

Variable displacement vane pump (with mechanical pressure compensator)

PLP-Type



Key Features:

- Rotation:** Right (viewed from shaft end)
- Mounting flanges:** 4-hole flange (UNI ISO 3019/2) and Rectangular Flange as gear pump Size 2 (only for PLP Size 05)
- Connections:** GAS BSP (UNI ISO 228/1) and SAE
- Integrated mechanical displacement limiter as standard on all pumps**
- Set-up for combined pumps on request**

| Series/Name | Rated Displacement (cm ³ /r) | Maximum Flow Capacity at 1450 rpm (L/min) | Maximum Pressure (bar) |
|--------------|---|---|------------------------|
| 01-PLP-05-16 | 16 | 23 | 120 |
| 01-PLP-1-20 | 20 | 29 | 100 |
| 01-PLP-1-25 | 25 | 36 | 100 |
| 01-PLP-1-32 | 32 | 47 | 100 |
| 01-PLP-2-40 | 40 | 58 | 100 |
| 01-PLP-2-50 | 50 | 73 | 100 |
| 01-PLP-2-63 | 63 | 92 | 100 |

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WARNING

All Berarma pumps have been carefully checked during manufacture and subjected to stringent testing cycles before shipment. To achieve optimum performance, avoid problems and maintain the warranty, the installation instructions enclosed with each pump sold must be strictly observed.

NOTES

Before selection and/or use of any Berarma product, it is important that the purchaser carefully analyses all aspects of its application and reviews the information in the current Berarma Technical-Sales catalogues. Due to the many different operating conditions and applications for Berarma products, the purchaser, through their own analysis and testing, is solely responsible for making the final selection of the products and assuring that all performance and safety requirements are met.

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GENERAL DESCRIPTION

As a result of the constant research carried out in order to introduce innovative products to the market characterised by high technological content and reliability, BERARMA has launched the **new 01 PLP series of LOW PRESSURE variable displacement vane pumps equipped with a MECHANICAL pressure regulating device.**

The new series of 01 PLP pumps, like all other BERARMA variable displacement vane pumps, ensure

- SILENT RUNNING
- HIGH EFFICIENCY
- LONG WORKING LIFE
- MODULAR DESIGN
- ENERGY SAVING

Moreover, the innovation related to the new series of vane pumps has led to an **IMPROVEMENT OF DISPLACEMENT CONTROL DYNAMICS and IMPROVED AXIAL BALANCING** thanks to the refinement of the hydrostatic compensation of the distribution plates. The 01 PLP pumps are come with dual inlet and outlet channels in the internal pump cartridge.

The new series of 01 PLP pumps is supplied with:

- ISO standard MOUNTING FLANGES
- GAS BSP and SAE standard PORT CONNECTIONS
- flow regulator unit in order to mechanically reduce pump displacement
- mechanical pressure regulating device
- (on request only) set-up for coupling to all BERARMA pumps or to the main others types of pump available on the fluid power market.

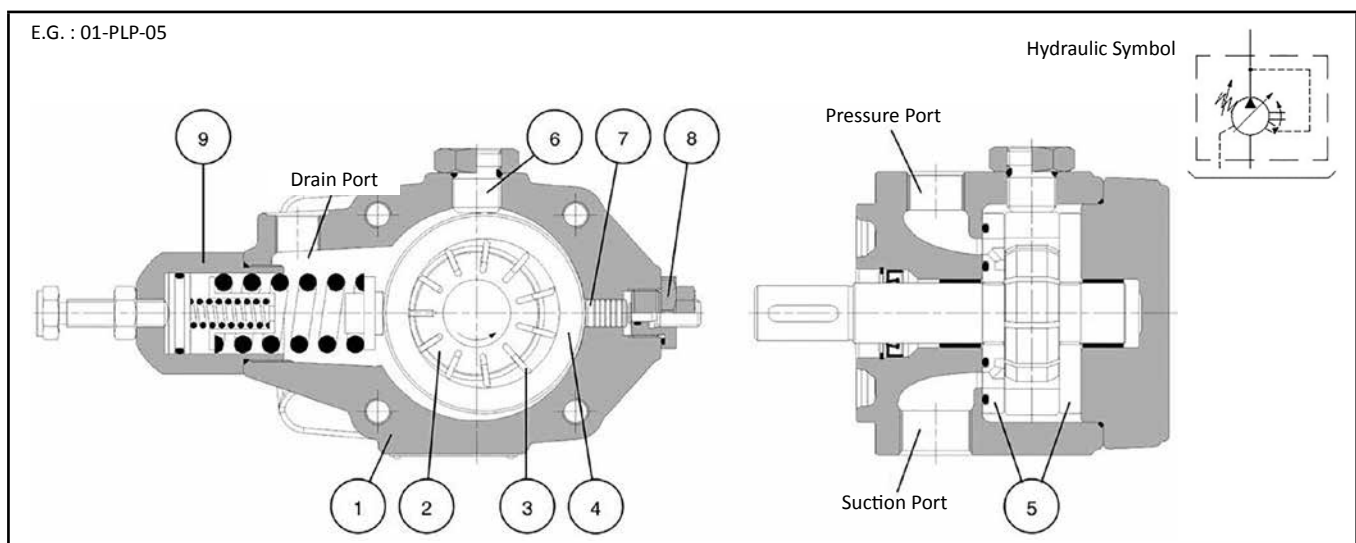
Based on the above features, the new series of 01 PLP pumps is of great interest to the market.

What makes the new BERARMA 01 PLP series pumps interesting for the market?

- INNOVATIVE SHAPES AND DESIGN
- COMPACT OVERALL DIMENSIONS
- REDUCTION IN WEAR on internal pump cartridge parts

NOTES AND DEFINITION OF PUMP COMPONENTS

Body (1); Drive rotor (2) where the Vanes (3) flow; Stator (mobile ring with varying eccentricity and consequently displacement) (4); Side distribution plates (5); Guide block balancing adjustment screw (6) (**absolutely must not be tampered with by the user**); Displacement adjustment piston (7); Flow regulator unit (8); Pressure regulating device (9).



TECHNICAL DATA

| NOMINAL SIZE | | SIZE 05 | SIZE 1 | | | SIZE 2 | | |
|---|------|---|---------------------------|-----|------|------------|-----|----|
| Geometric displacement according to UNI-ISO 3662 (cm ³ /r) | | 16 | 20 | 25 | 32 | 40 | 50 | 63 |
| Actual displacement (cm ³ /r) Due to manufacturing tolerances, the value can vary by approx. ± 3% | | 17,9 | 22.5 | 28 | 33.4 | 43 | 51 | 63 |
| Maximum working pressure (bar) Pressure peak exceeding 30% of the maximum operating pressure must be eliminated by adopting the appropriate measures | | 120 | 100 | | | | | |
| Pressure setting range (bar) | | H: 20 - 120 | L: 15 - 50 H: 30 - 100 | | | | | |
| Permitted maximum drain port pressure (bar) | | 1 | | | | | | |
| Inlet pressure (bar) | | 0.8 - 1.5 absolute | | | | | | |
| Speed range (r/min) | | 800 - 1800 | | | | 800 - 1500 | | |
| Rotation direction (viewed from shaft end) | | R - Right (clockwise) | | | | | | |
| Loads on drive shaft | | NO RADIAL OR AXIAL LOADS ALLOWED | | | | | | |
| Maximum torque on primary shaft (Nm) | Tmax | F Flange 110 | FGR2 Flange 70 | 250 | | | 586 | |
| Hydraulic fluid | | HM hydraulic oil according to ISO 6743/4 HLP according to DIN 5124/2 for other fluids contact Berarma Technical-Sales Service | | | | | | |
| Viscosity range (cSt, mm ² /s) | | 22 - 68 at operating temperature | | | | | | |
| Starting viscosity under full flow conditions (cSt, mm ² /s) | | 400 max | | | | | | |
| Viscosity index according to ISO 2909 | | 100 min | | | | | | |
| Inlet fluid temperature range (°C) | | +15 / +60- pay attention to viscosity range | | | | | | |
| Maximum acceptable fluid contamination level | | 20/18/15 according to ISO 4406/99, CLASS 9 according to NAS 1638 | | | | | | |
| Recommended fluid contamination level for a longer pump working life | | 18/16/13 according to ISO 4406/99, CLASS 7 according to NAS 1638 | | | | | | |
| Moment of inertia (kgm ²) | | 0.00012 | 0.00050 | | | 0.00909 | | |
| Weight (kg) | | 7.4 | 18.3 | | | 43.8 | | |

