

## FEATURES

### GUARANTEE

CASAPPA provides a two years guarantee for FORMULA pumps on industrial vehicles if used in accordance with the applications and conditions indicated in this technical catalogue.

### WARNING !

Failure or improper use of the product can cause damage at the same product or system.

Make sure that this is the last issue.

Construction	External gear type pumps
Mounting	ISO (ZF), ITALIAN (triangular) and SAE flanges
Line connections	Screw
Direction of rotation (looking on drive shaft)	Anti-clock (S) - clockwise (D) - reversible (R or B)
Inlet pressure range for pumps	0,7 ÷ 3 bar (abs.)
Fluid temperature range	From -25 to +110 °C
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 12 to 100 mm <sup>2</sup> /s (cSt) recommended Up to 750 mm <sup>2</sup> /s (cSt) permitted
Filtering requirement	See table (2)

Type	Fluid composition	Max pressure [bar]	Max speed [min <sup>-1</sup> ]	Temperature [°C]	Seals
ISO/DIN	Mineral oil based hydraulic fluid to ISO/DIN	See page 3 - 4 - 5	See page 3 - 4 - 5	-25 ÷ +80	N
				-25 ÷ +110	V
HFA	Oil emulsion in water 5 ÷ 15% of oil	50	1500	2 ÷ 55	N
HFB	Water emulsion in oil 40 % of water	120	1500	2 ÷ 60	
HFC	Water - glycol	70	1500	-20 ÷ +60	N Bz
HFD	Phosphate ester (•)	150	1500	-10 ÷ +80	V Bz

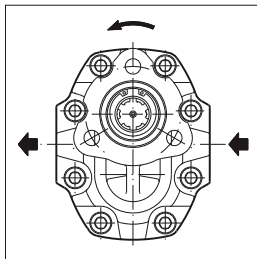
(•) For skydrol phosphate esters please consult our technical sales department.

Working pressure	Δp > 200 bar	Δp < 200 bar
Contamination class NAS 1638	8	10
Contamination class ISO 4406	19/17/14	21/19/16
Achieved with filter β <sub>x</sub> ≥ 75	10 μm	25 μm

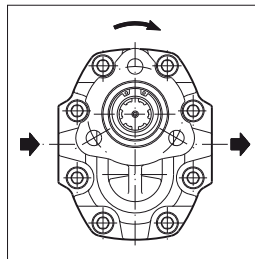
Casappa recommends to use its own production filters:



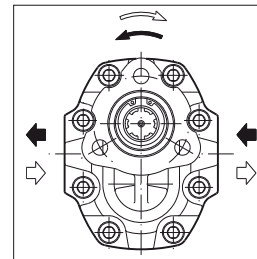
**DEFINITION OF ROTATION DIRECTION LOOKING ON THE DRIVE SHAFT**



**Anti-clock rotation**

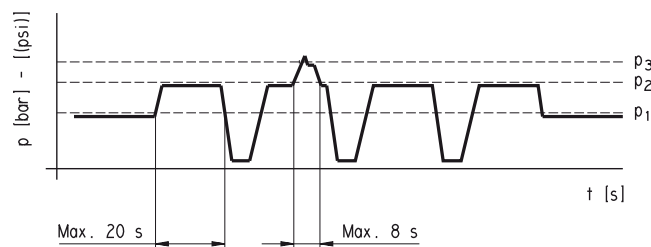


**Clockwise rotation**



**Reversible rotation**

**PRESSURE DEFINITION**




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

**GENERAL NOTES**

Available with different inlet and outlet ports. Standard pumps are equipped with BUNA N (N) seals for temperature up to 80 °C, 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.

**FORMULA 20 GENERAL DATA PUMPS**

**FP 20**

Pump type	Displacement	Max. pressure			Intermittent max. speed		Min. speed
		p <sub>1</sub>	p <sub>2</sub>	p <sub>3</sub>	At p <sub>2</sub> press.	Without load	At p <sub>2</sub> press.
	cm <sup>3</sup> /rev 	bar			min <sup>-1</sup>		
<b>FP 20•8 (•)</b>	8,26	280	310	325	2000	4200	300
<b>FP 20•11,2 (•)</b>	11,23	280	310	325	2000	4200	300
<b>FP 20•16</b>	16,85	280	310	325	2000	4200	300
<b>FP 20•20</b>	21,14	260	280	290	2000	4200	300
<b>FP 20•25</b>	26,42	220	250	260	2000	4200	300
<b>FP 20•31,5</b>	33,03	190	210	220	1800	4000	300
<b>FP 20•36 (•)</b>	35,94	170	190	200	1800	4000	300
<b>FP 20•40</b>	39,64	160	180	190	1800	4000	300

(•): Only available in ISO 16 Z0 and ITALIAN 13 T1 version.


p<sub>1</sub>= Max. continuous pressure      p<sub>2</sub>= Max. intermittent pressure      p<sub>3</sub>= Max. peak pressure

The values in the table refer to unidirectional and reversible pumps.

