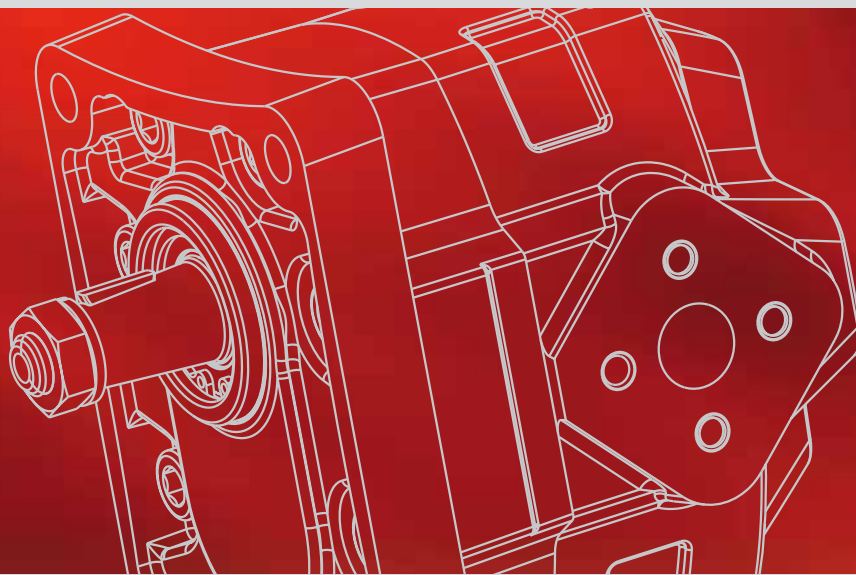




HYDRAULIC GEAR
PUMPS AND
MOTORS

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)

Tab. 1

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

Tab. 2

Working pressure psi (bar)	Δp<2030 (140)	2030<Δp<3045 (140) (210)	Δp>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 μm	10 μm
Achieved with filter β ₂₅ (c) ≥ 200 according to ISO 16889	25 μm	-	-

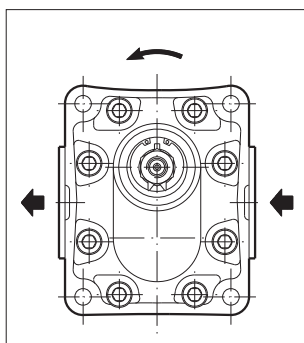
Casappa recommends to use its own production filters:



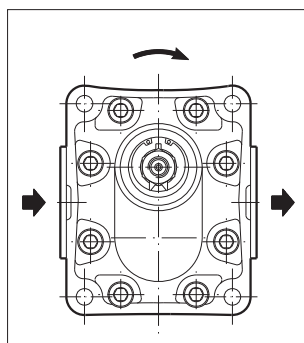
GENERAL NOTES

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.

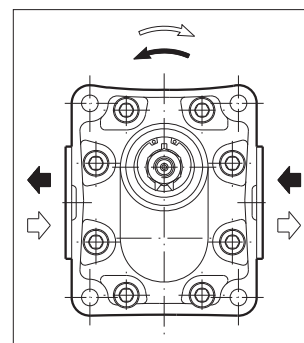
DEFINITION OF ROTATION DIRECTION LOOKING AT THE DRIVE SHAFT



Anti-clock rotation

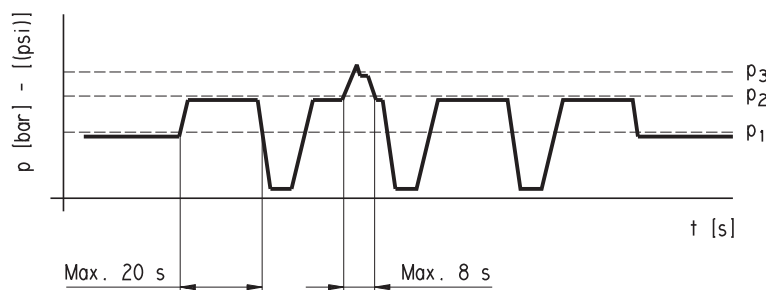


Clockwise rotation



Reversible rotation

PRESSURE DEFINITION



p_1 Max. continuous pressure

p_2 Max. intermittent pressure

p_3 Max. peak pressure

01/03.2002

DESIGN CALCULATIONS FOR MOTORS

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

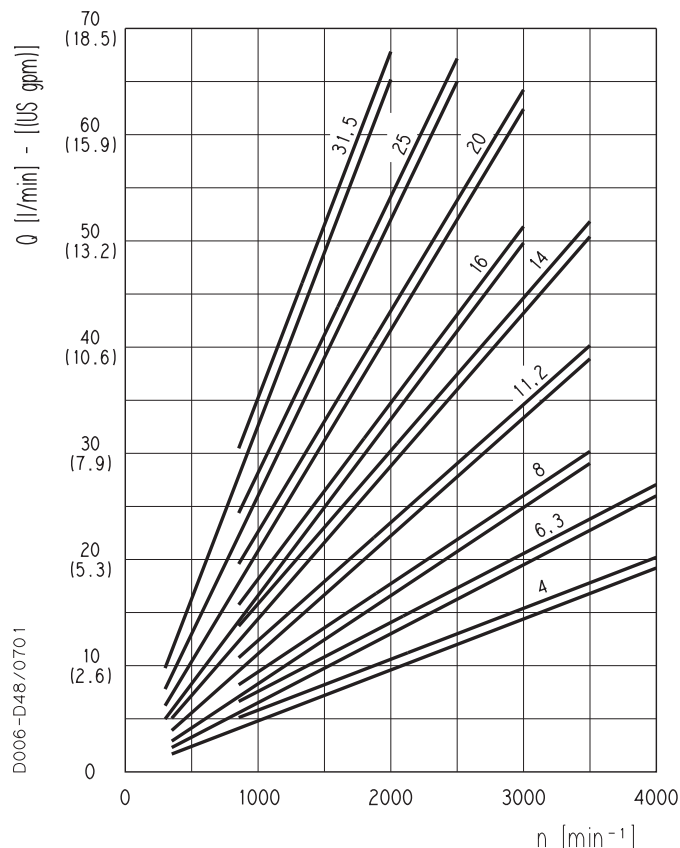
$$\begin{aligned}
 \text{○} \quad Q &= \frac{Q_{\text{theor.}}}{\eta_v} \quad [\text{l/min}] \\
 Q_{\text{theor.}} &= \frac{V \text{ (cm}^3\text{/rev)} \cdot n \text{ (min}^{-1}\text{)}}{1000} \\
 M &= M_{\text{theor.}} \cdot \eta_{hm} \quad [\text{Nm}] \\
 M_{\text{theor.}} &= \frac{\Delta p \text{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

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

KAPPA 20 GEAR MOTORS PERFORMANCE CURVES

KM 20

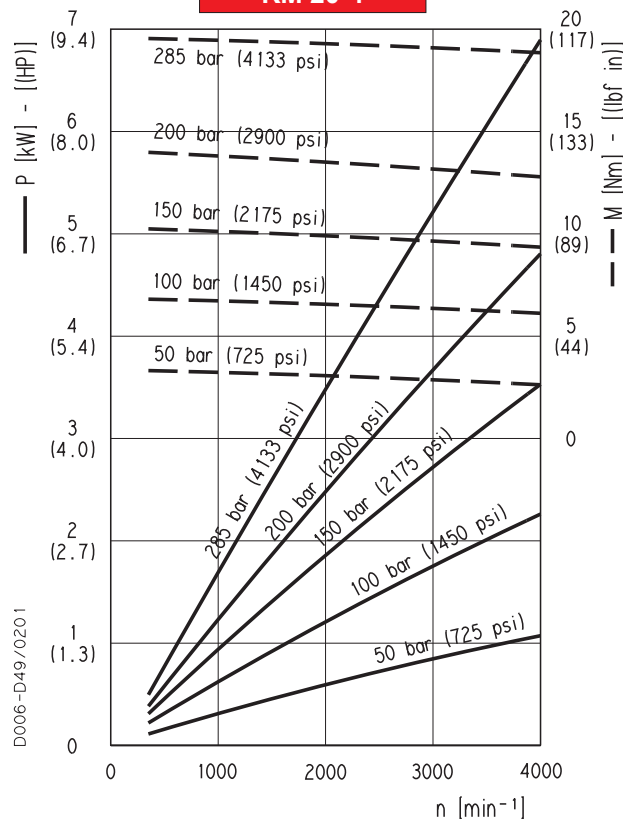
KM 20



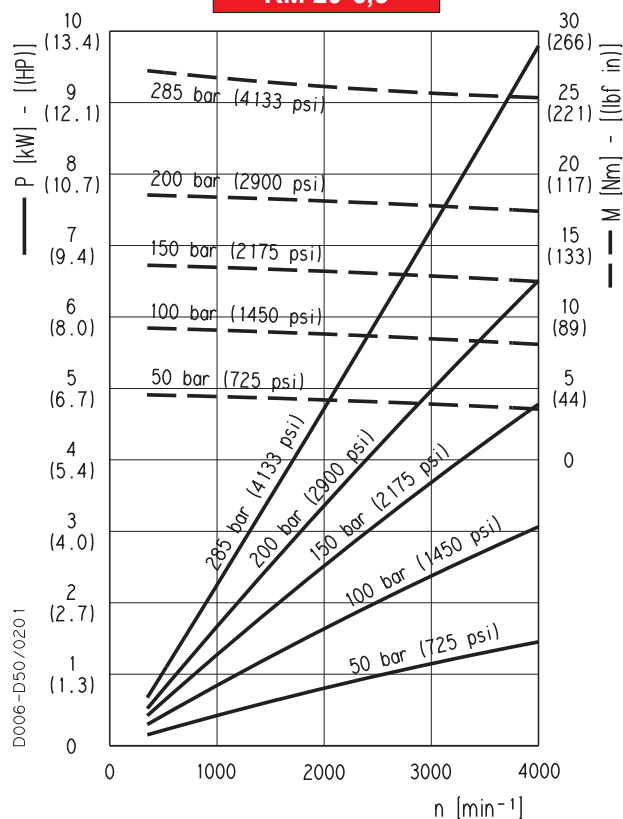
Each curve has been obtained at 122 °F (50 °C), using oil with viscosity 168 SSU (36 cSt) at 104 °F (40 °C) and at these pressures:

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

KM 20•4



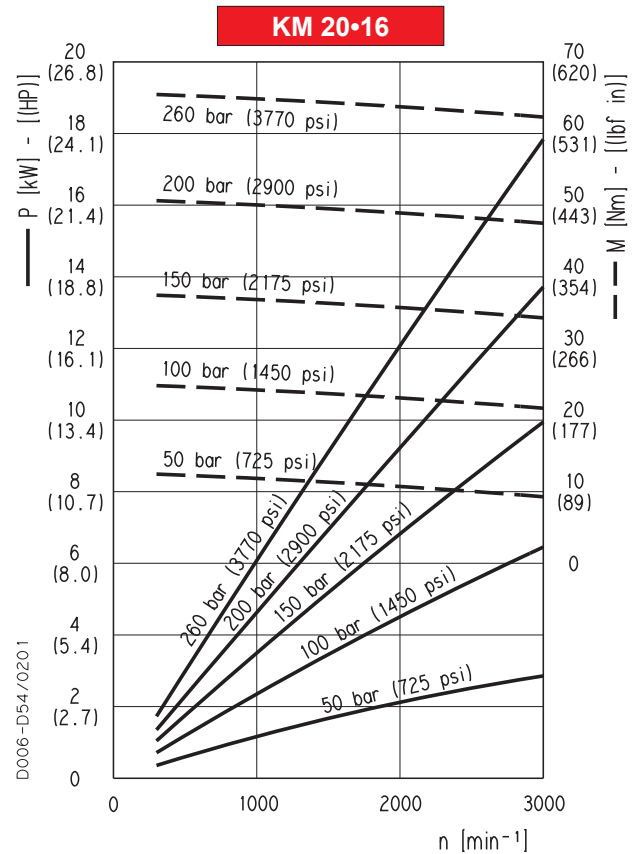
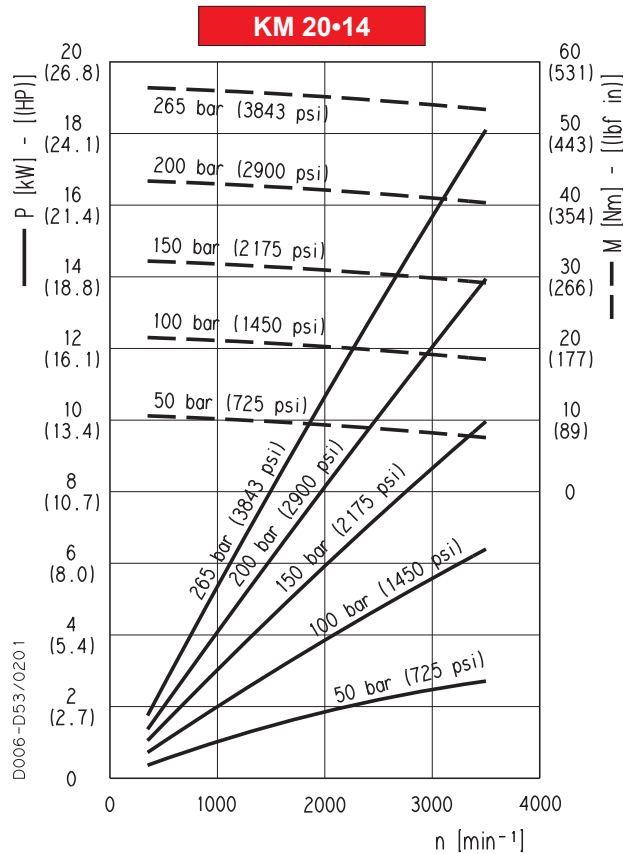
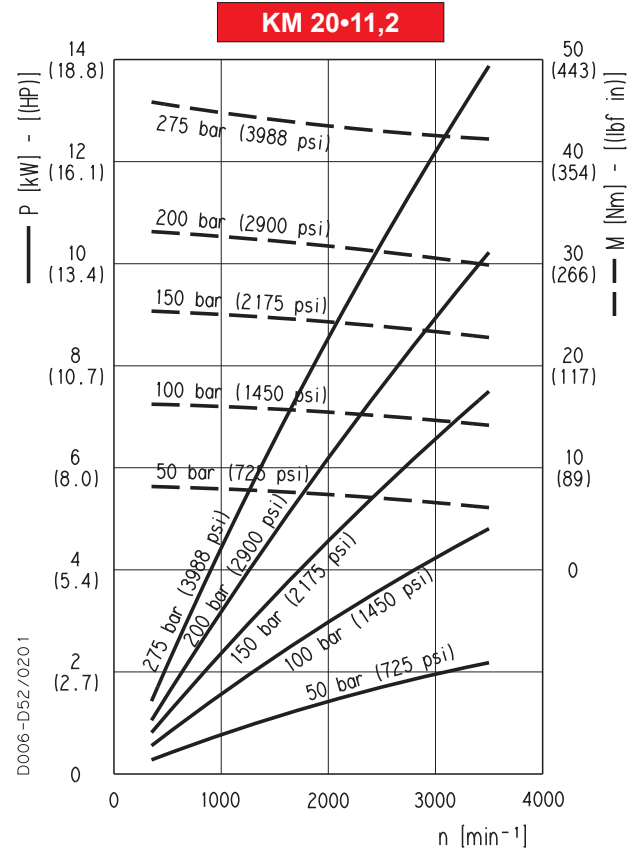
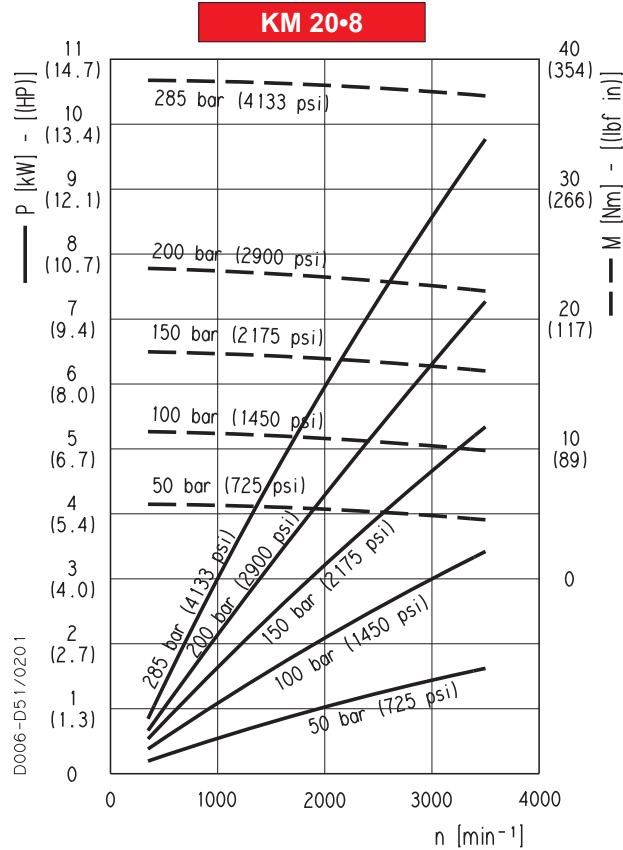
KM 20•6,3



