

*New*

HYDRAULIC GEAR  
PUMPS  
FOR TRUCK  
APPLICATIONS

**FORMULA**<sup>®</sup>  
S F P

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## FEATURES

“SFP” the new line of hydraulic gear pumps of Formula series is available in groups 3 and 3,5. The main features of new Formula “SFP” line are the noise level reduction, the availability of different ports position and the modular and compact design for direct mounting on PTOs.

### DISPLACEMENTS

From 2.16 in<sup>3</sup>/rev (35,43 cm<sup>3</sup>/rev)  
To 7.22 in<sup>3</sup>/rev (118,31 cm<sup>3</sup>/rev)

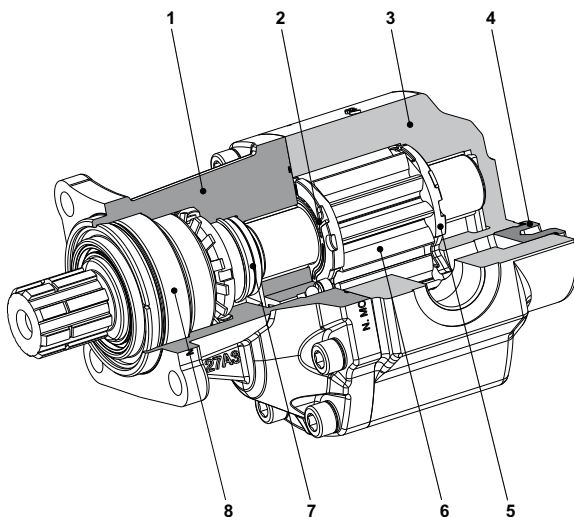
### PRESSURE

Max. continuous 4060 psi (280 bar)  
Max. intermittent 4350 psi (300 bar)  
Max. peak 4495 psi (310 bar)

### MAX. SPEED

Max. 2800 min<sup>-1</sup>

- Two pieces cast iron housing
- High performance also at very low speed
- Different ports position availability
- Low noise level
- Shaft seal system no leakage guarantee
- Modular design
- Direct mounting on the PTOs



1	Mounting flange
2	Seal
3	Body
4	Plug
5	Thrust plate
6	Gear
7	Shaft seal
8	Bearing



**Modification from former edition.**

03/09.2016

## FEATURES

### 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.

Replaces: 02/04.2012

Construction	External gear type pumps
Mounting	ISO (ZF), ITALIAN (triangular) and SAE flanges
Line connections	Screw
Direction of rotation (looking at the drive shaft)	Anti-clock (S) - clockwise (D)
Inlet pressure range for pumps	10 ÷ 44 psi - [0,7 ÷ 3 bar (abs.)]
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 <sup>2</sup> /s (cSt)] recommended Up to 3410 SSU [750 mm <sup>2</sup> /s (cSt)] permitted
Filtering requirement	See table (2)
Anti-oxidant protection	Red painting IC105

**Tab. 1**

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

(◆) **N**= Buna N (standard) - **V**= Viton - **N Bz**= Buna N and Bronze thrust plates - **V Bz**= Viton and Bronze thrust plates.

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

03/09.2016

**Tab. 2**

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

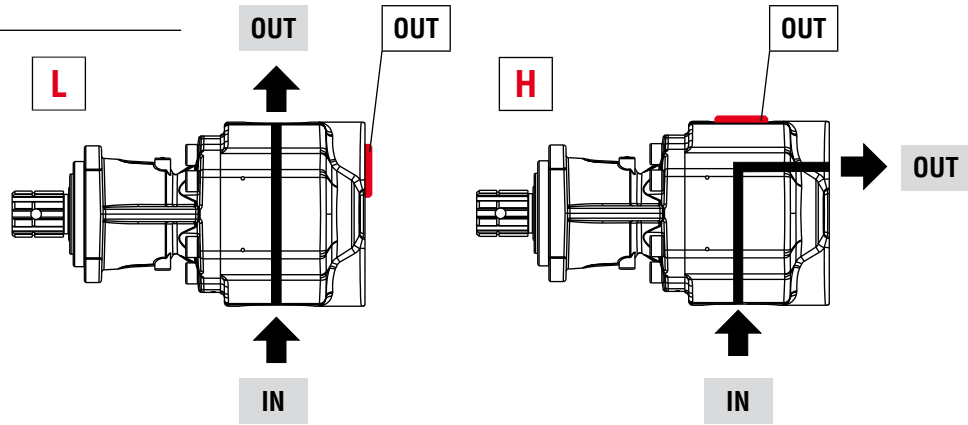
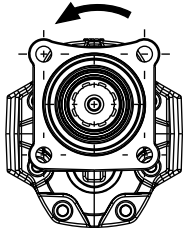
Casappa recommends to use its own production filters:



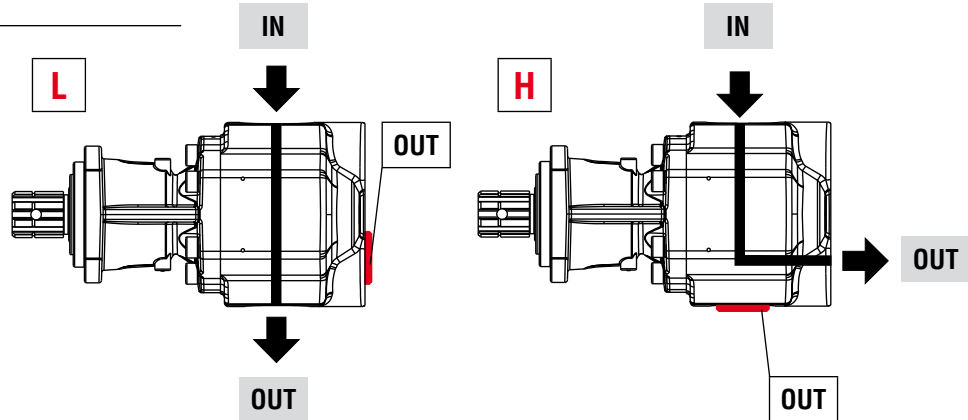
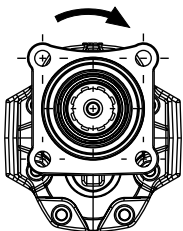
## PORTS POSITION

“SFP” Formula pumps are available with three ports; one inlet and two outlet. They are supplied in version L with a plug on the rear outlet ports. Version H is obtained just switching the plug from the rear port to the side port. Version with rear ports is available on request. For more information please consult our technical sales department.

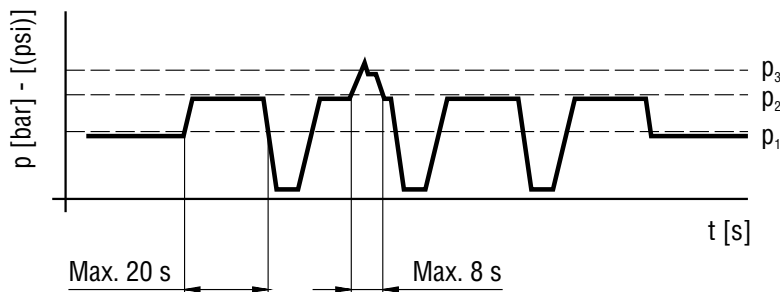
### ANTI-CLOCK ROTATION



### ANTI-CLOCK 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 176 °F (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 when ordering. For more information please consult our technical sales department.