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**FORMULA 30 GENERAL DATA PUMPS**

**FP 30**

Pump type	Displacement	Max. pressure			Intermittent max. speed		Min. speed
		p <sub>1</sub>	p <sub>2</sub>	p <sub>3</sub>	At p <sub>2</sub> press.	Without load	At p <sub>2</sub> press.
	cm <sup>3</sup> /rev 	bar			min <sup>-1</sup>		
<b>FP 30•17</b>	17,28	290	315	325	3000	4000	300
<b>FP 30•27</b>	26,70	290	315	325	3000	4000	300
<b>FP 30•34</b>	34,56	280	300	310	2800	4200	300
<b>FP 30•38</b>	39,27	280	300	310	2800	3500	300
<b>FP 30•43</b>	43,98	270	290	300	2500	3500	300
<b>FP 30•51</b>	51,83	240	260	280	2500	3500	300
<b>FP 30•61</b>	61,26	220	240	250	2000	3500	300
<b>FP 30•73</b>	73,82	200	220	230	1800	3500	300
<b>FP 30•82</b>	81,68	190	210	220	1800	3500	300
<b>FP 30•100</b>	100,52	180	200	220	1800	3500	300
<b>FP 30•125</b>	125,66	160	180	200	1800	3500	300

p<sub>1</sub>= Max. continuous pressure      p<sub>2</sub>= Max. intermittent pressure      p<sub>3</sub>= 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.

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**FORMULA 40 GENERAL DATA PUMPS**

**FP 40**

Pump type	Displacement	Max. pressure			Intermittent max. speed		Min. speed
		p <sub>1</sub>	p <sub>2</sub>	p <sub>3</sub>	At p <sub>2</sub> press.	Without load	At p <sub>2</sub> press.
	cm <sup>3</sup> /rev 	bar			min <sup>-1</sup>		
<b>FP 40-63</b>	61,43	290	315	325	2700	4200	300
<b>FP 40-73</b>	72,60	280	300	315	2700	4200	300
<b>FP 40-87</b>	86,56	260	280	290	2700	4000	300
<b>FP 40-109</b>	108,90	240	260	280	2700	4000	300
<b>FP 40-133</b>	134,03	220	250	260	2500	4000	300
<b>FP 40-151</b>	150,79	180	210	220	2500	4000	300

p<sub>1</sub>= Max. continuous pressure      p<sub>2</sub>= Max. intermittent pressure      p<sub>3</sub>= 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.

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**DESIGN CALCULATIONS FOR PUMPS**

<b>Q</b>	[l/min]	Delivery
<b>M</b>	[Nm]	Torque
<b>P</b>	[kW]	Power
<b>V</b>	[cm <sup>3</sup> /rev]	Displacement
<b>n</b>	[min <sup>-1</sup> ]	Speed
<b>Δp</b>	[bar]	Pressure
$\eta_v = \eta_v(V, \Delta p, n) \quad (\approx 0,98)$		Volumetric efficiency
$\eta_m = \eta_m(V, \Delta p, n) \quad (\approx 0,90)$		Mechanical efficiency
$\eta_t = \eta_v \cdot \eta_m \quad (\approx 0,88)$		Overall efficiency

