

Variable displacement vane pump with hydraulic pressure compensator

P04



Series Name	Displacement [cm ³ /r]	Flow rate at 1450rpm [l/min]	Max. Pressure [bar]
P04 - 8	8	12	210

General description

Pumps P04 are high pressure variable vane pumps equipped with hydraulic pressure regulating device that allow you to instantly adjust the flow rate accordingly to circuit requirements. Variable displacement vane pumps are volumetric type so they deliver a maximum flow rate equivalent to its displacement for their speed of rotation. Operating pressure is due to pressure loads encountered by the fluid within the system. When the outlet pressure (on the system) equals the pump setting pressure, the flow rate is adjusted to the values required by the system. When this value is achieved, pump reduces its flow rate to zero, keeping the pressure almost constant. In zero flow conditions, pump delivers oil only to compensate any possible drain and piloting.

The new series of P04 pumps was created as a response to the increasingly stringent requirements for energy saving and noise reduction on compact hydraulic systems, where usually are used fixed displacement external gear pumps. This new series of pump gathers 60 years of experience and innovation applied to hydraulic pumps. It allows high performances combined with extremely compact dimensions, maintaining high standards of solidity (robustness) and reliability. Replacement of external gear pumps with P04 pumps on systems where work cycle includes pressure and / or speed control phases allows to:

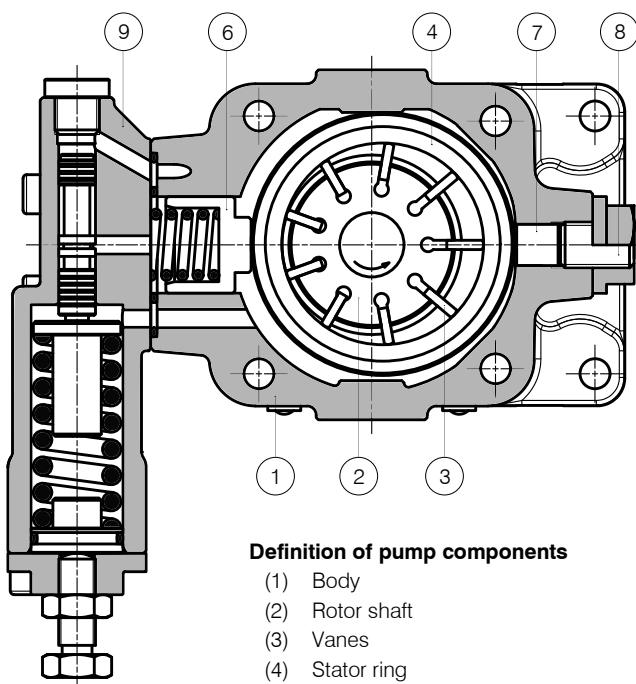
- Reduce the number of components on the system
- Reduce power consumption
- Reduce oil heating
- Reduce or avoid heat exchangers installation
- Significantly reduce noise

The series of P04 pumps is supplied with:

- Standard mounting flanges and shafts
- Gas BSP standard port connections
- Max. flow regulator device to mechanically reduce pump max. displacement
- Different types of devices for hydraulic, electric and proportional control for flow rate and / or pressure
- Different types of seals depending on the type of fluid and operating temperature

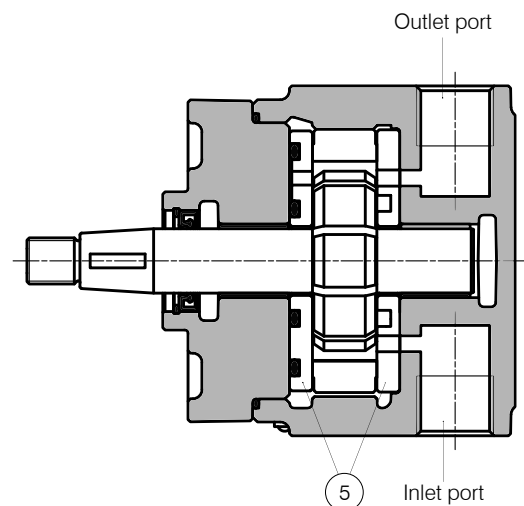
What makes the Berarma P04 series pumps a unique product of its kind?

