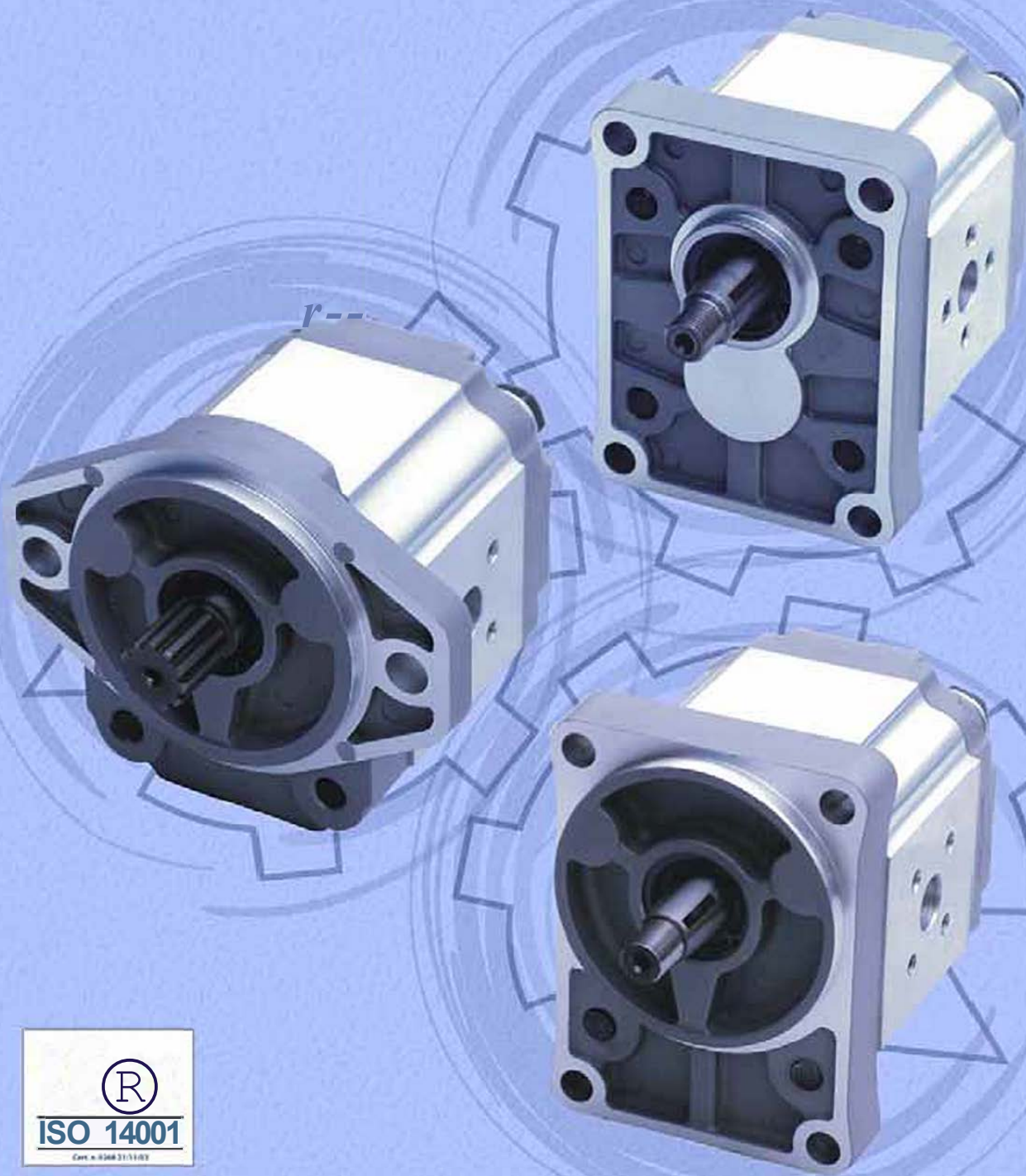




# Petrone Oleodinamica s.r.l.

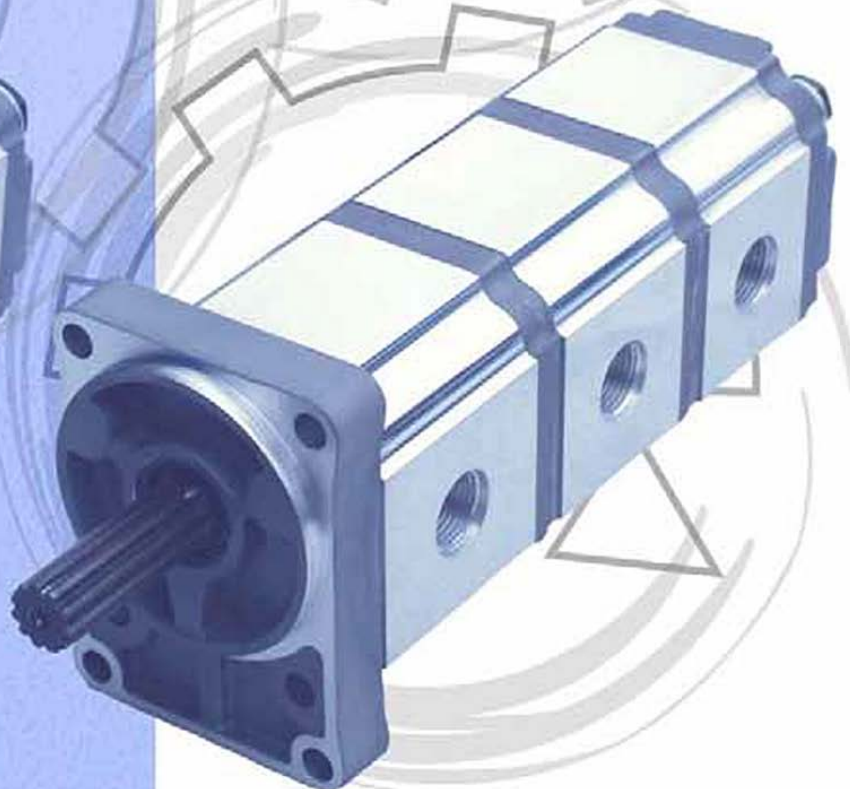
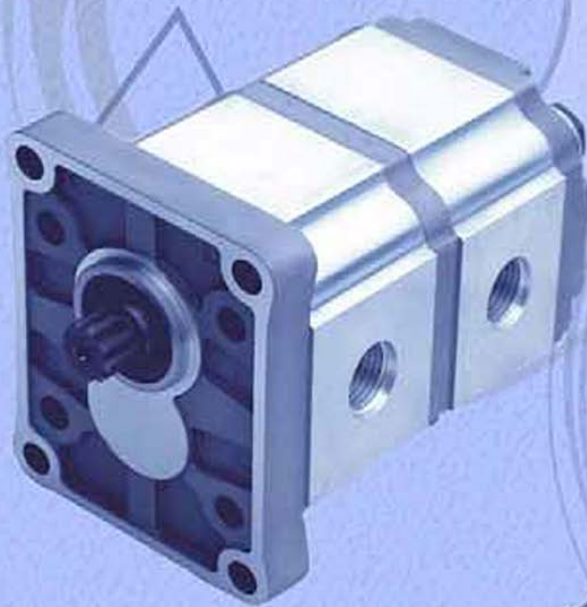


**Pompe e motori  
unidirezionali ad ingranaggi**



# Gear pumps and unidirectional motors

Pompa Tipo	Cilindrata teorica cm <sup>3</sup> /giro	Vel. Min. giri/min	Vel. Max. giri/min	Pressione max continua 1500 giri/min bar	Pressione max di punta 1500 giri/min bar	Portata a 1500 giri/min
PNP4	4	600	4000	280	310	6
PNP6	6	600	3500	270	310	9
PNPS	8	600	3500	270	310	12
PNPI 1	11	600	3500	270	310	16.5
PNP14	14	500	3000	260	300	21
PNP16	16	500	3000	250	290	24
PNP20	20	500	3000	230	250	30
PNP22,5	22.5	400	3000	210	230	33.7
PNP26	26	400	3000	190	210	39
Type	Displacement cm <sup>3</sup> /rev.	Min. Speed r.p.m.	Max. Speed r.p.m.	Max. operating pressure at 1500 r.p.m. bar	Max. peak pressure at 1500 r.p.m. bar	Litres/mln at 1500 r.p.m.



Leggera, compatta, silenziosa

Lightweight, compact, silent

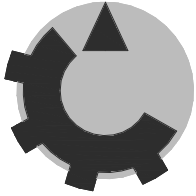
Alto rapporto prestazioni/prezzo

High performance at low cost..

The background features three interlocking gears of different sizes, rendered in a light gray, semi-transparent style. Each gear contains a simple black outline of a triangle. The gears are arranged in a triangular pattern, with one at the top, one at the bottom left, and one at the bottom right.

**Petrone Oleodinamica**

**Group 2**



## Technical informations Series PNP 2

▪ **Pump Displacement:**

4 – 6 – 8 – 11 – 14 – 16 – 20 – 22.5 – 26 cm<sup>3</sup> / rev.

▪ **Speed range**

400 – 4000 rpm

▪ **Efficiency:**

volumetric  $\eta_v > 98\%$ ; mechanical  $\eta_m > 95\%$ ; overall  $\eta_t > 90\%$

▪ **Suitable to run under severe conditions of:**

pressure, speed and temperature.

▪ **High pressure capability**

Up to 270 bar maximum continuous operating pressure for capacities up to 11 cm<sup>3</sup> (see performance table for further details).

