

Part number:

HYDROMA

HYDRAULICKÉ SYSTÉMY

**HIDROMA
SYSTEMS**

UKŁADY HYDRAULICZNE

HYDROMA

ГИДРАВЛИЧЕСКИЕ СИСТЕМЫ

FEATURES

KAPPA pump and motor units consist essentially of a housing and a mounting flange in cast iron of superior mechanical specifications. KAPPA is available with mounting flanges and side or rear ports according to SAE and European standard.

The rigidity of assembly and the compact design of KAPPA pumps and motors ensure reliability and high volumetric efficiency also at high operating pressures. Infinite care and attention is taken over the design and construction of each single component, and with quality monitored unceasingly, the result is a consistent, perfectly balanced assembly that guarantees unbroken service under the most arduous operating conditions. KAPPA series is the right choice wherever noise, contamination, non inflammable fluids and size are critical factors. The wide choice of combinations of mounting flanges, shafts and ports ensure to KAPPA series to be applied in a vast range of application.

DISPLACEMENTS

From 0.30 in³/rev (4,95 cm³/rev)

To 4.50 in³/rev (73,82 cm³/rev)

PRESSURE

Max. Continuous 4133 psi (285 bar)

Max. Intermittent 4350 psi (300 bar)

Max. Peak 4785 psi (330 bar)

MAX. SPEED

Max. 4000 min⁻¹

- High operating pressures
- High efficiency at high temperature
- Exceptional working life expectancy



Modification from former edition.

05/03.2012

FEATURES

Construction	External gear type pumps and motors
Mounting	EUROPEAN - SAE - ISO standard flanges
Line connections	Screw and flange
Direction of rotation (looking on drive shaft)	Anti-clock (S) - clockwise (D) - reversible (L, R or B)
Inlet pressure range for pumps	10 ÷ 44 psi - [0,7 ÷ 3 bar (abs.)]
Max back pressure for single rotation 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	2175 psi (150 bar)
Fluid temperature range	See table (1)
Fluid	Mineral oil based hydraulic fluids to ISO/DIN and fire resistant fluids [see table (1)]. For other fluids please consult our technical sales department.
Viscosity range	From 60 to 456 SSU [12 to 100 mm ² /s (cSt)] recommended
Filtering requirement	See table (2)

Replaces: 04/07.2008

Type	Fluid composition	Max pressure psi - (bar)	Max speed min ⁻¹	Temperature °F - (°C)			Seals (◆)
				Min	Max continuous	Max peak	
ISO/DIN	Mineral oil based hydraulic fluid to ISO/DIN	See page 3, 4 75, 76	See page 3, 4 75, 76	-13 (-25)	176 (80)	212 (100)	N
				-13 (-25)	230 (110)		N-H
HFA	Oil emulsion in water 5 ÷ 15% of oil	725 (50)	1500	36 (2)	131 (55)	257 (125)	V
HFB	Water emulsion in oil 40 % of water	1740 (120)	1500	36 (2)	140 (60)		N
HFC	Water - glycol	1450 (100)	1500	-4 (-20)	140 (60)		N Bz
HFD	Phosphate ester	2175 (150)	1500	14 (-10)	176 (80)		V Bz

(◆) N= Buna N (standard) - N-H= Buna N and high back pressure shaft seals - V= Viton
 N Bz= Buna N and Bronze thrust plates - V Bz= Viton and Bronze thrust plates

Working pressure psi (bar)	$\Delta p < 2030$ (140)	$2030 < \Delta p < 3045$ (140) (210)	$\Delta p > 3045$ (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 β_{10} (c) ≥ 200 according to ISO 16889	-	10 μ m	10 μ m
Achieved with filter β_{25} (c) ≥ 200 according to ISO 16889	25 μ m	-	-

Casappa recommends to use its own production filters:

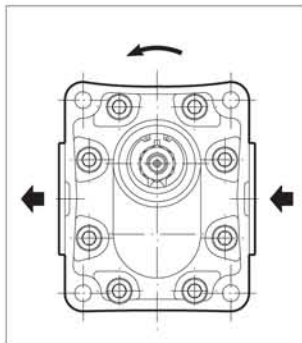
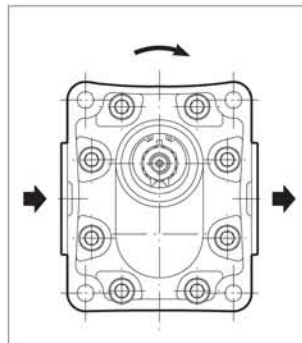
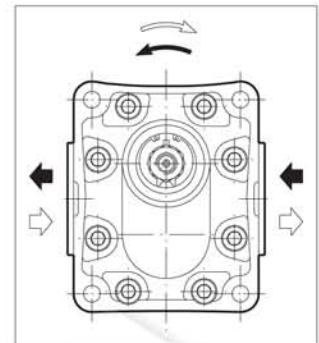


GENERAL NOTES

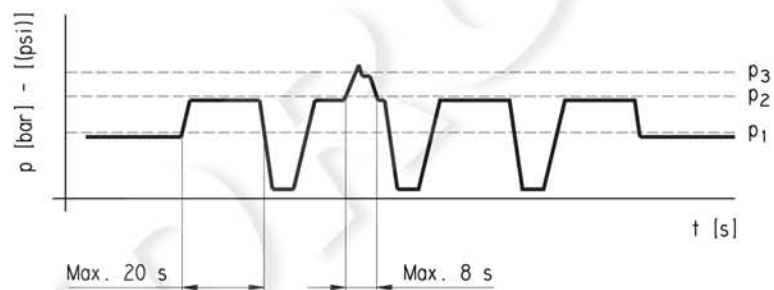
Available with different inlet and outlet ports. If you use fire resistant fluids specify the type of them at the order. For more information please consult our technical sales department.

05/03.2012

DEFINITION OF ROTATION DIRECTION LOOKING AT THE DRIVE SHAFT


Anti-clock rotation

Clockwise rotation

Reversible rotation

PRESSURE DEFINITION



p_1 Max. continuous pressure

p_2 Max. intermittent pressure

p_3 Max. peak pressure

KAPPA 20 GENERAL DATA PUMPS

KP 20

Pump type	Displacement	Max. pressure			Max. speed	Min. speed
		p ₁	p ₂	p ₃		
	in ³ /rev (cm ³ /rev)	psi (bar)			min ⁻¹	
KP 20•4	0.30 (4,95)	4133 (285)	4350 (300)	4785 (330)	4000	350
KP 20•6,3	0.40 (6,61)	4133 (285)	4350 (300)	4785 (330)	4000	350
KP 20•8	0.50 (8,26)	4133 (285)	4350 (300)	4785 (330)	3500	350
KP 20•11,2	0.69 (11,23)	3988 (275)	4205 (290)	4640 (320)	3500	350
KP 20•14	0.89 (14,53)	3843 (265)	4205 (290)	4640 (320)	3500	350
KP 20•16	1.03 (16,85)	3770 (260)	4205 (290)	4640 (320)	3000	300
KP 20•20	1.29 (21,14)	3045 (210)	3335 (230)	3625 (250)	3000	300
KP 20•25	1.61 (26,42)	2610 (180)	2900 (200)	3190 (220)	2500	300
KP 20•31,5	2.01 (33,03)	2030 (140)	2320 (160)	2610 (180)	2000	300

p₁= Max. continuous pressurep₂= Max. intermittent pressurep₃= Max. peak pressure

The values in the table refer to unidirectional pumps.

Reversible pump max pressures are 15% lower than those shown in table.

For different working conditions please consult our sales department.