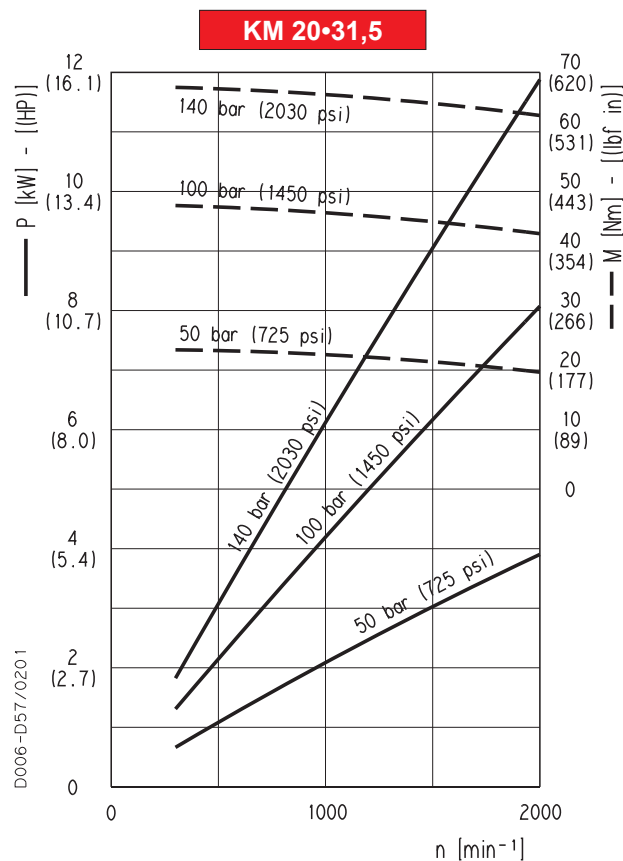
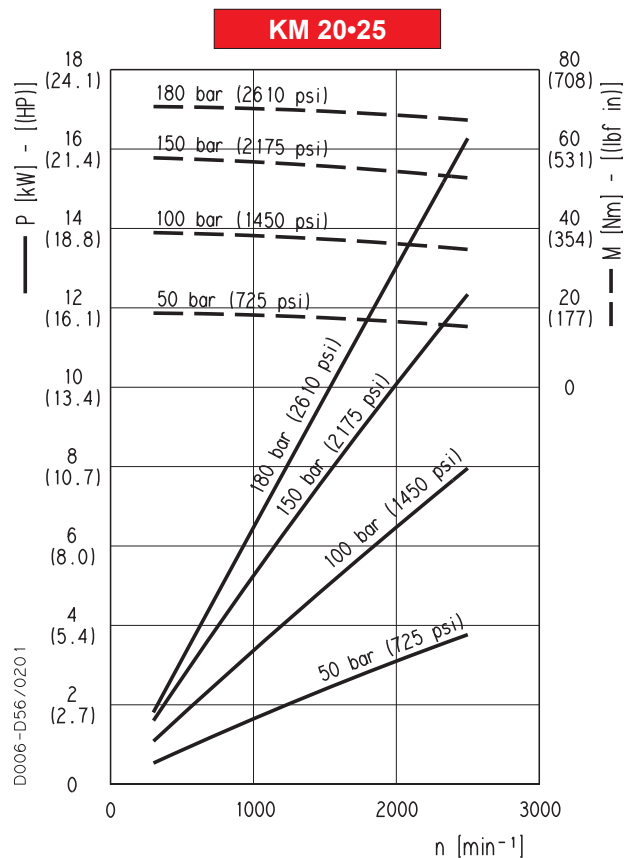
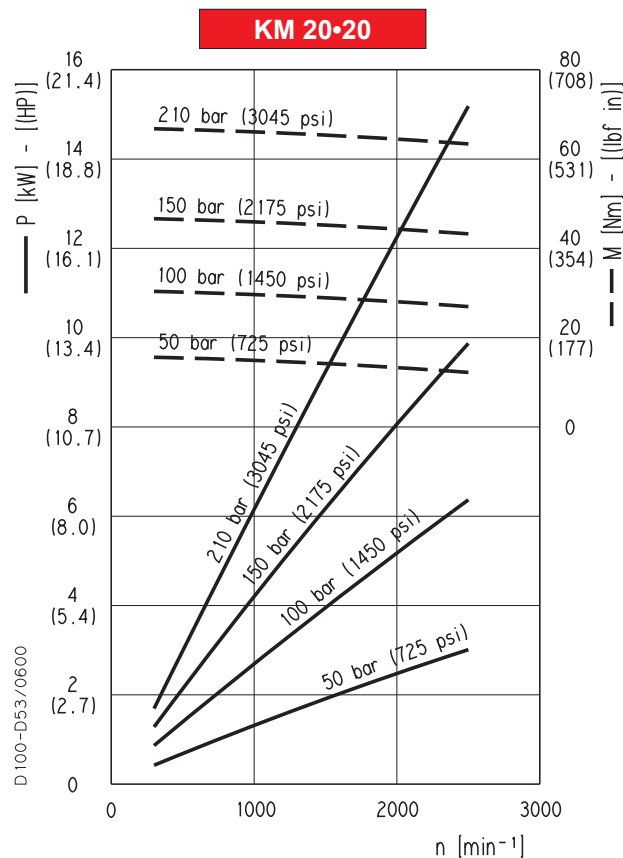
01/03.2002

KAPPA 20 GEAR MOTORS PERFORMANCE CURVES

KM 20

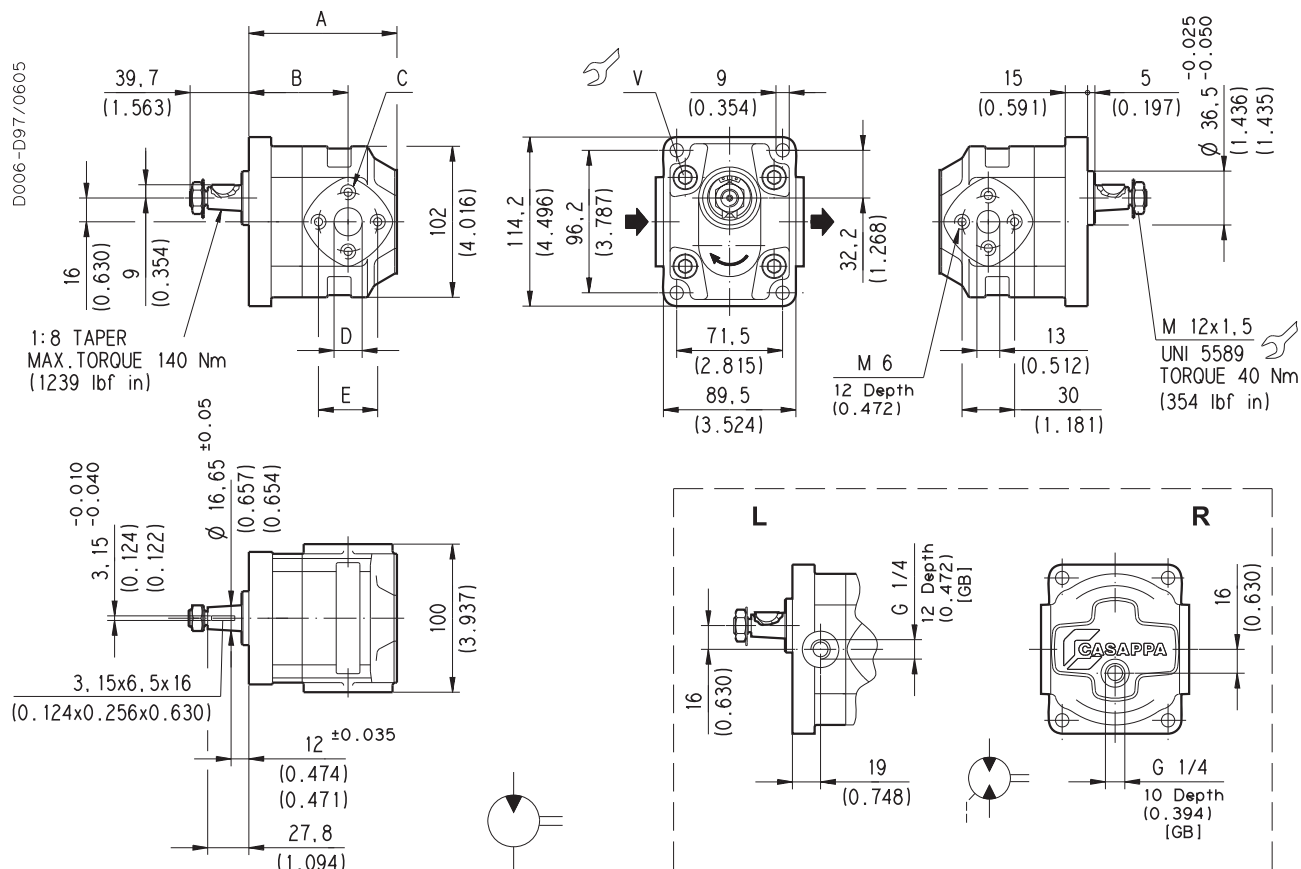


KAPPA 20 GEAR MOTORS PERFORMANCE CURVES

KM 20


01/03.2002

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



V Screws tightening torque Nm (lbf in)

70 ±7 (558 ÷ 682)

Motor type		A	B	C	D	E
		mm (in)	mm (in)	mm (in)	mm (in)	mm (in)
KM 20•4 KM 20•6,3 KM 20•8 KM 20•11,2 KM 20•14 KM 20•16 KM 20•20 KM 20•25 KM 20•31,5	S D L R B	0-82 E2-L EA/EA-N		M6 Depth 12 (0.551)	13 (0.512)	30 (1.181)
		0-82 E2-L EA/EB-N		M8 Depth 14 (0.551)	19 (0.748)	40 (1.575)