▪ **High temperature seal kit available**

T > 85° C

▪ **Main different mounting configurations of drive shaft and mounting flange**

Drive shaft and mounting flange are fully interchangeable with the main Standards of the market, and with all the other “range 2” Petrone Oleodinamica S.r.l. gear pumps.

▪ **Large standardization of components:**

Seal kit, cover, bearing, gears, are common to all the configurations.

▪ **Tandem options available**

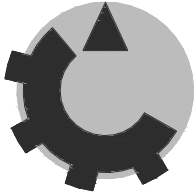
All drive shafts of pumps PNP2 have the predisposition to the joining for the realization of double pumps.

▪ **All PNP 2 pumps may work as unidirectional motors**

(In the opposite sense of rotation compared to the one of a pump), without any change of components.

▪ **Easy to change**

Sense of rotation, drive shaft, front flange, or from single to multiple pump stage.



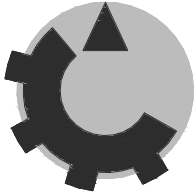
## Instructions for use

To achieve the best in terms of performance and life, it is necessary to meet the catalogue specifications, but it is also necessary to follow some general rules, and we would like to recommend the following :

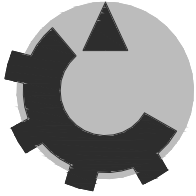
- Put much care in designing the hydraulic circuit as a whole, specially the suction line, the choice and the position of the safety relief valves, of the filters, and dimensioning reservoir and heat exchangers.
- Ensure a correct and frequent cleaning and maintenance of circuit and hydraulic fluid.
- Equip the circuit with suitable alarm and safety devices, as well as reliable instrumentations.
- Avoid as much as possible cold starting, under load, specially at low room-temperatures, and after long standstills. Repeated starts under load are not recommended.
- At low speeds, avoid to use the pump at high pressure for long periods, or in excessively intermittent duties. In these cases a multiplier gearbox is recommended.
- A proper oil choice is a major factor, as well as a correct thermal protection.
- Drive the pump with a suitable power take off (PTO).

### OPERATING REQUIREMENTS

- **Max. inlet vacuum: 0.3 bar**
- **Max inlet pressure: 3 bar**
- **Environmental temperature range : - 15° C ÷ 80° C**



<b>Hydraulic fluid</b>	
<ul style="list-style-type: none"> <li>▪ Recommended: Mineral base hydraulic oils HLP HV (DIN 51514)</li> <li>▪ Allowed engine oils with additives preventing from oxidation, wear and foaming.</li> </ul>	
<i><b>Fluid Temperature</b></i>	
Max. operating:	<b>80° C</b>
Recommended:	<b>30° C ÷ 60° C</b>
<b>Temperature over 80 °C are allowed but using FPM (Viton) seals.</b>	
<i><b>Viscosity</b></i>	
Recommended range:	<b>20 ÷ 65 cSt</b>
Max. at cold starting:	<b>1000 cSt</b>
<i><b>Fluid cleanliness and filtering</b></i>	
The recommended degrees of filtration are:	<b>Inlet: 80 ÷ 100 µm</b> <b>Return the: up to 170 bar 25 µm over 170 bar 10 µm</b>
<b><u>Use quality filters, with indicators and alarm. Avoid as much as possible to use filter with by-pass valve.</u></b>	

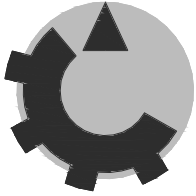


## Hydraulic circuit and installation

Rules for dimensioning the circuit:

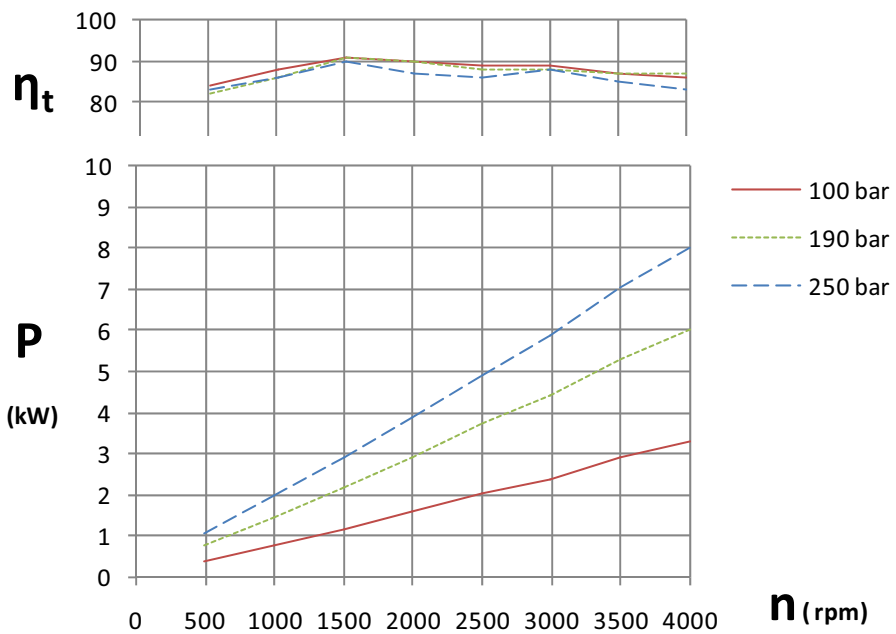
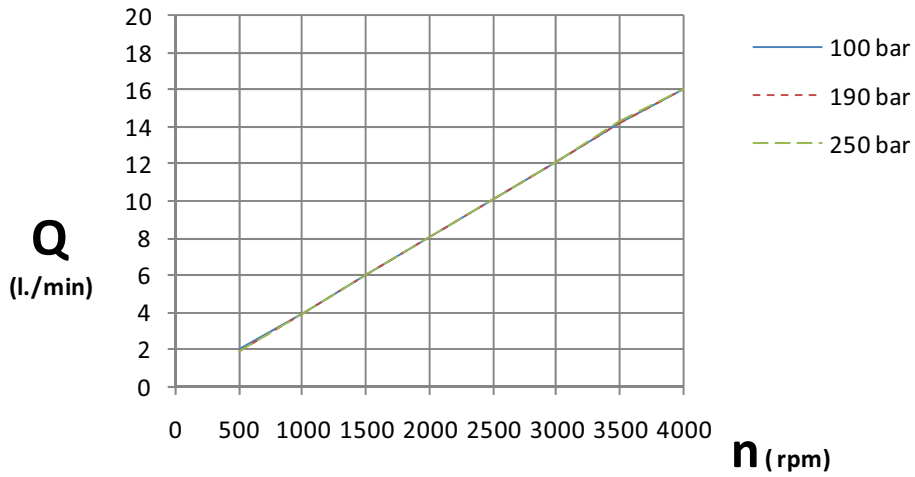
- Avoid sharp restrictions and small radius bends.
- Recommended fluid speed in inlet line:  $0,5 \div 1,6$  m / sec.
- Recommended fluid speed in delivery line:  $2 \div 6$  m / sec.
- Recommended fluid speed in return line:  $1,5 \div 3$  m / sec.

**For further details and information regarding the applications of our pumps, please contacts PETRONE OLEODINAMICA S.r.l..**

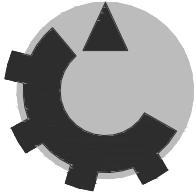


## Typical performance curves – gear pump 4 cm<sup>3</sup>/rev

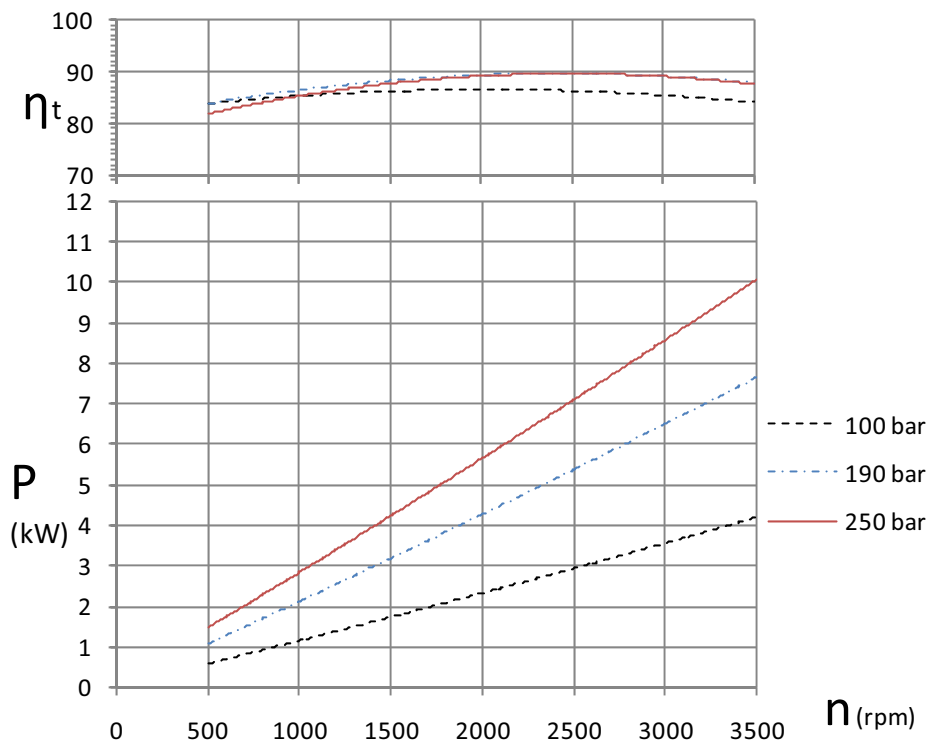
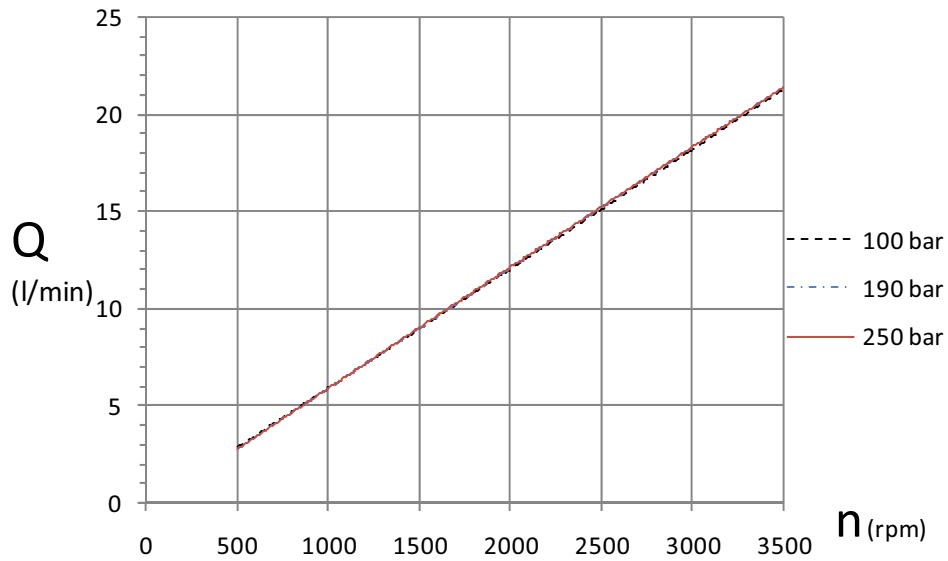
Test temperature 50 ± 2°C with ISO VG46 oil