- 210 bar operating pressure
- Extremely small overall dimensions that allow the replacement of external gear pumps size 1
- New functional concept of the pressure compensator device (reduction of peak pressure values and response times)



Definition of pump components

- (1) Body
- (2) Rotor shaft
- (3) Vanes
- (4) Stator ring
- (5) Distributor plates
- (6) Control piston
- (7) Flow regulator piston
- (8) Flow regulator device
- (9) Pressure regulator device



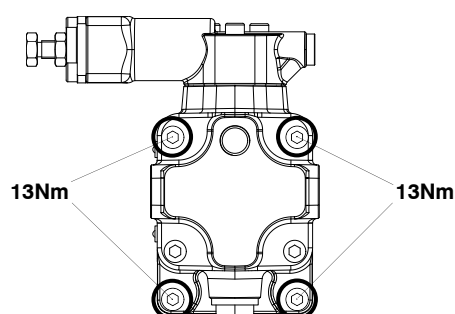
Technical data

Size	04
Geometric displacement according to ISO 3662 (cm ³ /r)	8
Actual displacement (cm ³ /r) Due to manufacturing tolerances, the value can vary by approx. $\pm 3\%$	8,4
Maximum working pressure (bar) Pressure peak exceeding 30% of the maximum operating pressure must be eliminated by adopting the appropriate measures	210
Pressure setting range (bar)	20 ÷ 210
Permitted maximum drain port pressure (bar)	1
Inlet pressure (bar)	0.8 ÷ 1.5 absolute
Speed range (rpm)	350 ÷ 2000 for high speed, it's important to correctly size the inlet line to maintain the inlet pressure in the range (see above) and avoid cavitation
Rotation direction	right (clockwise) viewed from shaft end
Load on drive shaft	NO RADIAL OR AXIAL LOADS ALLOWED
Hydraulic fluid for other fluids please contact Berarma technical sales service	HM according to ISO 6743-4 HLP according to DIN 51524-2
	HEES according to ISO 15380 FPM-Viton seals ÷ Pmax 160bar
	HFD according to ISO 12922 FPM-Viton seals ÷ Pmax 160bar
	HFC according to ISO 12922 water <40% ÷ NBR seals ÷ Pmax 100bar ÷ Vmax 1000rpm ÷ Temp. <40°C
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 CLASS 9 according to NAS 1638
Recommended fluid contamination level for a longer pump working life	18/16/13 according to ISO 4406 CLASS 7 according to NAS 1638
Moment of inertia (kgm ²)	0.000028
	Weight single pump (kg)
S control	2.9
R control	3.3
D control	3.6
LR control	3.6
LD control	3.9
For further information and/or different operating conditions please contact Berarma technical sales service	

Installation and start-up

Warning – The 4 highlighted screws must be tightened with the correct tightening torque of **13Nm** (12.9 class screws supplied with the pump).

For the installation and start-up of Berarma pumps please refer to related **Document USE AND MAINTENANCE MANUAL** available on our website.



Ordering code

Series Name	Displacement	Flanges	Seals	Pressure-flow controls	Options
P04 -	8	G	N	LR	Omit