For further information and/or different operating conditions, please contact Berarma Technical-Sales Service

ORDERING CODE

| Series/ Name | Size Displacement | Flange | Pressure setting | Rotation | Seals | Combined pumps |
|-----------------|----------------------|--------|---------------------|----------|-------|-------------------|
| 01 PLP | | | | R | | |

| Code | Size | Displacement (cm ³ /r) |
|----------------|------|--------------------------------------|
| 05 - 16 | 05 | 16 |
| 1 - 20 | 1 | 20 |
| 1 - 25 | 1 | 25 |
| 1 - 32 | 1 | 32 |
| 2 - 40 | 2 | 40 |
| 2 - 50 | 2 | 50 |
| 2 - 63 | 2 | 63 |

| Code | Flange | Thread |
|-----------------------------------|-------------------------|----------------------------|
| F | UNI ISO3019/2 - 4 holes | GAS BSP UNI ISO 228/1; SAE |
| FGR2 (only for size 05) | As for gear pump size 2 | GAS BSP UNI ISO 228/1 |

| Code | Pressure setting |
|----------|---|
| H | 20 - 120 bar (for Size 05) 30 - 100 bar (for Size 1 and 2) |
| L | 15 - 50 bar (for Size 1 and 2) |

| Code | Rotation Direction |
|----------|-------------------------------|
| R | Right (viewed from shaft end) |

| Code | Seals |
|----------|-------------|
| M | NBR |
| E | FPM (viton) |

| Code | Combined pumps |
|----------|---|
| / | Omit for single pump |
| A | A - Primary and/or intermediate pump (available only for F flange) |

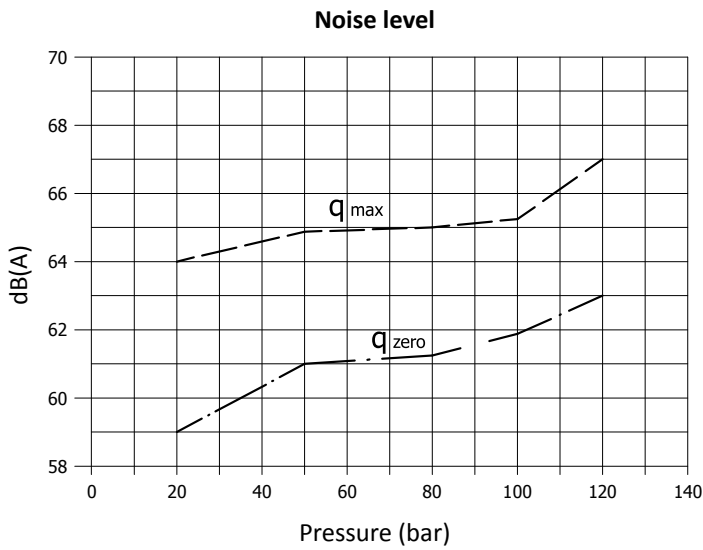
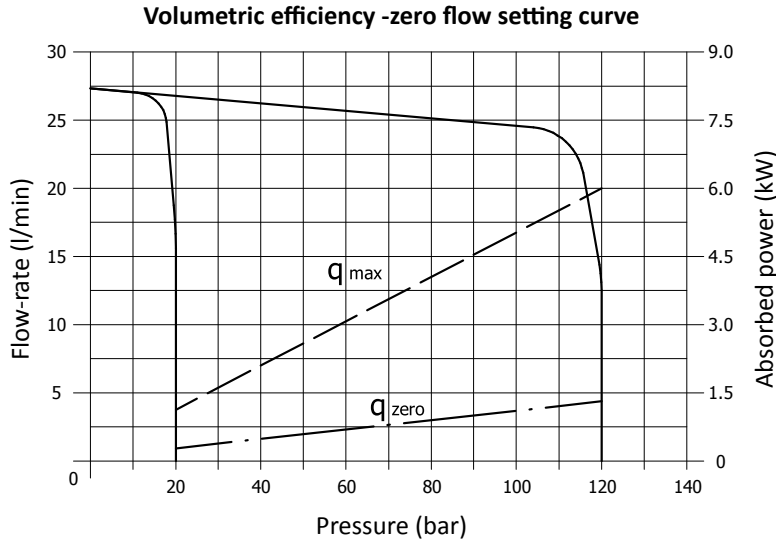
Ordering code example:

- 01 PLP 05-16 F H R M
- 01 PLP 05-16 F H R M A
- 01 PLP 05-16 FGR2 H R M
- 01 PLP 1-20 F L R M
- 01 PLP 1-32 F H R M A

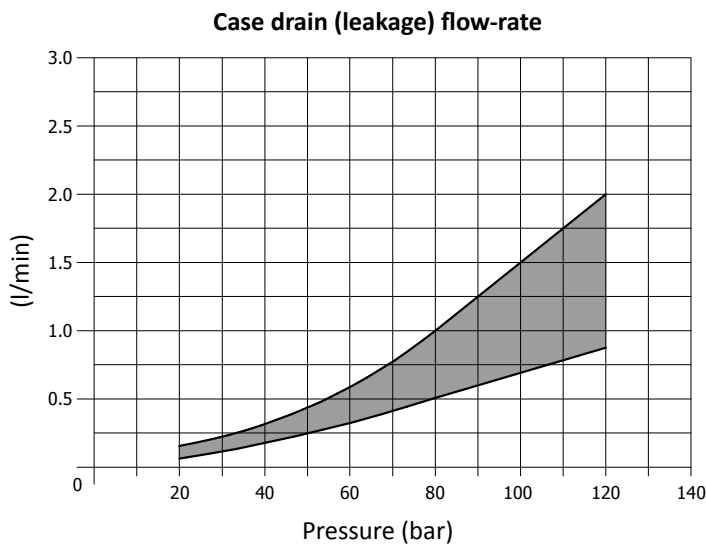
CHARACTERISTIC CURVES

Indicative values measured on Berarma test machine, referring to 1500 rpm, with HM hydraulic oil according to ISO 6743/4, ISO VG 46 according to ISO 3448, temperature 40 °C.

01 PLP 05 16



Indicative maximum noise level measured on Berarma test bench with sound-level meter placed 1 metre from the pump, with flexible coupling.

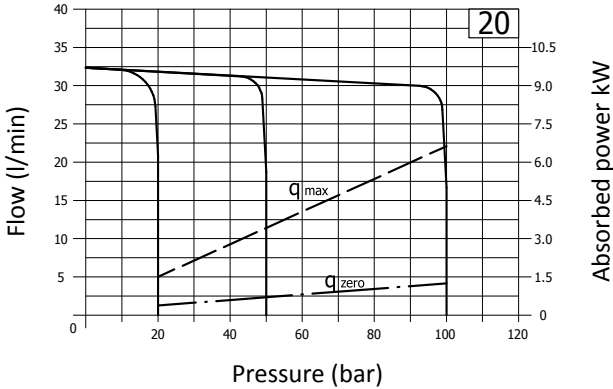


Pump under zero flow setting conditions

Indicative values measured on Berarma test machine, referring to 1500 rpm, with HM hydraulic oil according to ISO 6743/4, ISO VG 46 according to ISO 3448, temperature 40 °C.

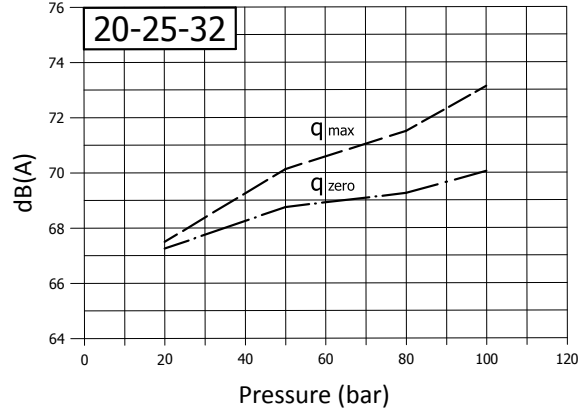
01 PLP 1 20-25-32

Volumetric efficiency -zero flow setting curve

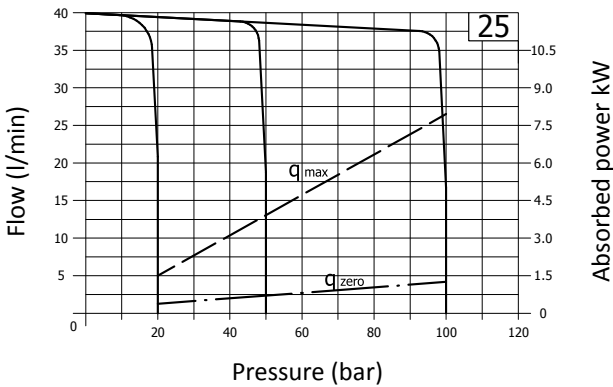


Noise level

Indicative maximum noise level measured on Berarma test bench with sound-level meter placed 1 metre from the pump, with flexible coupling.

