

HYDRAULIC
GEAR
PUMPS

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Replaces: 01/08.2005

FEATURES

FORMULA designates a CASAPPA gear pump range specifically designed for applications requiring high pressure levels also at low speed; applications such as truck-mounted cranes, tripper trucks and lift-trucks etc. Special design features and an exclusive CASAPPA patent have perfected a sophisticated mechanism which makes FORMULA a highly reliable unit, proven by years of service in the specific field of use. The versatility offered by the range of Italian (triangular) European (ISO) and American (SAE) mounting flanges allows to the FORMULA pumps to be used in several applications.

DISPLACEMENTS

From 0.50 in³/rev (8,26 cm³/rev)
To 9.20 in³/rev (150,79 cm³/rev)

PRESSURE

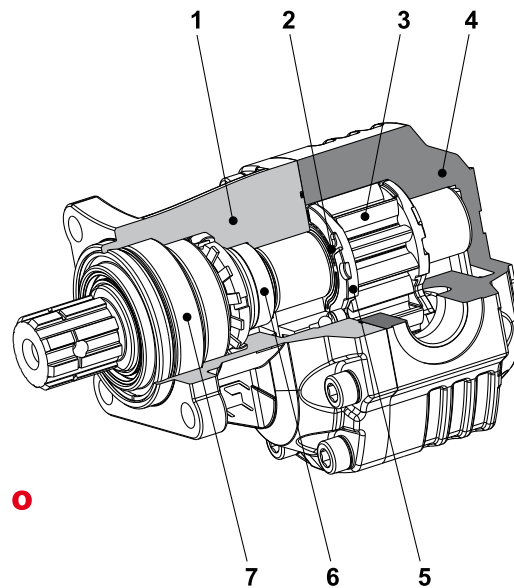
Max. continuous 4205 psi (290 bar)
Max. intermittent 4568 psi (315 bar)
Max. di peak 4713 psi (325 bar)

MAX. SPEED

Max. 3000 min⁻¹

- Two piece cast iron housing
- High performance at very low speed
- Ideal for truck applications

1	Mounting flange
2	Seals
3	Gear
4	Body
5	Thrust plates
6	Shaft
7	Outboard bearing

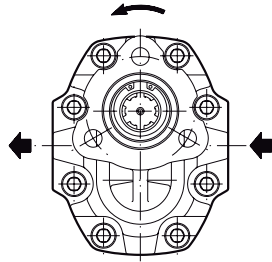


● 03/05.2013

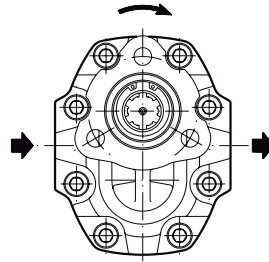
● **Modification from former edition.**

FEATURES

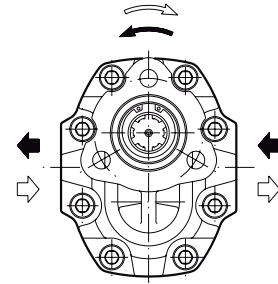
DEFINITION OF ROTATION DIRECTION LOOKING AT THE DRIVE SHAFT



ANT-CLOCK ROTATION

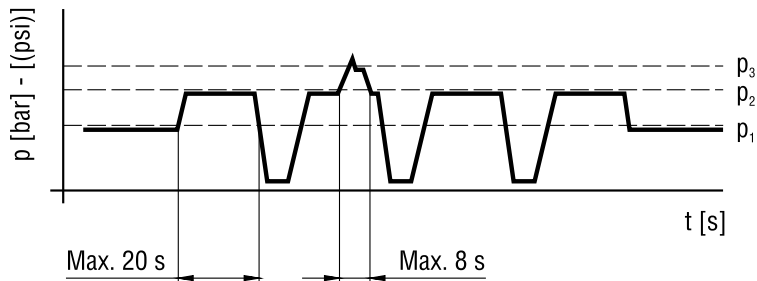


CLOCKWISE ROTATION



REVERSIBLE ROTATION

PRESSURE DEFINITION



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

GENERAL NOTES

Available with different inlet and outlet ports. Standard pumps are equipped with BUNA N (N) seals, for particular operating conditions (V) VITON seals and BUNA or VITON seals with bronze thrust plates (N Bz), (V Bz) are available. If you use fire resistant fluids specify the type of them at the order. For more information please consult our technical sales department.

01/08.2005

FORMULA 30 GENERAL DATA PUMPS
FP 30

Pump type	Displacement in ³ /rev (cm ³ /rev)	Max. pressure			Intermittent max. speed		Min. speed
		p ₁	p ₂	p ₃	At p ₂ press.	Without load	At p ₂ press.
		psi (bar)			min ⁻¹		
FP 30•17	1.05 (17,28)	4205 (290)	4568 (315)	4713 (325)	3000	4000	300
FP 30•27	1.63 (26,70)	4205 (290)	4568 (315)	4713 (325)	3000	4000	300
FP 30•34	2.11 (34,56)	4060 (280)	4350 (300)	4495 (310)	2800	4200	300
FP 30•38	2.40 (39,27)	4060 (280)	4350 (300)	4495 (310)	2800	3500	300
FP 30•43	2.68 (43,98)	3915 (270)	4205 (290)	4350 (300)	2500	3500	300
FP 30•51	3.16 (51,83)	3480 (240)	3770 (260)	4060 (280)	2500	3500	300
FP 30•61	3.74 (61,26)	3190 (220)	3480 (240)	3625 (250)	2000	3500	300
FP 30•73	4.50 (73,82)	2900 (200)	3190 (220)	3335 (230)	1800	3500	300
FP 30•82	4.98 (81,68)	2755 (190)	3045 (210)	3190 (220)	1800	3500	300
FP 30•100	6.16 (100,52)	2610 (180)	2900 (200)	3190 (220)	1800	3500	300
FP 30•125	7.67 (125,66)	2320 (160)	2610 (180)	2900 (200)	1800	3500	300