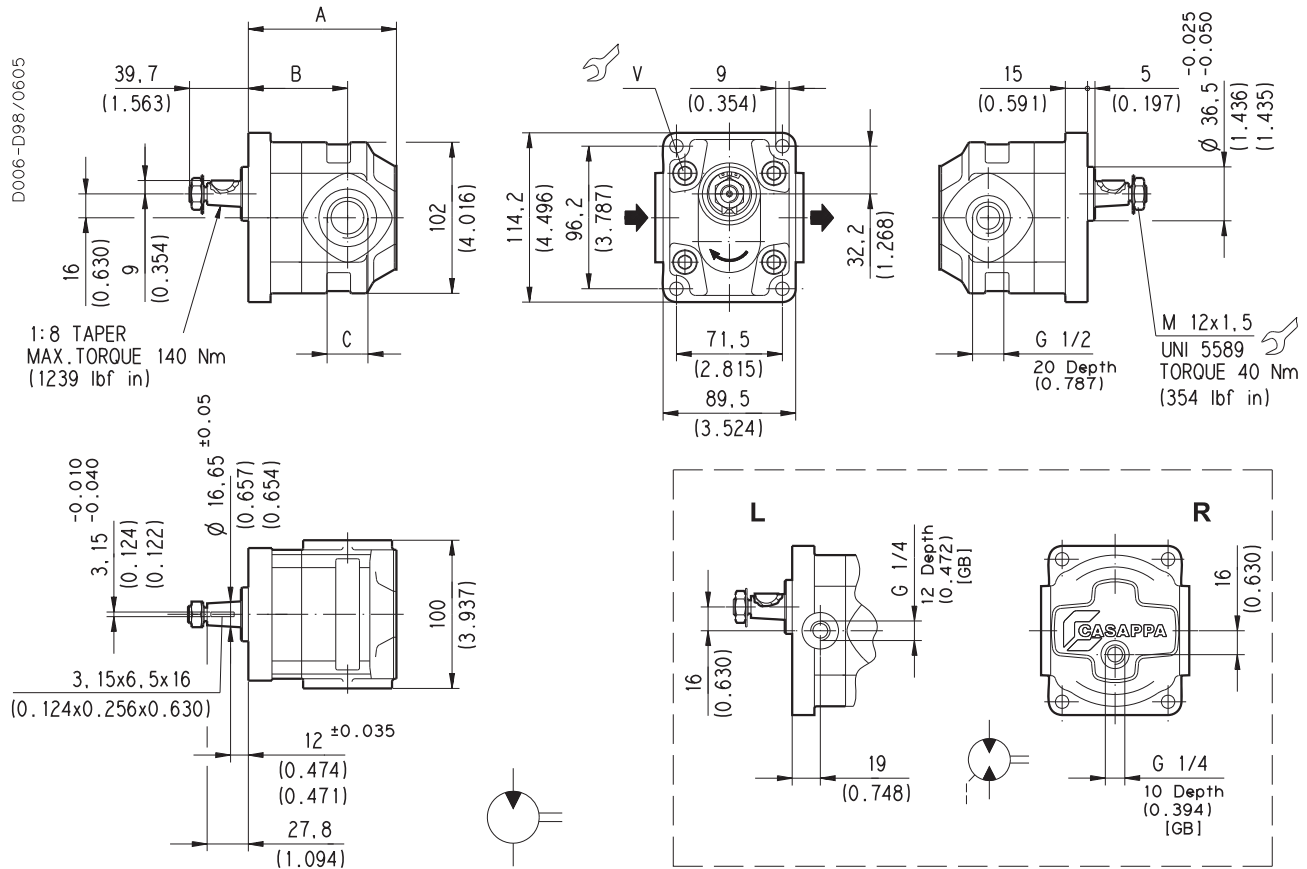
Rotation: S=left - D=right - L=reversible side drain - R=reversible rear drain - B=reversible internal drain

How to order:

KM 20•4 S0-82 E2-L EA/EA-N

GAS STRAIGHT THREAD PORTS

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


V Screws tightening torque Nm (lbf in)

70 ±7 (558 ÷ 682)

Motor type			A	B	C
			mm (in)	mm (in)	mm (in)
KM 20•4	S D L R B	0-82 E2-L GD/GD-N	87,5 (3.445)	60 (2.362)	G 1/2 Depth 20 (0.787)
KM 20•6,3			90 (3.543)	62,5 (2.461)	
KM 20•8			92,5 (3.642)	65 (2.559)	
KM 20•11,2			96 (3.780)	68,5 (2.697)	
KM 20•14		0-82 E2-L GD/GE-N	100 (3.937)	67 (2.638)	G 3/4 Depth 22 (0.866)
KM 20•16			105,5 (4.154)	72,5 (2.854)	
KM 20•20			112 (4.409)	79 (3.110)	
KM 20•25			120 (4.724)	72 (2.835)	
KM 20•31,5			130 (5.118)	82 (3.228)	

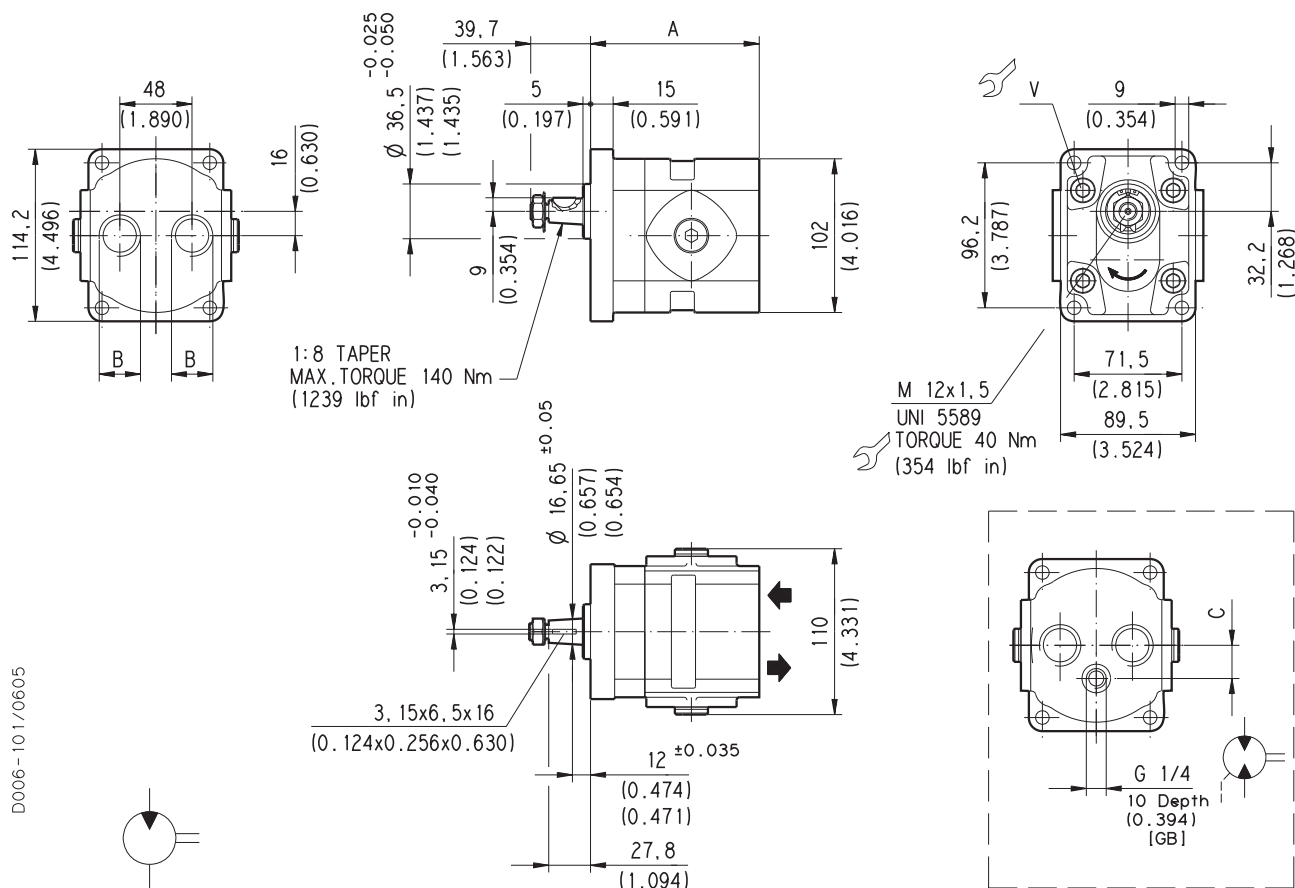
Rotation: S=left - D=right - L=reversible side drain - R=reversible rear drain - B=reversible internal drain

How to order:

KM 20•4 S0-82 E2-L GD/GD-N

GAS STRAIGHT THREAD PORTS

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


V Screws tightening torque Nm (lbf in)
70 ± 7 (558 $\div$ 682)
Rear ports version

Moror type			A	B	C
			mm (in)	mm (in)	mm (in)
KM 20•4	S D R B	0-82 E2-P GD/GD-N	84,5 (3.327)	G 1/2 Depth 17 (0.670)	19 (0.748)
KM 20•6,3			87 (3.425)		
KM 20•8			89,5 (3.524)		
KM 20•11,2			93 (3.661)		
KM 20•14		0-82 E2-P GE/GE-N	112 (4.409)	G 3/4 Depth 18 (0.709)	22 (0.866)
KM 20•16			115,5 (4.547)		
KM 20•20			122 (4.803)		
KM 20•25			130 (5.118)		
KM 20•31,5			140 (5.512)		

Rotation: S=left - D=right - R=reversible rear drain - B=reversible internal drain

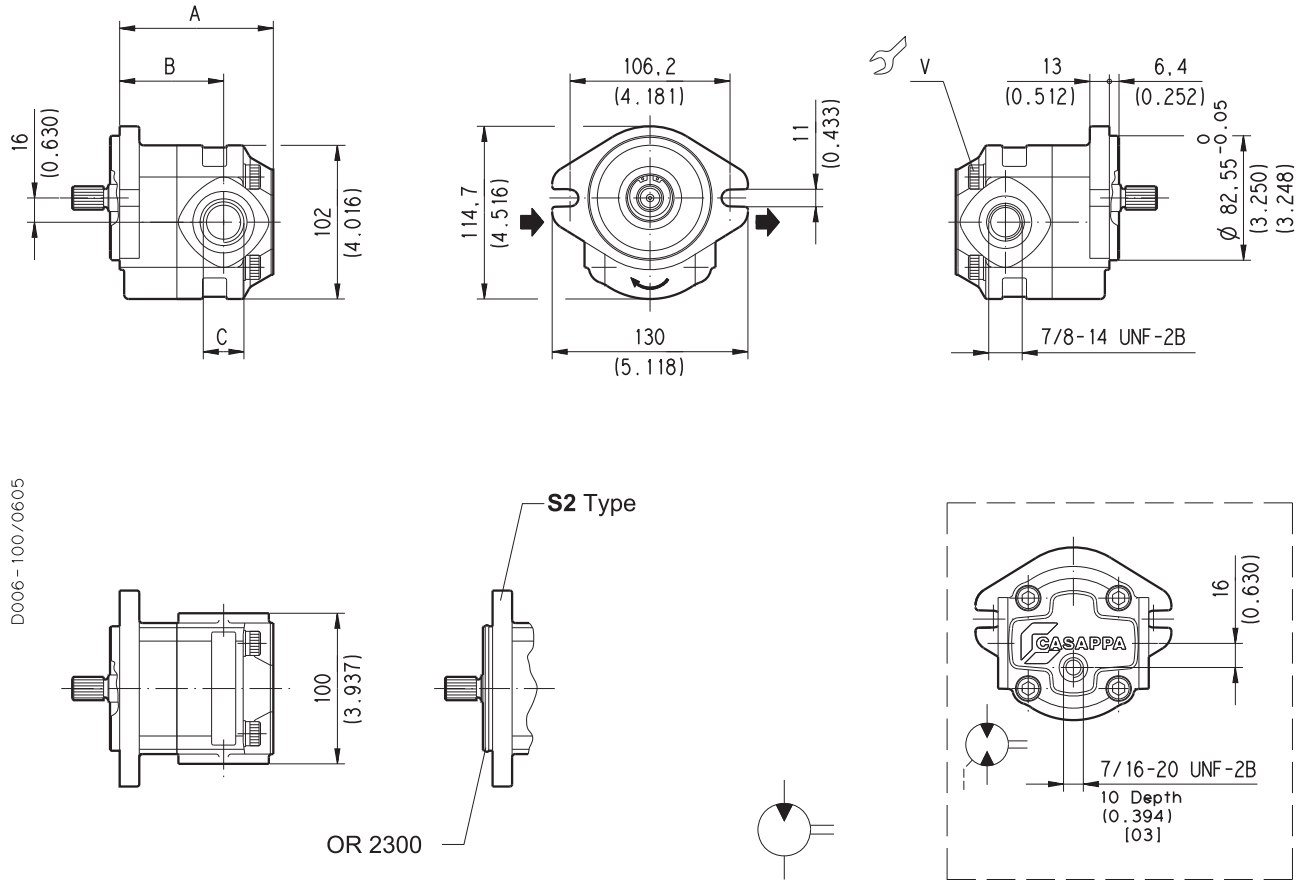
How to order:

KM 20•4 S0-82 E2-P GD/GD-N

KAPPA 20
HYDRAULIC GEAR MOTORS SAE STANDARD
... S1

SAE STRAIGHT THREAD PORTS J514

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


V Screws tightening torque Nm (lbf in)

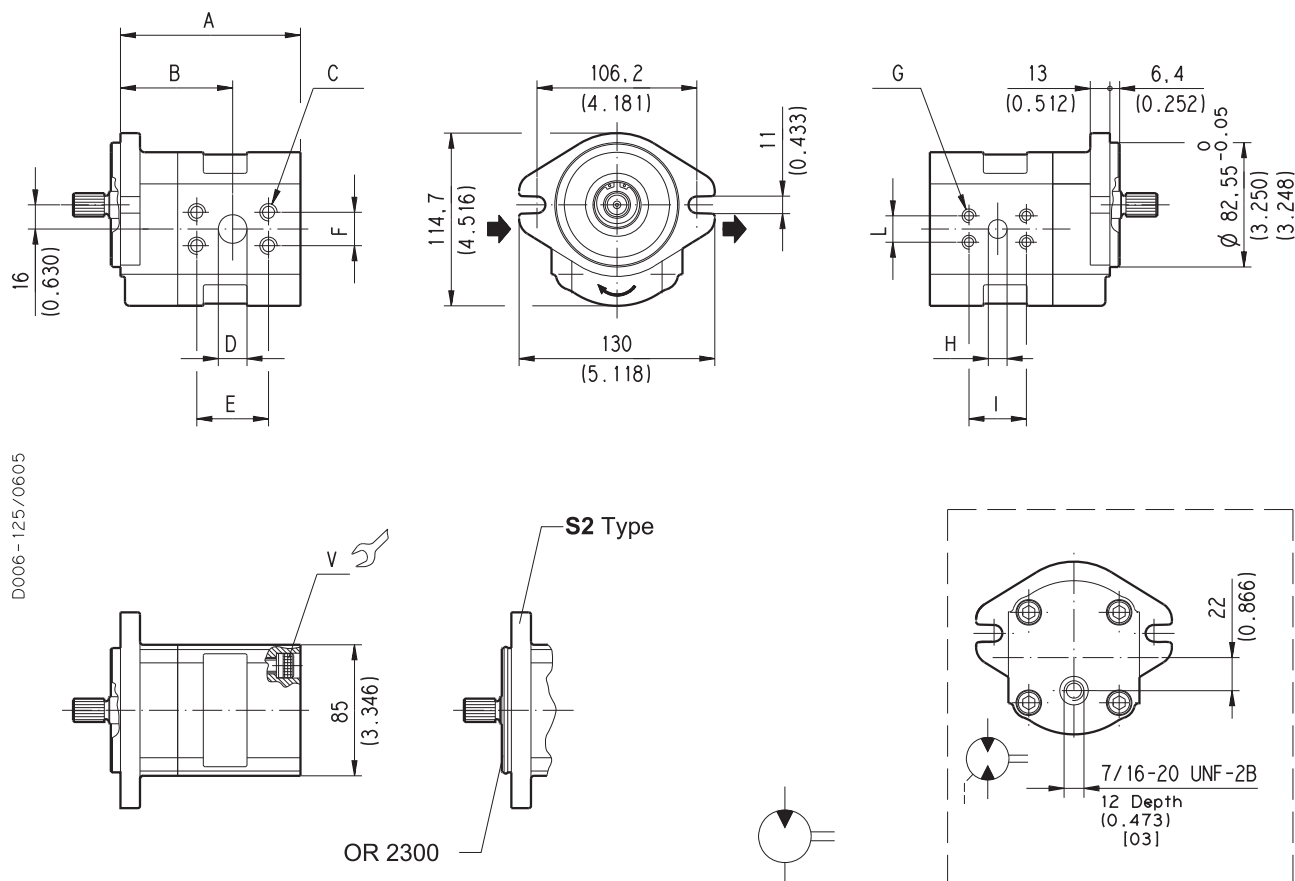
70 ^{±7} (558 ÷ 682)

Side ports version (L) - To order see page 93 e 94

Motor type	A	B	C	Ports code		
	mm (in)	mm (in)	mm (in)	IN	OUT	
KM 20•4	89,5 (3.524)	62 (2.441)	7/8-14 UNF-2B	OC	OC	
KM 20•6,3	92 (3.622)	64,5 (2.539)				
KM 20•8	94,5 (3.720)	67 (2.638)				
KM 20•11,2	98 (3.858)	70,5 (2.776)				
KM 20•14	102 (4.016)	69 (2.717)	1-1/16-12 UN-2B		OC	OD
KM 20•16	107,5 (4.232)	74,5 (2.933)				
KM 20•20	114 (4.488)	81 (3.189)				
KM 20•25	122 (4.803)	74 (2.913)				
KM 20•31,5	132 (5.197)	84 (3.307)				

SAE FLANGED PORTS J518 - Standard pressure series 3000 PSI

Metric thread ISO 60° conforms to ISO/R 262


V Screws tightening torque Nm (lbf in)

70 ±7 (558 ÷ 682)

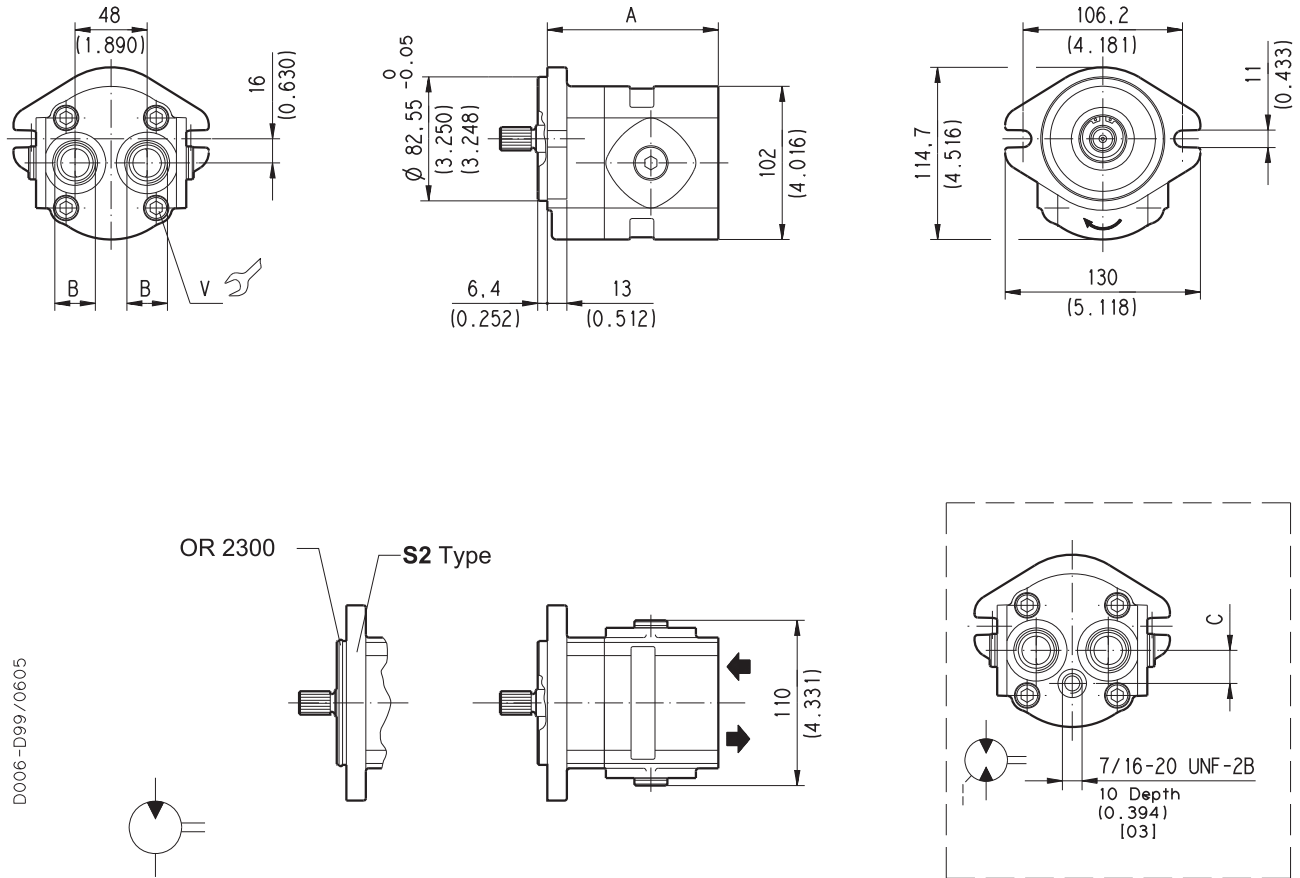
Side ports version (L) - To order see page 93 e 94