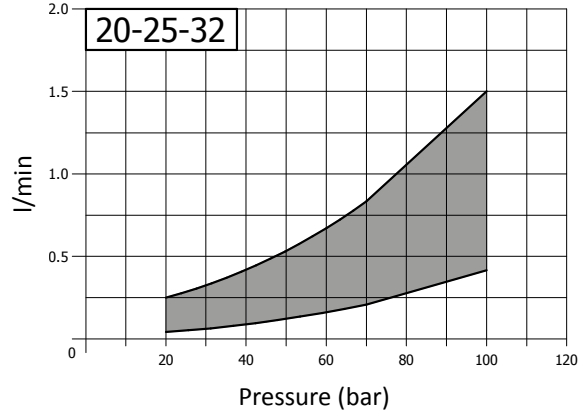


Volumetric efficiency -zero flow setting curve

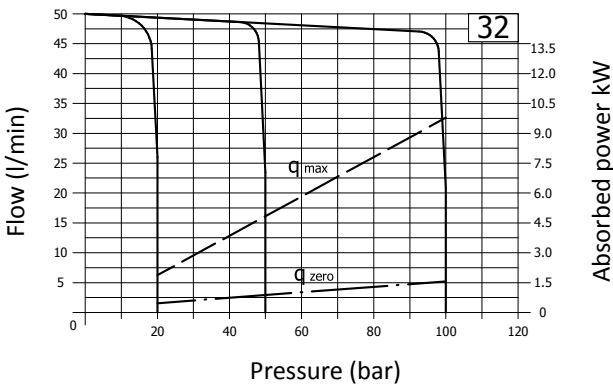


Case drain (leakage) flow-rate

Data with pump under zero flow setting



Volumetric efficiency -zero flow setting curve

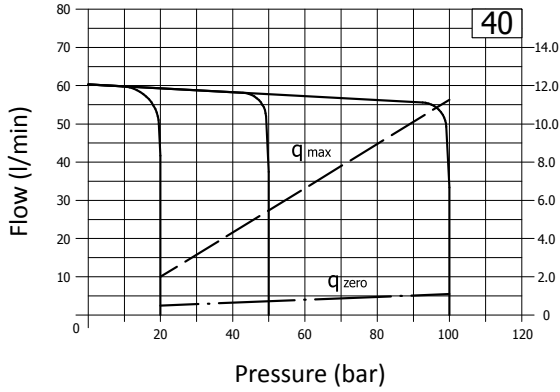


Indicative values measured on Berarma test machine, referring to 1500 rpm, with HM hydraulic oil according to ISO 6743/4, ISO VG 46 according to ISO 3448, temperature 40 °C.

CHARACTERISTIC CURVES

01 PLP 2 40-50-63

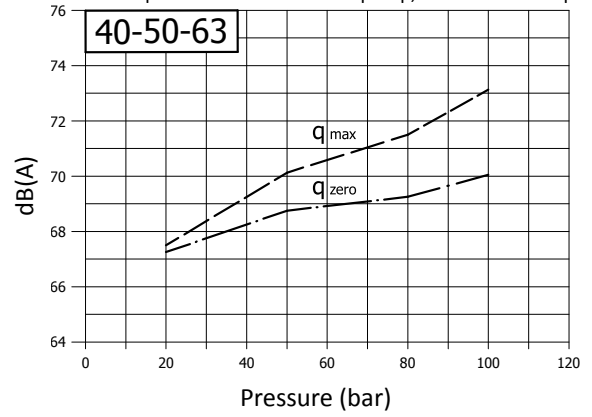
Volumetric efficiency -zero flow setting curve



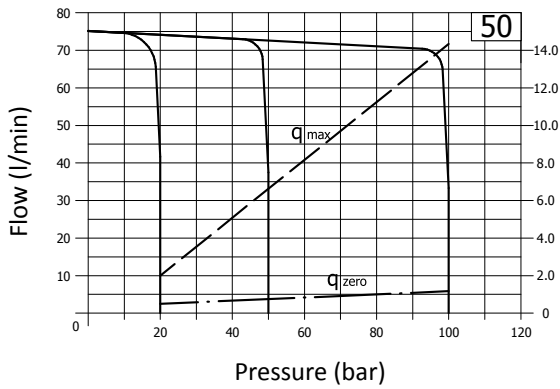
Absorbed power kW

Noise level

Indicative maximum noise level measured on Berarma test bench with sound-level meter placed 1 metre from the pump, with flexible coupling.



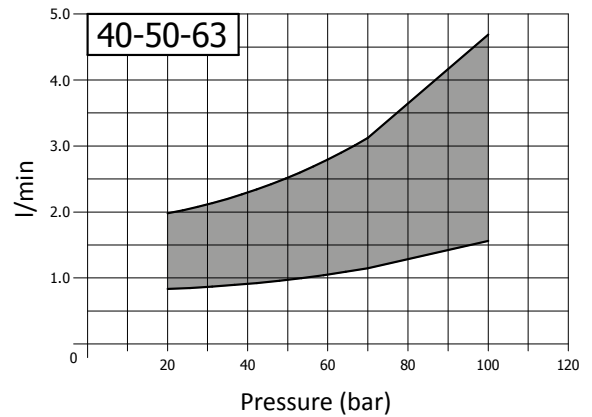
Volumetric efficiency -zero flow setting curve