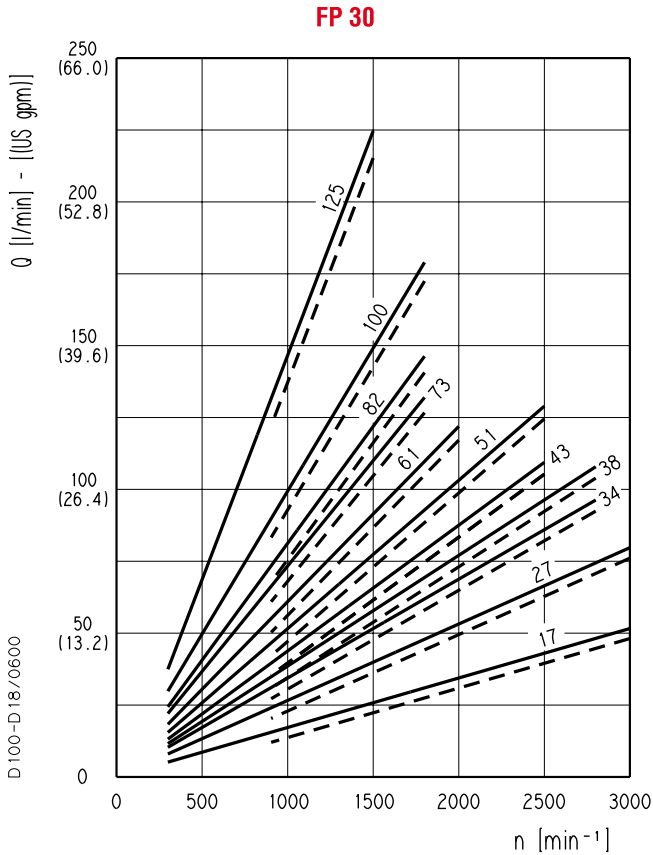
p₁= Max. continuous pressurep₂= Max. intermittent pressurep₃= Max. peak pressure

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.

T2 type double shaft flange allow the pumps to work in clockwise or anticlockwise rotation obtaining the reversible advantages and maintaining the general data of unidirectional pumps.

FORMULA 30 GEAR PUMPS PERFORMANCE CURVES

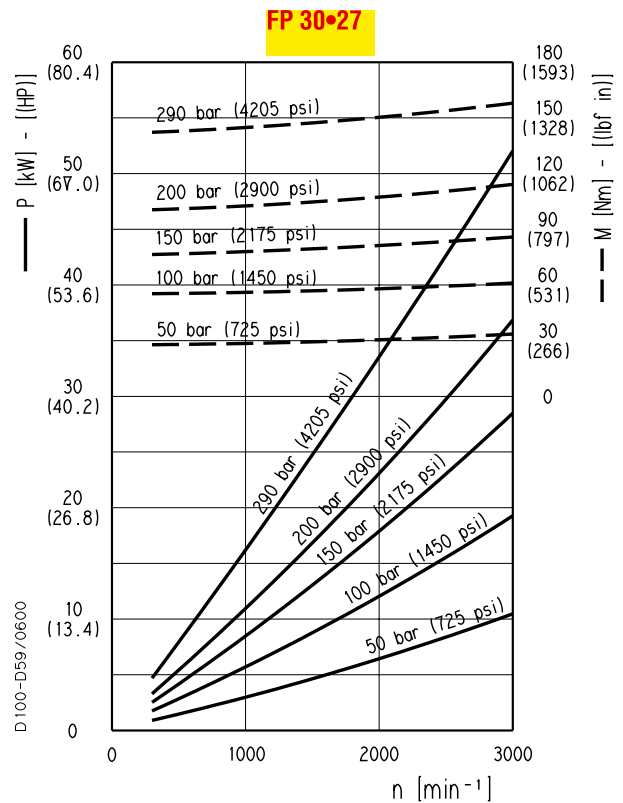
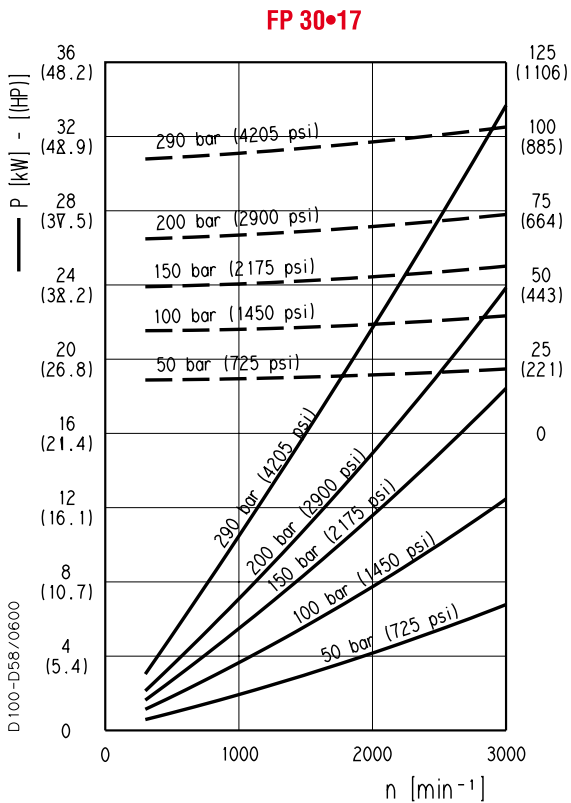
FP 30



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

○	FP 30•17	—	290 psi (20 bar)
		- -	4205 psi (290 bar)
○	FP 30•27	—	290 psi (20 bar)
		- -	4205 psi (290 bar)
○	FP 30•34	—	290 psi (20 bar)
		- -	4060 psi (280 bar)
○	FP 30•38	—	290 psi (20 bar)
		- -	4060 psi (280 bar)
○	FP 30•43	—	290 psi (20 bar)
		- -	3915 psi (270 bar)
○	FP 30•51	—	290 psi (20 bar)
		- -	3480 psi (240 bar)
○	FP 30•61	—	290 psi (20 bar)
		- -	3190 psi (220 bar)
○	FP 30•73	—	290 psi (20 bar)
		- -	2900 psi (200 bar)
○	FP 30•82	—	290 psi (20 bar)
		- -	2755 psi (190 bar)
○	FP 30•100	—	290 psi (20 bar)
		- -	2610 psi (180 bar)
○	FP 30•125	—	290 psi (20 bar)
		- -	2320 psi (160 bar)

Replaces: 01/08.2005



○ 03/05.2013

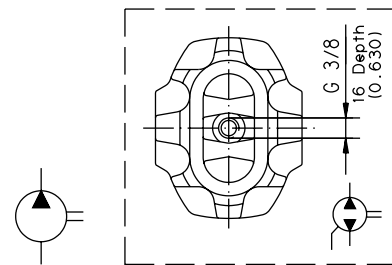
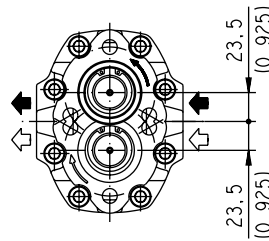
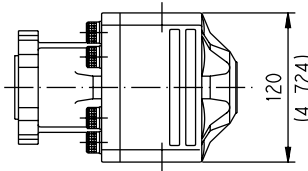
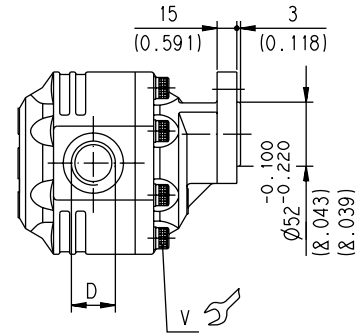
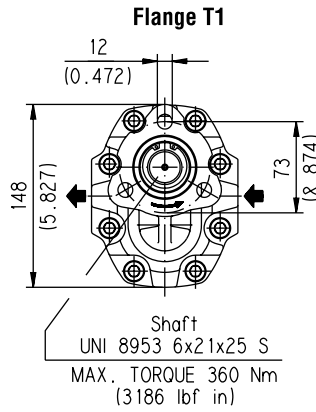
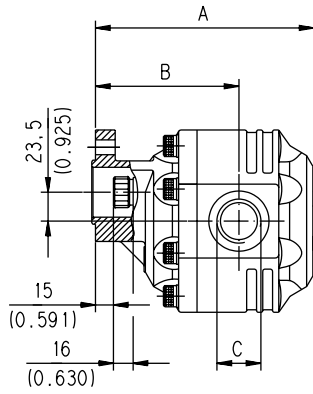
FORMULA 30