01/07.2008

## GENERAL DATA PUMPS

Replaces: 01/07.2008

Pump type	Displacement	Max. pressure			Intermittent max. speed		Min. speed
		$p_1$	$p_2$	$p_3$	At $p_2$ press.	Without load	At $p_2$ press.
	in <sup>3</sup> /rev (cm <sup>3</sup> /rev)	psi (bar)			min <sup>-1</sup>		
<b>SFP 30•34</b>	2.16 (35,43)	4060 (280)	4350 (300)	4495 (310)	2800	4200	300
<b>SFP 30•43</b>	2.75 (45,09)	3915 (270)	4205 (290)	4350 (300)	2500	3500	300
<b>SFP 30•51</b>	3.24 (53,14)	3625 (250)	3915 (270)	4060 (280)	2500	3500	300
<b>SFP 30•61</b>	3.83 (62,80)	3335 (230)	3625 (250)	3770 (260)	2500	3500	300
<b>SFP 30•73</b>	4.62 (75,68)	2973 (205)	3408 (235)	3480 (240)	2250	3500	300
<b>SFP 30•82</b>	5.11 (83,74)	2828 (195)	3263 (225)	3335 (230)	2250	3500	300
<b>SFP 35•90</b>	5.86 (95,99)	3335 (230)	3625 (250)	3843 (265)	2250	3500	300
<b>SFP 35•100</b>	6.40 (104,92)	3190 (220)	3480 (240)	3698 (255)	2250	3500	300
<b>SFP 35•112</b>	7.22 (118,31)	2973 (205)	3263 (225)	3480 (240)	2250	3500	300

 $p_1$  = Max. continuous pressure

 $p_2$  = Max. intermittent pressure

 $p_3$  = Max. peak pressure

For different working conditions please consult our technical sales department.

## DESIGN CALCULATIONS FOR PUMPS

02/04.2012

<b>Q</b>	US gpm (l/min)	Flow
<b>M</b>	lbf in (Nm)	Torque
<b>P</b>	HP (kW)	Power
<b>V</b>	in <sup>3</sup> /rev (cm <sup>3</sup> /rev)	Displacement
<b>n</b>	min <sup>-1</sup>	Speed
<b>Δp</b>	psi (bar)	Pressure
$\eta_v = \eta_v(V, \Delta p, n)$	( $\approx 0,98$ )	Volumetric efficiency
$\eta_{hm} = \eta_{hm}(V, \Delta p, n)$	( $\approx 0,90$ )	Hydro-mechanical efficiency
$\eta_t = \eta_v \cdot \eta_{hm}$	( $\approx 0,88$ )	Overall efficiency

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

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

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

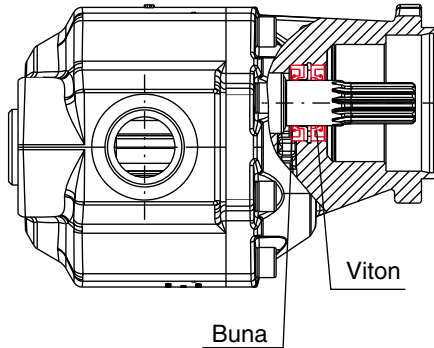
$$M_{theor.} = \frac{\Delta p \text{ (bar)} \cdot V \text{ (cm}^3\text{/rev)}}{62,83}$$

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

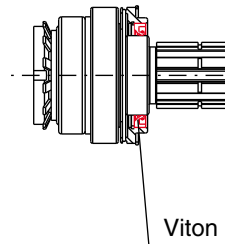
$$P_{OUT} = \frac{\Delta p \text{ (bar)} \cdot Q \text{ (l/min)}}{600}$$

## LEAKAGE FREE - ISO STANDARD 16 Z0

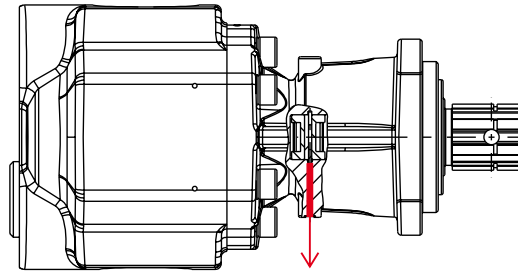
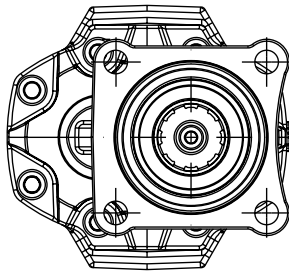
Base pump - version 0



Support kit - version 5



Two shaft seals on the pump and one on the support guarantee a perfect seals avoiding the oil exchange between the hydraulic circuit and the gear box; catastrophic failures are eliminated.



In case of failure, a safety system between the shaft seals of the pump allows the oil to escape, but doesn't allow the entry of contamination into the pump.

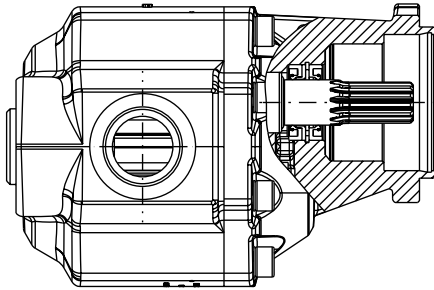
We recommend to mount the pumps with the hole in horizontal position or even better facing down.

01/07.2008

**SFP 30**

**MODULAR DESIGN**

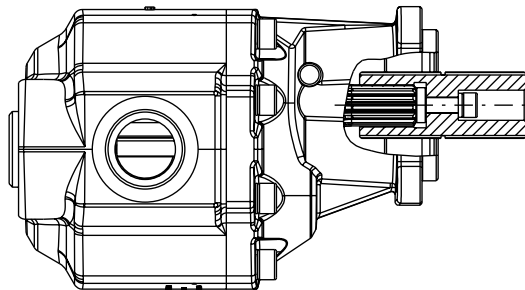
**Base pump - version 0 - L8 Z0**



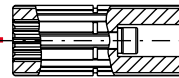
Starting from one pump you can have more versions using different kit.

**ISO standard - version 0 - 16 Z0**

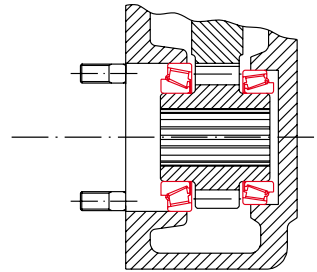
For PTOs applications with support



**Coupling kit - version 0**

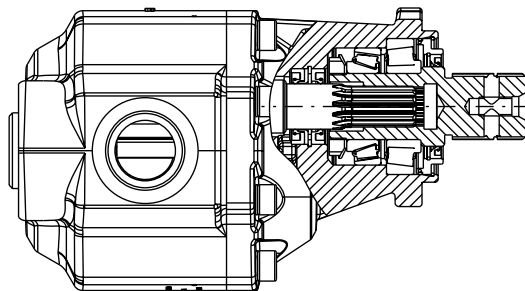


**PTOs with support**

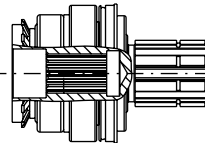


**ISO standard - version 5 - 16 Z0**

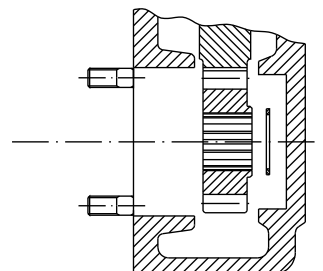
For PTOs applications without support



**Support kit - version 5**



**PTOs without support**

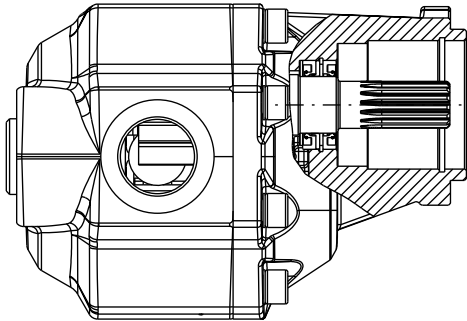


01/07.2008

**SFP 35**

**MODULAR DESIGN**

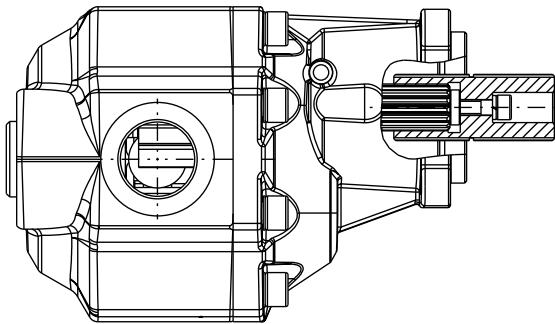
**Base pump - version 0 - F9 Z0**



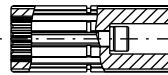
Starting from one pump you can have more versions using different kit.