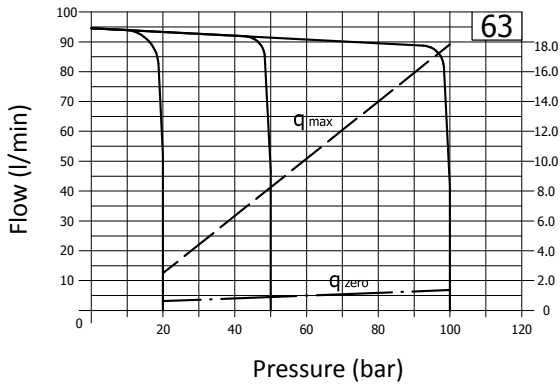
Absorbed power kW

Case drain (leakage) flow-rate

Data with pump under zero flow setting



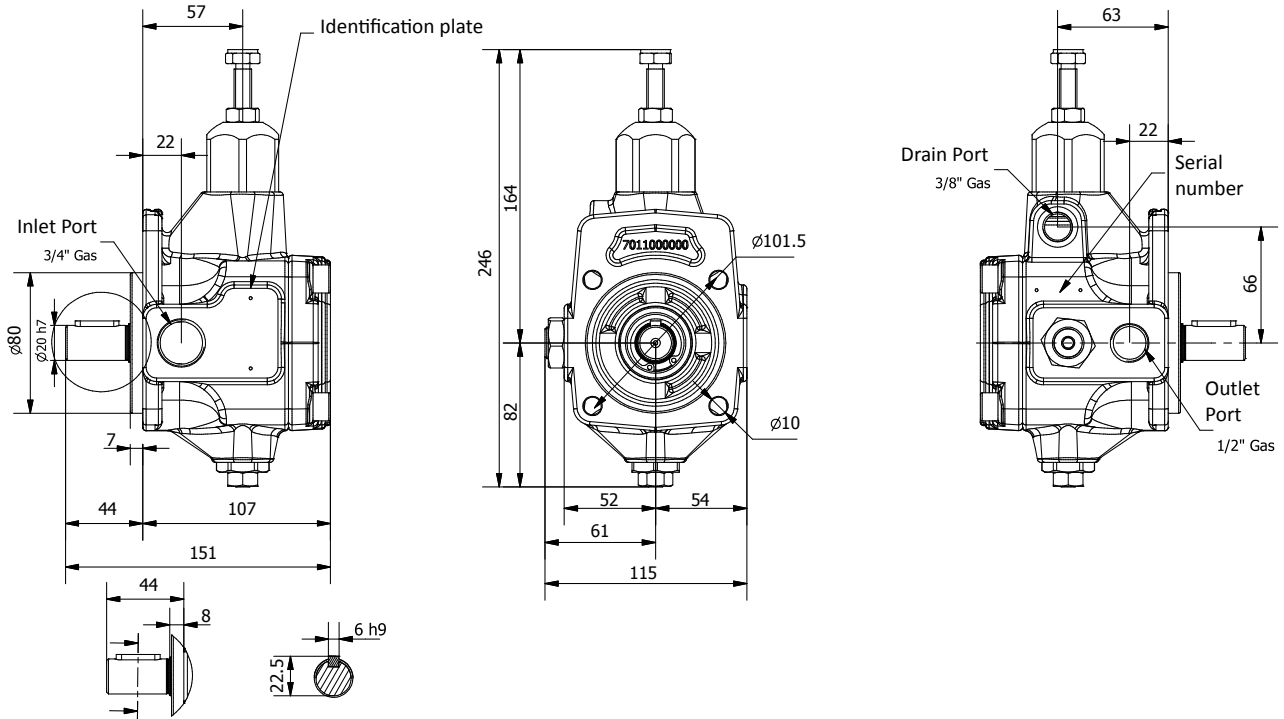
volumetric efficiency -zero flow setting curve



Absorbed power kW

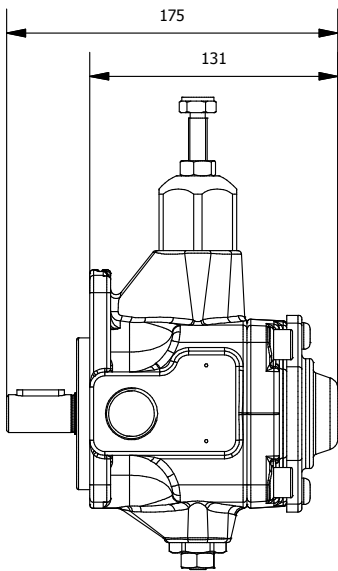
OVERALL DIMENSIONS

01 PLP 05 16 F

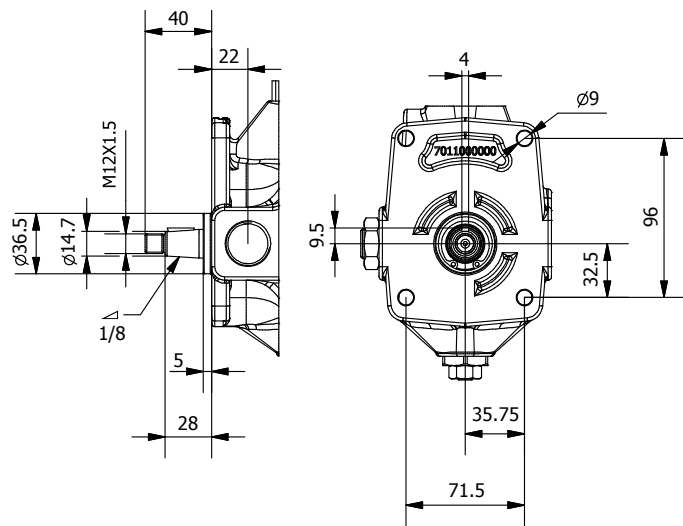


OVERALL DIMENSIONS

THRU-DRIVE SHAFT (-A)



FLANGE AND SHAFT FGR2

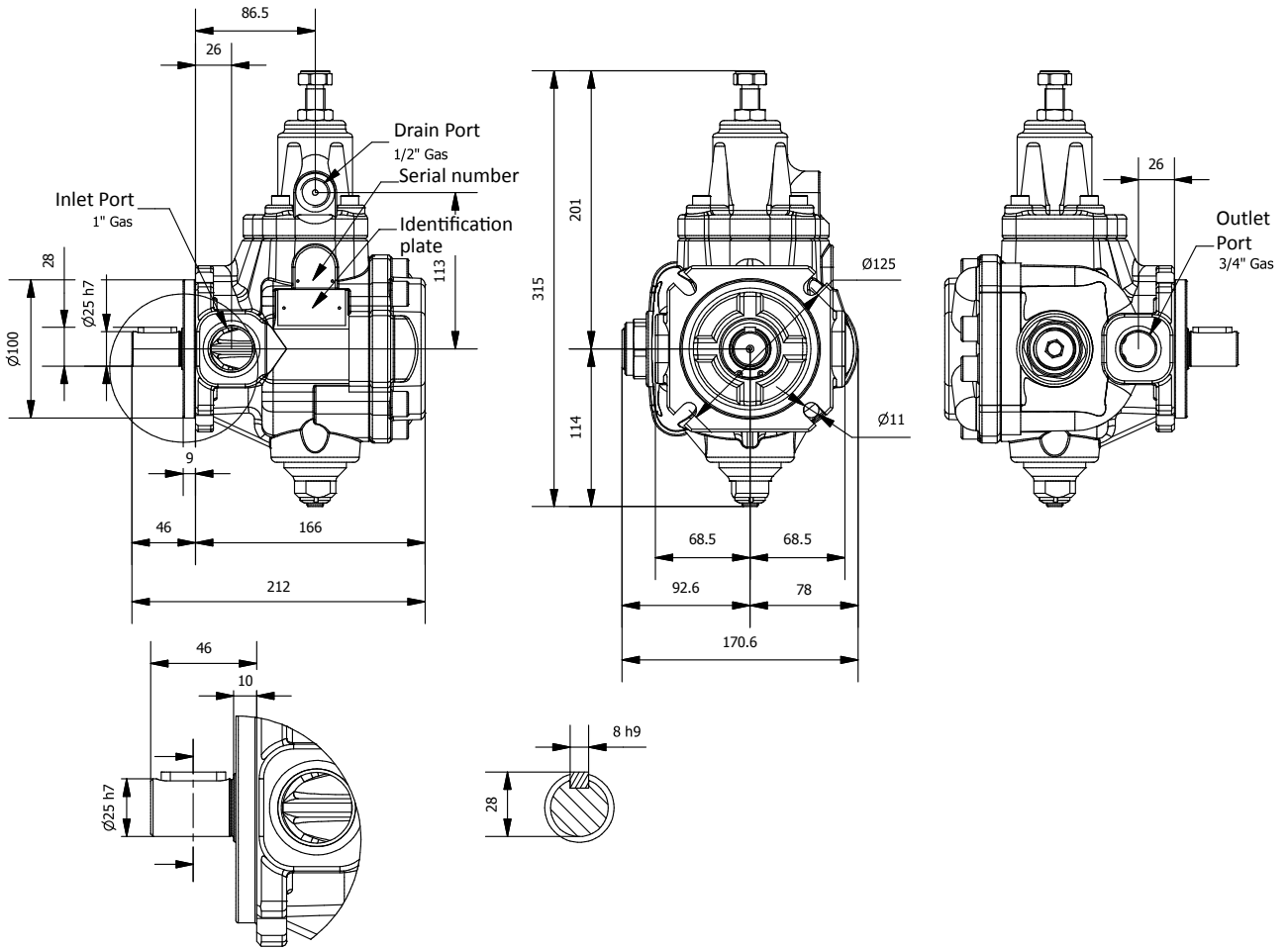


NOTE: Available only with F flange

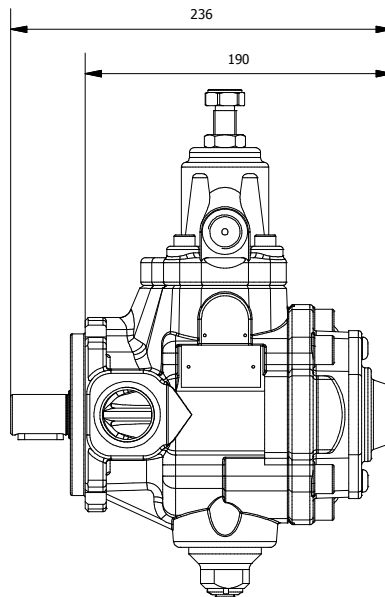
For combined pump solutions, please see pages 12-15