HYDRAULIC GEAR PUMPS ITALIAN STANDARD

19 T

GAS STRAIGHT THREAD PORTS

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



D 100 - 113 / 0805

Screw tightening torque Nm (lbf in)

V
70 ±7 (558 ÷ 682)

Pump type	A	B	C	D	Mass							
						mm (in)	mm (in)	IN	OUT	kg (lbs)		
FP 30•17	S D R B	0-19	T1	T2	L GD/GD-N	150,5 (5.925)	100,5 (3.957)	G 1/2	G 1/2	9 (19.85)		
FP 30•27												9,3 (20.51)
FP 30•34					L GE/GE-N	161,5 (6.358)	106,5 (4.193)	G 3/4	G 3/4	9,6 (21.17)		
FP 30•38										9,8 (21.61)		
FP 30•43										10 (22.05)		
FP 30•51										10,3 (22.71)		
FP 30•61										10,7 (23.59)		
FP 30•73										10,9 (24.03)		
FP 30•82										11 (24.26)		
FP 30•100 (●)										11,5 (25.36)		
FP 30•125 (●)						12,3 (27.12)						

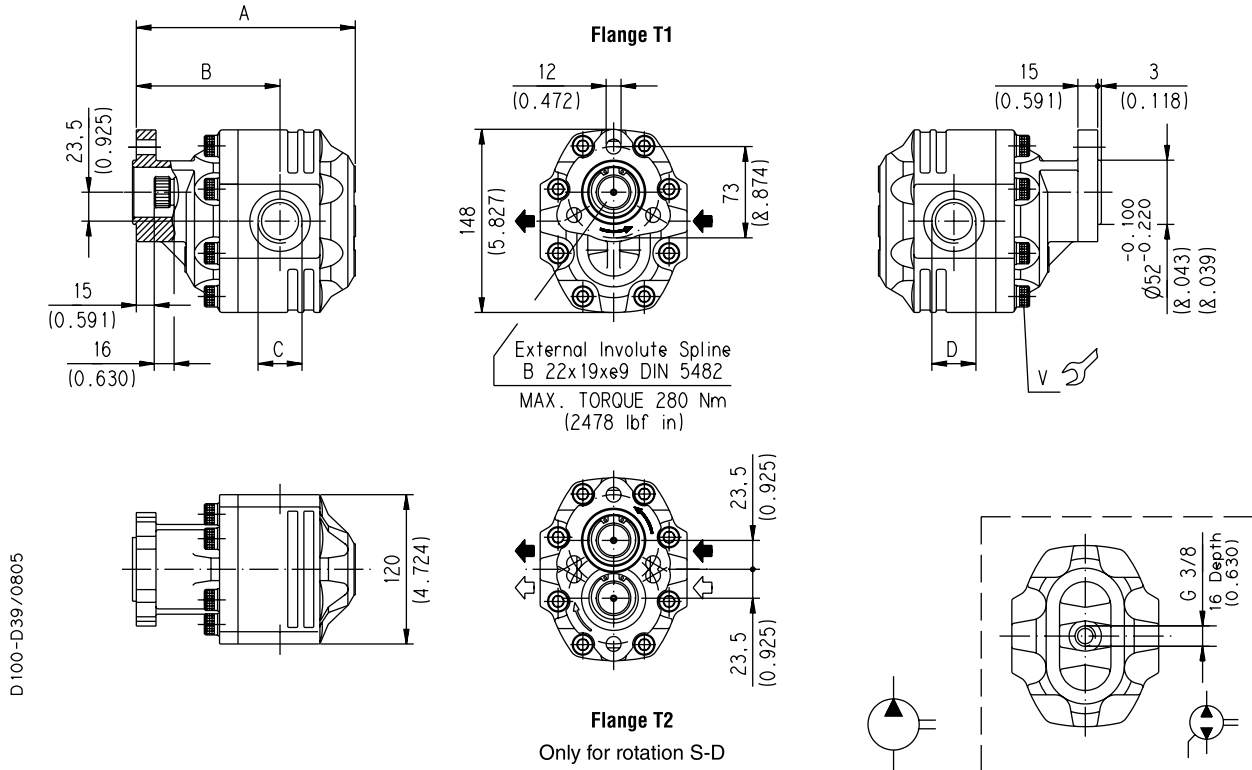
Rotation: S=left - D=right - R=reversible - B=reversible internal drain
How to order:

(●) Only available in T1 version.

FP 30•17 S0-19T1-L GD/GD-N

01/08.2005

GAS STRAIGHT THREAD PORTS
British standard pipe parallel (55°) conforms to UNI - ISO 228



Screw tightening torque Nm (lbf in)

V
70 ^{±7} (558 ÷ 682)

01/08.2005

	Pump type	A	B	C	D	Mass	
						kg (lbs)	
FP 30•61	S D R B 0-13	T1	L GF/GF-N	178,5 (7.028)	116,5 (4.587)	G 1	10,7 (23.59)
FP 30•82							

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

How to order:

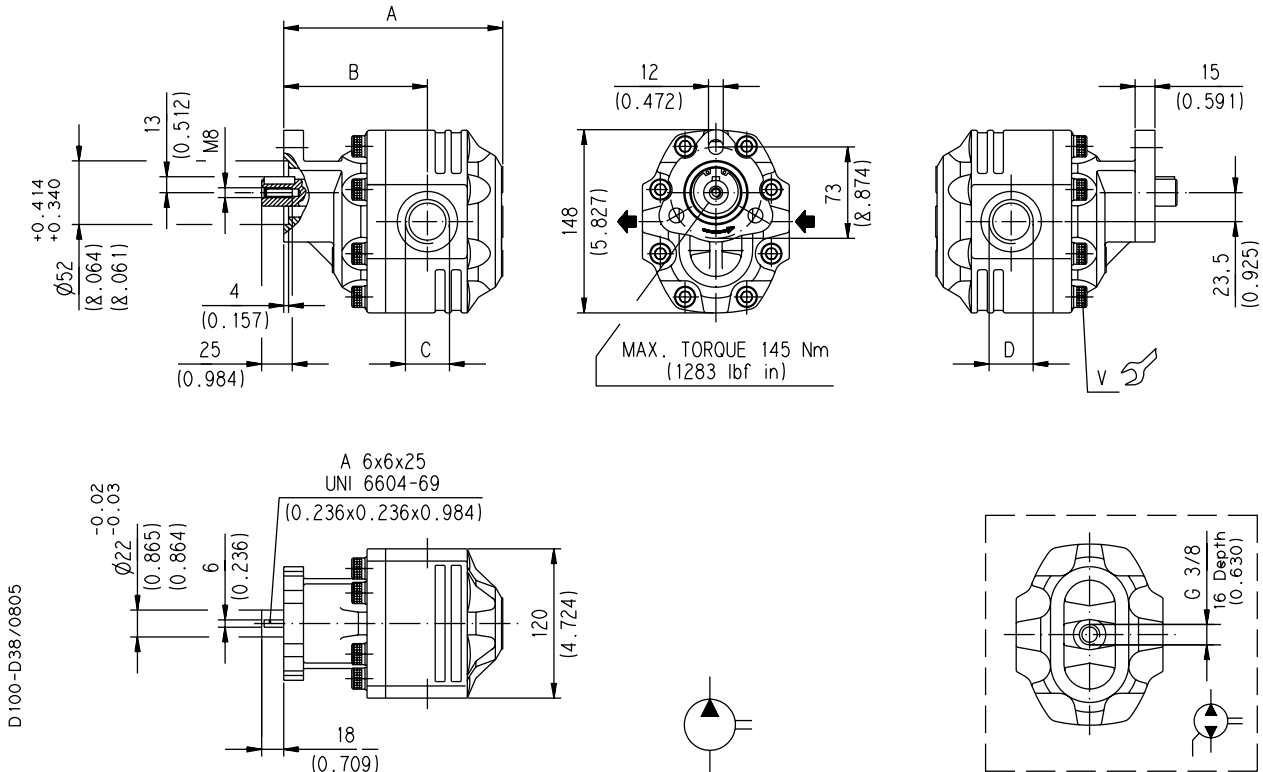
FP 30•61S0-13T1-L GF/GF-N

FORMULA 30

HYDRAULIC GEAR PUMPS ITALIAN STANDARD

43 TO

GAS STRAIGHT THREAD PORTS
British standard pipe parallel (55°) conforms to UNI - ISO 228



Screw tightening torque Nm (lbf in)

V
70 ^{±7} (558 ÷ 682)

Pump type			A	B	C	D	Mass
			mm (in)	mm (in)	IN	OUT	kg (lbs)
FP 30•61	S D R	0-43-T0-L GF/GF-N	178,5 (7.028)	116,5 (4.587)	G 1		10,7 (23.59)
FP 30•82			0-43-T0-L GG/GF-N	191,5 (7.539)	122,5 (4.823)	G 1 1/4	G 1

Rotation: S=left - D=right - R=reversible - B=reversible internal drain
How to order:

FP 30•61S0-43T0-L GF/GF-N

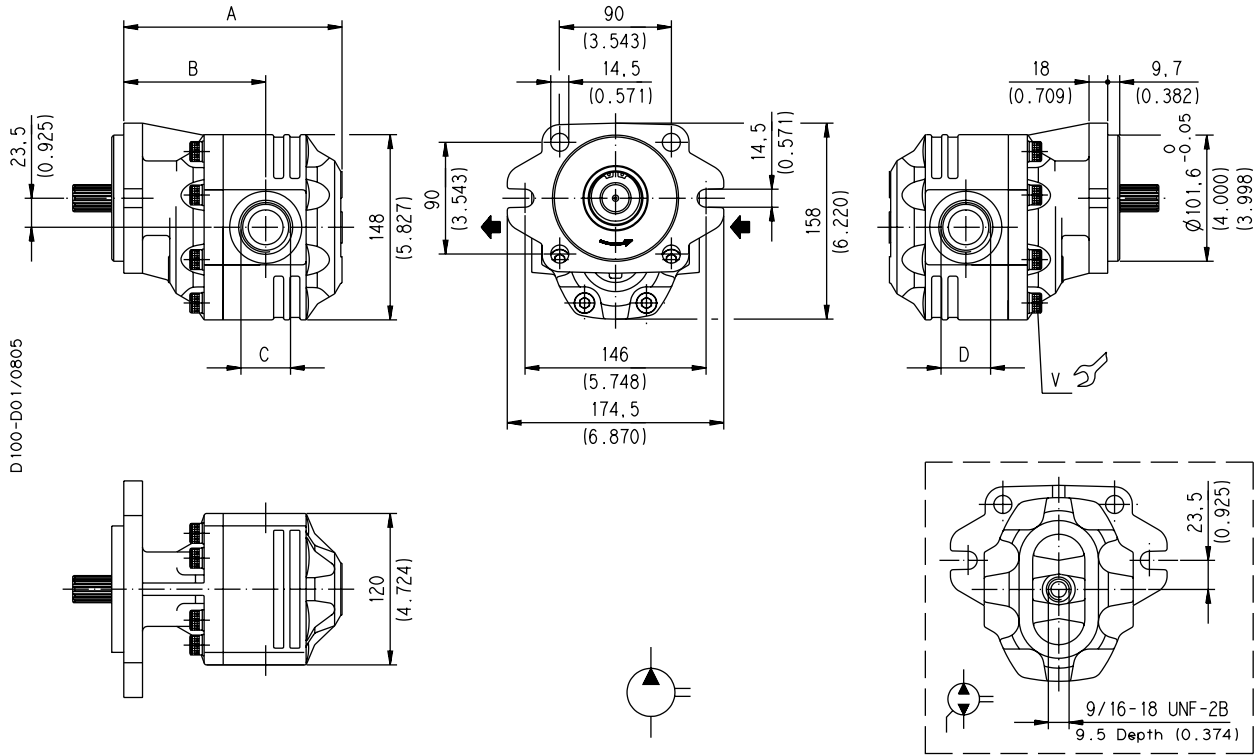
01/08.2005

FORMULA 30

HYDRAULIC GEAR PUMPS SAE STANDARD

SAE

SAE STRAIGHT THREAD PORTS J514
American straight thread UNC-UNF 60° conforms to ANSI B 1.1.



