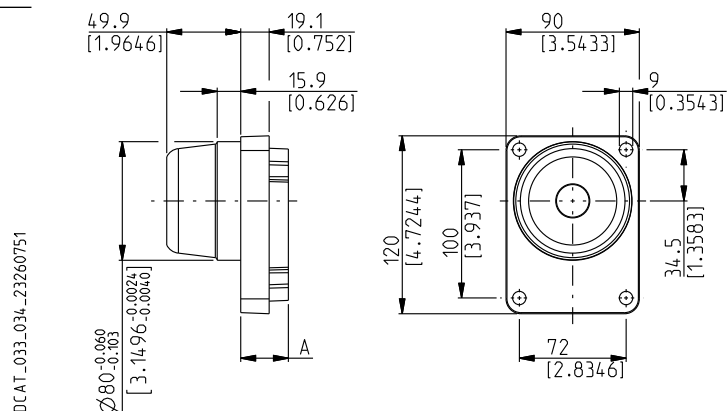
Standard combination

x Available combination

GERMAN

W8

Material: cast iron



DRIVE SHAFTS

See page 53 ÷ 55

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

Standard combination

x Available combination

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

IN/OUT PORTS TYPE	SIDE PORTS						REAR PORTS	
	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

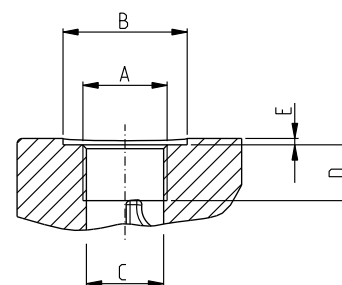
GAS STRAIGHT THREAD PORTS

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)	
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)

DCAT_006_026_21064779



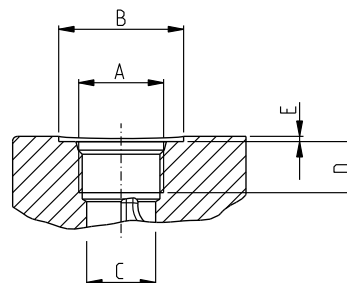
METRIC STRAIGHT THREAD PORTS ISO 6149

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)	
TA	M 10x1	22 (0.8661)	9 (0.3543)	13 (0.5118)	0,5 (0.0197)	10 ^{+0,5} (89 ÷ 93)

DCAT_006_027_21060524



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)	
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

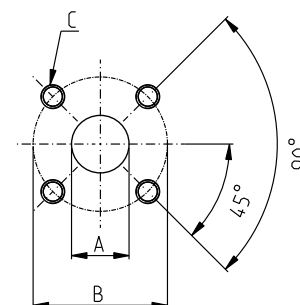
GERMAN FLANGED PORTS - 4 Bolts

GERMAN

Metric thread ISO 60° conforms to ISO/R 262

CODE	A mm (in)	B mm (in)	C 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)

DCAT_033_028_17661888



EUROPEAN FLANGED PORTS - 4 Bolts

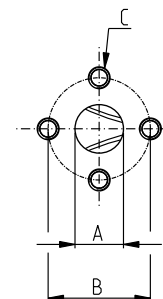
EUROPEAN

Metric thread ISO 60° conforms to ISO/R 262

CODE	A mm (in)	B mm (in)	C 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)
			M 10 18 (0.7087)	20 ⁺¹ (177 ÷ 186)	30 ^{+2.5} (266 ÷ 288)
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

DCAT_006_024_21060533



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

(◆) For POLARIS 30

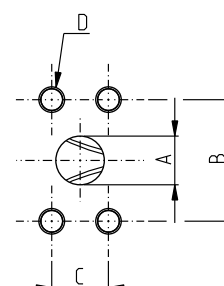
SAE FLANGED PORTS J518 - Standard pressure series 3000 PSI

SSS

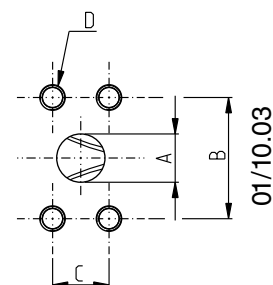
American straight thread UNC-UNF 60° conforms to ANSI B 1.1