Code	Displacement
8	8 cm ³ /r

Code	Flanges	Ports
G	European type gear pump 1	Gas BSP

Code	Seals
N	NBR
V	FPM – Viton

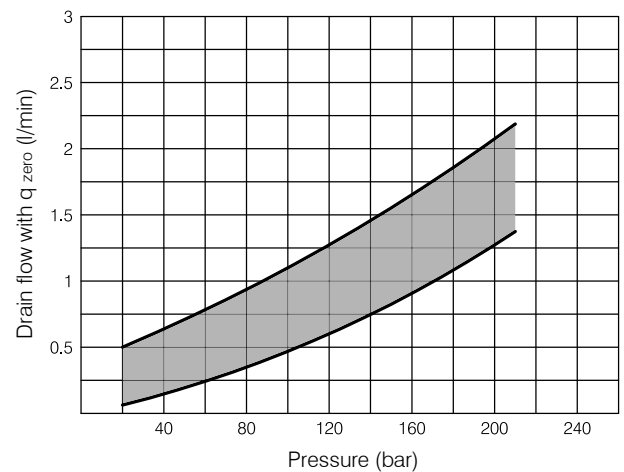
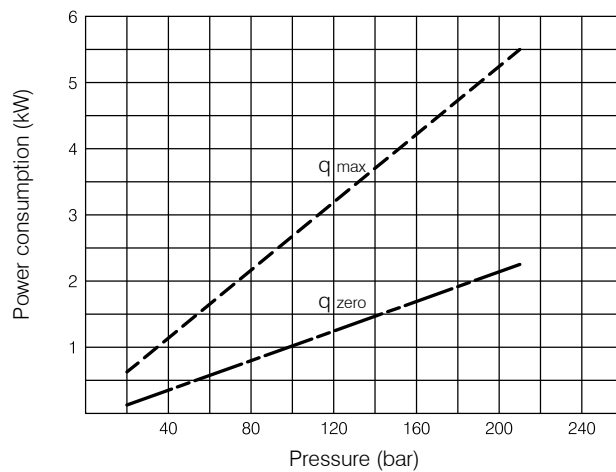
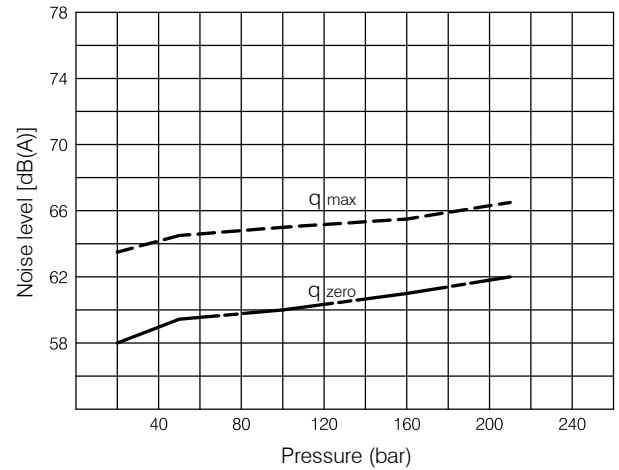
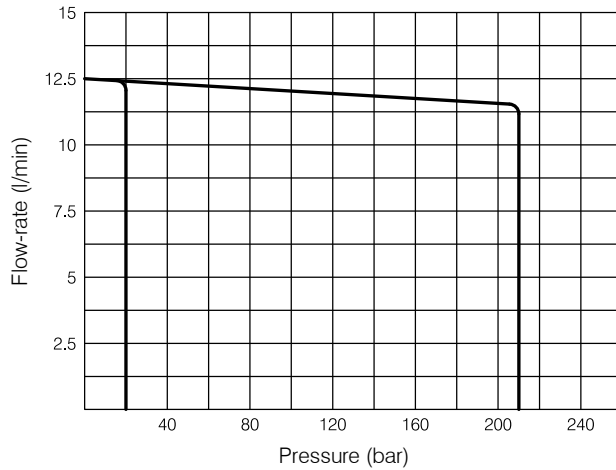
Code	Pressure-flow controls
S	Single stage of pressure
R	Single stage of pressure with remote control
D	Two stages of pressure
LR	Load Sensing control with remote control possibility
LD	Load Sensing control with two stages of pressure

Code	Options
Omit	No option
xxx	Indicate pressure-flow settings to be carried out in full

Ordering code examples:

- P04-8 G N S
- P04-8 G V S
- P04-8 G N R
- P04-8 G N D
- P04-8 G N LR
- P04-8 G V D setted to 65bar MIN and 190bar MAX
- P04-8 G N S limited to 5cm³/r

Characteristic curves



Indicative values measured on Berarma test stand, referring to 1500 rpm with HM hydraulic oil according to ISO 6743-4, ISO VG 46 according to ISO 3448, temperature 40 °C. Sound level meter placed 1 meter from the pump with flexible coupling.