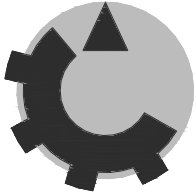






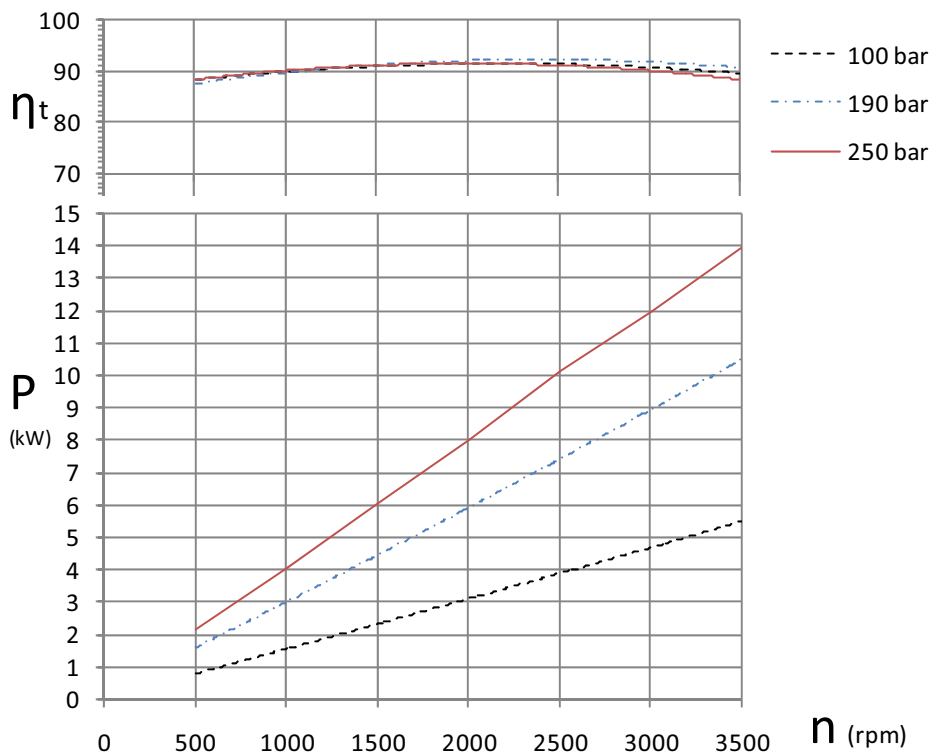
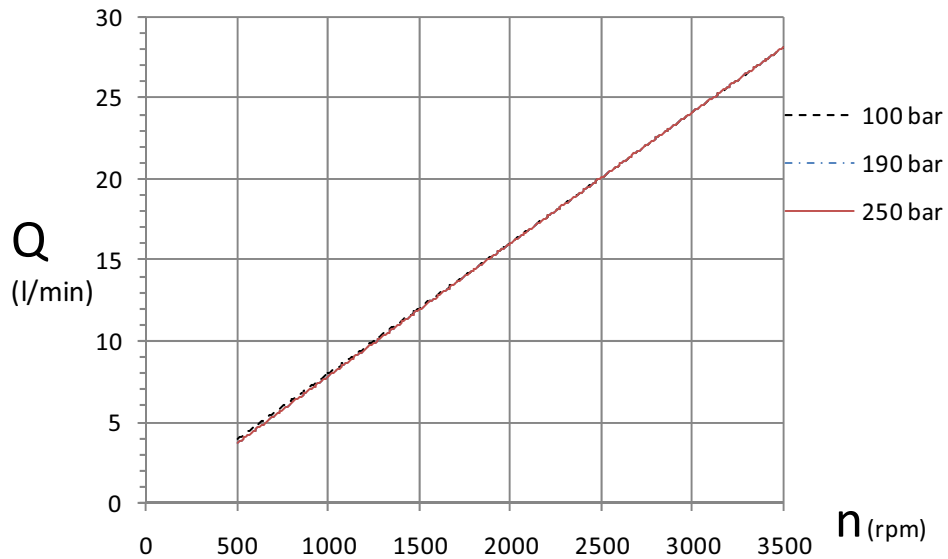
Typical performance curves – gear pump 6 cm<sup>3</sup>/rev  
Test temperature 50 ± 2°C with ISO VG46 oil

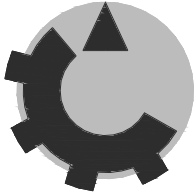




## Typical performance curves – gear pump 8 cm<sup>3</sup>/rev

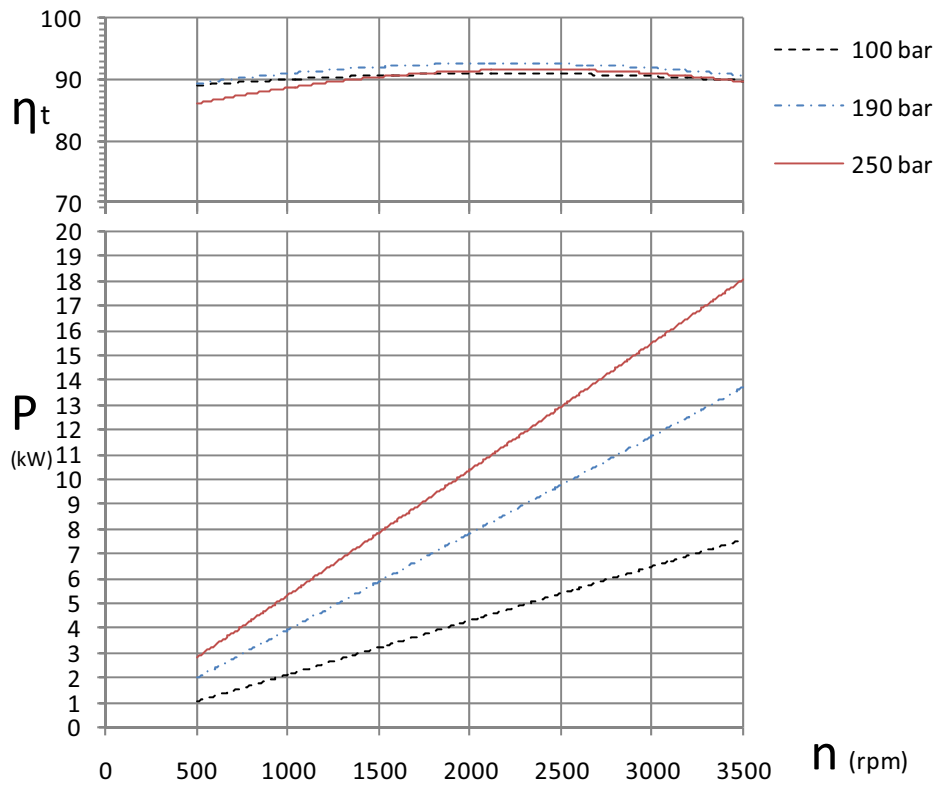
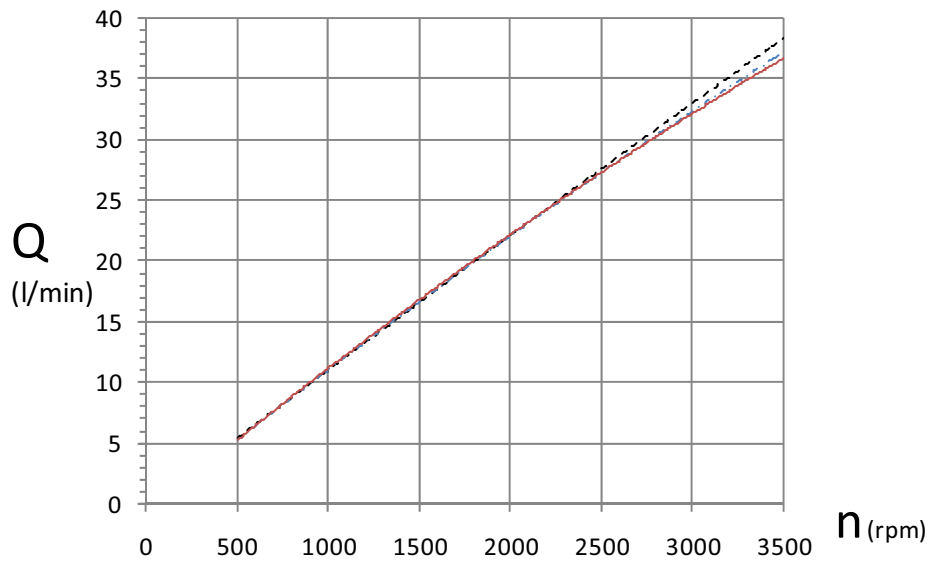
Test temperature 50 ± 2°C with ISO VG46 oil