To order see page 28 - 30

Screw tightening torque Nm (lbf in)

V

70 ±7 (558 ÷ 682)

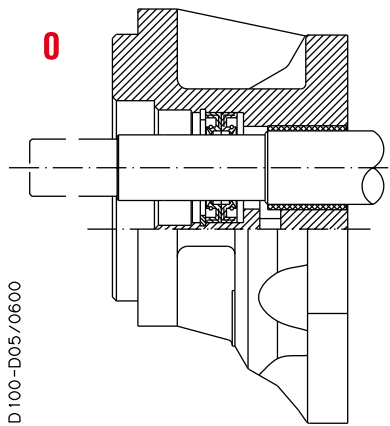
01/08.2005

Pump type	A	B	C	D	Ports code		Mass
	mm (in)	mm (in)	IN	OUT	IN	OUT	kg (lbs)
FP 30•17 (●)	148 (5.827)	98 (3.858)	3/4-16 UNF-2B	3/4-16 UNF-2B	OB	OB	10,4 (22.93)
FP 30•27	154 (6.063)	104 (4.094)					10,8 (23.81)
FP 30•34	159 (6.260)	104 (4.094)	1-1/16-12 UN-2B		OD	OD	11,3 (24.92)
FP 30•38	162 (6.378)	107 (4.213)		1-1/16-12 UN-2B			11,5 (25.36)
FP 30•43	165 (6.496)	110 (4.331)					11,8 (26.02)
FP 30•51	170 (6.693)	108 (4.252)	1-5/16-12 UN-2B		OF	OE	12 (26.46)
FP 30•61	176 (6.929)	114 (4.488)		1-3/16-12 UN-2B			13 (28.67)
FP 30•73	184 (7.244)	115 (4.528)	1-5/8-12 UN-2B	1-5/16-12 UN-2B	OG	OF	13,4 (29.55)
FP 30•82	189 (7.441)	120 (4.724)					13,9 (30.65)

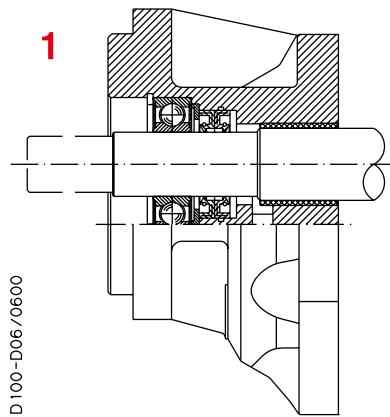
(●) Only available in version 2.

FORMULA 30 SAE VERSION

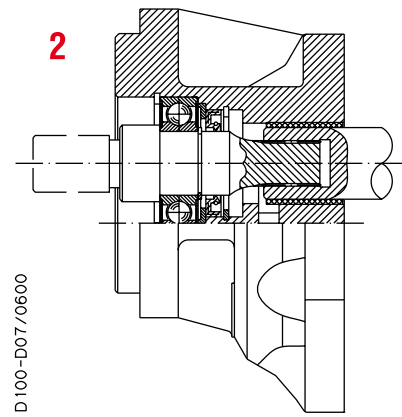
SAE



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



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



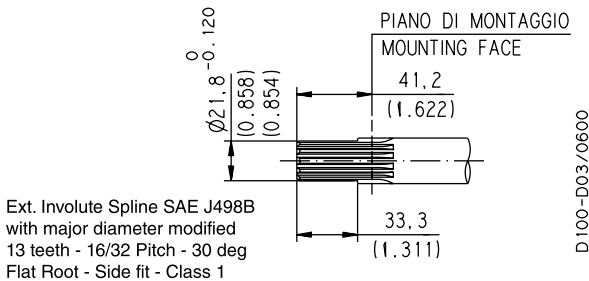
Special version with independent shaft for applications with low radial load and without axial load on the drive shaft.

FORMULA 30 SAE END DRIVE SHAFTS

SAE

SAE "B" SPLINE

04

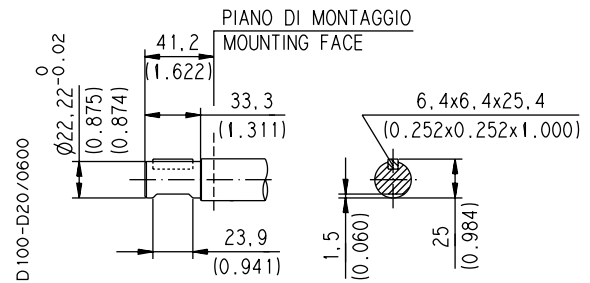


Ext. Involute Spline SAE J498B with major diameter modified 13 teeth - 16/32 Pitch - 30 deg Flat Root - Side fit - Class 1

MAX 330 Nm (2921 lbf in) ◆

SAE "B" STRAIGHT

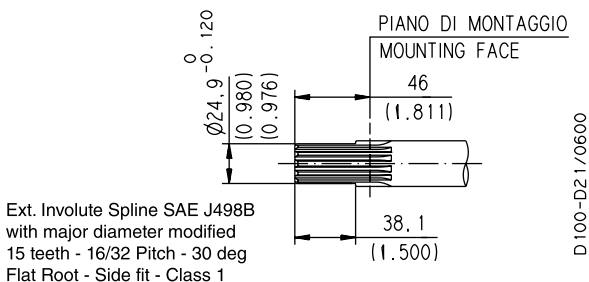
32



MAX 200 Nm (1770 lbf in) ◆

SAE "BB" SPLINE

05

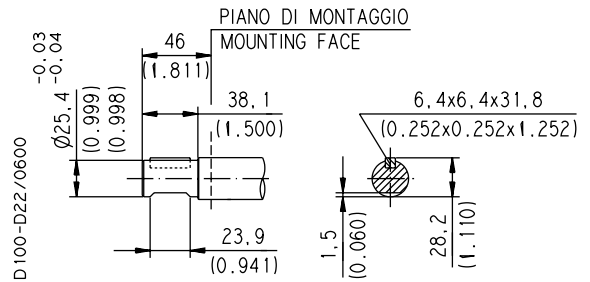


Ext. Involute Spline SAE J498B with major diameter modified 15 teeth - 16/32 Pitch - 30 deg Flat Root - Side fit - Class 1

MAX 500 Nm (4426 lbf in) ◆

SAE "BB" STRAIGHT

33

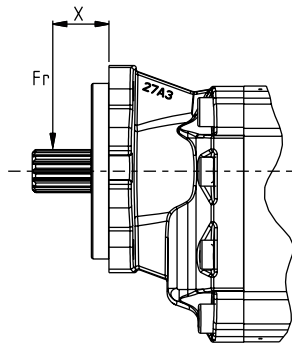


MAX 280 Nm (2478 lbf in) ◆

◆ For "2" version whichever end shaft, the max. torque applicable is $M= 170 \text{ Nm (1505 lbf in)}$