DESIGN CALCULATIONS FOR PUMPS

Replaces: 02/06.2005

Q	US gpm (l/min)	Delivery
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
$\eta_v = \eta_v(V, \Delta p, n) \quad (\approx 0,98)$		Volumetric efficiency
$\eta_{hm} = \eta_{hm}(V, \Delta p, n) \quad (\approx 0,90)$		Hydro-mechanical efficiency
$\eta_t = \eta_v \cdot \eta_m \quad (\approx 0,88)$		Overall efficiency

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

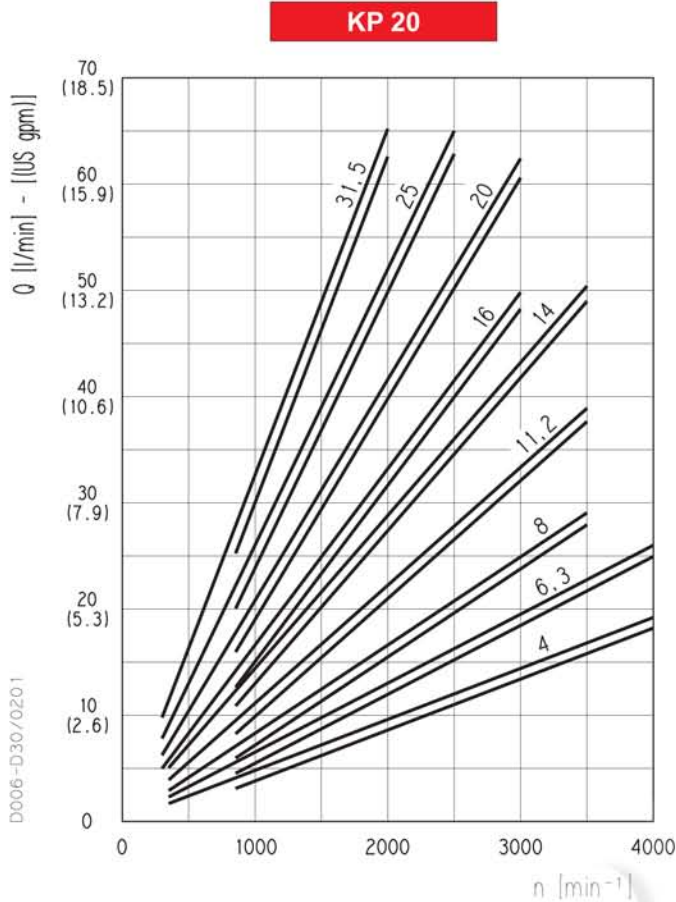
$$\begin{aligned}
 \bullet \quad Q &= Q_{\text{theor.}} \cdot \eta_v \\
 Q_{\text{theor.}} &= \frac{V \text{ (cm}^3\text{/rev)} \cdot n \text{ (min}^{-1}\text{)}}{1000} \quad [\text{l/min}] \\
 M &= \frac{M_{\text{theor.}}}{\eta_{hm}} \quad [\text{Nm}] \\
 M_{\text{theor.}} &= \frac{\Delta p \text{ (bar)} \cdot V \text{ (cm}^3\text{/rev)}}{62,83} \\
 P_{\text{IN}} &= \frac{P_{\text{OUT}}}{\eta_t} \quad [\text{kW}] \\
 P_{\text{OUT}} &= \frac{\Delta p \text{ (bar)} \cdot Q \text{ (l/min)}}{600}
 \end{aligned}$$