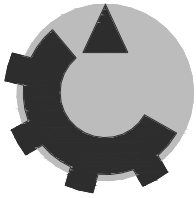




## Typical performance curves – gear pump 11 cm<sup>3</sup>/rev

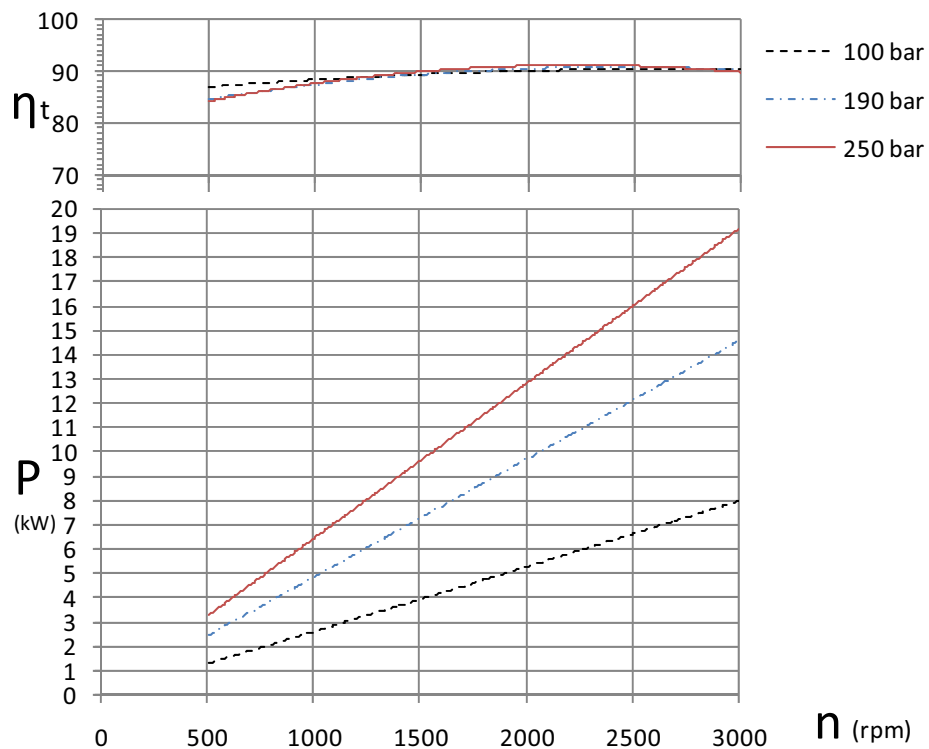
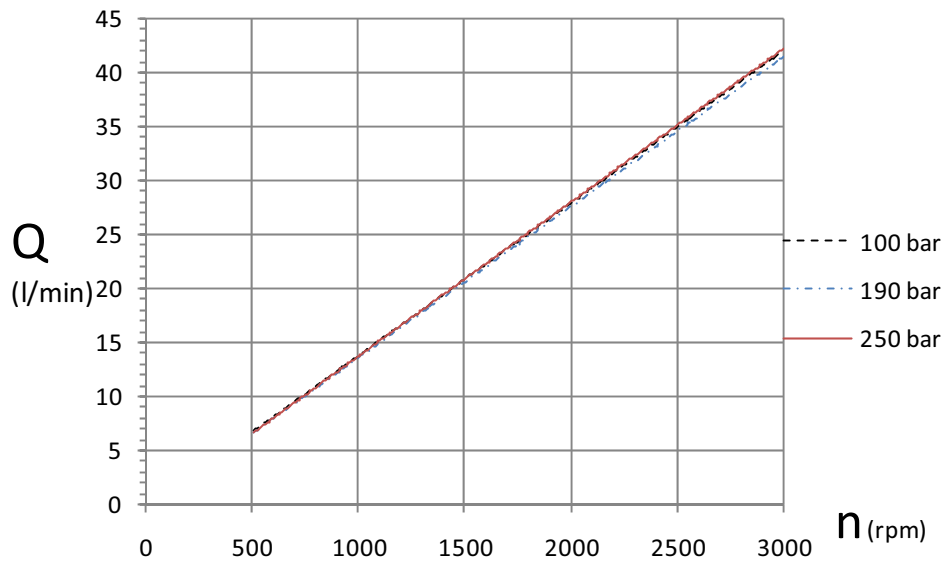
Test temperature 50 ± 2°C with ISO VG46 oil

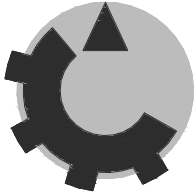




## Typical performance curves – gear pump 14 cm<sup>3</sup>/rev

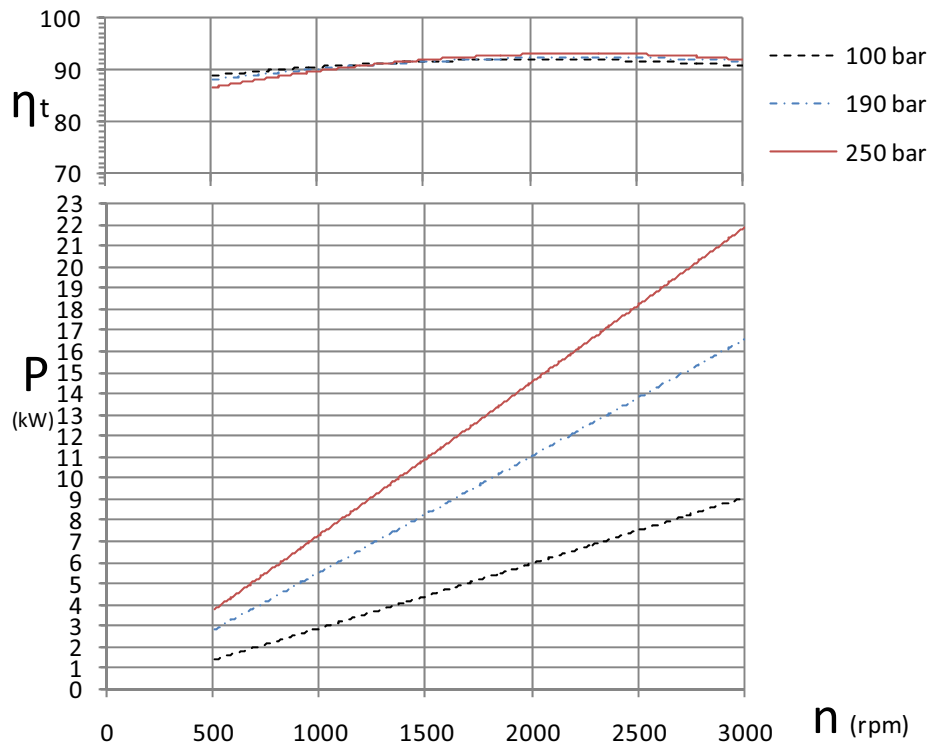
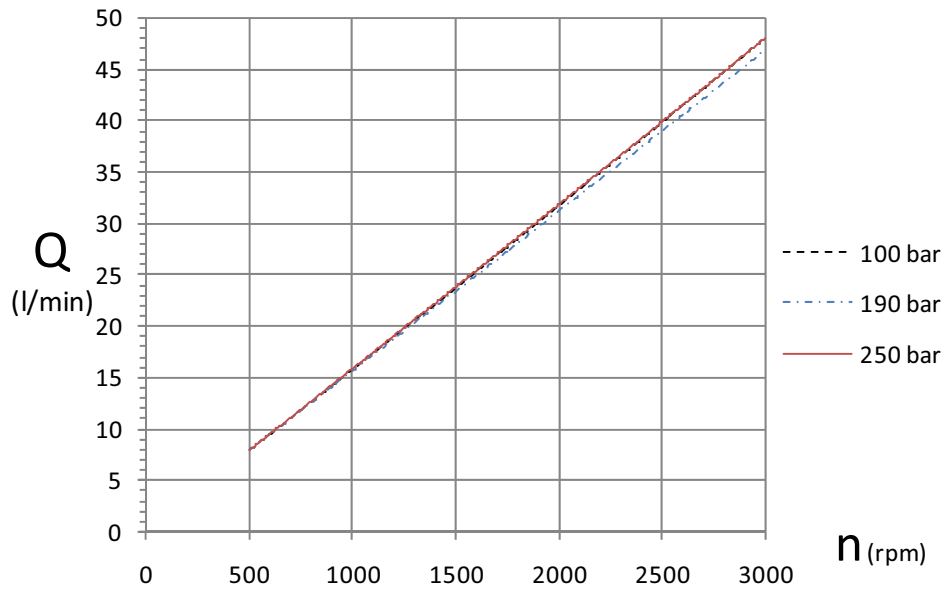
Test temperature 50 ± 2°C with ISO VG46 oil