$$Q = V \cdot \eta_v \cdot n \cdot 10^{-3} \quad [\text{l/min}]$$

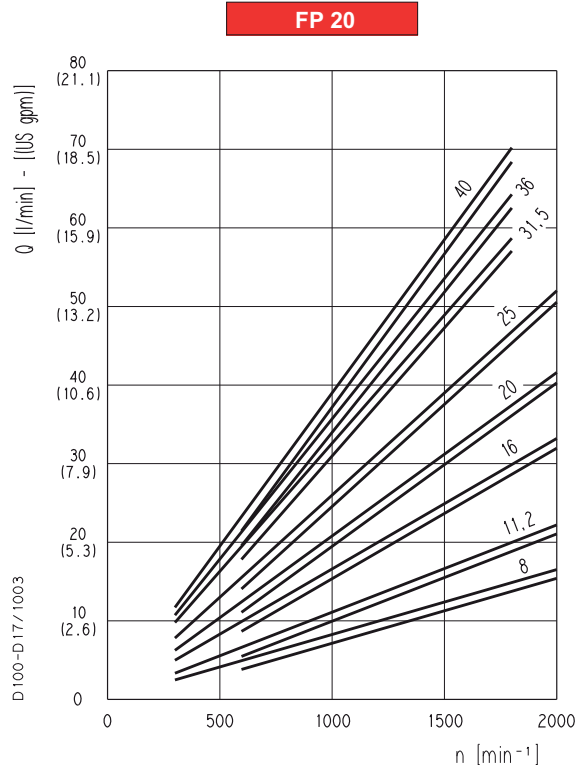
$$M = \frac{\Delta p \cdot V}{62,83 \cdot \eta_m} \quad [\text{Nm}]$$

$$P = \frac{\Delta p \cdot V \cdot n}{600 \cdot 1000 \cdot \eta_t} \quad [\text{kW}]$$

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

## FORMULA 20 GEAR PUMPS PERFORMANCE CURVES

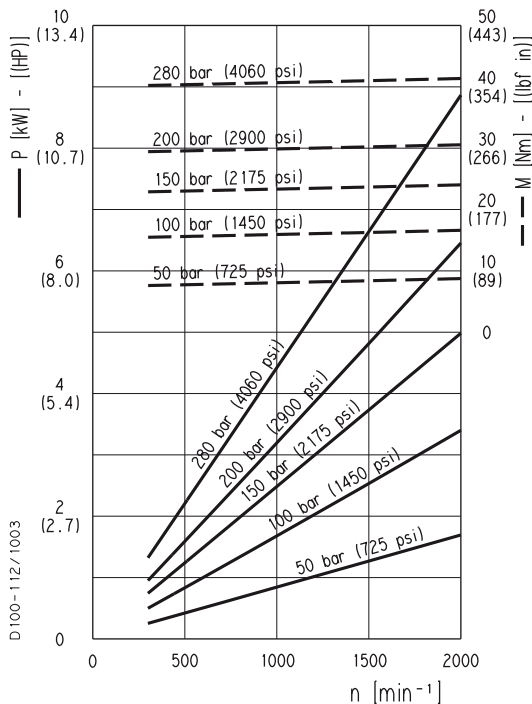
## FP 20



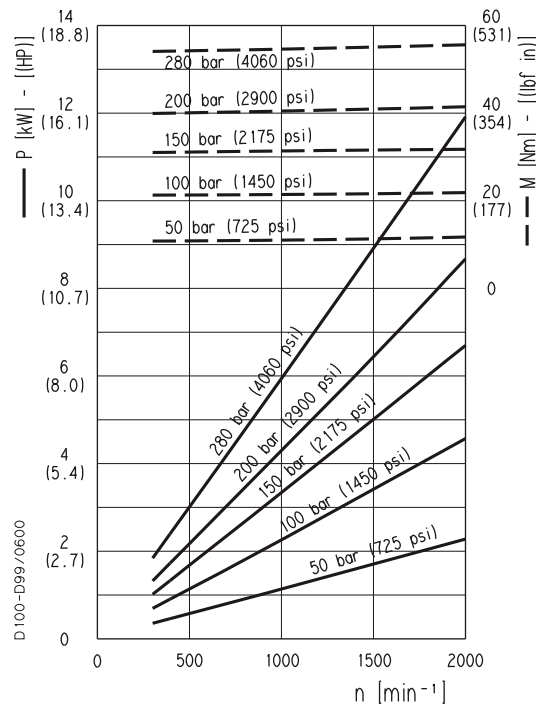
Each curve has been obtained at 50°C, using oil with viscosity 36 mm<sup>2</sup>/s at 40°C and at these pressures.

- FP 20•8 . . . . . 20-280 bar
- FP 20•11,2 . . . . . 20-280 bar
- FP 20•16 . . . . . 20-280 bar
- FP 20•20 . . . . . 20-260 bar
- FP 20•25 . . . . . 20-220 bar
- FP 20•31,5 . . . . . 20-190 bar
- FP 20•36 . . . . . 20-170 bar
- FP 20•40 . . . . . 20-160 bar