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

(◆) For POLARIS 30



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DCAT_006_028_21060740

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

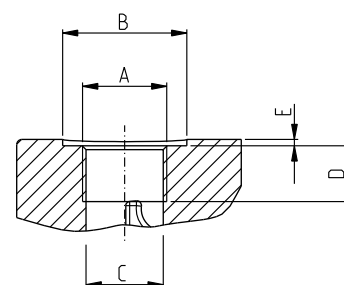
Replaces: 01/10.03

GAS STRAIGHT THREAD PORTS

BSPP

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

DCAT_006_026_21064779



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 	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 	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

02/07.2006

PORTS SIZES



Tightening torque for low pressure side port



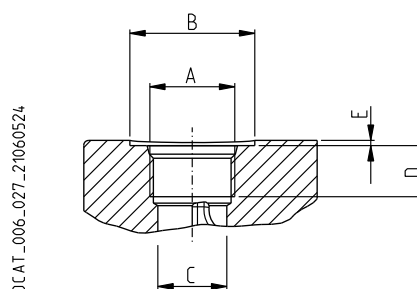
Tightening torque for high pressure side port [values obtained at 5075 psi (350 bar)]

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	30 ^{+2,5} (266 ÷ 288)	70 ⁺⁵ (620 ÷ 664)
					17 (0.6693)	0,5 (0.0197)	—	—
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

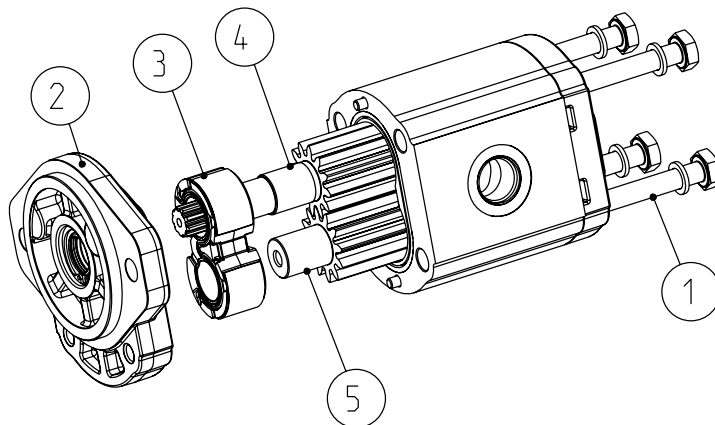
01/10.03

CHANGING ROTATION

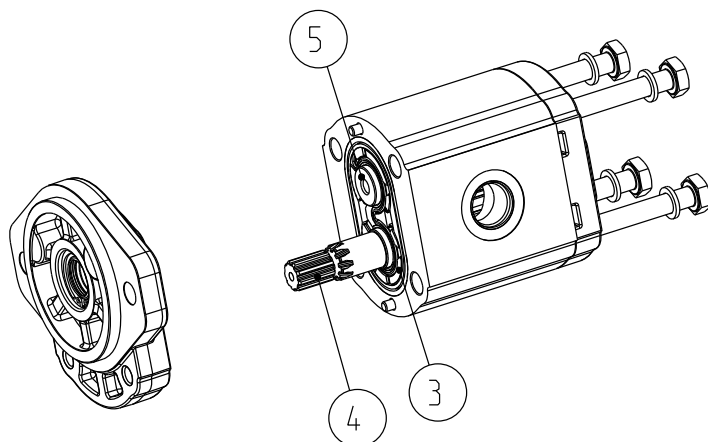
Example of changing rotation: from PLP20 pump clockwise to counterclockwise