Motor type	A	B	C	D	E	F	G	H	I	L	Ports code	
	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	IN	OUT
KM 20•4	101,5 (3.996)	62 (2.441)	M8 Depth 12 (0.472)	12,5 (0.492)	38,1 (1.500)	17,5 (0.689)	M8 Depth 12 (0.472)	12,5 (0.492)	38,1 (1.500)	17,5 (0.689)	MA	MA
KM 20•6,3	104 (4.094)	64,5 (2.539)										
KM 20•8	106,5 (4.193)	67 (2.638)										
KM 20•11,2	111 (4.370)	70,5 (2.776)										
KM 20•14	116 (4.567)	69 (2.717)	M10 Depth 12 (0.472)	19 (0.748)	47,6 (1.874)	22,2 (0.874)	M10 Depth 12 (0.472)	19 (0.748)	47,6 (1.874)	22,2 (0.874)	MB	MB
KM 20•16	119,5 (4.705)	74,5 (2.933)										
KM 20•20	126 (4.961)	81 (3.189)										
KM 20•25	134 (5.276)	74 (2.913)										
KM 20•31,5	144 (5.669)	84 (3.307)										

02/06.2005

SAE STRAIGHT THREAD PORTS J514

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



D006-D99/0605

V Screws tightening torque Nm (lbf in)

70 ±7 (558 ÷ 682)

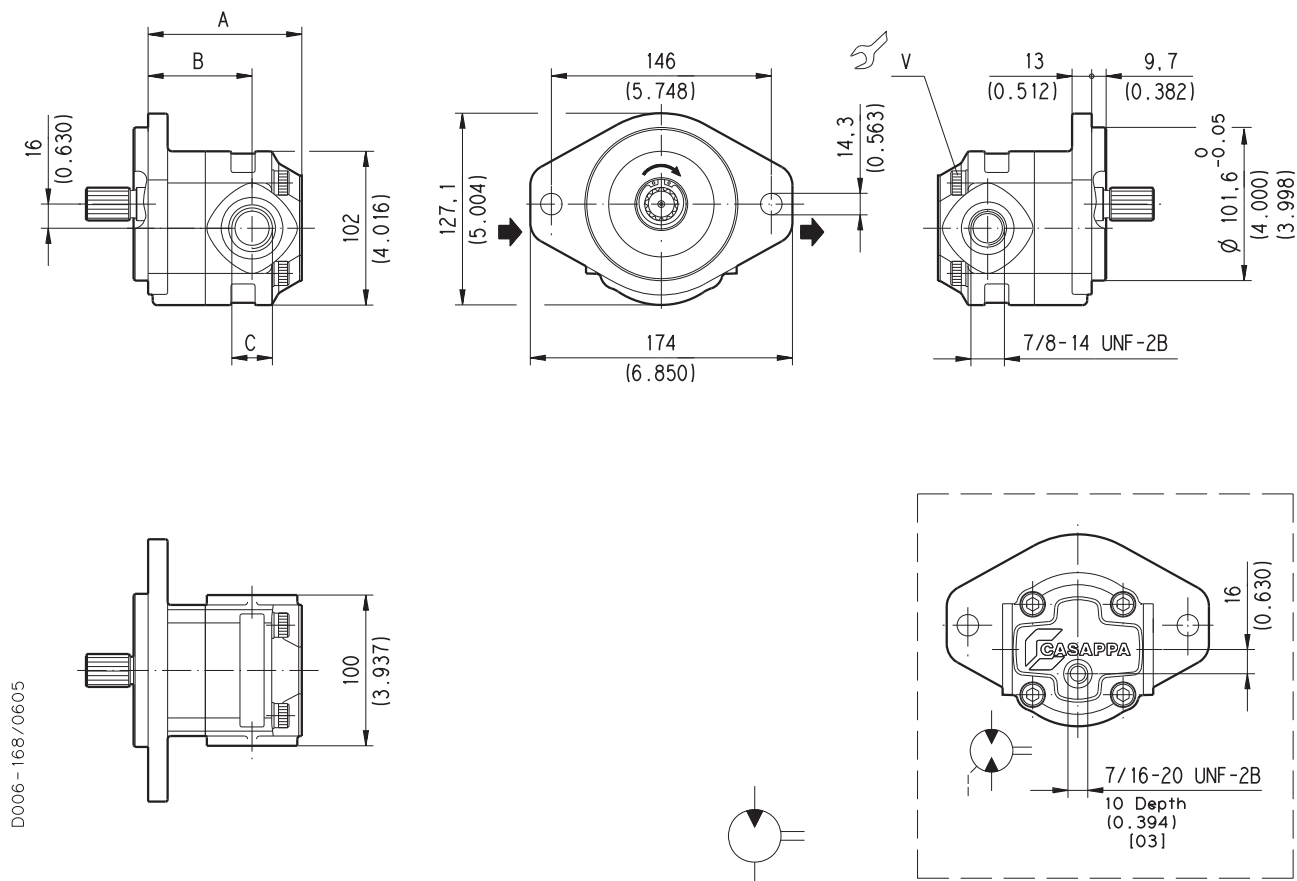
Rear ports version (P) - To order see page 93 e 94

Motor type	A	B	C	Ports code	
	mm (in)		mm (in)	IN	OUT
KM 20•4	86,5 (3.406)	7/8-14 UNF-2B	19 (0.748)	OC	OC
KM 20•6,3	89 (3.504)				
KM 20•8	91,5 (3.602)				
KM 20•11,2	95 (3.740)				
KM 20•14	114 (4.488)	1-1/16-12 UN-2B	22 (0.866)	OC	OD
KM 20•16	117,5 (4.623)				
KM 20•20	124 (4.882)				
KM 20•25	132 (5.197)				
KM 20•31,5	142 (5.591)				

02/06.2005

SAE STRAIGHT THREAD PORTS J514

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


V Screws tightening torque Nm (lbf in)

70 ±7 (558 ÷ 682)

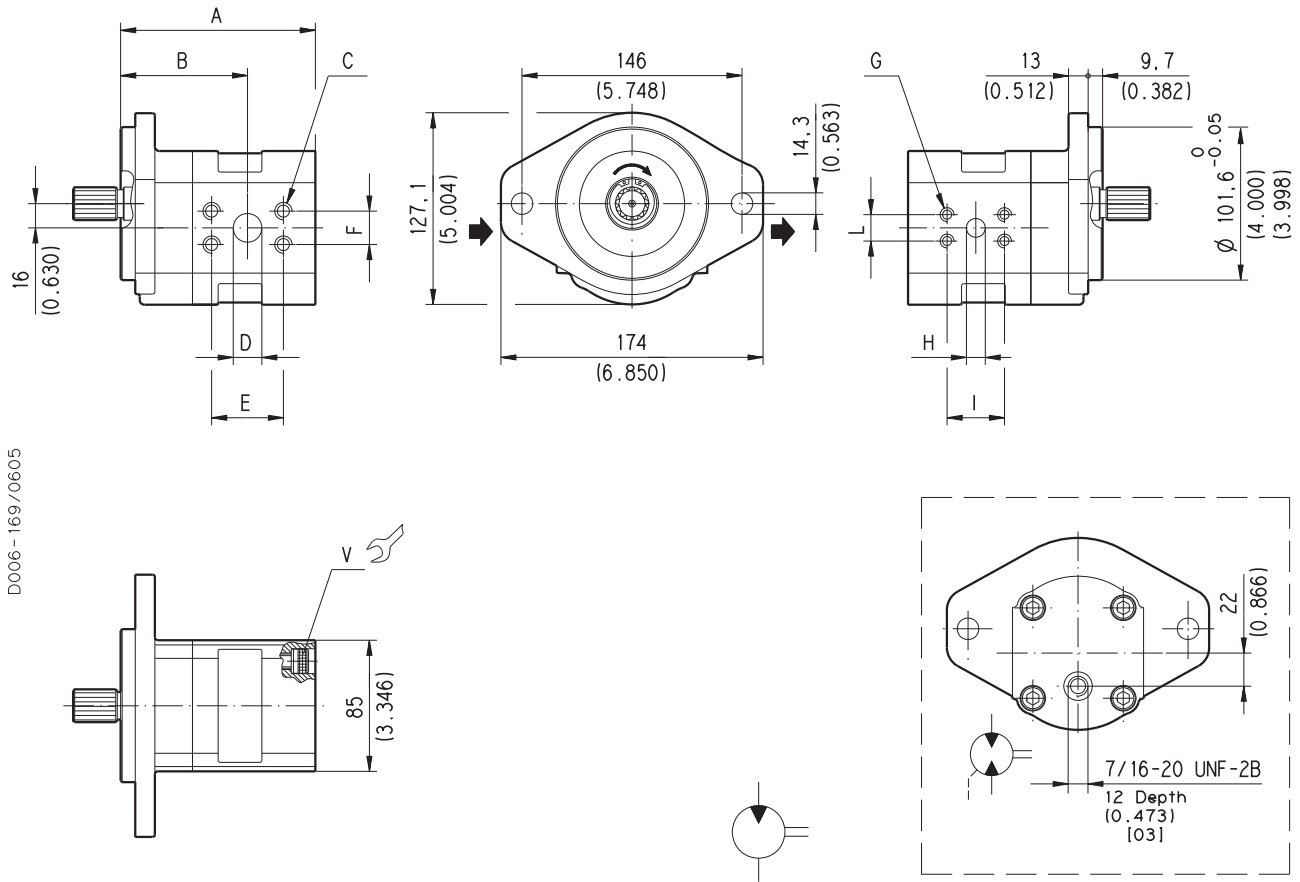
Side ports version (L) - To order see page 93 e 94