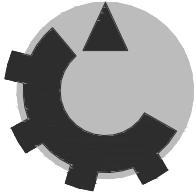


## Typical performance curves – gear pump 16 cm<sup>3</sup>/rev

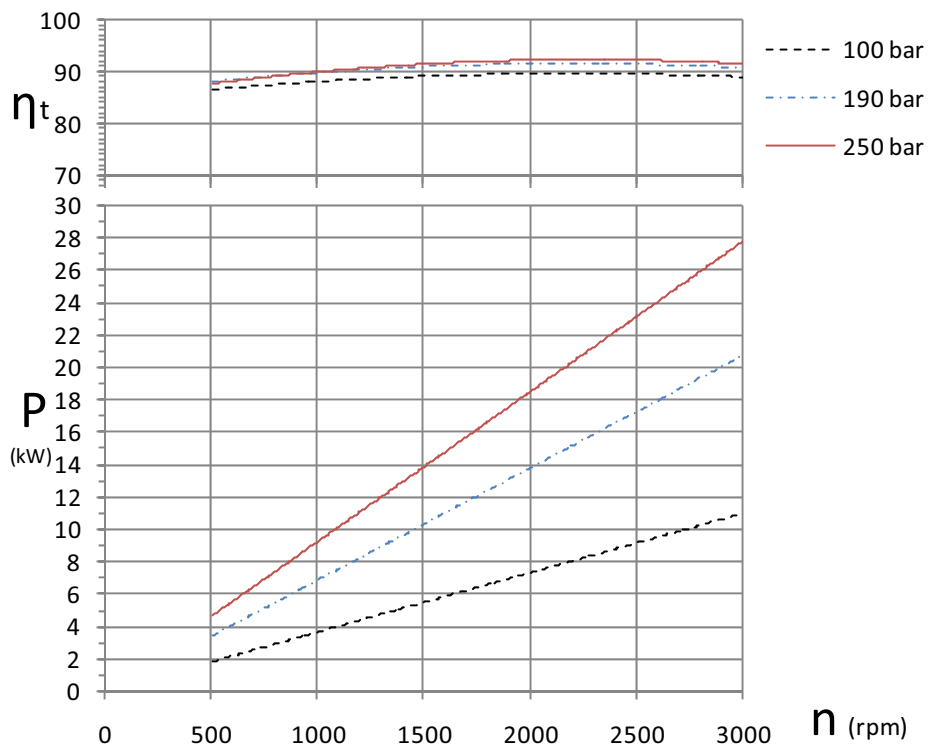
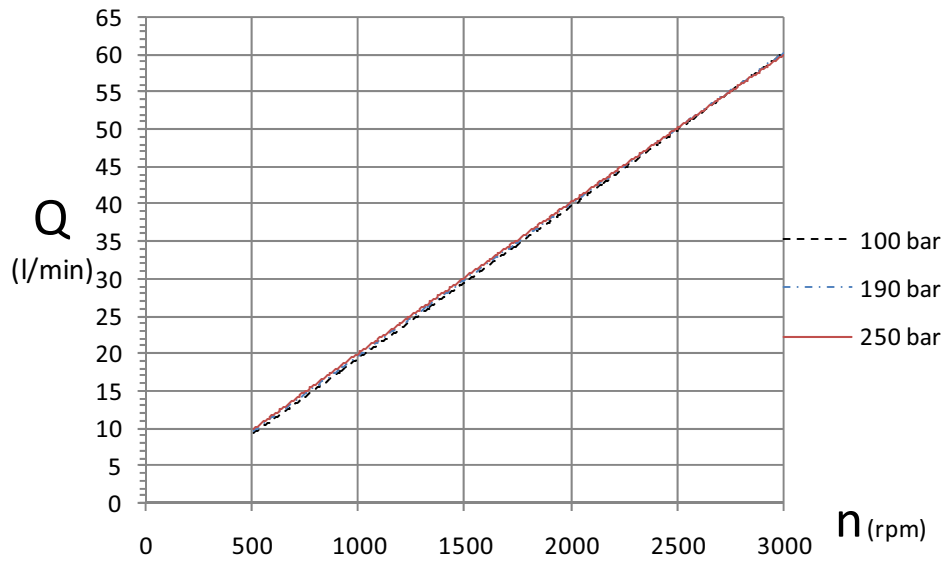
Test temperature 50 ± 2°C with ISO VG46 oil

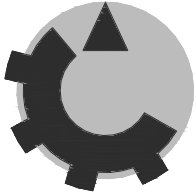






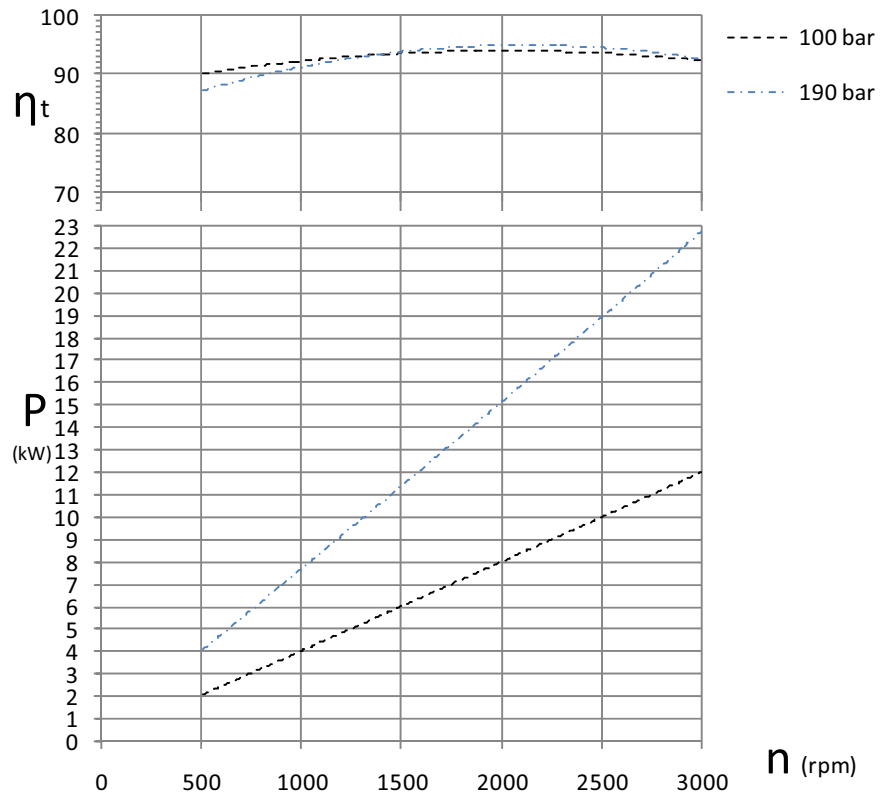
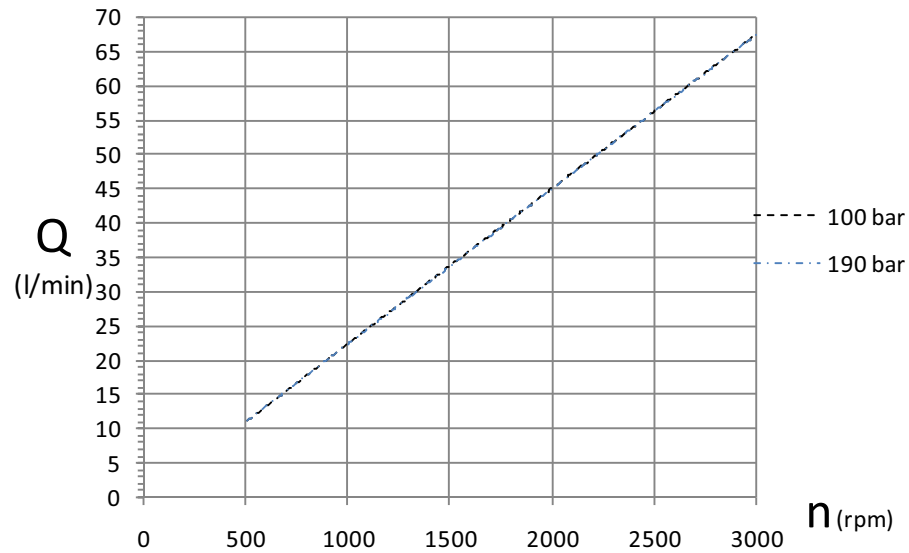
Typical performance curves – gear pump 20 cm<sup>3</sup>/rev  
Test temperature 50 ± 2°C with ISO VG46 oil