OVERALL DIMENSIONS

01 PLP 1 20-25-32 F

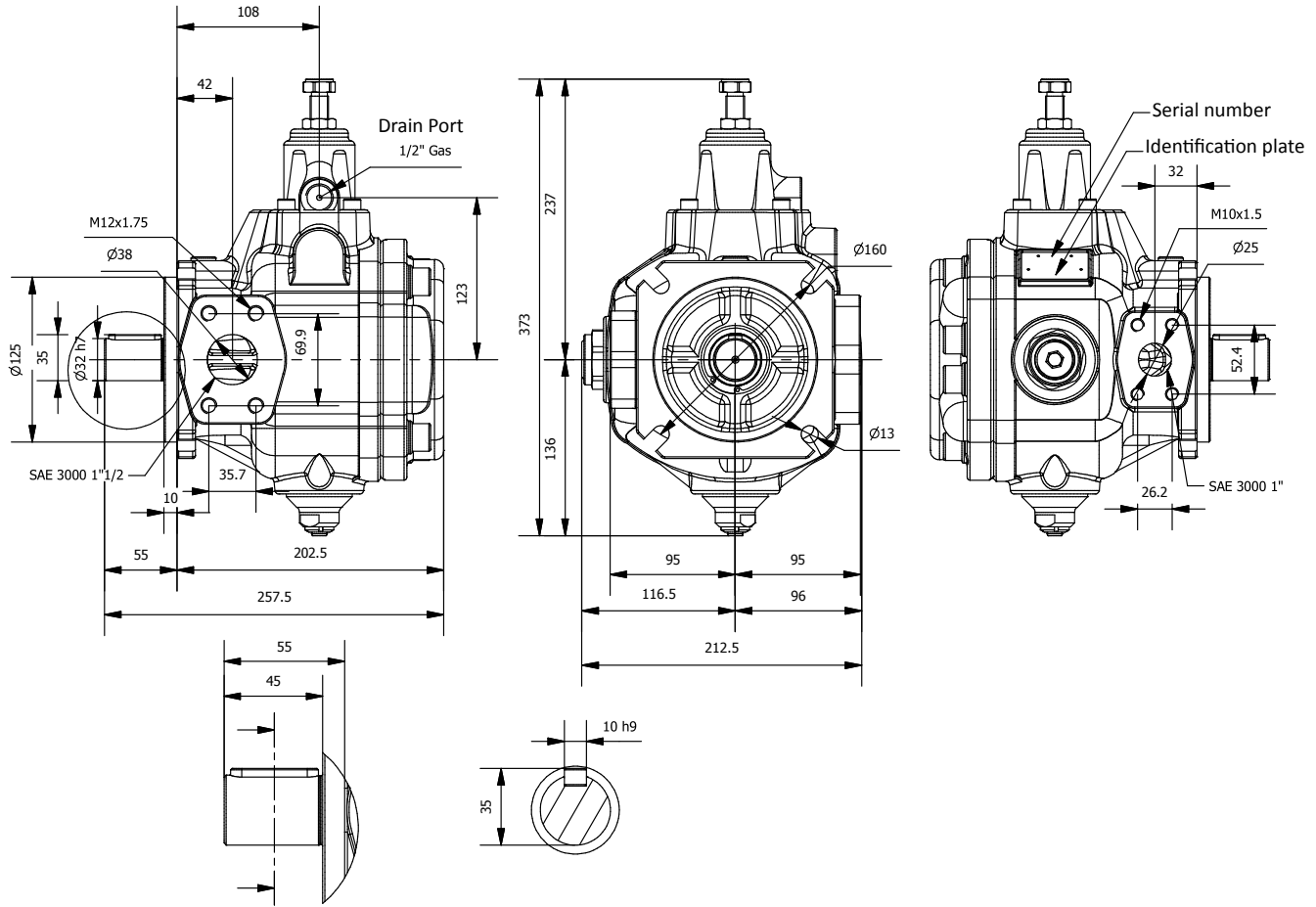


THRU-DRIVE SHAFT (-A)



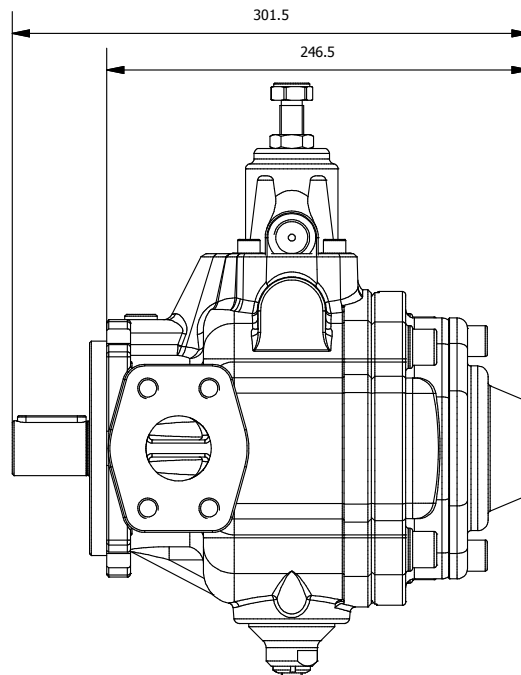
For combined pump solutions, please see pages 12-15

01 PLP 2 40-50-63 F



OVERALL DIMENSIONS

THRU-DRIVE SHAFT (-A)



For combined pump solutions, please see pages 12-15

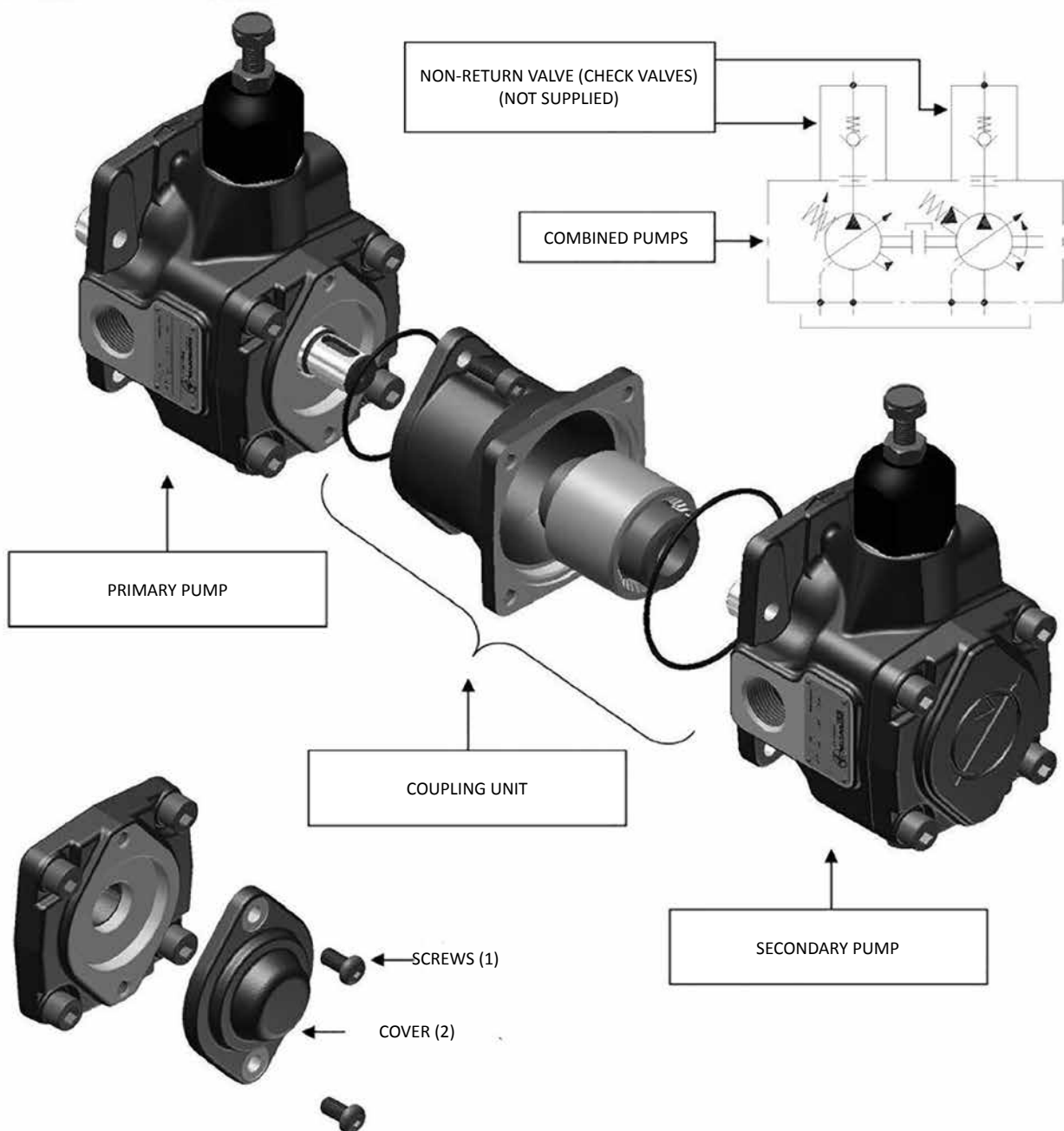
COMBINED PUMPS

On request, BERARMA pumps from the 01 PLP series can be set up for coupling:

- to pumps belonging to the same 01 PLP series;
- to pumps belonging to other BERARMA series;
- to the main others types of pumps available on the fluid power market.

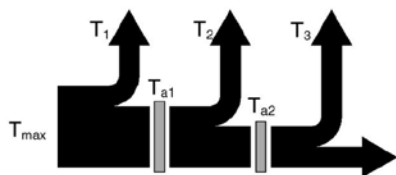
The 01 PLP series pumps set up for coupling are marked by the letter "A" in the ordering code. In these pumps, the shaft and the rear pump cover are set up for coupling to the various available coupling units.

- Unscrew the screws marked (1) from the primary pump (screws will not be re-installed)
- Remove the pump cover marked as (2) from the primary pump (cover will not be re-installed)
- Mount the coupling unit, paying attention to the seals (Note: primary pump drainage fluid will fill up the coupling bell-housing)
- Mount the secondary pump

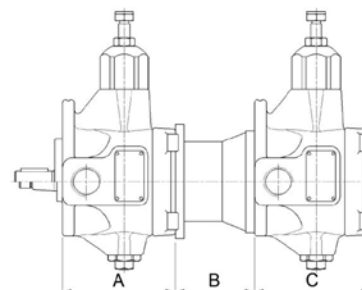


Combined pumps should be mounted in decreasing order of absorbed power, paying attention to the maximum acceptable torques (see diagram below). The ordering code for a combined pump should be specified according to coupling sequence (primary pump code + coupling unit code + secondary pump code).

- The sum of individual torques of all pumps in the complete pump combination must not exceed the maximum permissible torque value applicable to the primary pump shaft (T_{max} see page 4).
- Secondary pump torque (or sum of torques for more than one secondary pump) must not exceed the coupling unit maximum thru drive torque (T_a , see table below).



$$\begin{cases} T_1 + T_2 + T_3 < T_{max} \\ T_2 + T_3 < T_{a1} \\ T_3 < T_{a2} \end{cases}$$



| PRIMARY PUMP | | SECONDARY PUMP | | COUPLING UNIT | | |
|--------------------------|-------|-----------------------|-------|---------------|------|---------------------------------|
| Pump type | A | Pump type | C | Code | B | Maximum thru drive torque T_a |
| 01 PLP 05 16 F..A | 104 | 01 PLP 05 16 F | 107 | 3000010200 | 73 | 55 Nm |
| | | 01 PLP 05 16 FGR2 | 107 | 3000011200 | 72 | |
| | | 01 PHP 05 16 F | 145 | 3000010200 | 73 | |
| | | 01 PHP 05 16 FGR2 | 145 | 3000011200 | 72 | |
| | | SAE "A" | (*) | 3100000100 | 88.5 | |
| | | POMPA INGR.1P | (**) | 3000011000 | 64 | |
| | | POMPA INGR.1 | (**) | 3000011100 | 64 | |
| POMPA INGR.2 | (**) | 3000011200 | 72 | | | |
| 01 PLP 1 (20-25-32) F..A | 163 | 01 PLP 05 16 F | 107 | 3000010200 | 73 | |
| | | 01 PLP 05 16 FGR2 | 107 | 3000011200 | 72 | |
| | | 01 PHP 05 16 F | 145 | 3000010200 | 73 | |
| | | 01 PHP 05 16 FGR2 | 145 | 3000011200 | 72 | |
| | | SAE "A" | (*) | 3100000100 | 88.5 | |
| | | POMPA INGR.1P | (**) | 3000011000 | 64 | |
| | | POMPA INGR.1 | (**) | 3000011100 | 64 | |
| | | POMPA INGR.2 | (**) | 3000011200 | 72 | |
| 01 PLP 2 (40-50-63) F..A | 199.5 | 01 PLP 1 (20-25-32) F | 166 | 3000010100 | 75 | 110 Nm |
| | | POMPA INGR.1P | (**) | 3000022000 | 64 | |
| | | POMPA INGR.1 | (**) | 3000022100 | 64 | |
| | | POMPA INGR.2 | (**) | 3000022200 | 72 | |
| | | POMPA INGR.3 | (**) | 3000022300 | 75 | |
| | | 01 PLP 05 16 F | 107 | 3000020400 | 73 | |
| | | 01 PLP 05 16 FGR2 | 107 | 3000022200 | 72 | |
| | | 01 PHP 05 16 F | 145 | 3000020400 | 73 | |
| | | 01 PHP 05 16 FGR2 | 145 | 3000022200 | 72 | |
| | | 01 PLP 1 (20-25-32) F | 166 | 3000020100 | 75 | |
| | | 01 PHP 1 (20-25-32)F | 166 | 3000020100 | 75 | |
| | | 01 PLP 2 (40-50-63)F | 202.5 | 3000020200 | 108 | |
| | | SAE "A" | (*) | 3100000200 | 88.5 | |
| SAE "B" | (*) | 3100000300 | 132.5 | | | |

(*) For the secondary pump SAE A flange dimensions please see page 14.

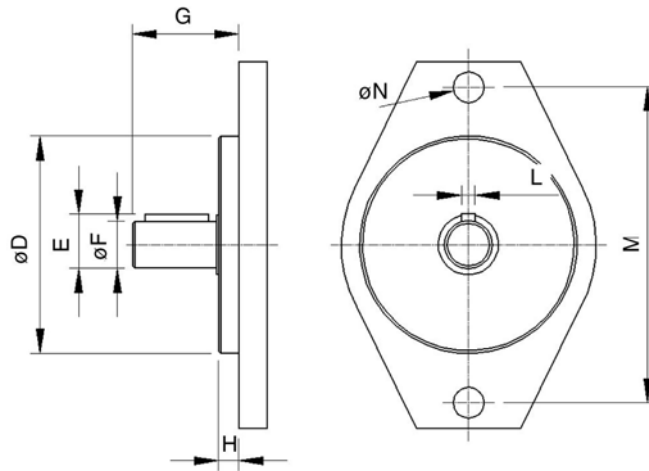
In order to find out the secondary SAE flange pump axial dimension please see the manufacturer's catalogue.

(**) For the secondary gear pump flange dimensions please see page 14.

In order find out the secondary gear pump axial dimension please see the manufacturer's catalogue.

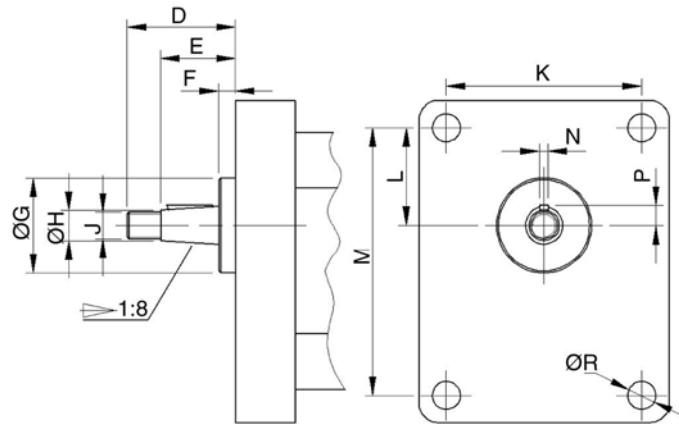
For other coupling unit types, please contact Berarma Technical-Sales Service.