Motor type	A	B	C	Ports code	
	mm (in)		mm (in)	IN	OUT
KM 20•4	89,5 (3.524)	62 (2.441)	7/8-14 UNF-2B	OC	OC
KM 20•6,3	92 (3.622)	64,5 (2.539)			
KM 20•8	94,5 (3.720)	67 (2.638)			
KM 20•11,2	98 (3.858)	70,5 (2.776)			
KM 20•14	102 (4.016)	69 (2.717)	1-1/16-12 UN-2B		OD
KM 20•16	107,5 (4.232)	74,5 (2.933)			
KM 20•20	114 (4.488)	81 (3.189)			
KM 20•25	122 (4.803)	74 (2.913)			
KM 20•31,5	132 (5.197)	84 (3.307)			

02/06.2005

SAE FLANGED PORTS J518 - Standard pressure series 3000 PSI

Metric thread ISO 60° conforms to ISO/R 262



D006 - 169 / 0605

V Screws tightening torque Nm (lbf in)

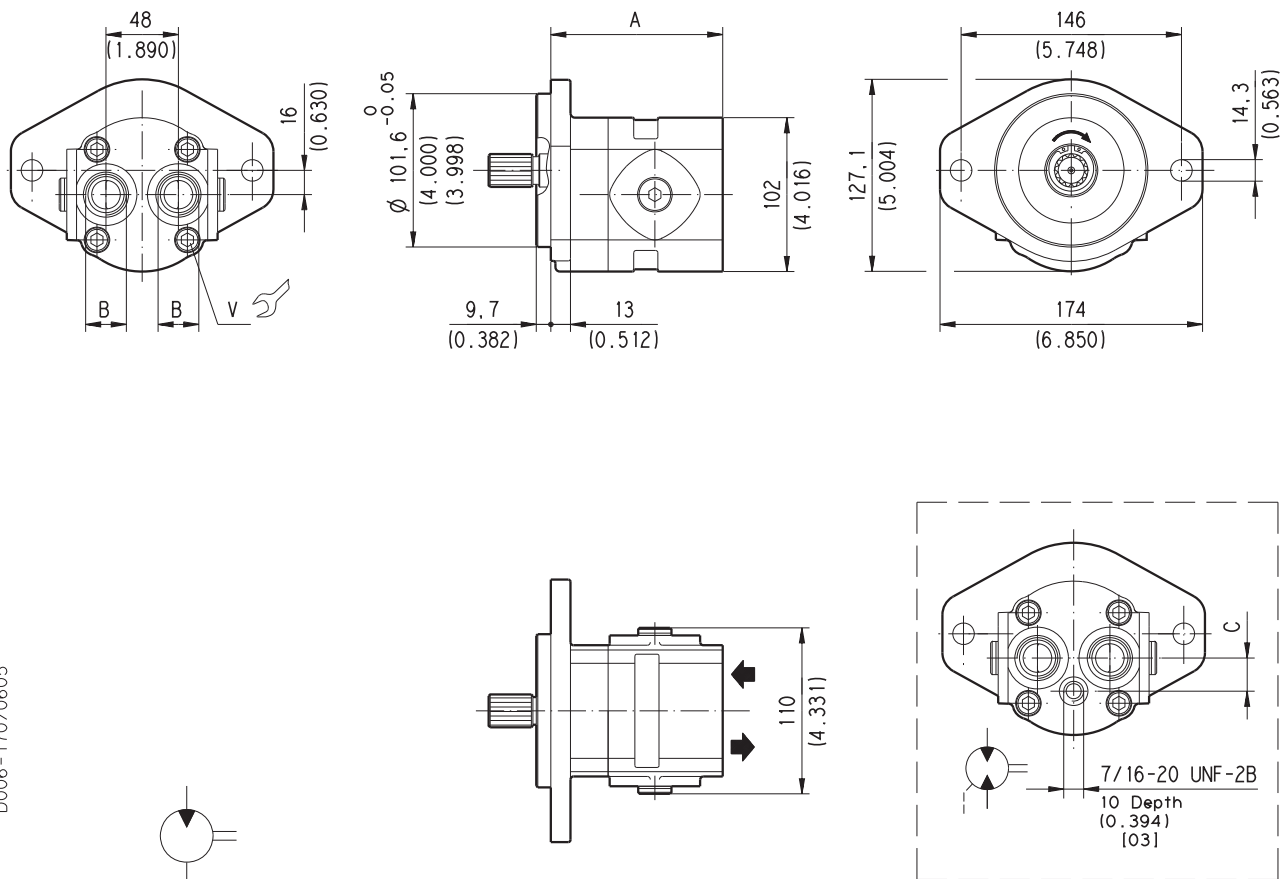
70 ±7 (558 ÷ 682)

Side ports version (L) - To order see page 93 e 94

Motor type	A	B	C	D	E	F	G	H	I	L	Ports code	
	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	IN	OUT
KM 20•4	101,5 (3.996)	62 (2.441)	M8 Depth 12 (0.472)	12,5 (0.492)	38,1 (1.500)	17,5 (0.689)	M8 Depth 12 (0.472)	12,5 (0.492)	38,1 (1.500)	17,5 (0.689)	MA	MA
KM 20•6,3	104 (4.094)	64,5 (2.539)										
KM 20•8	106,5 (4.193)	67 (2.638)										
KM 20•11,2	111 (4.370)	70,5 (2.776)	M10 Depth 12 (0.472)	19 (0.748)	47,6 (1.874)	22,2 (0.874)	M10 Depth 12 (0.472)	19 (0.748)	47,6 (1.874)	22,2 (0.874)	MA	MB
KM 20•14	116 (4.567)	69 (2.717)										
KM 20•16	119,5 (4.705)	74,5 (2.933)										
KM 20•20	126 (4.961)	81 (3.189)									MB	MC
KM 20•25	134 (5.276)	74 (2.913)										
KM 20•31,5	144 (5.669)	84 (3.307)										

SAE STRAIGHT THREAD PORTS J514

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



D006-170/0605

V Screws tightening torque Nm (lbf in)

 70 ± 7 (558 ÷ 682)

Rear ports version (P) - To order see page 93 e 94

Motor type	A	B	C	Ports code	
	mm (in)		mm (in)	IN	OUT
KM 20•4	86,5 (3.406)	7/8-14 UNF-2B	19 (0.748)	OC	OC
KM 20•6,3	89 (3.504)				
KM 20•8	91,5 (3.602)				
KM 20•11,2	95 (3.740)				
KM 20•14	114 (4.488)	1-1/16-12 UN-2B	22 (0.866)	OC	OD
KM 20•16	117,5 (4.623)				
KM 20•20	124 (4.882)				
KM 20•25	132 (5.197)				
KM 20•31,5	142 (5.591)				

02/06.2005

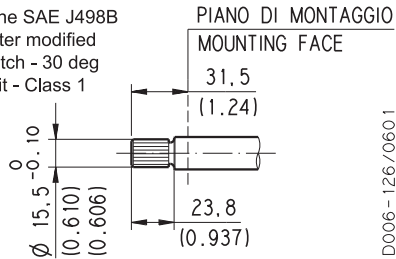
KAPPA 20 END DRIVE SHAFTS

SAE

SAE "A" SPLINE

03

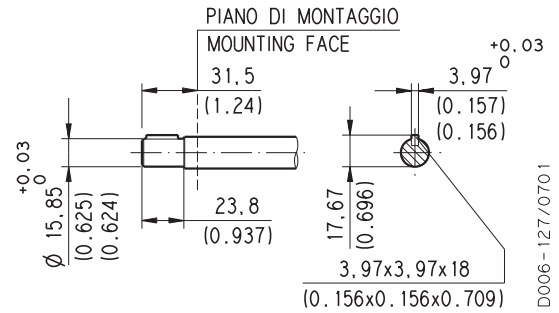
Ext. Involute Spline SAE J498B
with major diameter modified
9 teeth - 16/32 Pitch - 30 deg
Flat Root - Side fit - Class 1



MAX 885 lbf in (100 Nm)

SAE "A" STRAIGHT

31

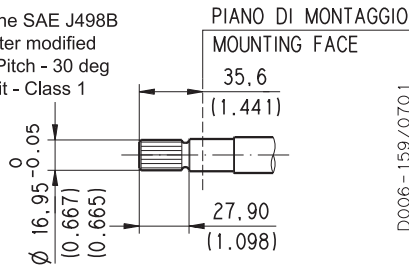


MAX 620 lbf in (70 Nm)

SAE SPLINE

01

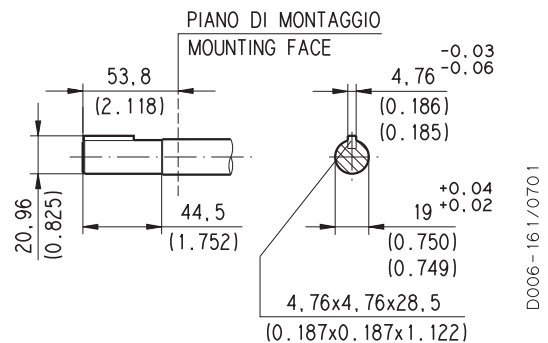
Ext. Involute Spline SAE J498B
with major diameter modified
10 teeth - 16/32 Pitch - 30 deg
Flat Root - Side fit - Class 1