**ISO standard - version 0 - 16 Z0**

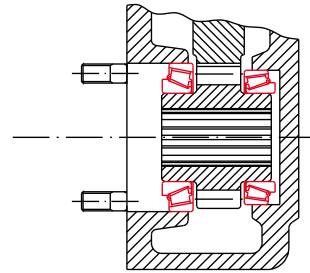
For PTOs applications with support



**Coupling kit - version 0**

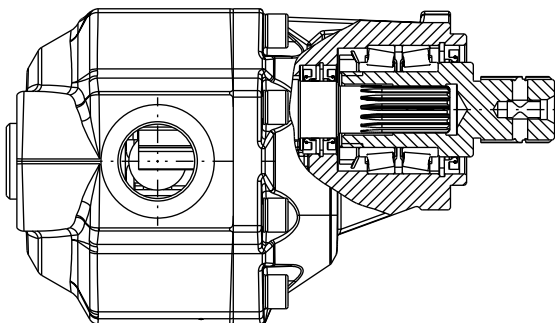


**PTOs with support**

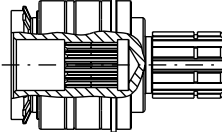


**ISO standard - version 5 - 16 Z0**

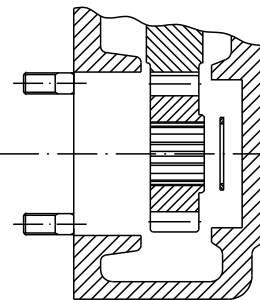
For PTOs applications without support



**Support kit - version 5**

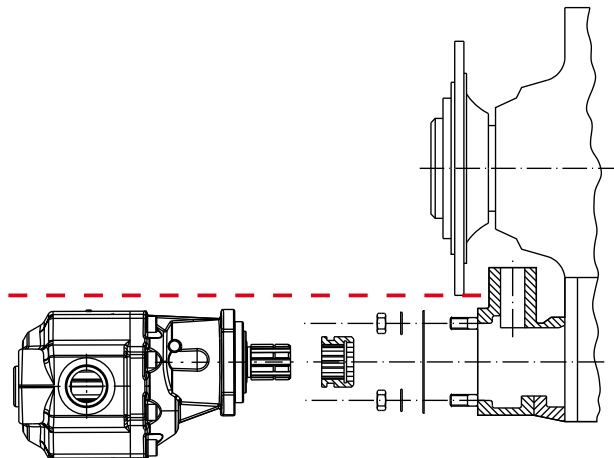


**PTOs without support**



**MOUNTING ON DIRECT PTOs WITH ISO FLANGE**

The new Formula SFP 35, specifically designed to avoid interference with the transmission shaft of truck, can be mounted on direct power take-off.



01/07.2008

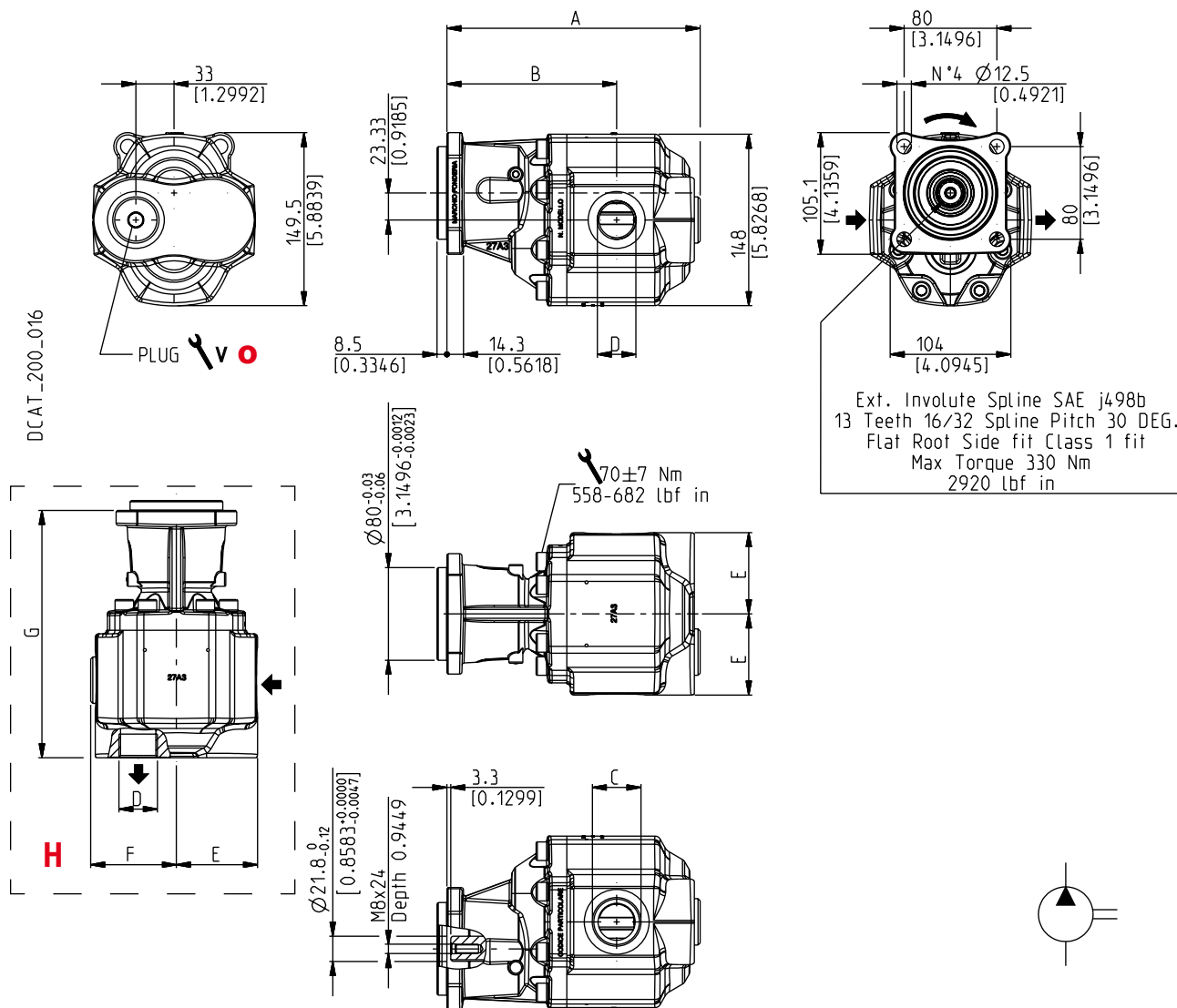


**SFP 30**

**BASE MODEL HYDRAULIC GEAR PUMPS VERSION 0**

**L8 Z0**

Replaces: 01/07.2008



Ext. Involute Spline SAE j498b  
13 Teeth 16/32 Spline Pitch 30 DEG.  
Flat Root Side fit Class 1 fit  
Max Torque 330 Nm  
2920 lbf in

01/03.2010

Pump type	A	B	C (◆)	D (◆)	E	F	G	V
	mm (in)	mm (in)	IN (BSPP)	OUT (BSPP)	mm (in)	mm (in)	mm (in)	Nm (lbf in)
<b>SFP 30•34</b>	189 (7.441)	130,5 (5.138)	G 3/4	G 3/4			183,5 (7.224)	90 ±9 (717 ÷ 876)
<b>SFP 30•43</b>	195 (7.677)	127,5 (5.020)			64 (2.520)	68 (2.677)	189,5 (7.461)	
<b>SFP 30•51</b>	200 (7.874)	132,5 (5.217)	G1				194,5 (7.657)	
<b>SFP 30•61</b>	206 (8.110)	138,5 (5.453)		G1			200,5 (7.894)	130 ±13 (1036 ÷ 1266)
<b>SFP 30•73</b>	214 (8.425)	141,5 (5.571)			70 (2.756)	74 (2.913)	208,5 (8.209)	
<b>SFP 30•82</b>	219 (8.622)	146,5 (5.768)	G 1 1/4				213,5 (8.406)	