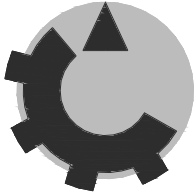




## Typical performance curves – gear pump 22.5 cm<sup>3</sup>/rev

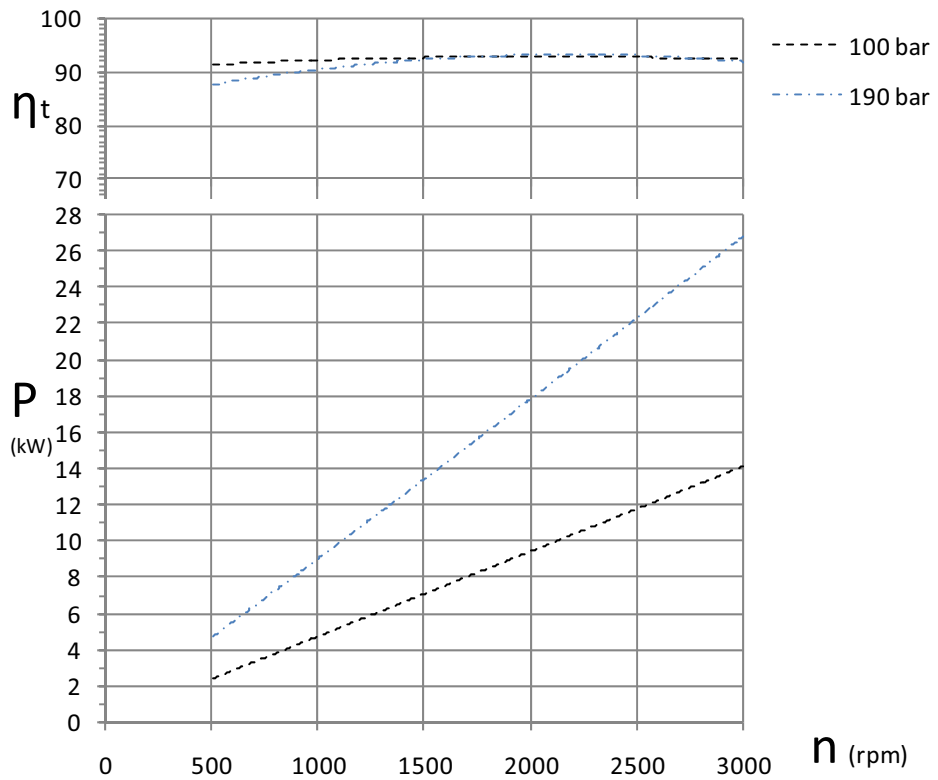
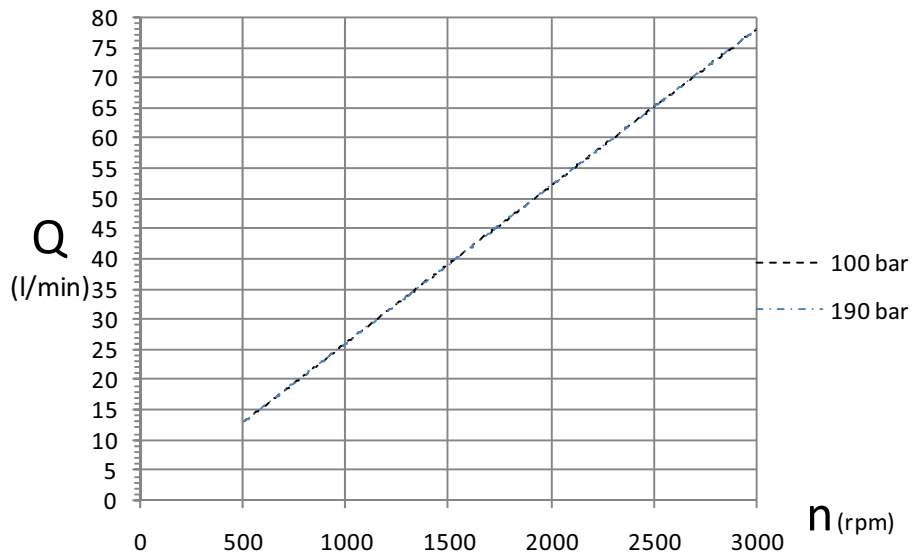
Test temperature 50 ± 2°C with ISO VG46 oil

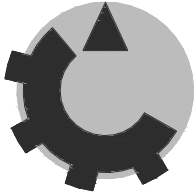




## Typical performance curves – gear pump 26 cm<sup>3</sup>/rev

Test temperature 50 ± 2°C with ISO VG46 oil





## Useful formulas

### **Flow:**

To calculate the output flow "Q" delivered by a pump at a certain speed "n":

$$Q = \frac{V \cdot n}{1000} \cdot \eta_v \text{ [ l / min]}$$

V = Pump capacity [ cm<sup>3</sup> / rev ]

n = Speed [ rpm]

$\eta_v$  = Volumetric Efficiency (assume, for general calculations 0,93-0,97 from 1000 to 3000 rpm)

### **Power-Efficiencies**

Hydraulic Power: the hydraulic power  $W_h$  transferred to an oil flow Q due to a pressure variation  $\Delta p$  is given by the:

$$W_h = \frac{Q \cdot \Delta p}{600} \text{ [kW]}$$

Mechanical Power: the mechanical power  $W_m$  absorbed from a pump shaft is given by the following:

$$W_m = \frac{M_t \cdot n \cdot \pi}{30 \cdot 1000} \text{ [kW]}$$

### **Torque**

To calculate the torque  $M_t$  necessary to run a pump under a differential pressure  $\Delta p$ :

$$M_t = \frac{V \cdot \Delta p}{20 \cdot \pi \cdot \eta_m} \text{ [N} \cdot \text{m]}$$

$\Delta p$  = Differential pressure between outlet and inlet [ bar ]

$\eta_m$  = Mechanical efficiency of the pump (assume, for general calculations 0.85 at cold start, 0.9 on steady running).

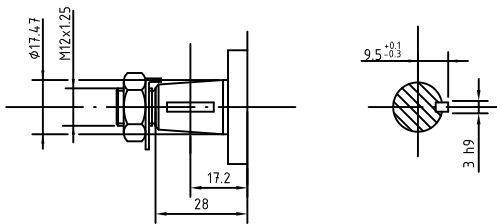




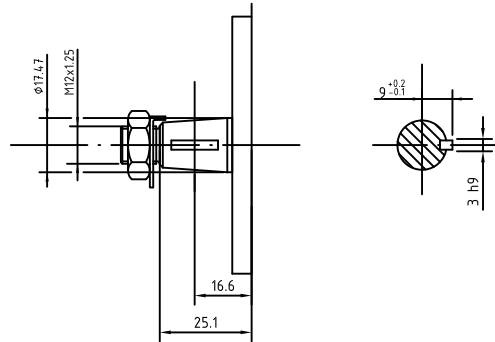


## Drive shaft

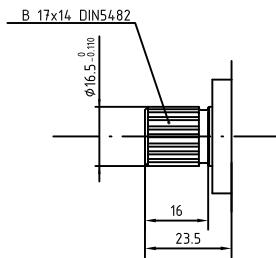
Tapered 1:8					CO 01
For mounting flanges					
01	02				
Dimensions in figure refer to mounting flange 01					



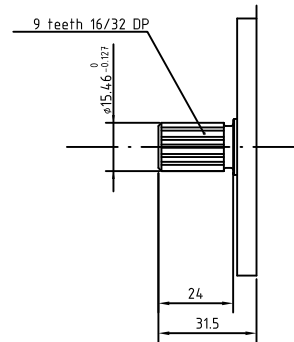
Tapered 1:5					CO 02
For mounting flanges					
03	04	05			
Dimensions in figure refer to mounting flange 03					



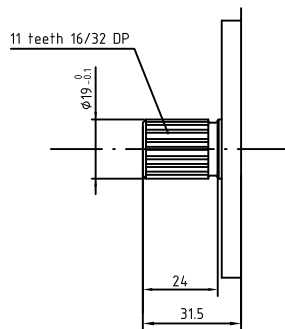
DIN 5482 Splined					SC 01
For mounting flanges					
01	02	03	04	05	
Dimensions in figure refer to mounting flange 01					



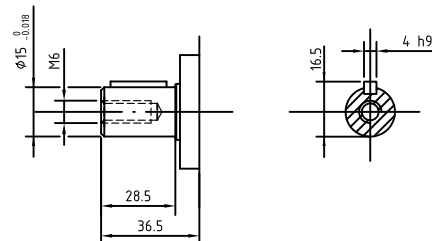
SAE "A" 9 T					SC 02
For mounting flanges					
02	03				
Dimensions in figure refer to mounting flange 02					

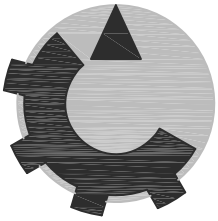


SAE "A" 11 T					Sc 03
For mounting flanges					
02					
Dimensions in figure refer to mounting flange 02					



Parallel					CI 01
For mounting flanges					
01	02				
Dimensions in figure refer to mounting flange 01					



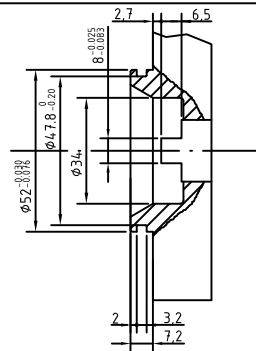


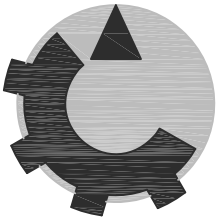

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## Drive shaft

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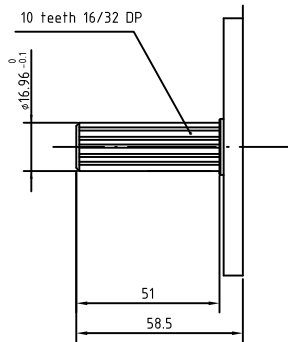
Tang drive for electric motors		FR 01	
For mounting flanges			
06	07	08	
Dimensions in figure refer to mounting flange 06			