 05/03.2012
 ○

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

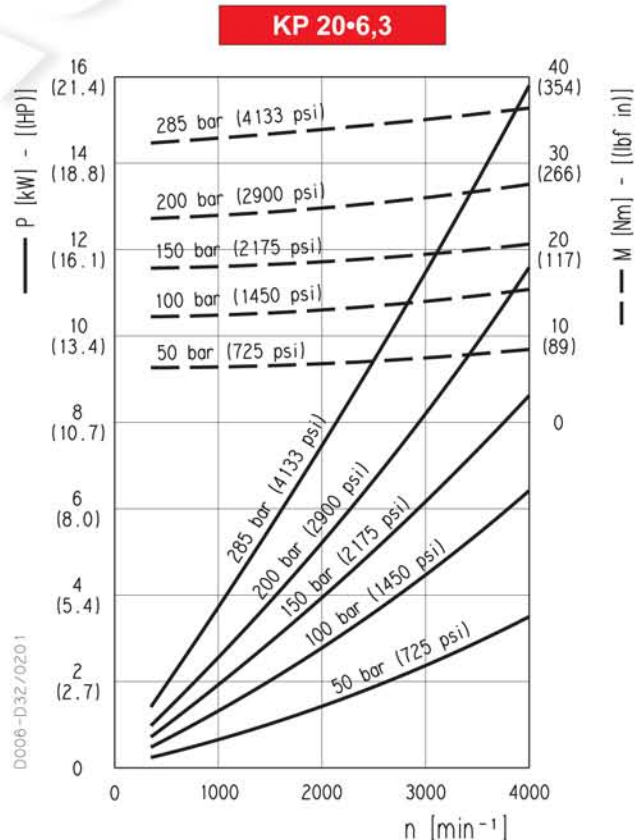
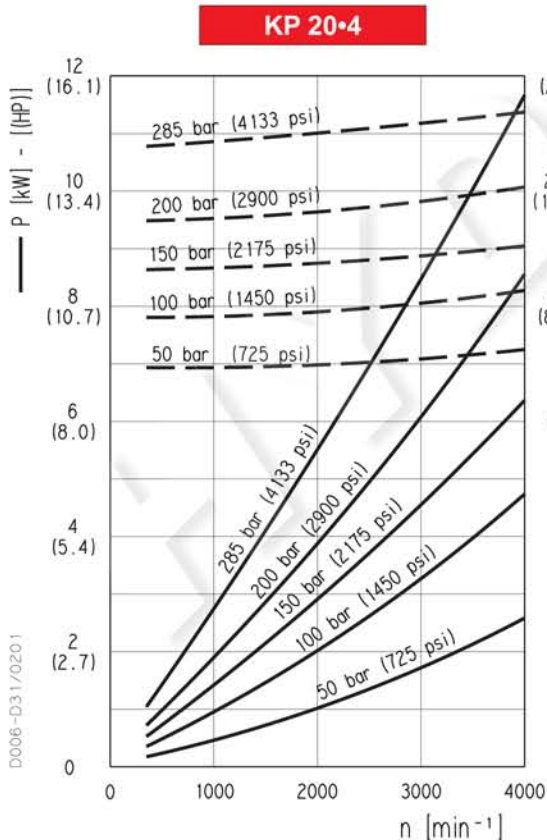
KAPPA 20 GEAR PUMPS PERFORMANCE CURVES

KP 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:

- KP 20•4. 290-4133 psi (20-285 bar)
- KP 20•6,3 290-4133 psi (20-285 bar)
- KP 20•8. 290-4133 psi (20-285 bar)
- KP 20•11,2 290-3988 psi (20-275 bar)
- KP 20•14. 290-3843 psi (20-265 bar)
- KP 20•16. 290-3770 psi (20-260 bar)
- KP 20•20. 290-3045 psi (20-210 bar)
- KP 20•25. 290-2610 psi (20-180 bar)
- KP 20•31,5 290-2030 psi (20-140 bar)



01/03.2002

MULTIPLE PUMPS

KAPPA series pumps can be coupled together in combination. Where input power requirement of each element 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.

M	lbf in (Nm)	Torque
V	in ³ /rev (cm ³ /rev)	Displacement
Δp	psi (bar)	Pressure
$\eta_{hm} = \eta_{hm} (V, \Delta p, n)$ ($\approx 0,90$)		Hydro-mechanical efficiency

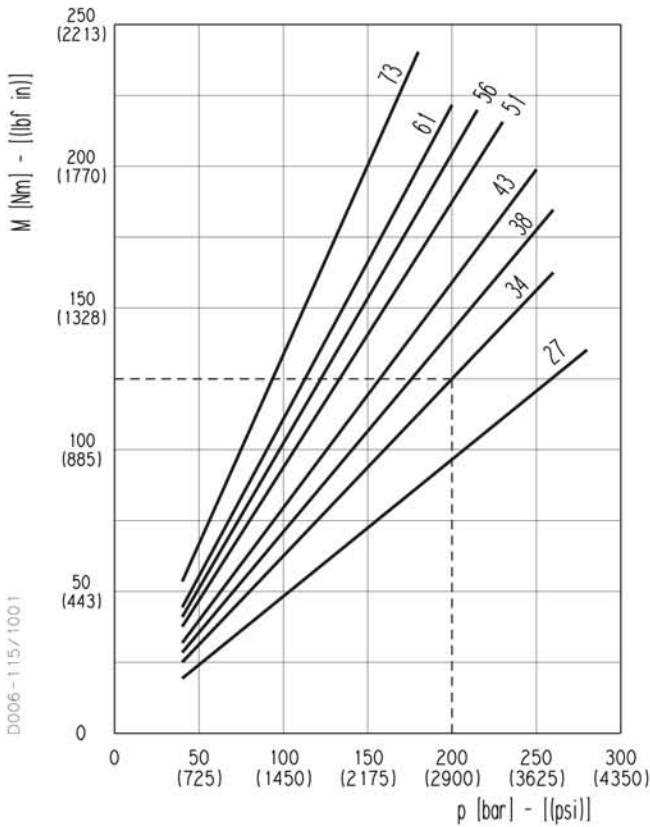
$$M = \frac{M_{theor.}}{\eta_{hm}} \quad [Nm]$$