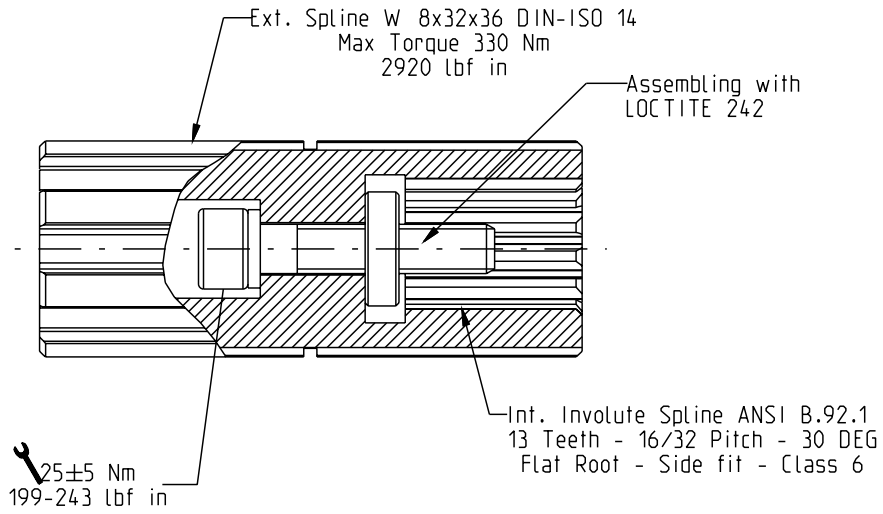
Rotation: S=left - D=right  
How to order:

(◆) GAS STRAIGHT THREAD PORTS  
For more information see page 18

**SFP 30•34 S0-L8 Z0-(H)L GE/GE-N-QW**

**SFP 30**

**COUPLING KIT VERSION 0**



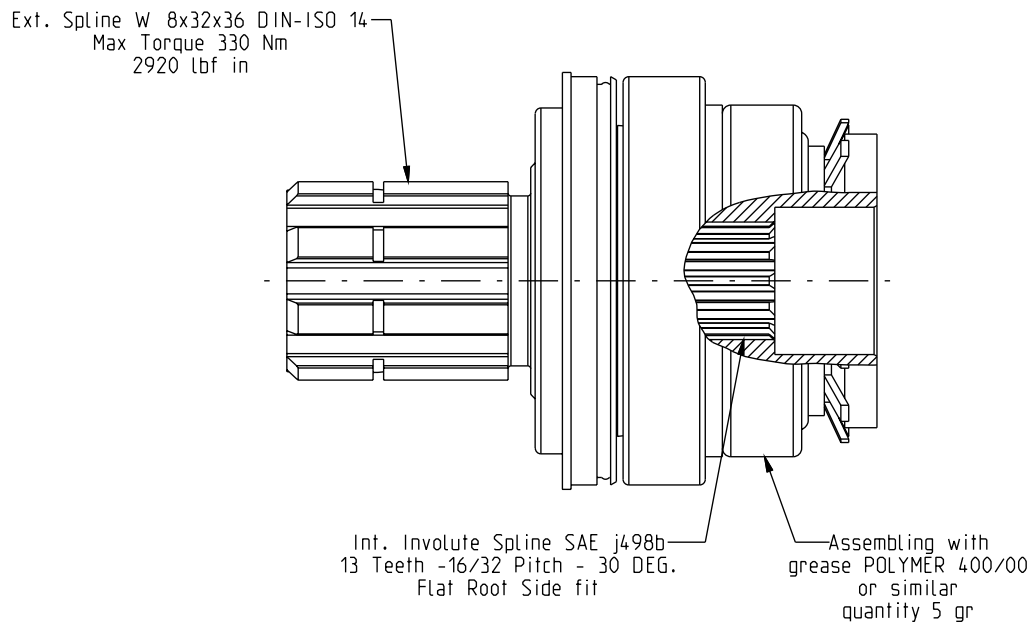
Ordering Code:

**62024007**

**COUPLING KIT FP30-0-16 Z0-L8**

**SFP 30**

**SUPPORT KIT VERSION 5**



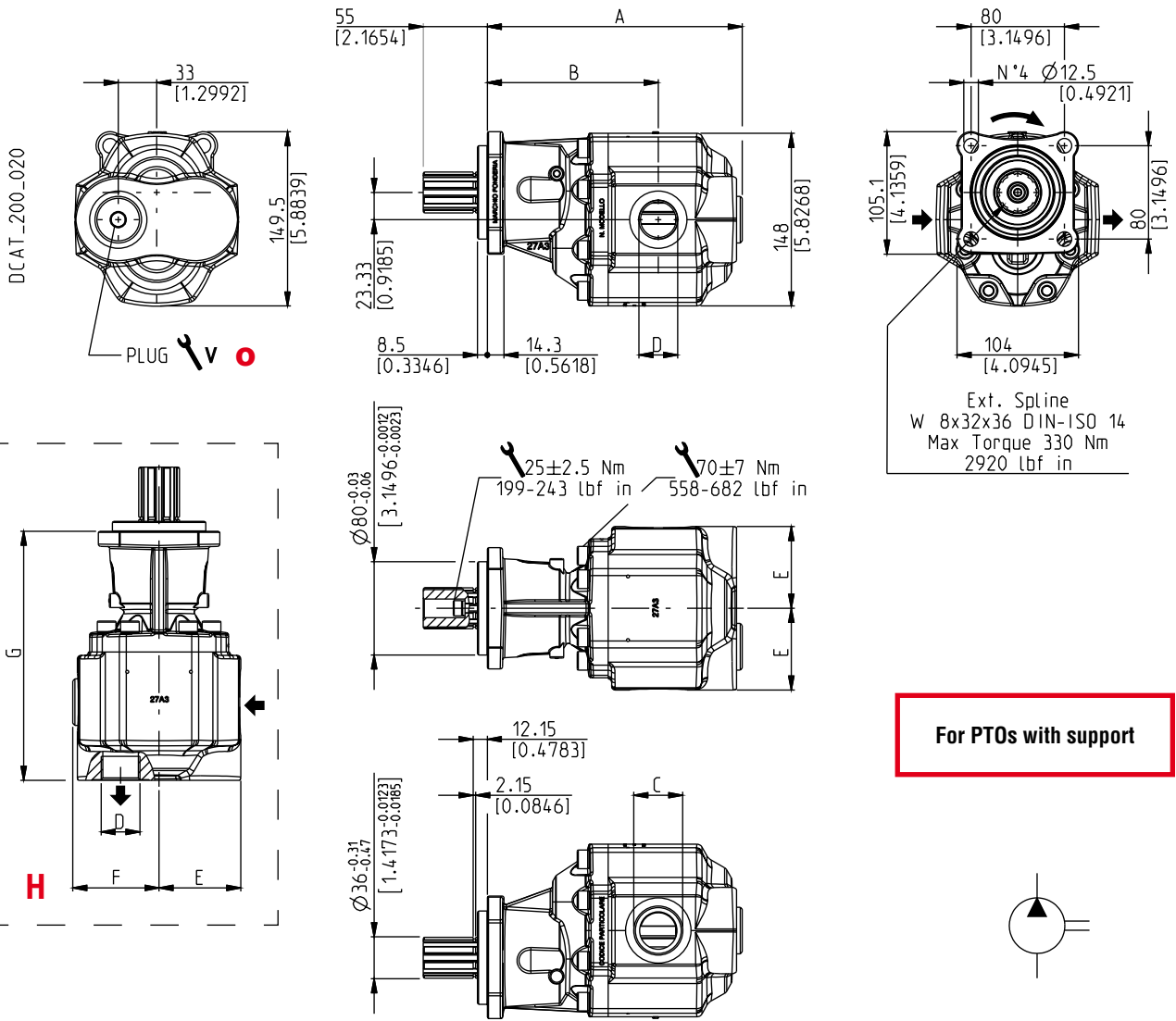
Ordering Code:

**62024006**

**SUPPORT KIT FP30-5-16 Z0-L8**

01/07.2008

Replaces: 01/07.2008



**For PTOs with support**

01/03.2010

○

Pump type		A	B	C(◆)	D(◆)	E	F	G	V	
		mm (in)	mm (in)	IN (BSPP)	OUT (BSPP)	mm (in)	mm (in)	mm (in)	Nm (lbf in)	
<b>SFP 30•34</b>	<b>S</b> <b>D</b> <b>0-16 Z0</b>	- (H)L GE/GE-N-QW	189 (7.441)	130,5 (5.138)	G 3/4	G 3/4		183,5 (7.224)	90 ±9 (717 ÷ 876)	
<b>SFP 30•43</b>			195 (7.677)	127,5 (5.020)			64 (2.520)	68 (2.677)	189,5 (7.461)	
<b>SFP 30•51</b>			200 (7.874)	132,5 (5.217)	G1				194,5 (7.657)	
<b>SFP 30•61</b>			206 (8.110)	138,5 (5.453)		G1			200,5 (7.894)	130 ±13 (1036 ÷ 1266)
<b>SFP 30•73</b>			214 (8.425)	141,5 (5.571)			70 (2.756)	74 (2.913)	208,5 (8.209)	
<b>SFP 30•82</b>			219 (8.622)	146,5 (5.768)	G 1 1/4				213,5 (8.406)	

Rotation: S=left - D=right  
How to order:

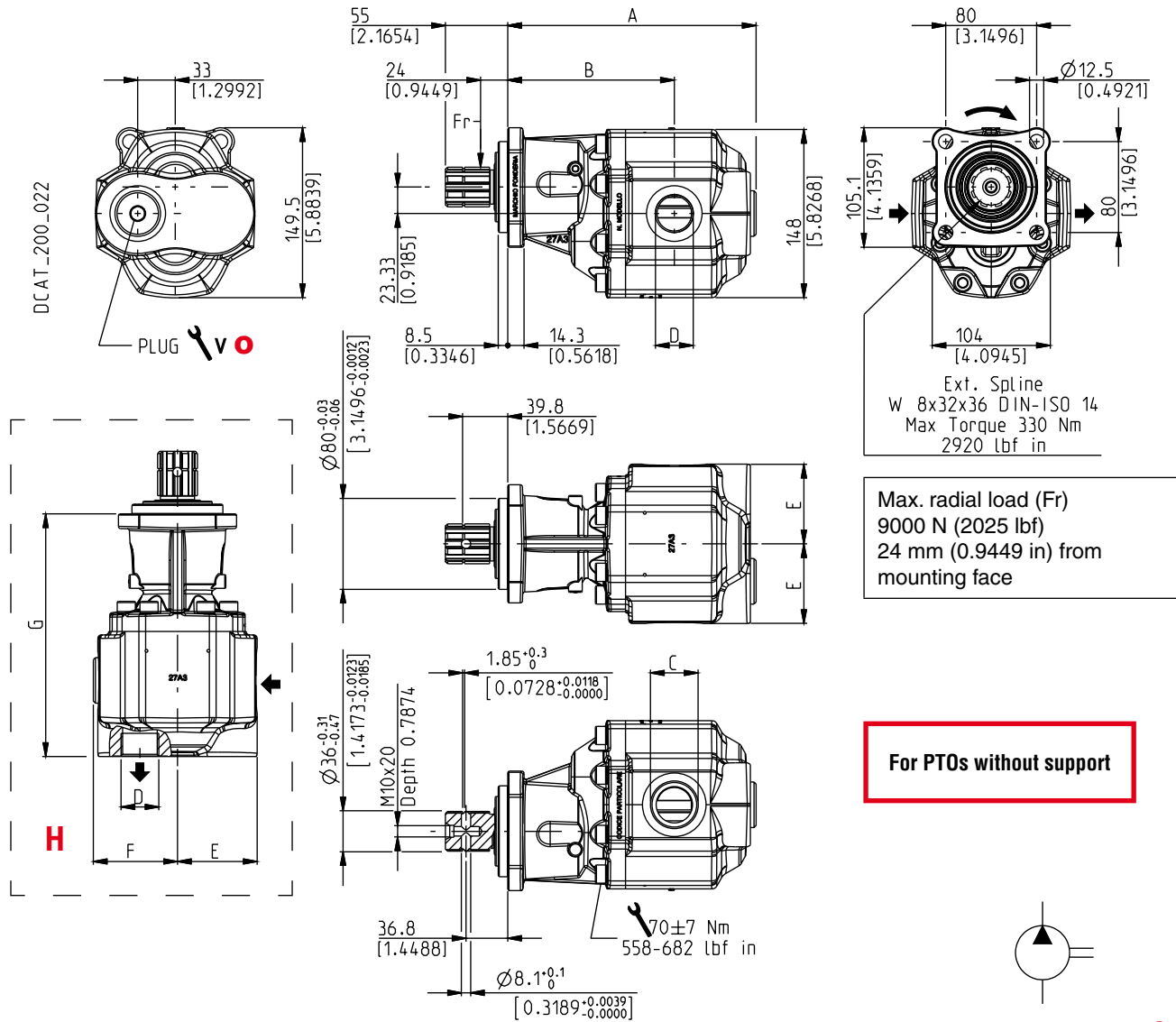
(◆) GAS STRAIGHT THREAD PORTS  
For more information see page 18

**SFP 30•34 S0-16 Z0-(H)L GE/GE-N-QW**

**SFP 30**

**HYDRAULIC GEAR PUMPS ISO STANDARD VERSION 5**

**16 Z0**



Replaces: 01/07.2008

Pump type	A	B	C (◆)		E	F	G	V
			IN (BSPP)	OUT (BSPP)				
<b>SFP 30•34</b>	189 (7.441)	130,5 (5.138)	G 3/4	G 3/4			183,5 (7.224)	90 ±9 (717 ÷ 876)
<b>SFP 30•43</b>	195 (7.677)	127,5 (5.020)			64 (2.520)	68 (2.677)	189,5 (7.461)	
<b>SFP 30•51</b>	200 (7.874)	132,5 (5.217)	G1				194,5 (7.657)	
<b>SFP 30•61</b>	206 (8.110)	138,5 (5.453)		G1			200,5 (7.894)	130 ±13 (1036 ÷ 1266)
<b>SFP 30•73</b>	214 (8.425)	141,5 (5.571)			70 (2.756)	74 (2.913)	208,5 (8.209)	
<b>SFP 30•82</b>	219 (8.622)	146,5 (5.768)	G 1 1/4				213,5 (8.406)	

Rotation: S=left - D=right  
How to order:

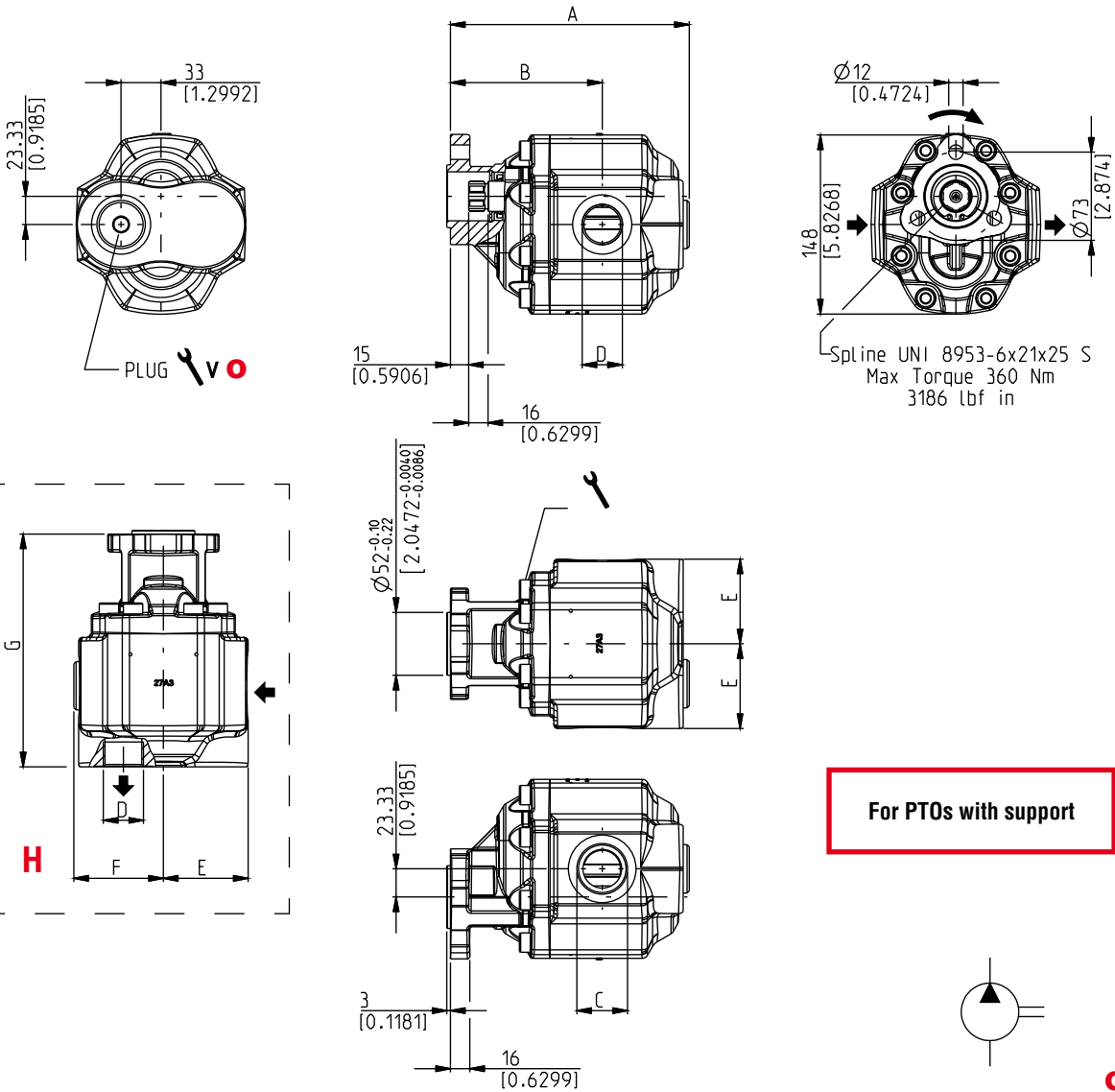
(◆) GAS STRAIGHT THREAD PORTS  
For more information see page 18

**SFP 30•34 S5-16 Z0-(H)L GE/GE-N-QW**

01/03.2010

Replaces: 01/07.2008

DCAT\_200\_017



01/03.2010

Pump type	A	B	C (◆)	D (◆)	E	F	G	V
	mm (in)	mm (in)	IN (BSPP)	OUT (BSPP)	mm (in)	mm (in)	mm (in)	Nm (lbf in)
<b>SFP 30•34</b>	168 (6.614)	109,5 (4.311)	G 3/4	G 3/4			162,5 (6.398)	90 ±9 (717 ÷ 876)
<b>SFP 30•43</b>	174 (6.850)	106,5 (4.193)			64 (2.520)	68 (2.677)	178,5 (7.028)	
<b>SFP 30•51</b>	179 (7.047)	111,5 (4.390)	G1				173,5 (6.831)	
<b>SFP 30•61</b>	185 (7.283)	117,5 (4.626)		G1			179,5 (7.067)	130 ±13 (1036 ÷ 1266)
<b>SFP 30•73</b>	193 (7.598)	120,5 (4.744)			70 (2.756)	74 (2.913)	187,5 (7.382)	
<b>SFP 30•82</b>	198 (7.795)	125,5 (4.941)	G 1 1/4				192,5 (7.579)	

Rotation: S=left - D=right  
How to order:

(◆) GAS STRAIGHT THREAD PORTS  
For more information see page 18

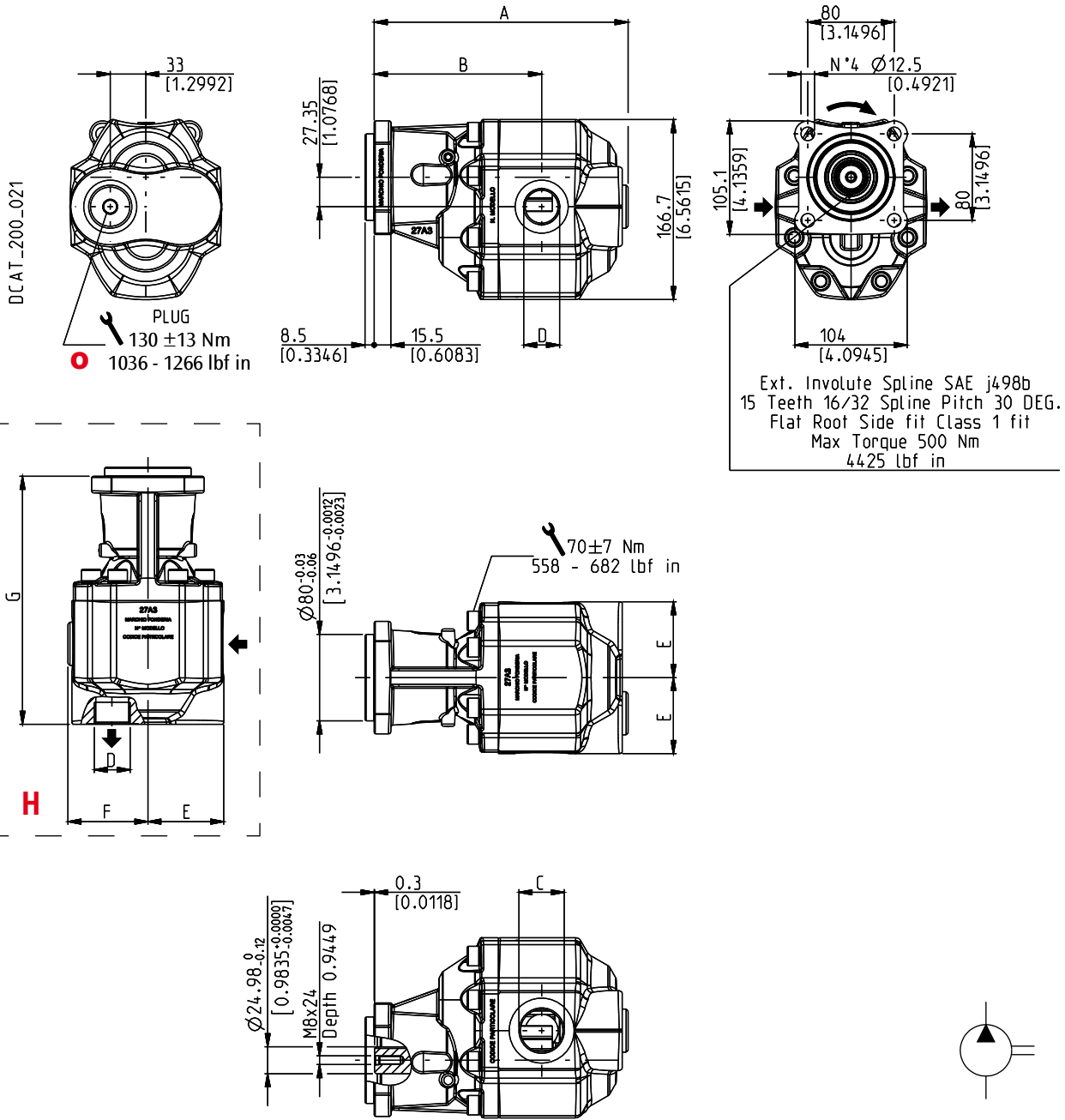
**SFP 30•34 S0-19 T1-(H)L GE/GE-N-QW**

**SFP 35**

**BASE MODEL HYDRAULIC GEAR PUMPS VERSION 0**

**F9 Z0**

Replaces: 01/07.2008



Pump type	A	B	C (◆)	D (◆)	E	F	G
<b>SFP 35•90</b>	235 (9.252)	155 (6.102)					229,5 (9.035)
<b>SFP 35•100</b> S D	239 (9.409)	159 (6.260)	G 1 1/4	G1	70,2 (2.764)	74 (2.913)	233,5 (9.193)
<b>SFP 35•112</b>	245 (9.646)	165 (6.496)					239,5 (9.429)