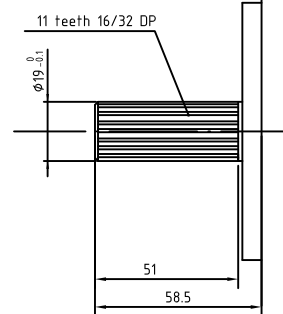


Special drive shaft

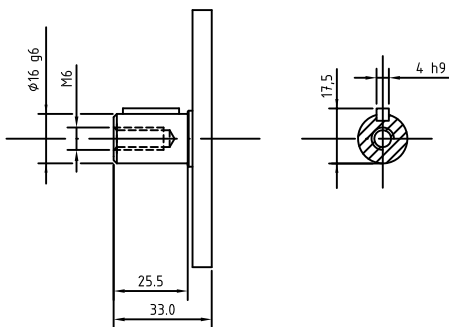
SAE "A" 10 T				SC 04
For mounting flanges				
02	03			
Dimensions in figure refer to mounting flange 03				



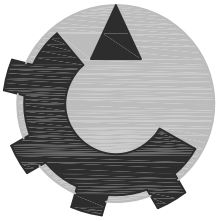
SAE "A" 11 T				SC 05
For mounting flanges				
02	03			
Dimensions in figure refer to mounting flange 03				



Parallel				CI 03
For mounting flanges				
01	02	03		
Dimensions in figure refer to mounting flange 03				

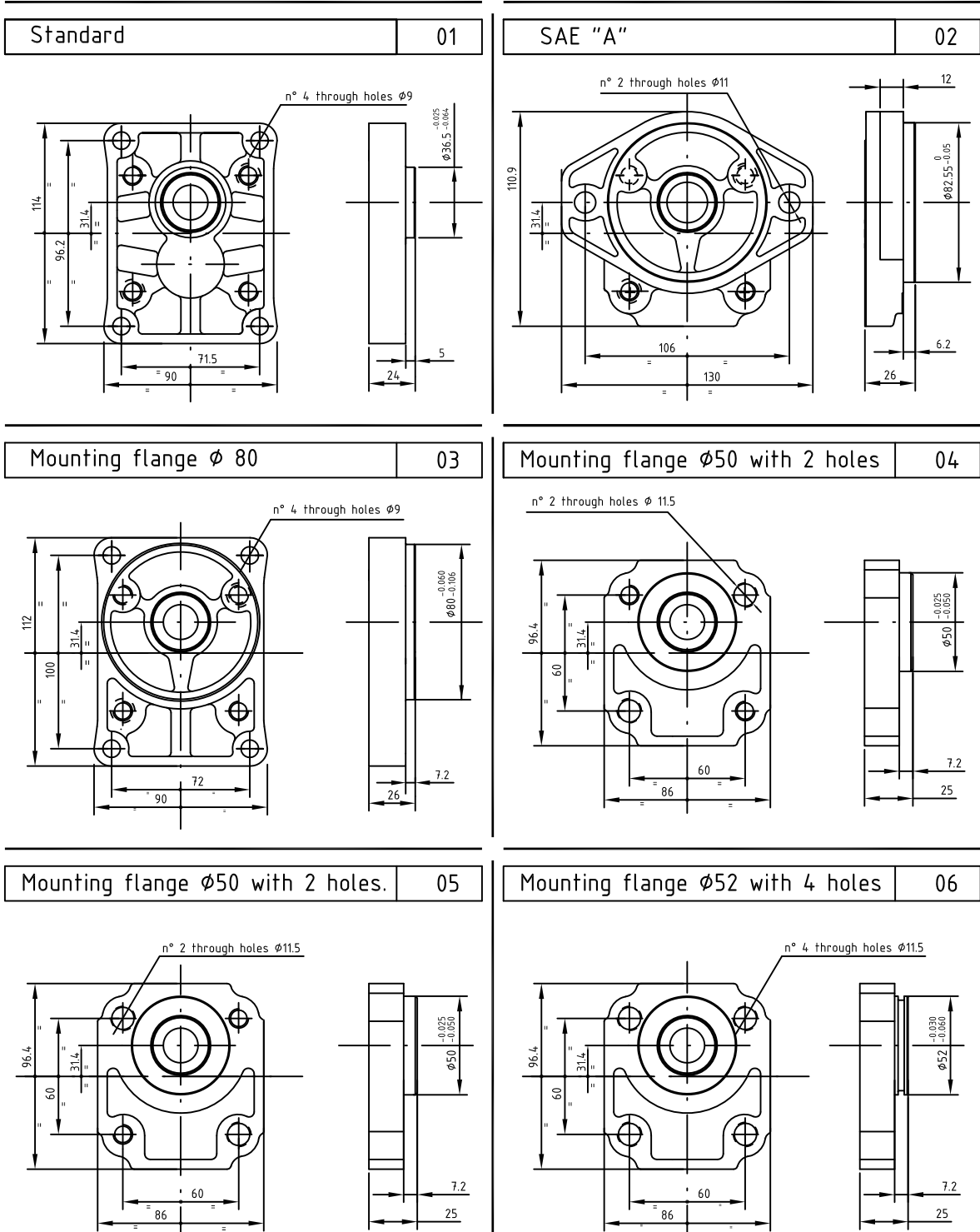


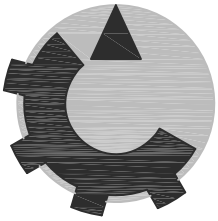
version April 2009



Mounting flanges

version April 2009





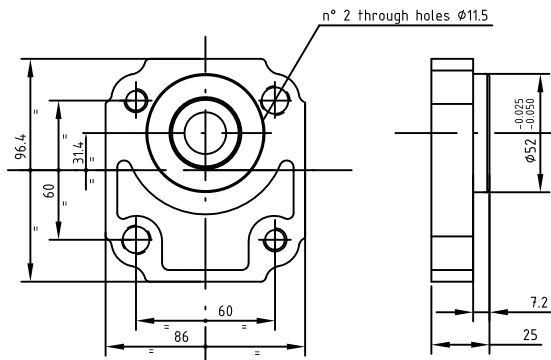
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## Mounting flanges

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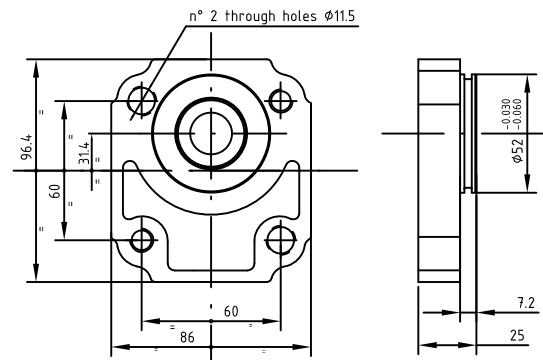
Mounting flange  $\phi 52$  with 2 holes.

07

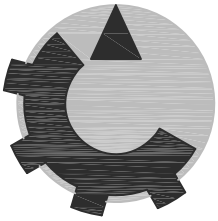


Mounting flange  $\phi 52$  with 2 holes

08

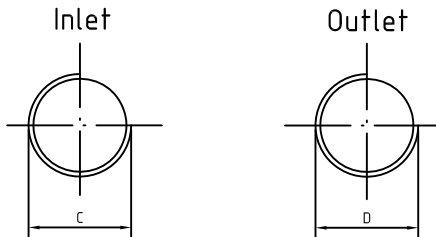






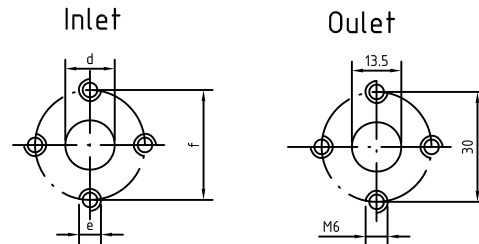
## Flanged ports

Type A



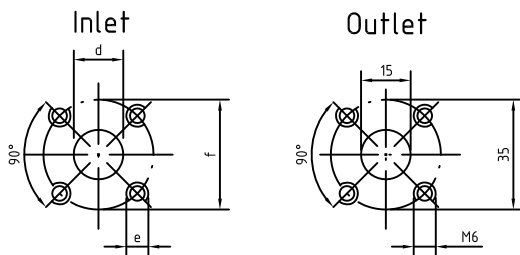
Type	C	D
4 - 8	G 1/2"	G 1/2"
11 - 26	G 3/4"	G 1/2"

Type B



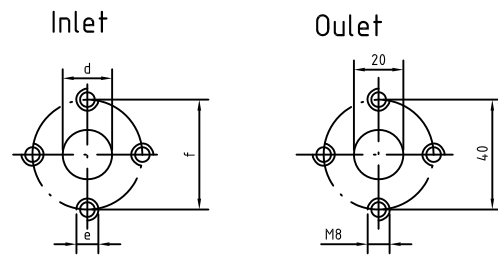
Type	d	f	e
4 - 11	13.50	30	M6
14 - 22.5	20	40	M8

Type C



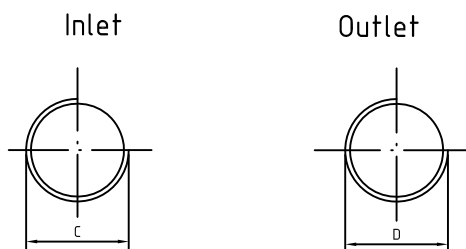
Type	d	f	e
4 - 8	15	40	M6
11 - 26	20	40	M6