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

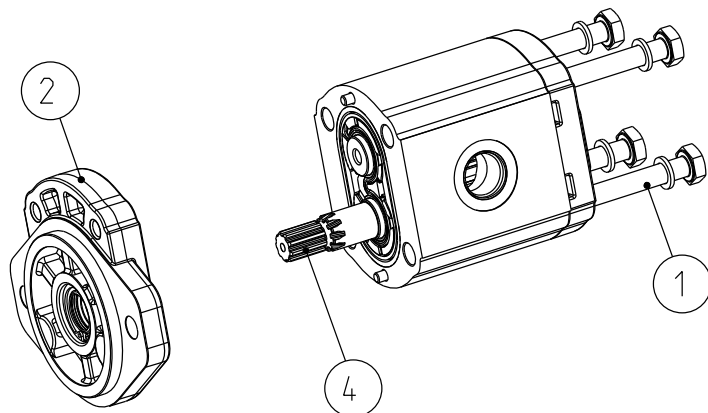
1. Clean the pump externally with care.
2. Loosen, and remove, the clamp bolts (1).
3. Coat the sharp edges of the drive shaft (4) with adhesive tape and smear a layer of clean grease on the shaft end extension to avoid damaging the lip of the shaft seal when removing the mounting flange.
4. Remove the 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.
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.
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.



DCA7_033_040



DCA7_033_029



DCA7_033_011

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) which 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



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:



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

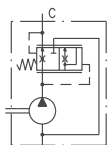
02/07.2006

VALVE OPTIONS (◆)

PRIORITY VALVE

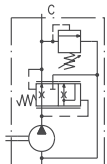
P1

Costant delivery and internal recirculation of excess flow.



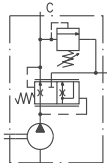
P2

Costant delivery at controlled pressure. Internal recirculation of excess flow and drain valve.



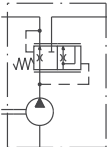
P3

Costant delivery at controlled pressure. Excess flow and drain valve must be connected to tank.



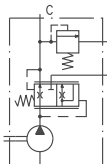
P4

Costant delivery and excess flow can both be used under load.



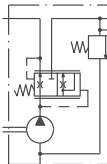
P5T

Costant delivery at controlled pressure with drain valve connected to tank. Excess flow can be used under load.



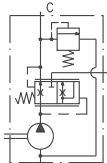
P7

Costant delivery. Excess flow at controlled pressure can be used under load. Internal recirculation of drain valve.



P9

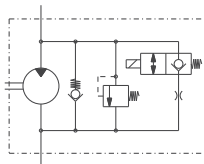
Costant delivery at controlled pressure. Internal recirculation of valve drain. Excess flow can be used under load.



ELECTRIC VALVE FOR MOTORS

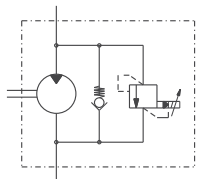
EC08..

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



DBVSA..

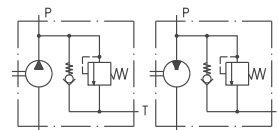
Proportional relief valve and anti-cavitation valve.



MAX PRESSURE RELIEF VALVE

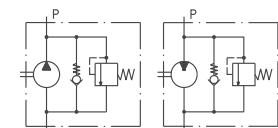
VPEF..

Fixed setting with external drain.



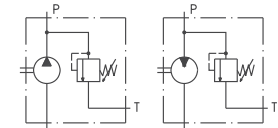
VPIF..

Fixed setting with internal drain.



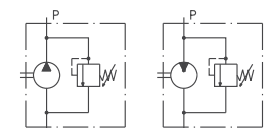
VPER..

Adjustable setting with external drain.



VPIR..

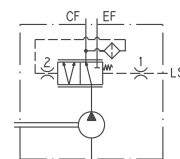
Adjustable setting with internal drain.



LOAD SENSING VALVE

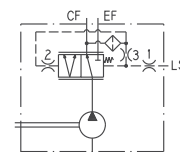
...

Static.



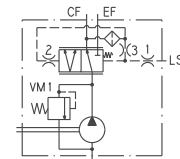
...

Dynamic.



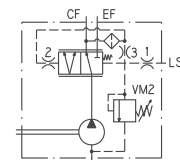
...