Rotation: S=left - D=right  
How to order:

(◆) GAS STRAIGHT THREAD PORTS  
For more information see page 18

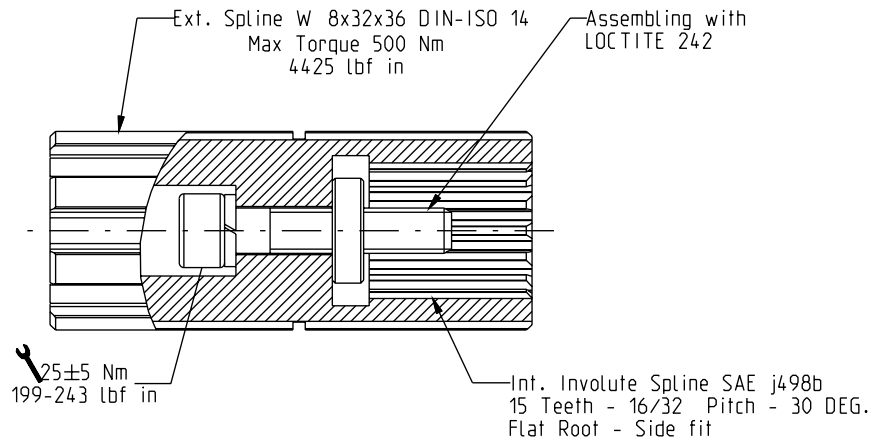
**SFP 35•90 S0-F9 Z0-(H)L GG/GF-N-QW**

01/03.2010

**SFP 35**

**COUPLING KIT VERSION 0**

Replaces: 01/07.2008



Ordering Code:

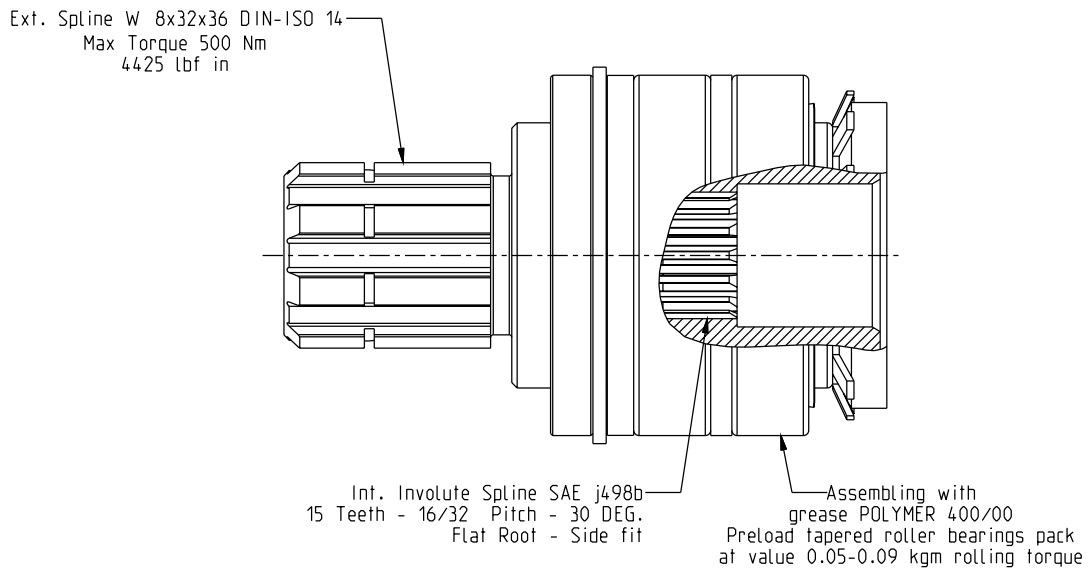
**62100015**

**COUPLING KIT FP 35 - 0 - 16 Z0 - F9**

**SFP 35**

**SUPPORT KIT VERSION 5**

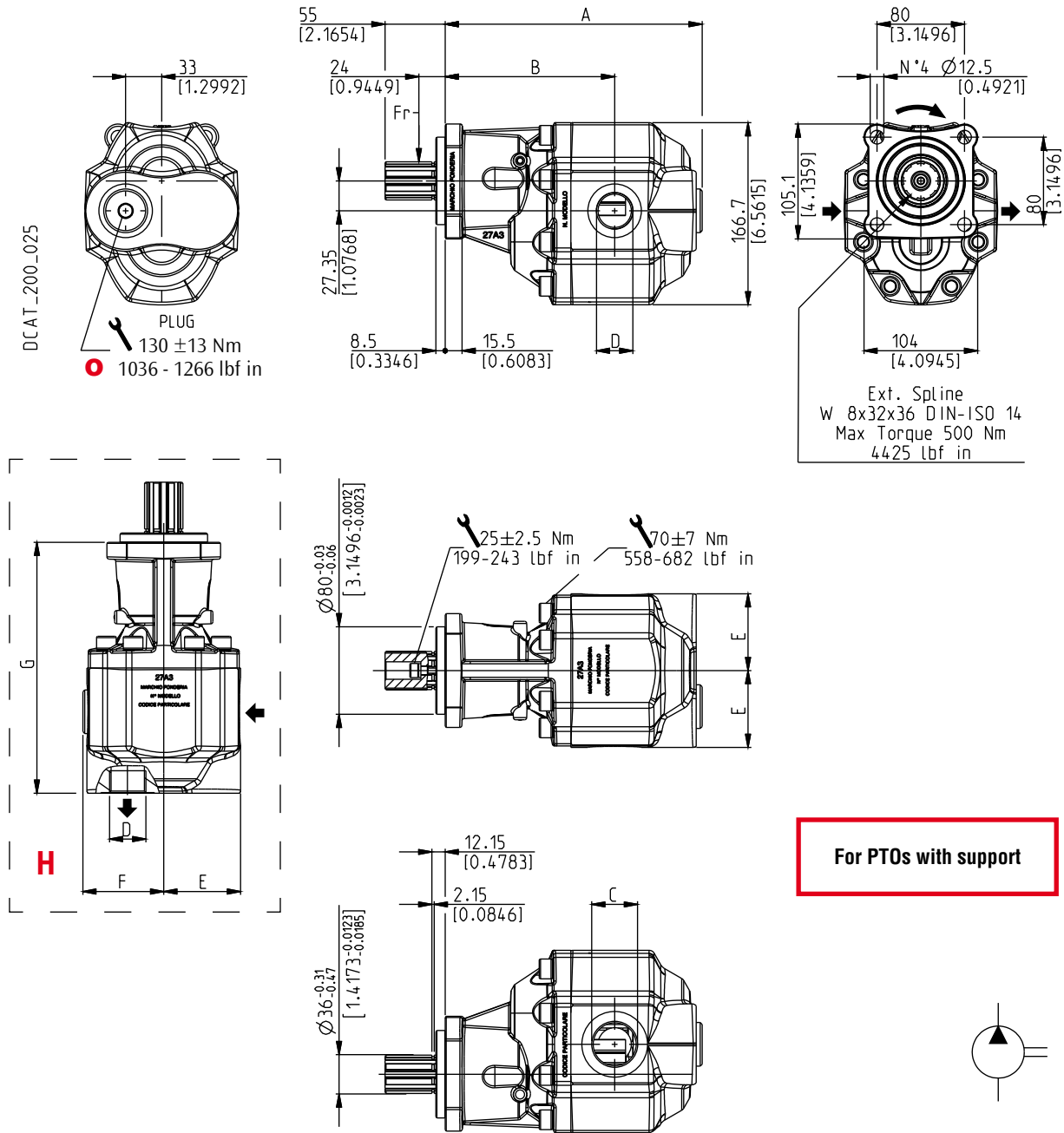
03/09.2016



Ordering Code:

**62100014**

**SUPPORT KIT FP 35 - 5 - 16 Z0 - F9**



Replaces: 01/07.2008

Pump type	A	B	C (◆)	D (◆)	E	F	G
<b>SFP 35•90</b>	235 (9.252)	155 (6.102)					229,5 (9.035)
<b>SFP 35•100</b>	239 (9.409)	159 (6.260)	G 1 1/4	G1	70,2 (2.764)	74 (2.913)	233,5 (9.193)
<b>SFP 35•112</b>	245 (9.646)	165 (6.496)					239,5 (9.429)

Rotation: S=left - D=right  
How to order:

(◆) GAS STRAIGHT THREAD PORTS  
For more information see page 18

**SFP 35•90 S0-16 Z0-(H)L GG/GF-N-QW**

01/03.2010



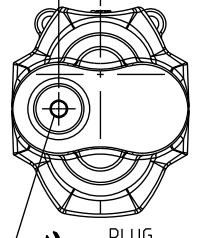
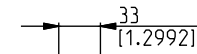
**SFP 35**

**HYDRAULIC GEAR PUMPS ISO STANDARD VERSION 5**

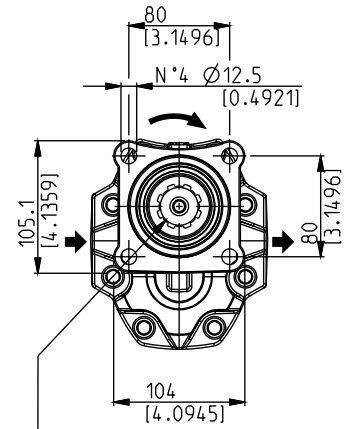
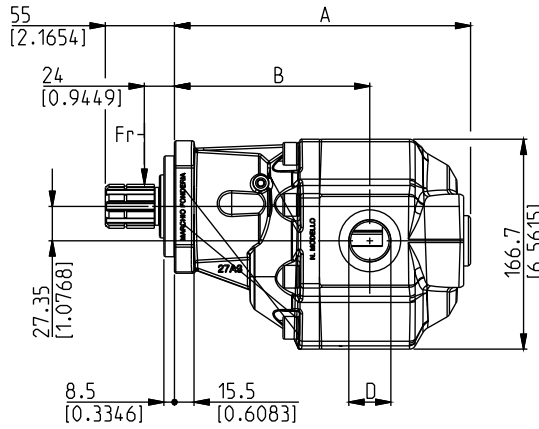
**16 Z0**

Replaces: 01/07.2008

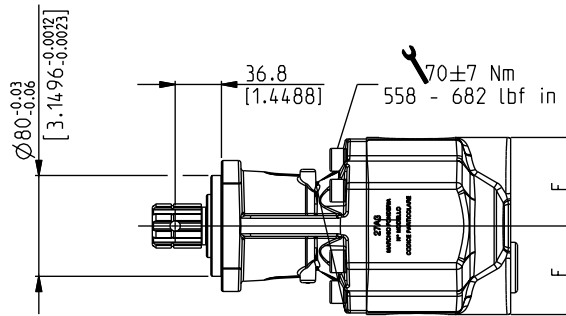
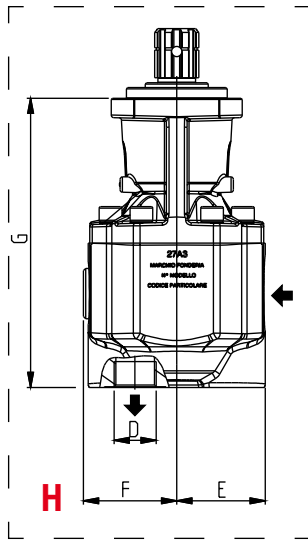
DCAT\_200\_026



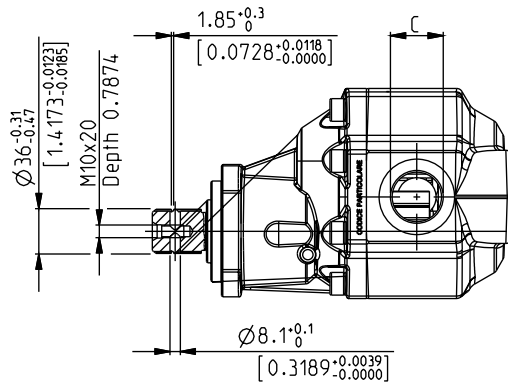
PLUG  
130 ± 13 Nm  
1036 - 1266 lbf in



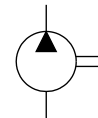
Ext. Spline  
W 8x32x36 DIN-ISO 14  
Max Torque 500 Nm  
4425 lbf in



Max. radial load (Fr)  
9000 N (2025 lbf)  
24 mm (0.9449 in) from  
mounting face



**For PTOs without support**



01/03.2010


Pump type	A	B	C (◆)	D (◆)	E	F	G
<b>SFP 35•90</b>	235 (9.252)	155 (6.102)					229,5 (9.035)
<b>SFP 35•100</b>	239 (9.409)	159 (6.260)	G 1 1/4	G1	70,2 (2.764)	74 (2.913)	233,5 (9.193)
<b>SFP 35•112</b>	245 (9.646)	165 (6.496)					239,5 (9.429)


Rotation: S=left - D=right  
How to order:

(◆) GAS STRAIGHT THREAD PORTS  
For more information see page 18

**SFP 35•90 S5-16 Z0-(H)L GG/GF-N-QW**

## PORT SIZES

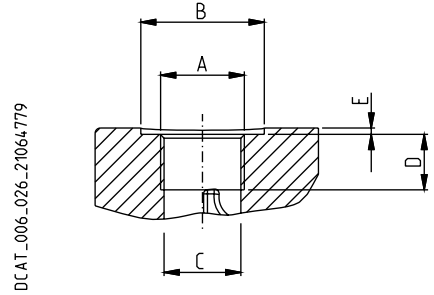
 Tightening torque for low pressure side port



 Tightening torque for high pressure side port (values obtained at 350 bar)

### 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 (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	Nm (lbf in)
<b>GE</b>	3/4"	G 3/4	39 (1.5354)	24,5 (0.9646)	18 (0.7087)	Max. 1 (0.039)	30 <sup>+2,5</sup> (266 ÷ 288)	90 <sup>+5</sup> (797 ÷ 841)
<b>GF</b>	1"	G 1	49 (1.9291)	30,5 (1.2008)	20 (0.7874)	Max. 1 (0.039) Max. 1,2 (◆) (0.047)	50 <sup>+2,5</sup> (443 ÷ 465)	130 <sup>+10</sup> (1151 ÷ 1239)
<b>GG</b>	1" 1/4	G 1 1/4	56 (2.2047) 60 (◆) (2.362)	39,3 (1.5472)	20 (0.7874)	Max. 1 (0.039) Max. 1,2 (◆) (0.047)	70 <sup>+5</sup> (620 ÷ 664)	170 <sup>+15</sup> (1505 ÷ 1637)

(◆) For SFP 35

01/07.2008

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## INSTRUCTIONS

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### INSTALLATION

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.

For pumps version 0 the connection do not generate an axial or radial load on the pump shaft. For pumps version 5 please consult the values indicated in this catalogue.

### 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 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 the table 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. 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

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.

SFP 03 T A

Edition: 03/09.2016

Replaces: SFP 02 T A



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