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

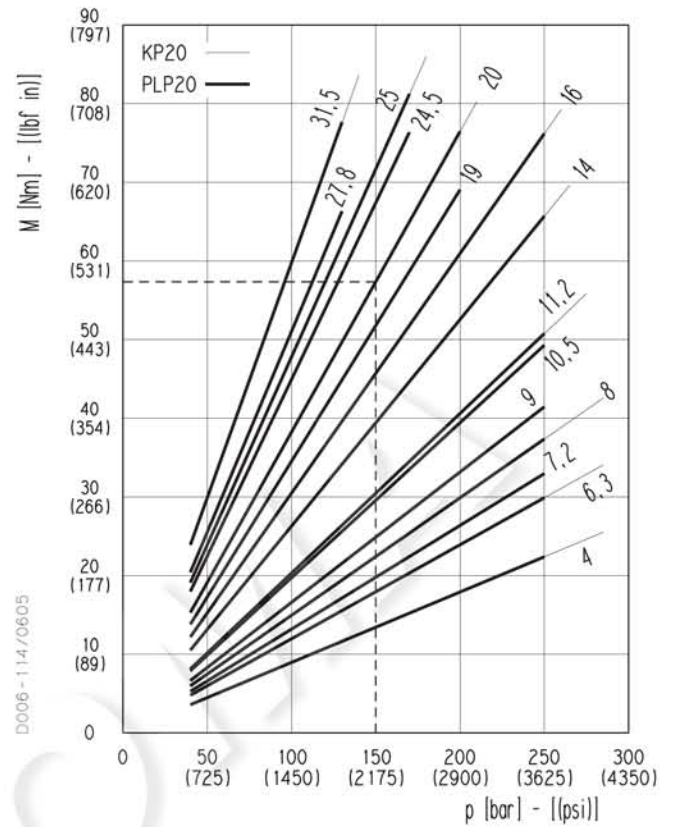
Note: The torque absorbed from the shaft of the first pump results from the sum of the torques due to all single stages. The achieved value must not exceed the maximum torque limit given for the shaft of the first pump. Diagrams providing approximate selection data will be found on page 36.