SAE A FLANGE DIMENSIONS FOR BERARMA COUPLING KIT



| Secondary pump | Secondary pump with SAE flange should conform to the dimensions below | | | | | | | | |
|----------------|---|------|--------|-----|-----|-----|-------|-------|------|
| | Ø D | E | Ø F | G | | H | L | M | Ø N |
| SAE "A" | Ø82.5 | 21.1 | Ø19.05 | min | max | 7 | 4.8 | 106.4 | 11.1 |
| | | | | 32 | 59 | | | | |
| SAE "B" | Ø101.6 | 25.1 | Ø22.2 | 41 | 71 | 9.5 | 6.375 | 146 | 14.3 |
| | | 25.5 | | | | | 4.8 | | |

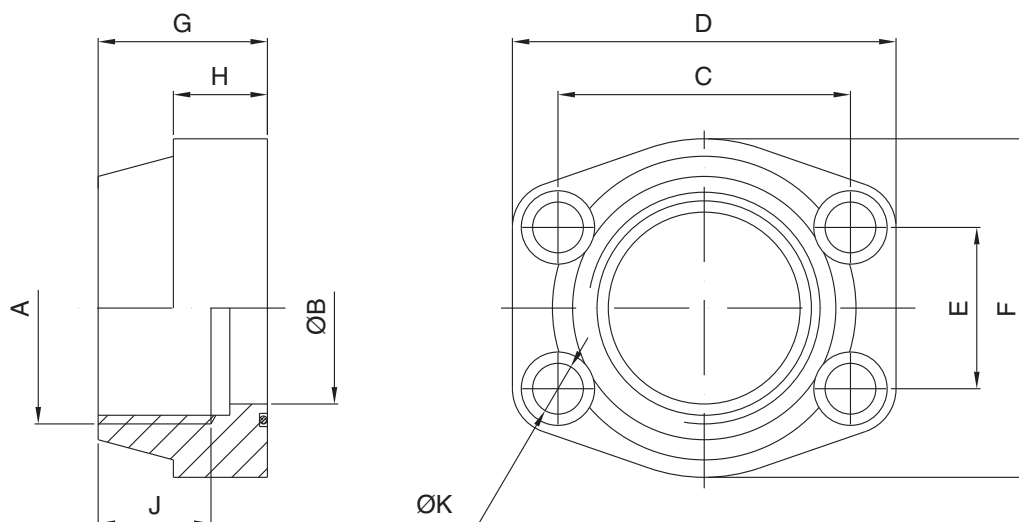
GEAR PUMP FLANGE DIMENSIONS FOR BERARMA COUPLING KIT



| Secondary pump | Secondary gear pumps should conform to the dimensions below | | | | | | | | | | | |
|----------------|---|------|-----|------|------|---------|------|------|------|-------|------|-----|
| | D | E | F | Ø G | Ø H | J | K | L | M | N | P | Ø R |
| gear pump 1P | 29 | 20 | 4 | 25.4 | 8 | M7 | 52.4 | 26.2 | 71.9 | 2.4 | 5.3 | 7.5 |
| gear pump 1 | 35 | 23.5 | 5.5 | 30 | 12 | M10x1 | 56 | 24.5 | 73 | 3 | 7.9 | 6.5 |
| gear pump 2 | 40 | 28 | 5 | 36.5 | 14.7 | M12x1.5 | 71.5 | 32.5 | 96 | 4 (*) | 9.7 | 8.5 |
| gear pump 3 | 47 | 33 | 5 | 50.8 | 19 | M14x1.5 | 98.5 | 43 | 128 | 4 | 12.2 | 11 |

ACCESSORIES

FLANGES SAE J518 (3000 SERIES) SUPPLIED WITH SCREWS AND O-RING



| Pump type | Ordering code | Nominal size | A | ØB | C | D | E | F | G | H | J | ØK | Screws | O-Ring |
|-----------|---------------|--------------|---------|----|------|----|------|----|----|----|----|------|--------|-------------|
| 01 PLP 2 | 5540000102 | 1" | 1" Gas | 25 | 52.4 | 70 | 26.2 | 52 | 38 | 18 | 19 | 11 | M10 | OR 4131 NBR |
| | 5540000106 | 1" 1/2 | 1"½ Gas | 38 | 70 | 93 | 35.7 | 78 | 44 | 25 | 24 | 13.5 | M12 | OR 4187 NBR |

INSTRUCTIONS FOR INSTALLATION AND USE

Pumps 01 PLP 05/1 series can be mounted in any position.

Pump type 01 PLP 2 must be mounted with the shaft HORIZONTAL and the compensator device upward.(see figure)

When the pump is installed over the reservoir fluid level, pay attention to the inlet pressure (see page 4).

Cleanliness is essential during assembly!

Motor-pump coupling must be made with a self-aligning flexible coupling with convex teeth and a polyamide cam. When assembling make sure that:

- **the distance between the half-couplings strictly falls within the specified values (see page 17);**
- **the pump shaft and the motor shaft are accurately aligned: concentricity within 0.05 mm, angular displacement within 0.2° (see drawing below);**
- **strictly no radial or axial loads on the pump shaft.**

Other types of motor-pump couplings are not permitted.

The fluid tank must be suitably sized in order to exchange the thermal power generated by the various system components and to provide a low recycle rate (tank capacity approximately 4 times the flow rate per minute of the pump). In systems where the pump runs for a long time under zero flow setting conditions, the installation of a heat exchanger in the drain line is recommended. The pressure on the drain port must never exceed the value specified on page 4.

Fluid temperature must not exceed 60°C under any circumstances.

To ensure the maximum pump working life, the inlet fluid temperature must never be above 50°C.

Suction pipe. The suction pipe should be as short as possible, with a small number of bends and without internal section changes. The pipe-end inside the tank should be cut at 45°, should have a minimum distance from the tank bottom of not less than 50 mm, and there should always be a minimum height of suction of 100 mm. Select the clear width of the pipes according to the pump inlet ports. **The suction pipe should be completely airtight in order to avoid air intake which could be extremely damaging to the pump.**

Drain pipe. The drain pipe must always be independent from the other return lines, connected directly to the tank, and extended sufficiently inside the tank so as to be below the minimum fluid level to avoid generating foam and to prevent emptying when the pump is not running. Moreover, the drain pipe must also be at the highest possible position in relation to the pump in order to always prevent fluid emptying from the pump, and must be free of restrictions. **The drain pipe should be as far as possible from the suction pipe to prevent hot fluid being circulated.**

Pressure line. Ensure that the pressure line is strong enough. It is recommended that a non-return valve (check valve) is installed on the pump pressure line as well as an automatic air bleed valve, for trouble free operation.

Ensure that any valves, taps and gate valves on the suction and pressure pipes are fully opened and all protective caps removed. Fill the pump through the case drain port and replace the drain pipework. Check that the reservoir is full of fluid.

Ensure that the pump shaft can be rotated manually without any resistance.

Check that the motor rotation direction is the same as the pump rotation direction: right-hand rotation (clockwise) viewed from shaft end of the pump.

Start the motor (in jogging mode), allowing free circulation of fluid to the tank in order to facilitate priming.

The pump should prime within 5 seconds. If it does not, switch it off and investigate the cause. The pump should not run empty.

During INITIAL INSTALLATION, the pump must run under maximum flow conditions (P connected to T), with the fluid flowing directly into the tank, without pressure for several minutes. Care should be taken to eliminate all the air from the system during this process.