FORMULA 30 PERMISSIBLE RADIAL LOADING

SAE



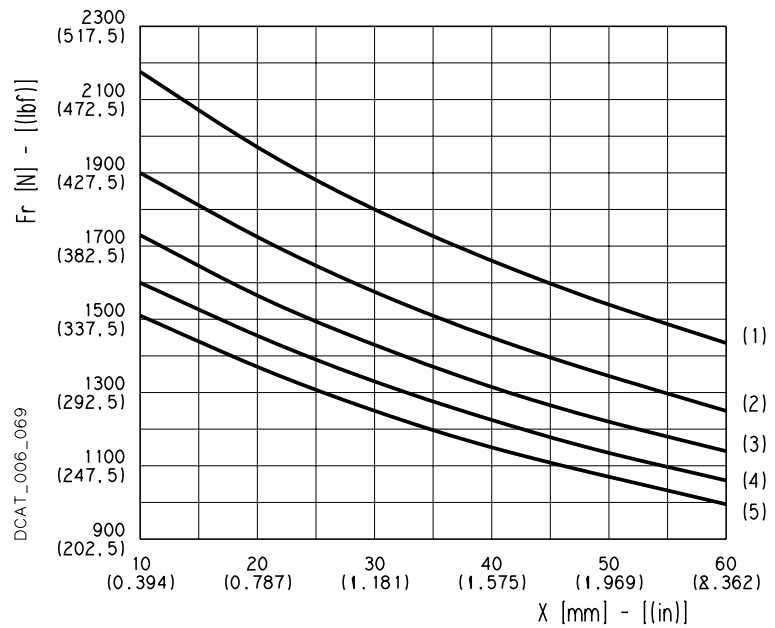
X = Distance of the radial load result from the mounting flange.

Fatigue life (hours) $L_h = 1000$ [h]

Each curve has been obtained at

- (1) 1000 min⁻¹ (4) 2500 min⁻¹
- (2) 1500 min⁻¹ (5) 3000 min⁻¹
- (3) 2000 min⁻¹

VERSION
1-2



01/08.2005

HOW TO ORDER SINGLE PUMPS

1	2	3	4	5	6	7	8
FP30•17	S	0	- 04	S3	- L	OB/OB	- N

1	Pump type	Code
	1.05 (17,28) in ³ /rev (cm ³ /rev)	FP 30-17
	1.63 (26,70) in ³ /rev (cm ³ /rev)	FP 30-27
	2.11 (34,56) in ³ /rev (cm ³ /rev)	FP 30-34
	2.40 (39,27) in ³ /rev (cm ³ /rev)	FP 30-38
	2.68 (43,98) in ³ /rev (cm ³ /rev)	FP 30-43
	3.16 (51,83) in ³ /rev (cm ³ /rev)	FP 30-51
	3.74 (61,26) in ³ /rev (cm ³ /rev)	FP 30-61
	4.50 (73,82) in ³ /rev (cm ³ /rev)	FP 30-73
	4.98 (81,68) in ³ /rev (cm ³ /rev)	FP 30-82

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

3	Version	Code
	Without outboard bearing	0
	With outboard bearing	1
	With outboard bearing and indep. shaft	2

4	Drive shaft	Code
	SAE "B" spline (13 teeth)	04
	SAE "B" straight	32
	SAE "BB" spline (15 teeth)	05
	SAE "BB" straight	33

5	Mounting flange	Code
	SAE "B" 2-4 holes	S3

Code	Ports position	6
	L Side	

Code	PORTS IN/OUT	7
SAE STRAIGHT THREAD PORTS (ODT)		
Side	Pump type	
OB/OB	FP 30•17	
OD/OD	FP 30•27	
OD/OD	FP 30•34	
OD/OD	FP 30•38	
OF/OD	FP 30•43	
OF/OE	FP 30•51	
OF/OE	FP 30•61	
OG/OF	FP 30•73	
OG/OF	FP 30•82	

Code	Seals (b)	8
N	Buna N (standard)	
V	Viton	
N Bz	Buna N and Bronze thrust plates	
V Bz	Viton and Bronze thrust plates	

(b) Choose the seals according to the temperature shown on page 3

ORDER EXAMPLE

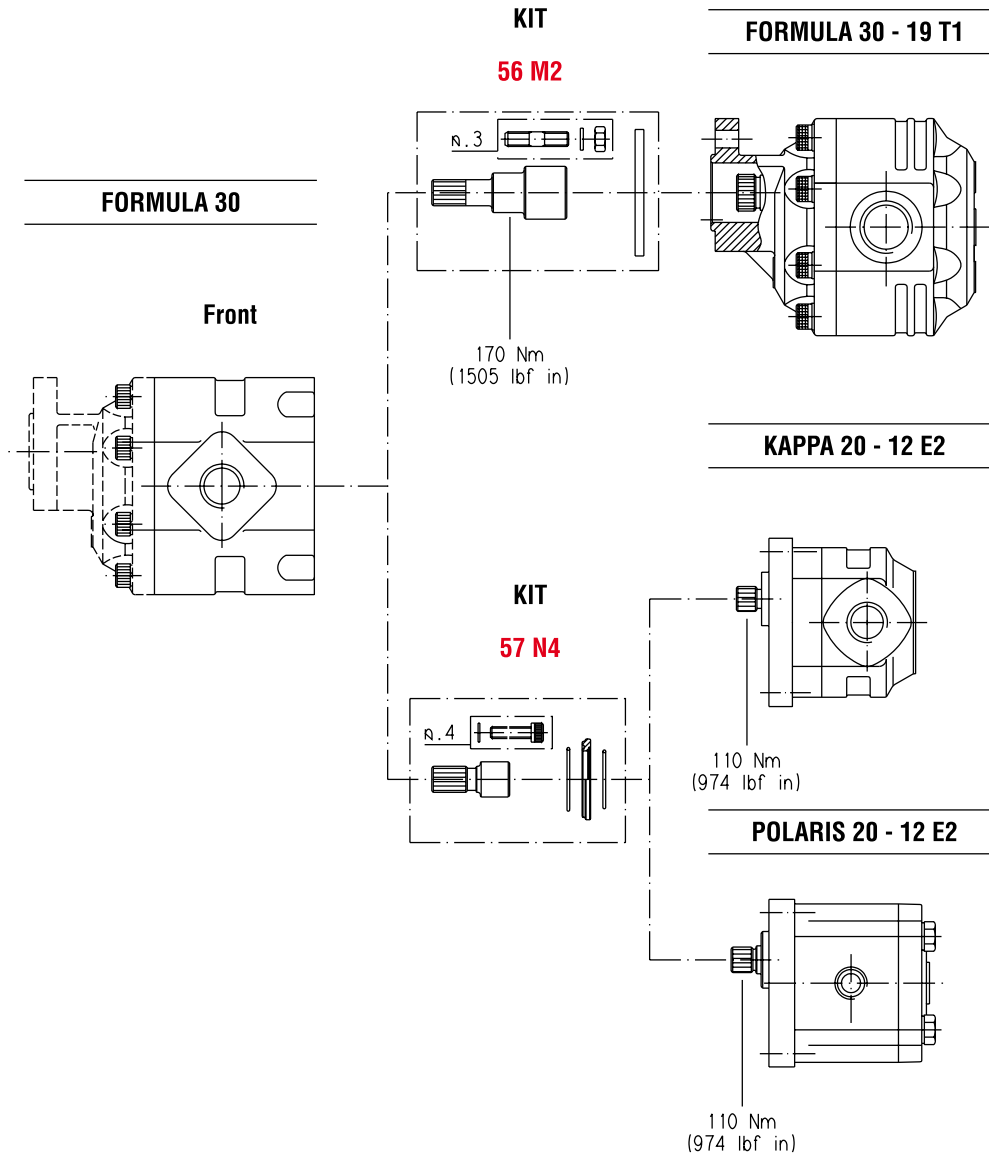
Standard pump **FP30.27S0-04S3-LOD/OD-N**

Special version pump **FP30.17S2-32S3-LOB/OB-V Bz**

FORMULA 30

MULTIPLE PUMPS SPECIAL COMBINATION

Special front section arranged to fit single pumps.
To order please consult our technical sales department.