ABSORBED TORQUE

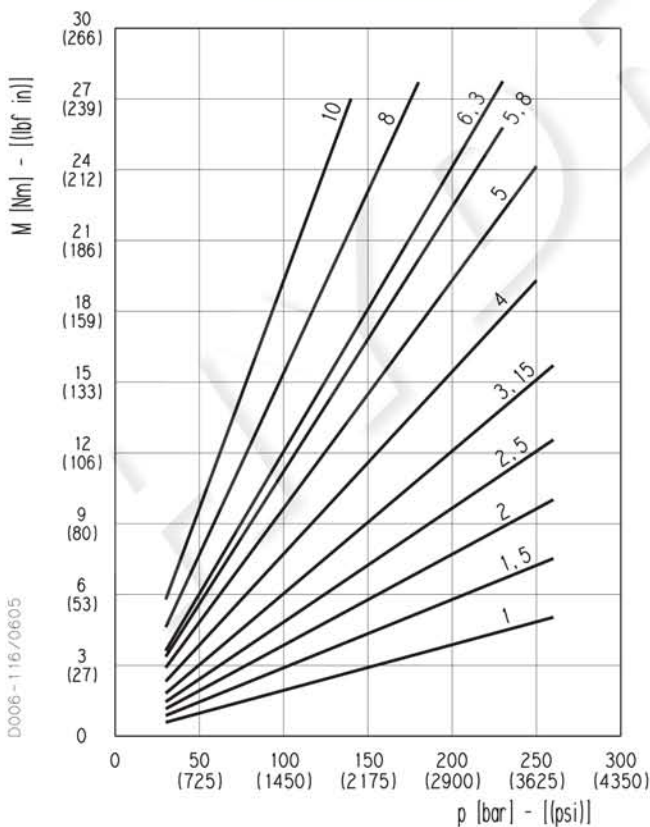
KP 30 **1**



KP 20 - PLP 20 **2**



PLP 10 **3**



DRIVE SHAFT SELECTION

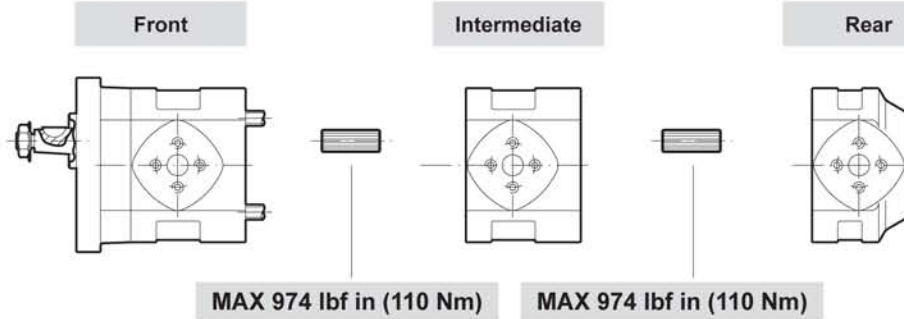
Let us consider a double pump KP30•34+KP20•20. If we suppose that we have to work with the first pump at a pressure of 2900 psi (200 bar) and the second pump at a pressure of 2175 psi (150 bar), the graph 1 shows that the torque absorbed by KP30•34 is 1106 lbf in (125 Nm) and the graph 2 shows that the torque absorbed by KP20•20 is 505 lbf in (57 Nm) acceptable value because it don't exceed the maximum drive shaft torque that is 974 lbf in (110 Nm), see page 38. The torque to be transmitted by the first drive shaft will thus be 1106+505= 1611 lbf in (125+57= 182 Nm), this value must not exceed the shaft's maximum rated value.

02/06.2005

KAPPA 20 + KAPPA 20

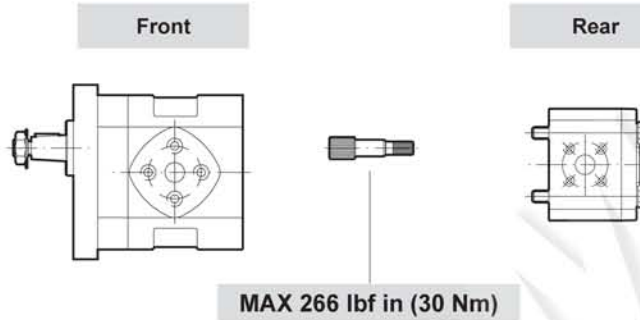
Replaces: 01/03.2002

D006-D27/070 1



KAPPA 20 + POLARIS 10

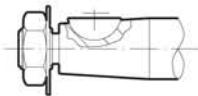
D006-D21/070 1



KAPPA 20 END DRIVE SHAFT

EUROPEAN TAPERED 1:8

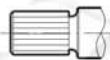
82



MAX 1239 lbf in (140 Nm)

SAE "A" SPLINE

03



MAX 885 lbf in (100 Nm)

SAE SPLINE

01



○ MAX 1151 lbf in (130 Nm)

SAE SPLINE

07



MAX 1505 lbf in (170 Nm)

SAE "B" SPLINE

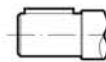
04



○ MAX 2478 lbf in (280 Nm)

SAE "A" STRAIGHT

31



MAX 620 lbf in (70 Nm)