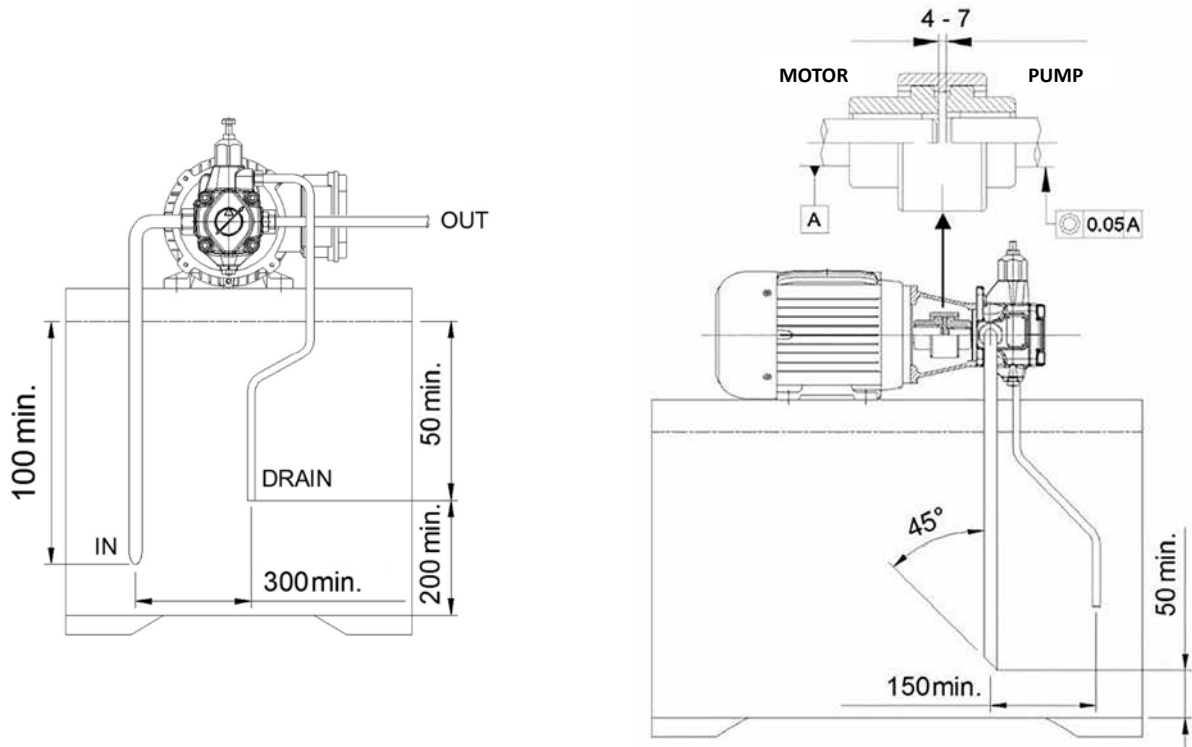
Subsequent start-ups under zero flow setting conditions are admissible only with pressure not exceeding 30 bar, and with the system and pump completely filled with fluid.

If the flow regulator unit is set to less than 50% of the nominal flow-rate, the pump can only start on condition that the system and the pump are completely filled with fluid.

During the initial and subsequent starting operations, it is necessary that the pump (ambient) and fluid temperature do not differ by more than 20°C. If this is the case, the pump should be switched on only for short intervals of approximately 1-2 seconds (start/stop mode) without pressure, until the temperatures are balanced.

All Berarma products are covered by a **1 YEAR WARRANTY** for manufacturing or material defects effective from the shipment date, but in any case **NO LONGER THAN 18 MONTHS FROM THE PRODUCTION BATCH DATE**. The warranty is for the exclusive benefit of the original purchaser of the products.

For further information, please contact the Berarma Technical-Sales Service.

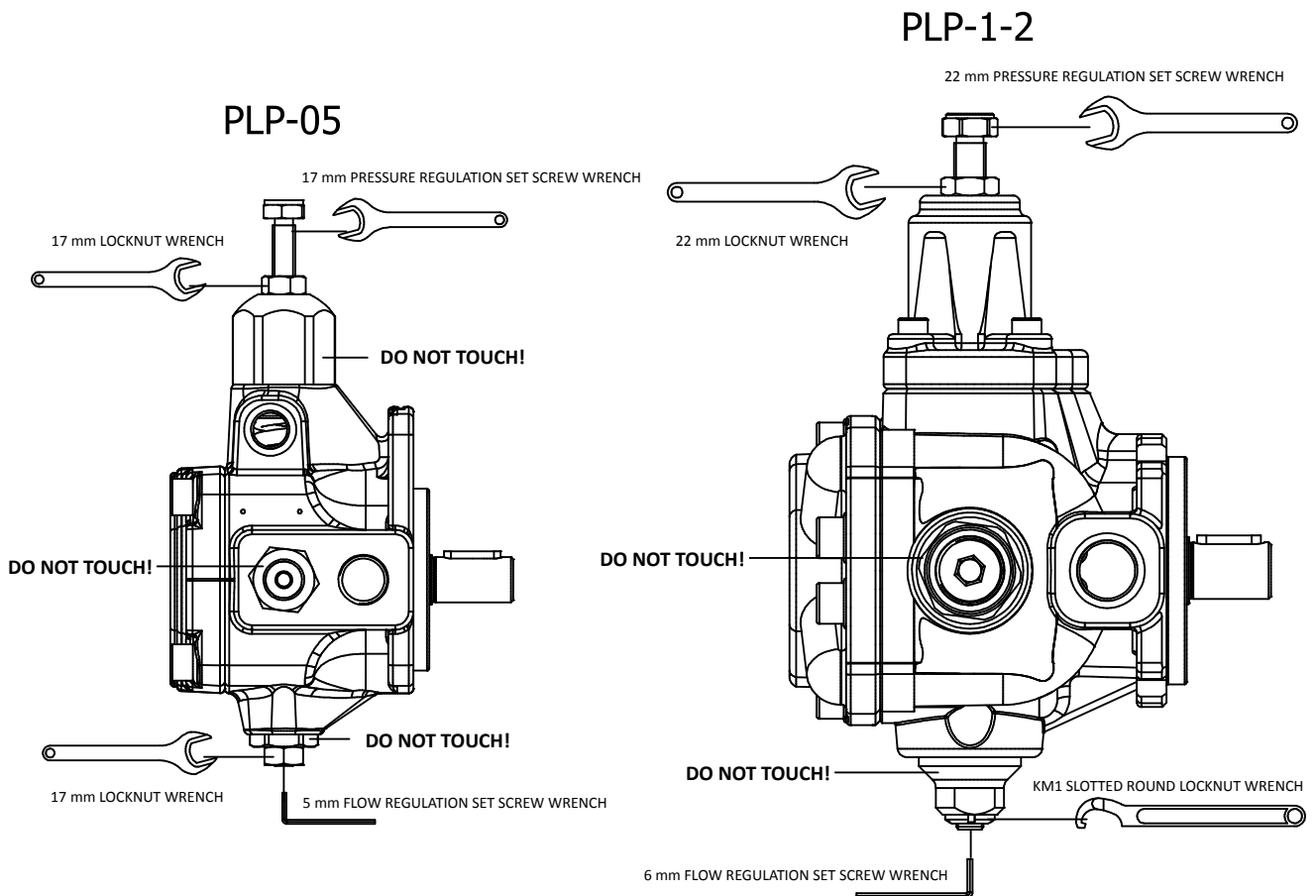


SETTINGS

Pressure adjustment

All BERARMA 01 PLP series pumps are equipped with a mechanical pressure adjustment unit. This allows the pump pressure to be set at the zero-flow setting. Clockwise rotation increases pressure (pay attention to avoid going out of the pressure setting range specified on page 4).

Warning: During the first run, make sure that the pressure adjustment screw is tight enough to ensure the correct priming of the pump.



Flow regulator

All BERARMA 01 PLP series pumps are equipped with a flow regulator unit. This allows the mechanical reduction of the pump displacement in relation to the nominal value. Clockwise rotation decreases the pump displacement.

Warning: If the flow regulator unit is set to less than 50% of the nominal displacement, the pump can only start on condition that the system and pump are completely filled with fluid.

| Nominal size | Actual displacement | Reduced displacement by screw turn | Minimum achievable displacement |
|--------------|----------------------|------------------------------------|---------------------------------|
| Size 05-16 | 17.9 cm ³ | 9,7 cm ³ | 3.1 cm ³ |
| Size 1-20 | 22.5 cm ³ | 10 cm ³ | 9.5 cm ³ |
| Size 1-25 | 28 cm ³ | 10 cm ³ | 15 cm ³ |
| Size 1-32 | 33.4 cm ³ | 10 cm ³ | 19 cm ³ |
| Size 2-40 | 43 cm ³ | 16 cm ³ | 27.5 cm ³ |
| Size 2-50 | 51 cm ³ | 16 cm ³ | 35.5 cm ³ |
| Size 2-63 | 63 cm ³ | 16 cm ³ | 43.5 cm ³ |

Indicative values influenced by manufacturing tolerances.