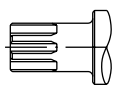
D 100 - 110 / 1003

01/08.2005

FORMULA 30 END DRIVE SHAFT

ITALIAN STANDARD

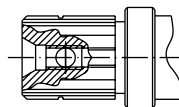
19



MAX 360 Nm (3186 lbf in)

ISO STANDARD

16



MAX 300 Nm (2655 lbf in)

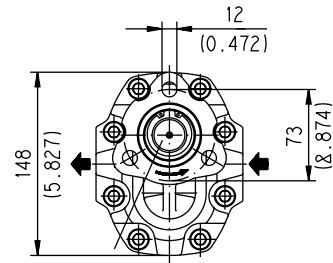
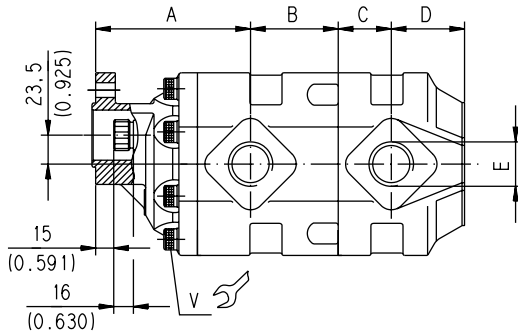
FORMULA 30

HYDRAULIC GEAR PUMPS ITALIAN STANDARD

19 T

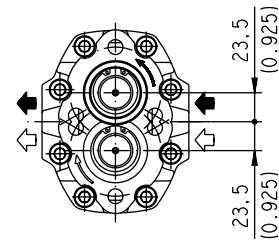
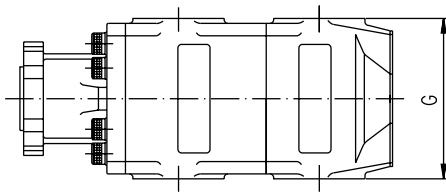
ISO (Z0) and SAE (S3) version available (◆)

GAS STRAIGHT THREAD PORTS
British standard pipe parallel (55°) conforms to UNI - ISO 228

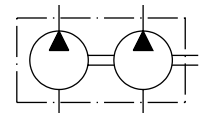
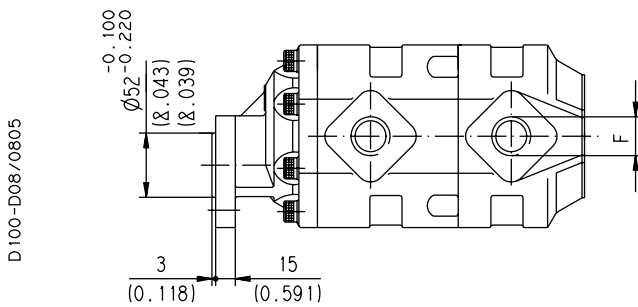


Shaft
UNI 8953 6x21x26 S
MAX. TORQUE 360 Nm
(3186 lbf in)

Flange T1



Flange T2



Screw tightening torque Nm (lbf in)

V

70 ±7 (558 ÷ 682)

01/08.2005

FORMULA 30
HYDRAULIC GEAR PUMPS ITALIAN STANDARD
19 T

(◆) Dimension "A"
 ISO and SAE version

mm (in)

A (Z0) A (19 T) + 18 (0.709)

A (S3) A (19 T) - 2,5 (0.098)

Pump type	A	B	C	D	E	F	G	Ports code	
	(19 T)							IN	OUT
	mm (in)	mm (in)	mm (in)	mm (in)	IN	OUT	mm (in)	IN	OUT
FP 30•17	111,5 (4.390)	63 (2.480)	29 (1.142)	49 (1.929)					
FP 30•27	117,5 (4.626)	63 (2.480)	35 (1.378)	49 (1.929)					
FP 30•34	122,5 (4.823)	63(2.480)	40 (1.575)	49 (1.929)	G 3/4	G 3/4	130 (5.118)	GE	GE
FP 30•38	125,5 (4.941)	63(2.480)	43 (1.693)	49 (1.929)					
FP 30•43	128,5 (5.059)	63 (2.480)	46 (1.811)	49 (1.929)					
FP 30•51	125,5 (4.941)	71 (2.795)	43 (1.693)	57 (2.244)					
FP 30•61	132,5 (5.217)	70 (2.756)	50 (1.969)	56 (2.205)	G 1			GF	
FP 30•73	140,5 (5.531)	70 (2.756)	58 (2.283)	56 (2.205)		G 1	135 (5.315)		GF
FP 30•82 (●)	145,5 (5.728)	70 (2.756)	---	---	G 1 1/4			GG	

(●) Available only for front and intermediate section.

The lenght 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	(1) Rotation	-	(2) Seals
FP30•17	/	30•17	/	30•17	S	-	

(1) S= Left - D= Right

(2) See page 3 (for Buna N seals no code)

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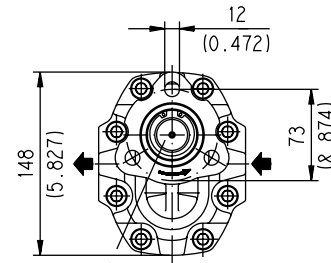
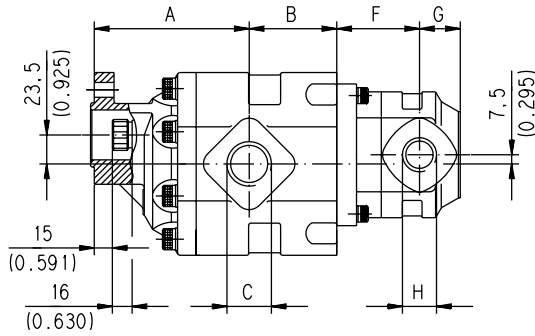
FORMULA 30

HYDRAULIC GEAR PUMPS ITALIAN STANDARD

19 T+KP20

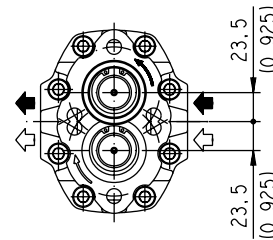
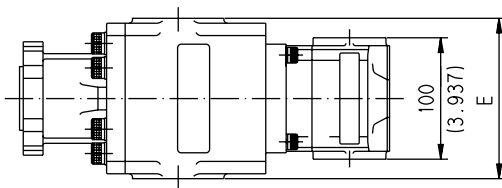
ISO (Z0) and SAE (S3) version available (◆)