STRAIGHT

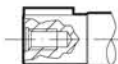
49



MAX 1239 lbf in (140 Nm)

STRAIGHT

50



MAX 885 lbf in (100 Nm)

SAE "B" STRAIGHT

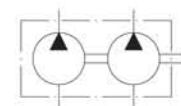
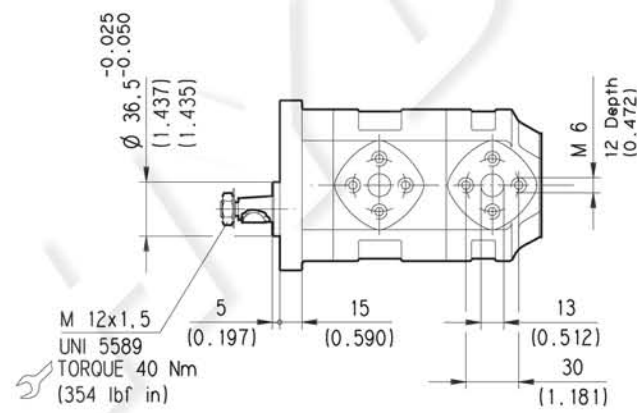
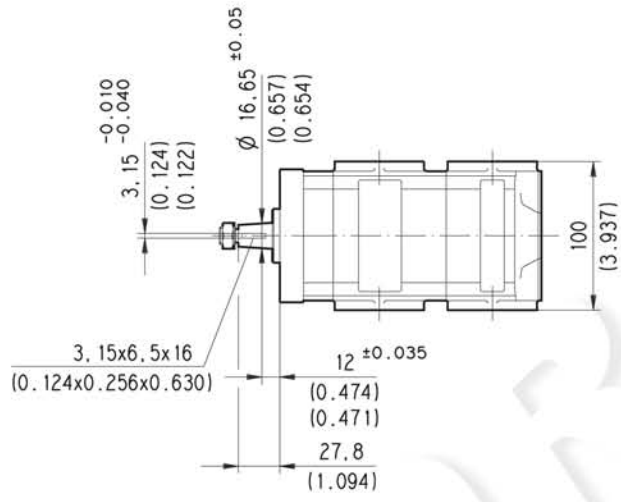
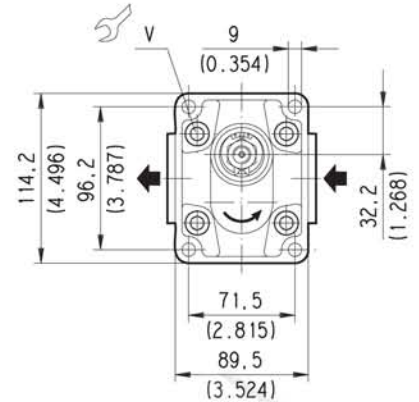
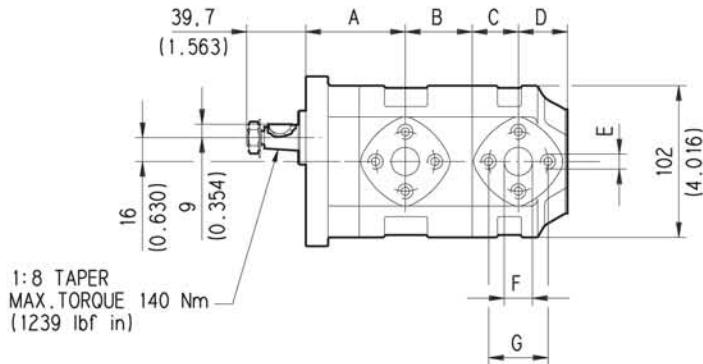
32



MAX 1770 lbf in (200 Nm)

○ 03/03.2006

EUROPEAN FLANGED PORTS - 4 Bolts
Metric thread ISO 60° conforms to ISO/R 262



D006-D05/0605

02/06.2005

V Screws tightening torque Nm (lbf in)
70 ±7 (558 ± 682)