Type D



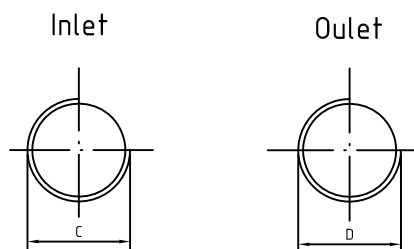
Type	d	f	e
26	23.50	40	M8

Type E

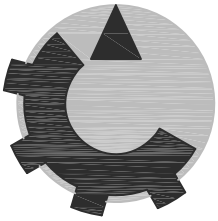


Type	C	D
4 - 8	7/8 - 14UNF	7/8 - 14UNF
11 - 26	1" 1/16 - 12UN	7/8 - 14UNF

Type F



Type	C	D
4 - 26	1" 5/16 - 12UN	1" 1/16 - 12UN

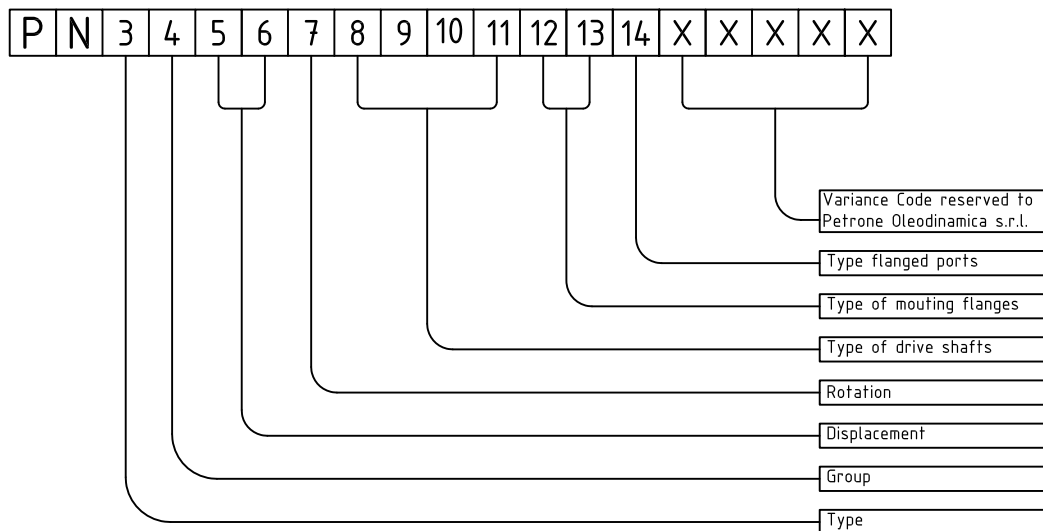


# Petrone Oleodinamica

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## Single pump code

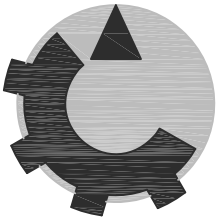
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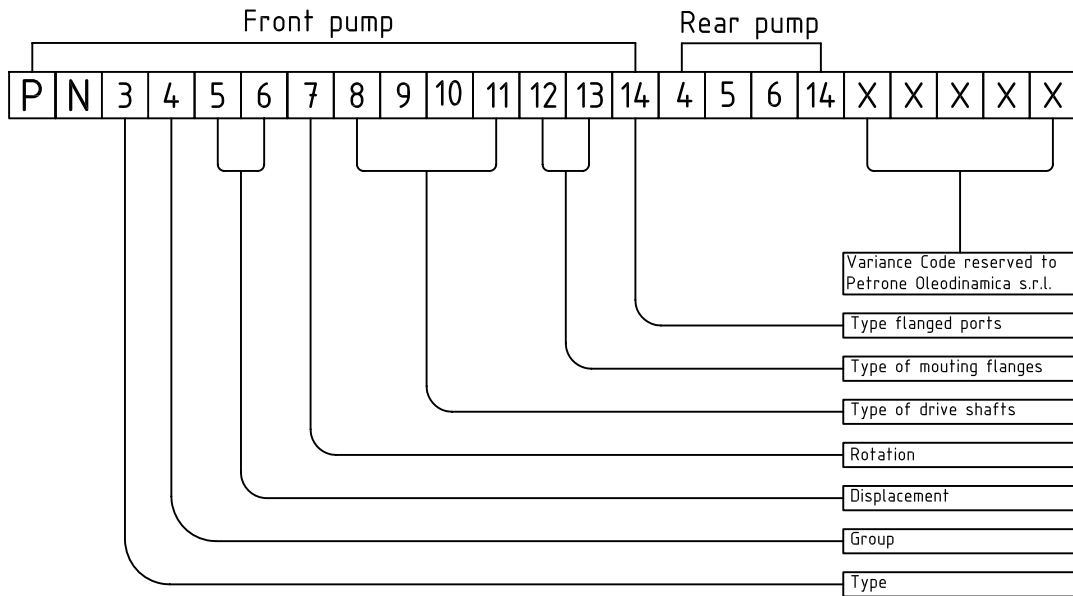
- (3) Type <Pump> <Motor>
- (4) Group <2>
- (5) (6) Displacement <04> <06> <08> <11> <14> <16> <20> <22> <26>
- (7) Rotation <Dx> <Sx>
- (8) (9) (10) (11) Type of drive shaft <CO01><CO02><SC01><SC02><SC03><CI01><CI02><FR01>
- (12) (13) Type of mounting flanges <01><02><03><04><05><06>
- (14) Type of flanged ports <A><B><C><D><E><F>

Example to order a simple pump: PNP 2/04 D CO01 01 A Pump 4 cm<sup>3</sup>/rev, right, drive shaft tapered 1:8, mounting flange standard, flanged ports type A.



# Petrone Oleodinamica

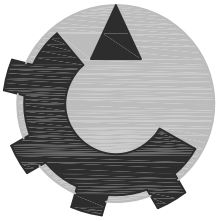
## Tandem pump code



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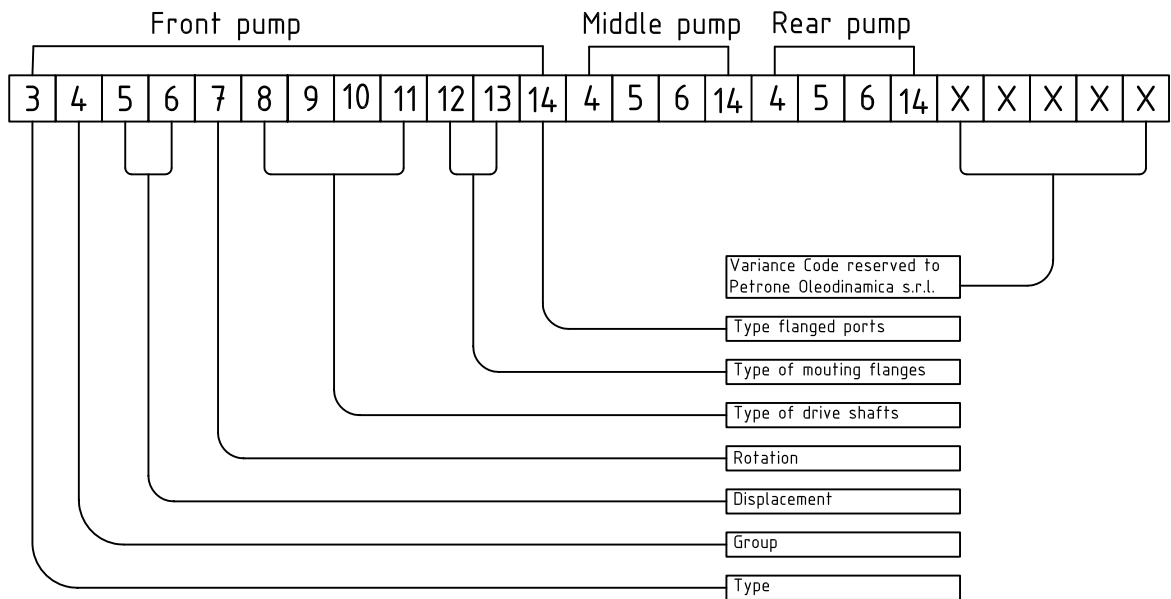
- (3) Type <Pump> <Motor>
- (4) Group <2>
- (5) (6) Displacement <04> <06> <08> <11> <14> <16> <20> <22> <26>
- (7) Rotation <Dx> <Sx>
- (8) (9) (10) (11) Type of drive shaft <CO01><CO02><SC01><SC02><SC03><CI01><CI02><FR01>
- (12) (13) Type of mounting flanges <01><02><03><04><05><06>
- (14) Type of flanged ports <A><B><C><D><E><F>

Example to order a tandem pump: PNP 2/08 D CO01 01 A 2/04 Pump 4 cm<sup>3</sup>/rev-8 cm<sup>3</sup>/rev, right ,drive shaft tapered 1:8, mounting flange standard, flanged ports type A.



# Petrone Oleodinamica

## Triple pump code



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- (3) Type <Pump> <Motor>
- (4) Group <2>
- (5) (6) Displacement <04> <06> <08> <11> <14> <16> <20> <22> <26>
- (7) Rotation <Dx> <Sx>
- (8) (9) (10) (11) Type of drive shaft <CO01>-<CO02>-<SC01>-<SC02>-<SC03>-<CI01>-<CI02>-<FR01>
- (12) (13) Type of mounting flanges <01>-<02>-<03>-<04>-<05>-<06>
- (14) Type of flanged ports <A>-<B>-<C>-<D>-<E>-<F>

Example to order a triple pump: P 2/08 D CO01 01 A 2/08 A 2/04 Pump 8 cm<sup>3</sup>/rev-8 cm<sup>3</sup>/rev-4 cm<sup>3</sup>/rev, right, drive shaft tapered 1:8, mounting flange standard, flanged ports type A.