Dynamic with relief valve fitted on the main line.



...

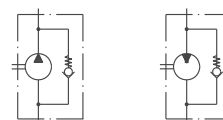
Dynamic with relief valve fitted on controlled line.



CHECK VALVE

V8

Anti-cavitation valve.



01/10.03

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

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 in ³ /rev (4,95 cm ³ /rev)		PLP 20-4	PLM 20-4
0.40 in ³ /rev (6,61 cm ³ /rev)		PLP 20-6,3	PLM 20-6,3
0.44 in ³ /rev (7,29 cm ³ /rev)		PLP 20-7,2	PLM 20-7,2
0.50 in ³ /rev (8,26 cm ³ /rev)		PLP 20-8	PLM 20-8
0.56 in ³ /rev (9,17 cm ³ /rev)		PLP 20-9	PLM 20-9
0.66 in ³ /rev (10,9 cm ³ /rev)		PLP 20-10,5	PLM 20-10,5
0.69 in ³ /rev (11,23 cm ³ /rev)		PLP 20-11,2	PLM 20-11,2
0.89 in ³ /rev (14,53 cm ³ /rev)		PLP 20-14	PLM 20-14
1.03 in ³ /rev (16,85 cm ³ /rev)		PLP 20-16	PLM 20-16
1.16 in ³ /rev (19,09 cm ³ /rev)		PLP 20-19	PLM 20-19
1.29 in ³ /rev (21,14 cm ³ /rev)		PLP 20-20	PLM 20-20
1.52 in ³ /rev (24,84 cm ³ /rev)		PLP 20-24,5	PLM 20-24,5
1.61 in ³ /rev (26,42 cm ³ /rev)		PLP 20-25	PLM 20-25
1.72 in ³ /rev (28,21 cm ³ /rev)		PLP 20-27,8	PLM 20-27,8
2.01 in ³ /rev (33,03 cm ³ /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
BC/BE	PLM 20	14-16-19-20-24,5-25
		27,8-31,5
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
EA/EB	PLM 20	27,8-31,5

01/10.03

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	MA/MA		
	PLM 20			
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	SA/SA		
	PLM 20			
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	GD/GD	GD/GD	
	PLM 20			
14-16-19-20-24,5-25 27,8-31,5	PLP 20	GE/GD	GE/GD	
	PLM 20		GD/GE	
SAE STRAIGHT THREAD PORTS (ODT)				
Type		Side		Rear
4-6,3-7,2-8-9-10,5-11,2	PLP 20	OC/OC	OC/OC	
	PLM 20			
14-16-19-20-24,5-25 27,8-31,5	PLP 20	OD/OC	OD/OC	
	PLM 20		OC/OD	

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

02/07.2006

9	Cover options (b)	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

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	4-6,3-7,2-8-9-10,5-11,2
	PLM 20	24,5-25-27,8-31,5

IN/OUT EUROPEAN FLANGED PORTS		
Side	Rear	Type
GB	PLP 20	4-6,3-7,2-8-9-10,5-11,2
	PLM 20	24,5-25-27,8-31,5

IN/OUT SAE FLANGED PORTS (SSM)		
Side	Rear	Type
GB	PLP 20	4-6,3-7,2-8-9-10,5-11,2
	PLM20	24,5-25-27,8-31,5

IN/OUT SAE FLANGED PORTS (SSS)		
Side	Rear	Type
03	PLP 20	4-6,3-7,2-8-9-10,5-11,2
	PLM 20	24,5-25-27,8-31,5

IN/OUT GAS STRAIGHT THREAD PORTS (BSPP)		
Side	Rear	Type
GB	PLP 20	4-6,3-7,2-8-9-10,5-11,2
	PLM 20	24,5-25-27,8-31,5

IN/OUT SAE STRAIGHT THREAD PORTS (ODT)		
Side	Rear	Type
03	PLP 20	4-6,3-7,2-8-9-10,5-11,2
	PLM 20	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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PL 03 T A

Edition: 03/02.2012

Replaces: PL 02 T A



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