GAS STRAIGHT THREAD PORTS
British standard pipe parallel (55°) conforms to UNI - ISO 228

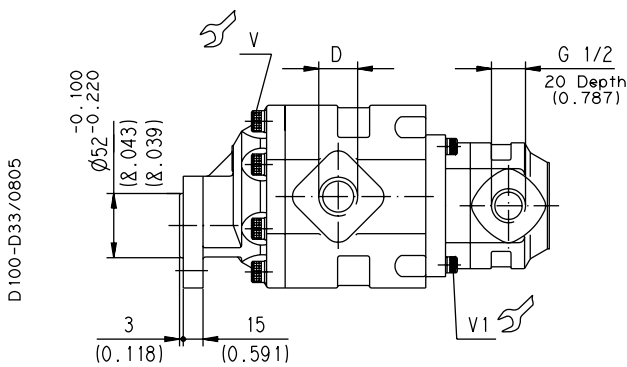


Shaft
UNI 8953 6x21x25 S
MAX. TORQUE 360 Nm
(3186 lbf in)

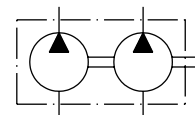
Flange T1



Flange T2



D100-D33/0805



01/08.2005

Screw tightening torque Nm (lbf in)

V	V1
70 ^{±7} (558 ÷ 682)	70 ^{±7} (558 ÷ 682)

FORMULA 30
HYDRAULIC GEAR PUMPS ITALIAN STANDARD
19 T+KP20

(◆) Dimension "A"
 ISO and SAE version

mm (in)

A (Z0)	A (19 T) + 18 (0.709)
A (S3)	A (19 T) - 2,5 (0.098)

Pump type	A (19 T)	B	C	D	E	Ports code	
	mm (in)	mm (in)	IN	OUT	mm (in)	IN	OUT
FP 30•17	111,5 (4.390)	63 (2.480)					
FP 30•27	117,5 (4.626)	63 (2.480)					
FP 30•34	122,5 (4.823)	63 (2.480)	G 3/4	G 3/4	130 (5.118)	GE	GE
FP 30•38	125,5 (4.941)	63 (2.480)					
FP 30•43	128,5 (5.059)	63 (2.480)					
FP 30•51	125,5 (4.941)	71 (2.795)					
FP 30•61	132,5 (5.217)	70 (2.756)	G 1	G 1		GF	GF
FP 30•73	140,5 (5.531)	70 (2.756)			135 (5.315)		
FP 30•82	145,5 (5.728)	70 (2.756)	G 1 1/4			GG	

Pump type	F	G	H	Ports code	
	mm (in)	mm (in)	IN	IN	OUT
KP 20•4	60 (2.362)	27,5 (1.083)			
KP 20•6,3	62,5 (2.460)	27,5 (1.083)	G 1/2	GD	
KP 20•8	65 (2.559)	27,5 (1.083)	Depth 20 (0.787)		
KP 20•11,2	68,5 (2.697)	27,5 (1.083)			
KP 20•14	67 (2.638)	33 (1.299)			GD
KP 20•16	72,5 (2.854)	33 (1.299)			
KP 20•20	79 (3.110)	33 (1.299)	G 3/4	GE	
KP 20•25	72 (2.835)	48 (1.890)	Depth 22 (0.866)		
KP 20•31,5	82 (3.228)	48 (1.890)			

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How to order

Front pump/	/	Rear pump	-	Ports position	Ports IN/OUT	(1) Rotation	(2) Seals		
FP30•17	-	67	/	KP20•4	-	L	GD/GD	S	-

(1) S= Left - D= Right

(2) See page 3 (for Buna N seals no code)

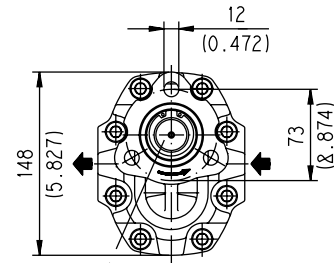
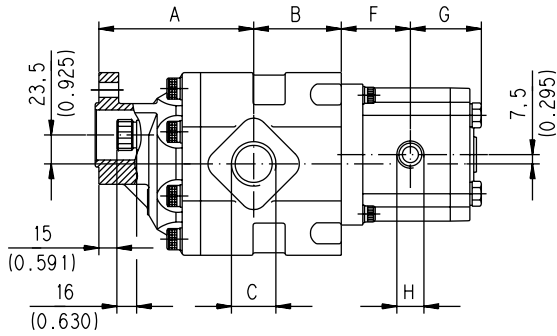
FORMULA 30

HYDRAULIC GEAR PUMPS ITALIAN STANDARD

19 T+PL20

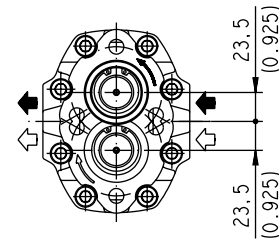
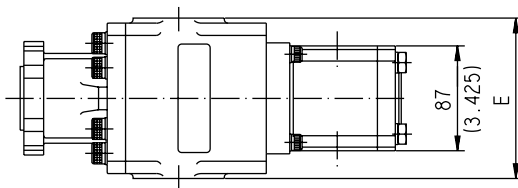
ISO (Z0) and SAE (S3) version available (◆)

GAS STRAIGHT THREAD PORTS
British standard pipe parallel (55°) conforms to UNI - ISO 228

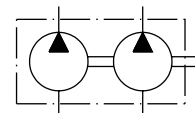
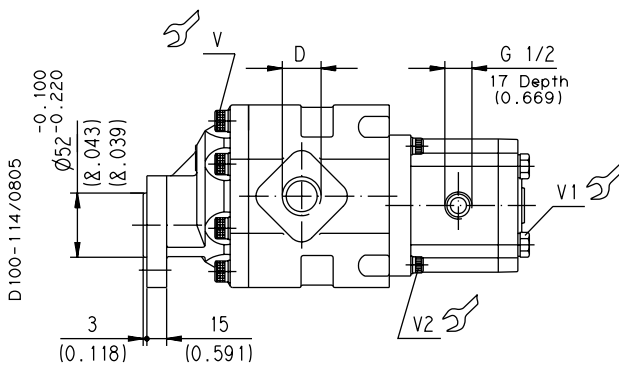


Shaft
UNI 8953 6x21x25 S
MAX. TORQUE 360 Nm
(3186 lbf in)

Flange T1



Flange T2



Screw tightening torque Nm (lbf in)

V	V1 (●)	V2
70 ±7 (558 ÷ 682)	70 ±7 (558 ÷ 682)	70 ±7 (558 ÷ 682)

(●) With cast iron front cover

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