### FP 20•8

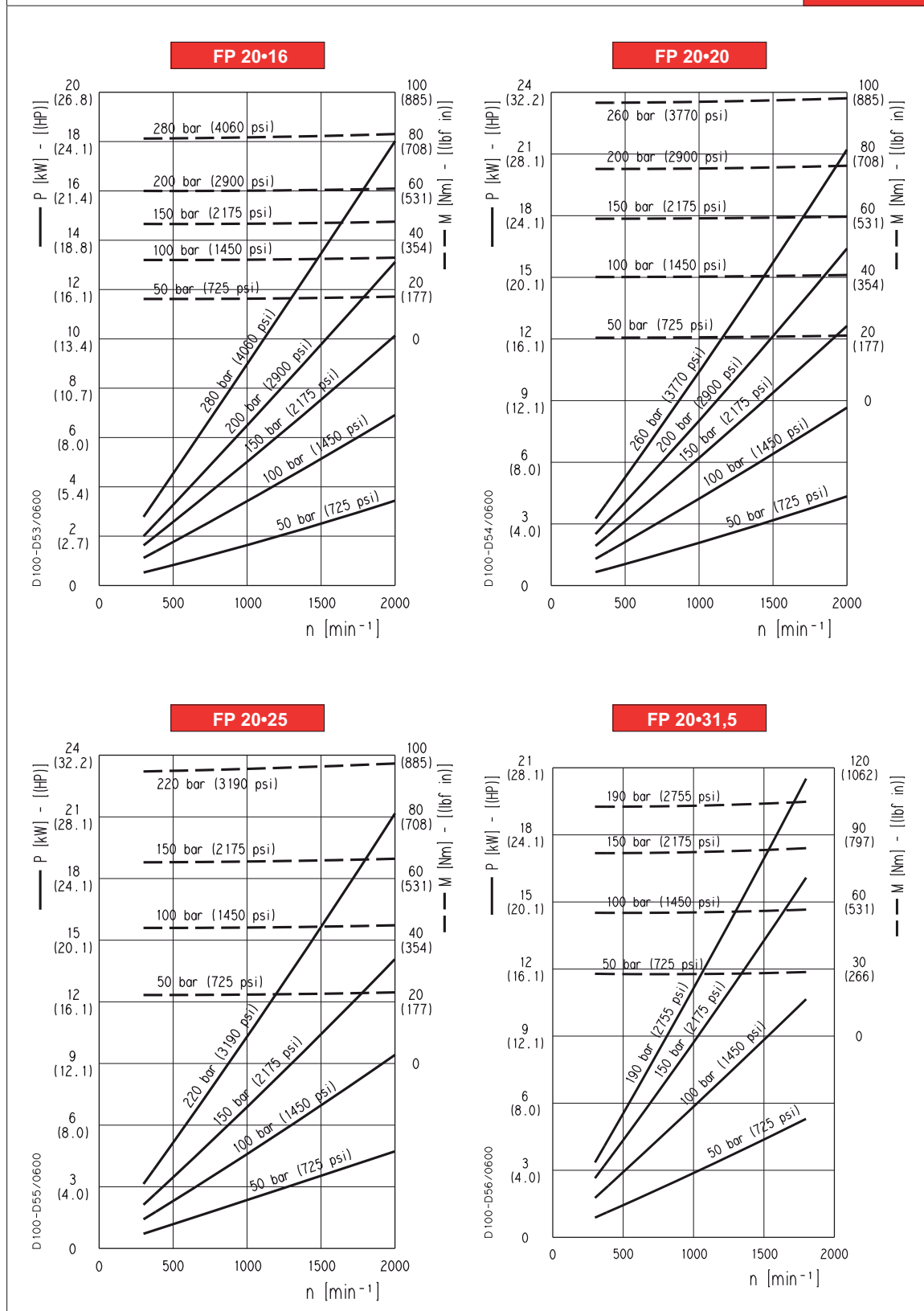


### FP 20•11,2



## FORMULA 20 GEAR PUMPS PERFORMANCE CURVES

FP 20



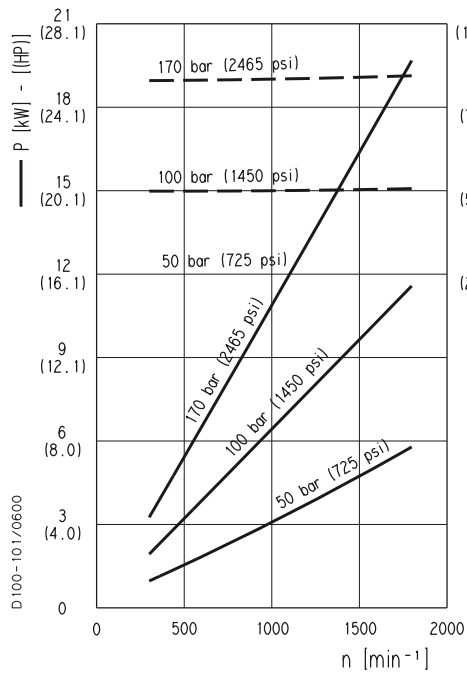
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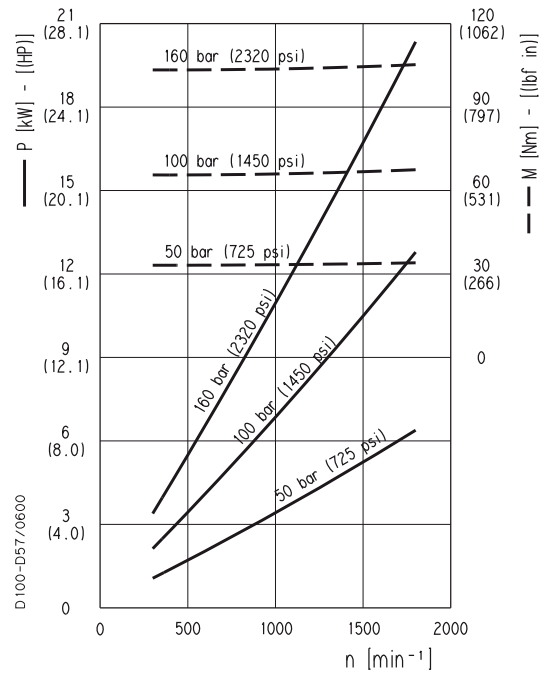
**FORMULA 20 GEAR PUMPS PERFORMANCE CURVES**