MAX 1151 lbf in (130 Nm)

STRAIGHT

49

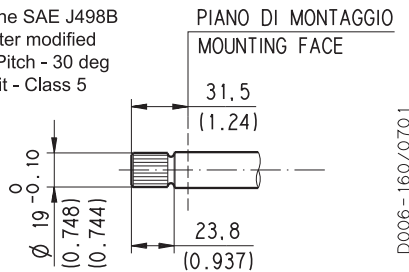


MAX 1239 lbf in (140 Nm)

SAE SPLINE

07

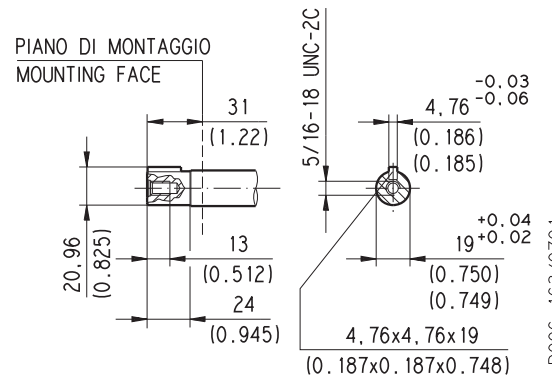
Ext. Involute Spline SAE J498B
with major diameter modified
11 teeth - 16/32 Pitch - 30 deg
Flat Root - Side fit - Class 5



MAX 1505 lbf in (170 Nm)

STRAIGHT

50

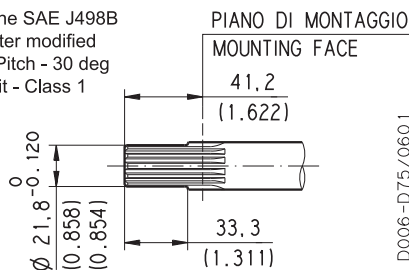


MAX 885 lbf in (100 Nm)

SAE "B" SPLINE

04

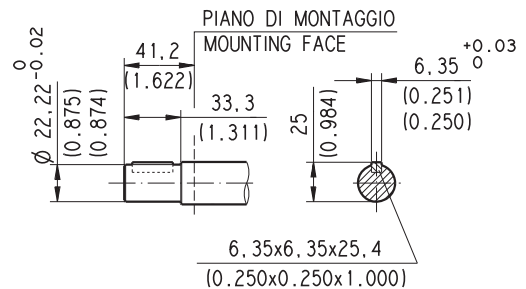
Ext. Involute Spline SAE J498B
with major diameter modified
13 teeth - 16/32 Pitch - 30 deg
Flat Root - Side fit - Class 1



MAX 2478 lbf in (280 Nm)

SAE "B" STRAIGHT

32



MAX 1770 lbf in (200 Nm)

Replaces: 01/03.2002

03/03.2006

HOW TO ORDER SINGLE MOTORS

1	2	3	4	5	6	7	8			
Motor type	Rotation	Version	–	Drive shaft	Mounting flange	–	Ports position	Ports IN/OUT	–	Seals
KM20•4	S	0	–	03	S1	–	L	OC/OC	–	N

1	Motor Type	CODE
in³/rev	(cm³/rev)	
0.30	4,95	KM 20•4
0.40	6,61	KM 20•6,3
0.50	8,26	KM 20•8
0.69	11,23	KM 20•11,2
0.89	14,53	KM 20•14
1.03	16,85	KM 20•16
1.29	21,14	KM 20•20
1.61	26,42	KM 20•25
2.01	33,03	KM 20•31,5

2	Rotation	CODE
Left		S
Right		D
Reversible		R
Reversible with internal drain		B

3	Version	CODE
	Without outboard bearing	0

4	Drive shaft	CODE
SAE "A" spline (9 teeth)	03	
SAE spline (10 teeth)	01	
SAE spline (11 teeth)	07	
SAE "B" spline (13 teeth)	04	
SAE "A" straight	31	
Straight	49	
Straight	50	
SAE "B" straight	32	

5	Mounting flange	CODE
SAE "A" 2 holes		S1
SAE "A" 2 holes (with o-ring seal)		S2
SAE "B" 2 holes (a)		S5

CODE	Ports position	6
L	Side	
P	Rear	

CODE	Ports IN/OUT	7
SAE STRAIGHT THREAD PORTS (ODT)		
Side	Rear	Motor type
OC/OC	OC/OC	KM 20•4
OC/OC	OC/OC	KM 20•6,3
OC/OC	OC/OC	KM 20•8
OC/OC	OC/OC	KM 20•11,2
OC/OD	OD/OD	KM 20•14
OC/OD	OD/OD	KM 20•16
OC/OD	OD/OD	KM 20•20
OC/OD	OD/OD	KM 20•25
OC/OD	OD/OD	KM 20•31,5
METRIC SAE SPLIT PORTS SAE J518 C		
MA/MA		KM 20•4
MA/MA		KM 20•6,3
MA/MA		KM 20•8
MA/MA		KM 20•11,2
MA/MB		KM 20•14
MA/MB		KM 20•16
MA/MB		KM 20•20
MB/MC		KM 20•25
MB/MC		KM 20•31,5

CODE	Seals (b)	8
N	Buna N (standard) - no code	
N-H	Buna with high back pressure shaft seals	
V	Viton	
N Bz	Buna N and Bronze thrust plates	
V Bz	Viton and Bronze thrust plates	

(a) Available only with 04 and 32 shaft

(b) Choose the seals according to the temperature shown on page 1

ORDER EXAMPLE

Standard motor **KM 20•4 S0 - 03 S1 - L OC/OC - N**Special version motor **KM 20•4 S0 - 04 S5 - L MA/MA - V Bz**

01/03.2002

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

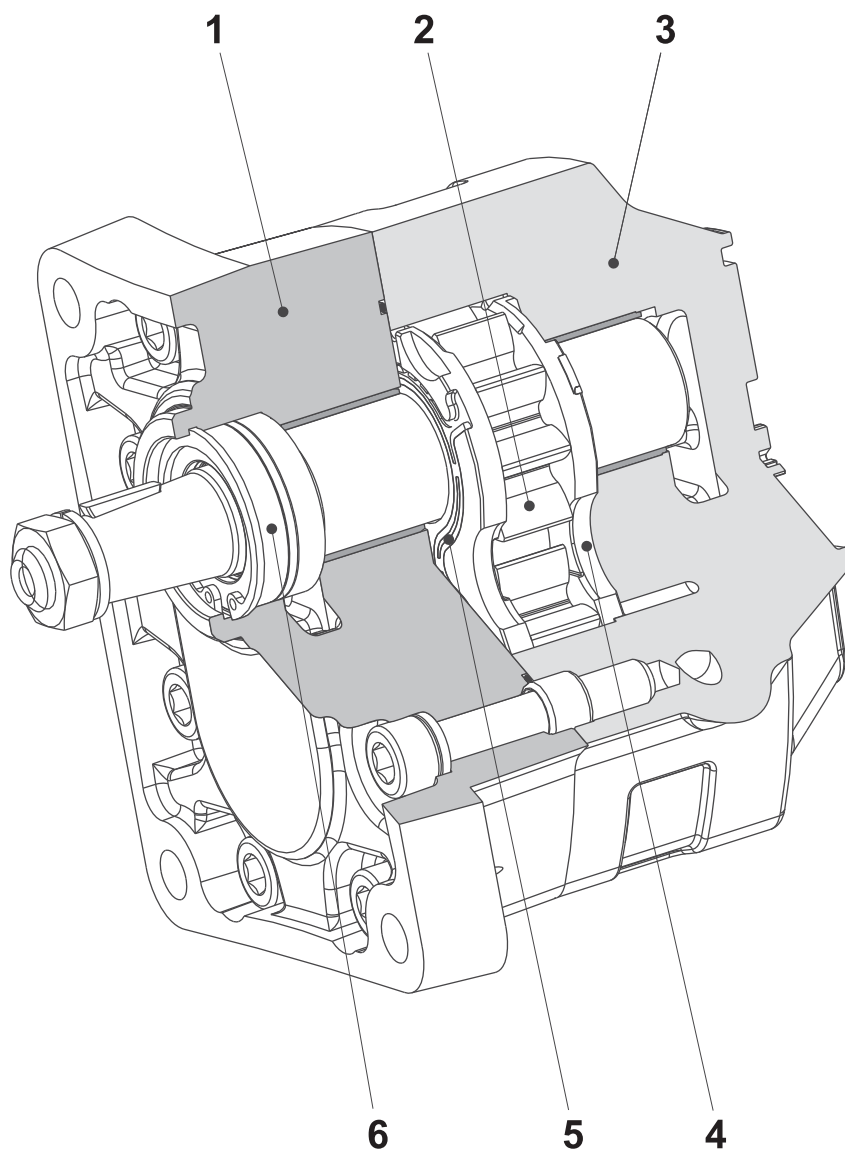
Check that all circuit connections are tight and that the entire system is completely clean. Insert the oil in the tank, using a filter. Bleed the circuit to assist in filling. Set the pressure relief valves to the lowest possible setting. Turn on the system for a few moments at minimum speed, then bleed 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.

02/06.2005

INSTRUCTIONS



- 1 _ Mounting flange
- 2 _ Gear
- 3 _ Body
- 4 _ Thrust plate
- 5 _ Seal
- 6 _ Shaft seal

01/03.2002

K 05 T A

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