Pump type	A	B	C	D	E	F	G
	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)
KP 20•4	60 (2.362)	37,5 (1.476)	24 (0.945)	27,5 (1.083)	M 6 Depth 12 (0.472)	13 (0.512)	30 (1.181)
KP 20•6,3	62,5 (2.461)		26,5 (1.043)				
KP 20•8	65 (2.559)		29 (1.142)				
KP 20•11,2	68,5 (2.697)		32,5 (1.280)				
KP 20•14	67 (2.638)	45 (1.772)	31 (1.220)	33 (1.299)	M 8 Depth 14 (0.551)	19 (0.748)	40 (1.575)
KP 20•16	72,5 (2.854)	43 (1.693)	36,5 (1.437)				
KP 20•20	79 (3.110)		43 (1.693)				
KP 20•25	72 (2.835)	58 (2.283)	36 (1.417)	48 (1.890)			
KP 20•31,5	82 (3.228)		46 (1.811)				

The length of a triple pump is obtained with the sum of the following dimensions: **A+B+C+B+C+D**.

How to order a triple pump

(for double pump omit the intermediate pump)

Front pump	/	Intermediate pump	/	Rear pump	/	Rotation (1)	/	-	Seals (2)
KP20•4	/	20•4	/	20•4	/	S	/	-	FS

(1) Rotation: S= Left - D= Right


(2) For Buna N seals no code


ORDER EXAMPLE

Double pump **KP20•4/20•4 S/FS**



Triple pump **KP20•4/20•4/20•4 S/FS**



PORTS CONNECTORS TIGHTENING TORQUE



 Tightening torque for low pressure side port.



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

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

EUROPEAN FLANGED PORTS - 4 Bolts					EUROPEAN
CODE					
	Nm	(lbf in)	Nm	(lbf in)	
EA	8 ^{+0.5}	71 + 75	8 ^{+0.5}	71 + 75	
EB	15 ⁺¹	133 + 142	20 ⁺¹ (KP 20)	177 + 186	
ED	20 ⁺¹	177 + 186	15 ⁺¹ (KP 30)	133 + 142	
EF	25 ⁺¹	221 + 230	30 ^{+2.5}	266 + 288	
			50 ^{+2.5}	443 + 465	

GAS STRAIGHT THREAD PORTS					BSPP
CODE					
	Nm	(lbf in)	Nm	(lbf in)	
GB (◆)	15 ⁺¹	133 + 142	—	—	
GC (■)	15 ⁺¹	133 + 142	—	—	
GD	20 ⁺¹	177 + 186	50 ^{+2.5}	443 + 465	
GE	30 ^{+2.5}	266 + 288	90 ⁺⁵	797 + 841	
GF	50 ^{+2.5}	443 + 465	130 ⁺¹⁰	1151 + 1239	
GG	60 ⁺⁵	531 + 575	170 ⁺¹⁰	1505 + 1593	

SAE STRAIGHT THREAD POTRS J514					ODT
CODE					
	Nm	(lbf in)	Nm	(lbf in)	
03 (⊙)	12 ⁺¹	106 + 115	—	—	
OA (■)	15 ⁺¹	133 + 142	—	—	
OC	30 ^{+2.5}	266 + 288	70 ⁺⁵	620 + 664	
OD	40 ^{+2.5}	354 + 376	120 ⁺¹⁰	1062 + 1151	
OF	60 ⁺⁵	531 + 575	170 ⁺¹⁰	1505 + 1593	
OG	70 ⁺⁵	620 + 664	200 ⁺¹⁰	1770 + 1859	
OH	100 ⁺⁵	885 + 929	270 ⁺¹⁵	2390 + 2523	

SAE FLANGED PORTS J518 - Standard pressure series 3000 PSI					SSM
CODE					
	Nm	(lbf in)	Nm	(lbf in)	
MA	12 ⁺¹	106 + 115	12 ⁺¹	106 + 115	
MB	20 ⁺¹	177 + 186	25 ⁺¹	221 + 230	
MC	20 ⁺¹	177 + 186	25 ⁺¹	221 + 230	

(◆) Drain port: KAPPA 20 rear drain (R) and KAPPA 30 side drain (L)

(⊙) Drain port: KAPPA 20 rear drain (R)

(■) Drain port: KAPPA 30 rear drain (R)