**FP 20**

**FP 20-36**

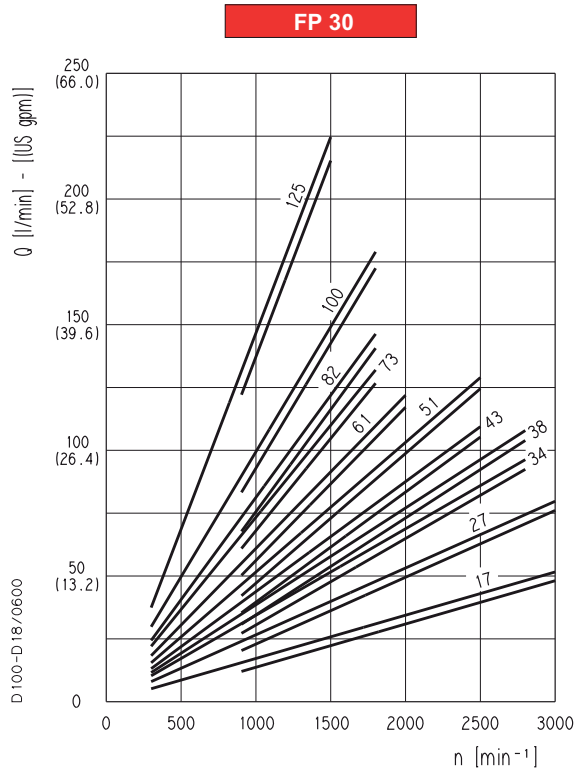


**FP 20-40**



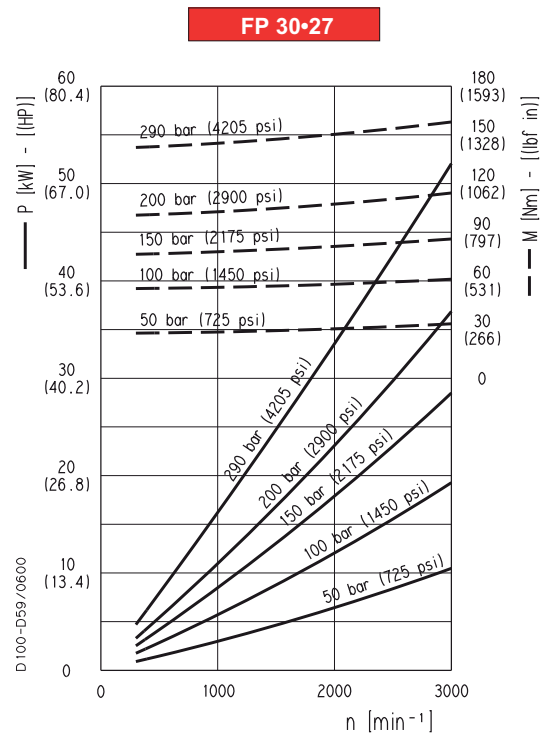
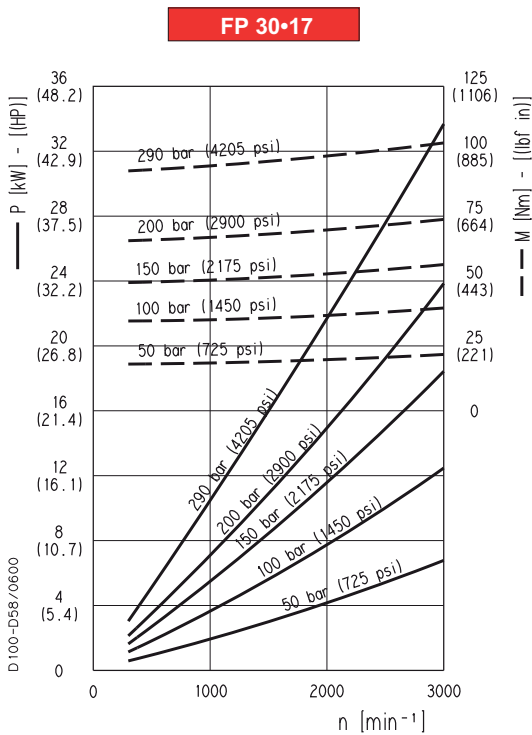
## FORMULA 30 GEAR PUMPS PERFORMANCE CURVES

**FP 30**



Each curve has been obtained at 50°C, using oil with viscosity 36 mm<sup>2</sup>/s at 40°C and at these pressures.

- FP 30•17 . . . . . 20-290 bar
- FP 30•27 . . . . . 20-290 bar
- FP 30•34 . . . . . 20-280 bar
- FP 30•38 . . . . . 20-280 bar
- FP 30•43 . . . . . 20-270 bar
- FP 30•51 . . . . . 20-240 bar
- FP 30•61 . . . . . 20-220 bar
- FP 30•73 . . . . . 20-200 bar
- FP 30•82 . . . . . 20-190 bar
- FP 30•100 . . . . . 20-180 bar
- FP 30•125 . . . . . 20-160 bar

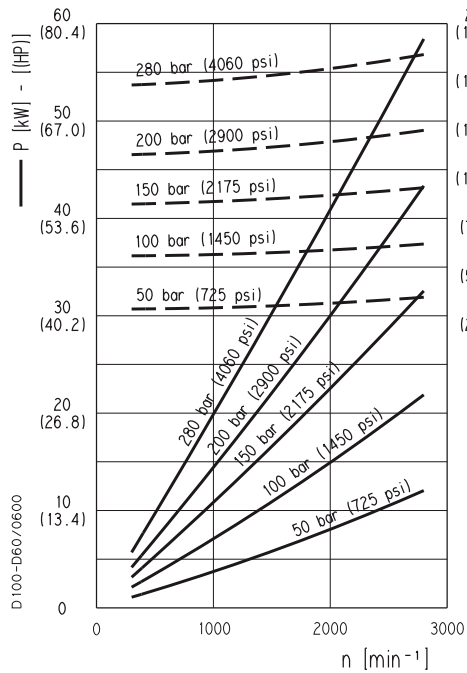


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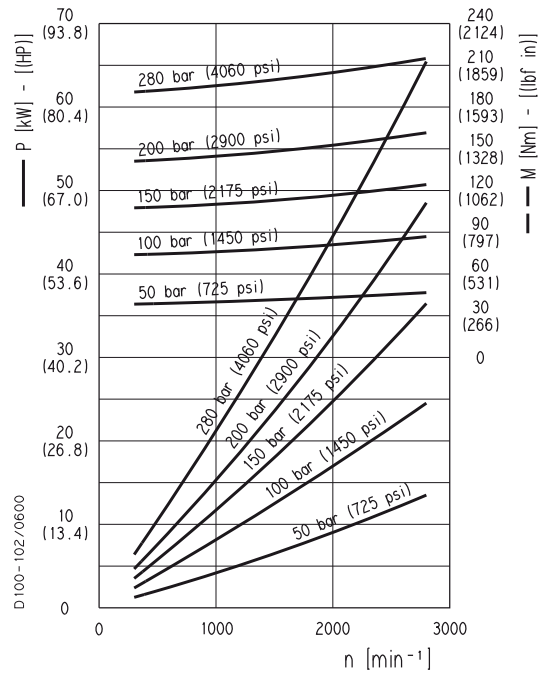
## FORMULA 30 GEAR PUMPS PERFORMANCE CURVES

## FP 30

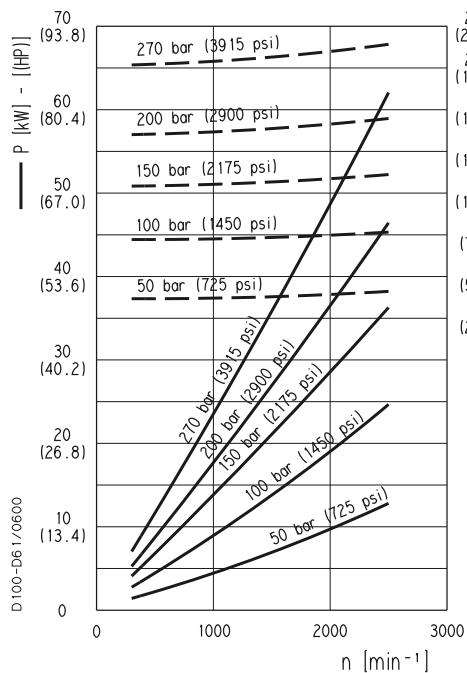
**FP 30•34**



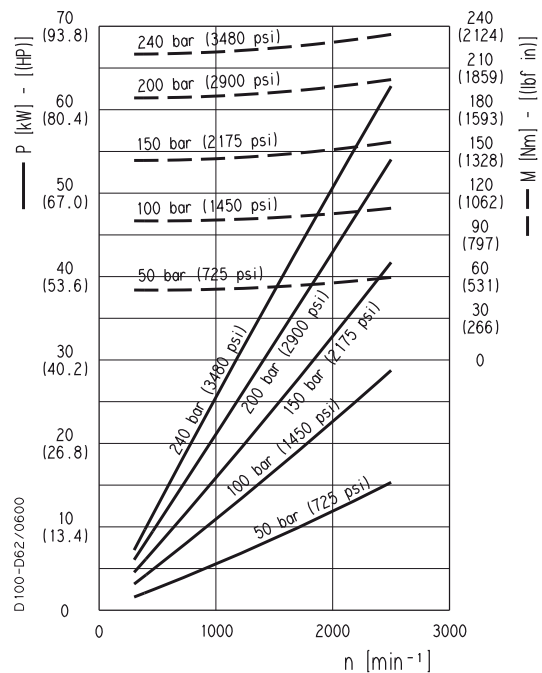
**FP 30•38**



**FP 30•43**



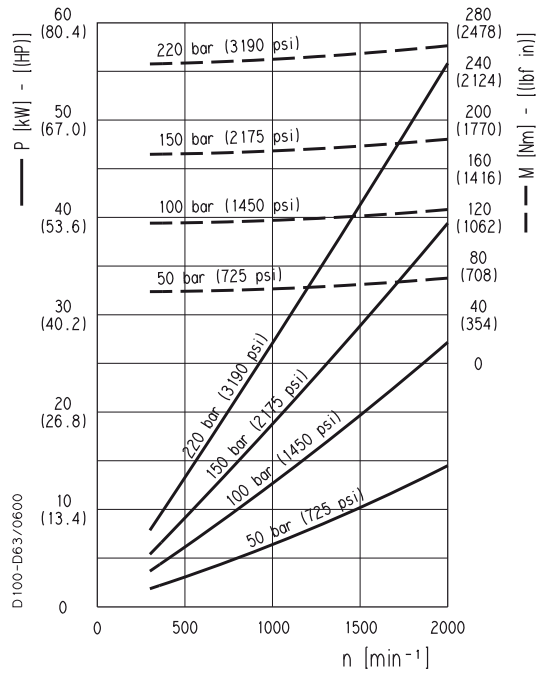
**FP 30•51**



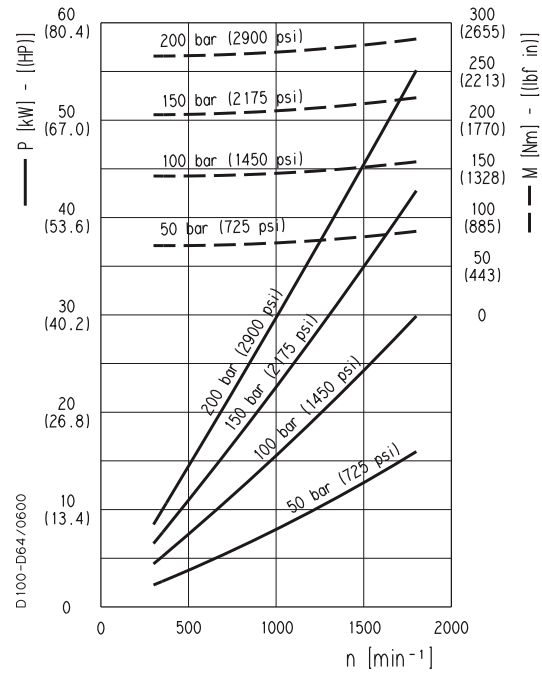
## FORMULA 30 GEAR PUMPS PERFORMANCE CURVES

## FP 30

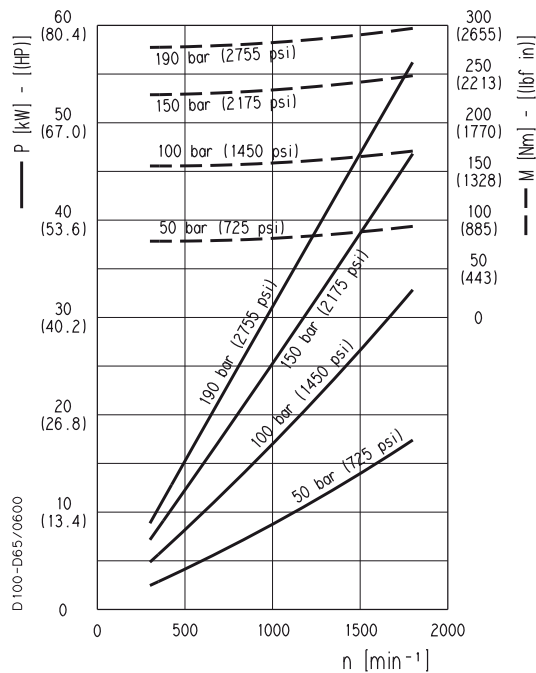
**FP 30•61**



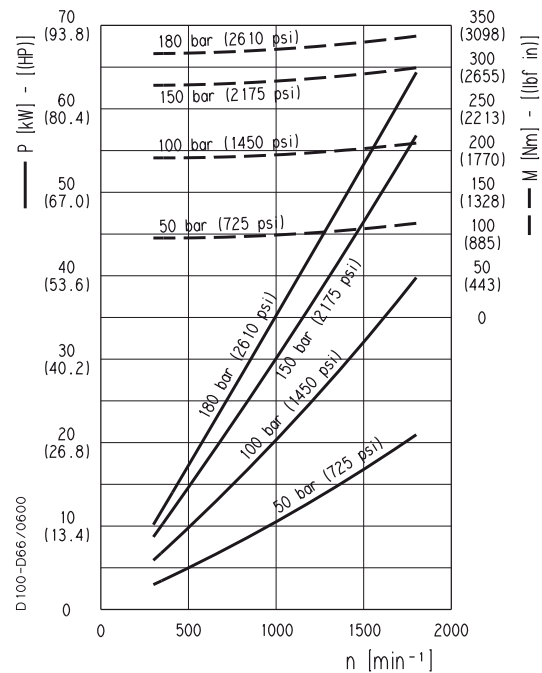
**FP 30•73**



**FP 30•82**



**FP 30•100**

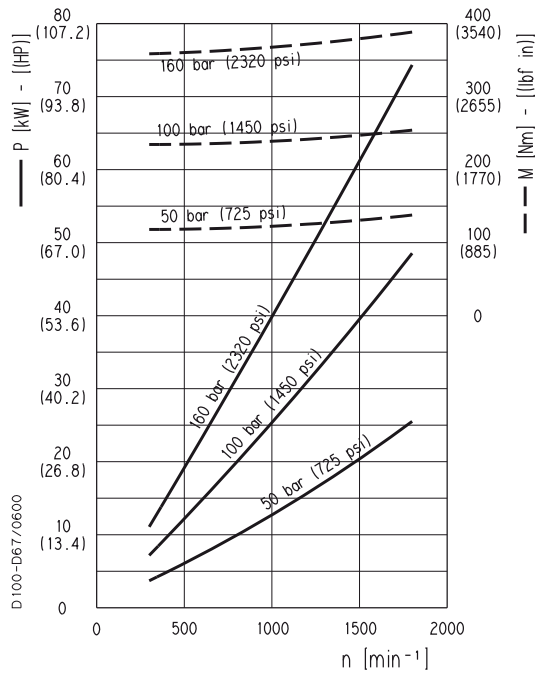




## FORMULA 30 GEAR PUMPS PERFORMANCE CURVES

**FP 30**

**FP 30•125**



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