Warning

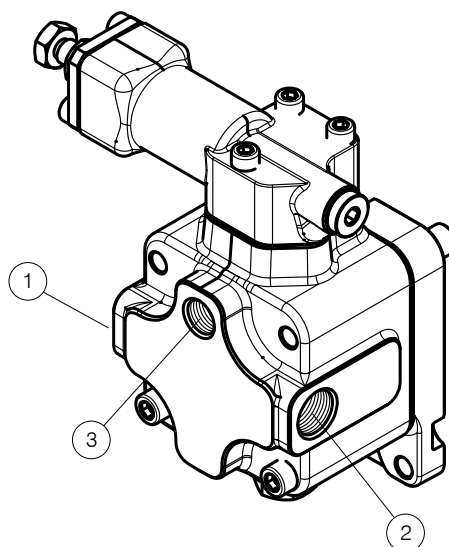
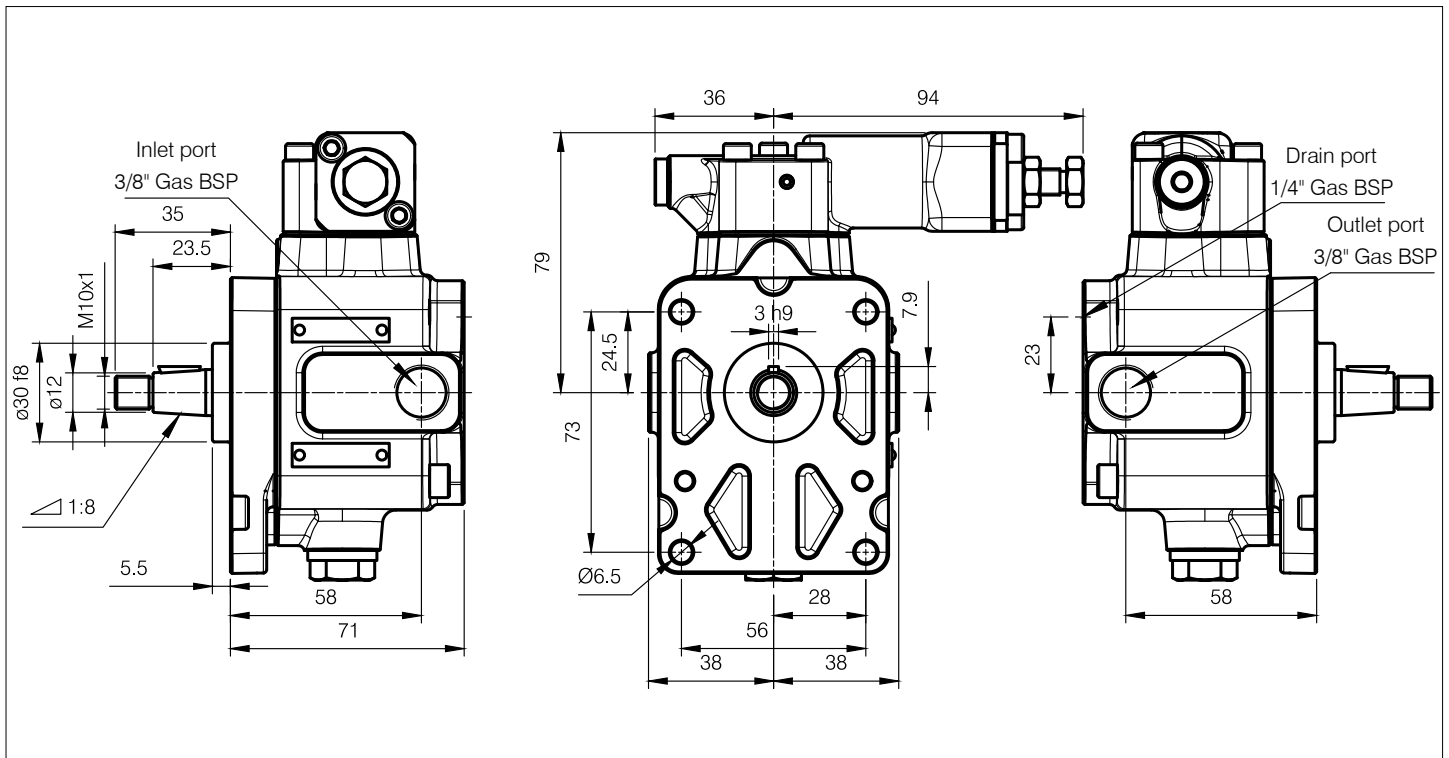
All Berarma pumps have been carefully checked during manufacture and subjected to testing cycles before shipment. To achieve optimum performance, avoid problems and maintain the warranty, **Document USE AND MAINTENANCE MANUAL**, available on our website, must be strictly observed.

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 documents. 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. Berarma S.r.l. accepts no responsibility for any editing mistakes in this catalogue. Berarma S.r.l. reserves the right to modify the products and data contained in this catalogue at any time and without prior notice.

Overall dimensions

P04-8 Flange "G" and Control "S"



Ports

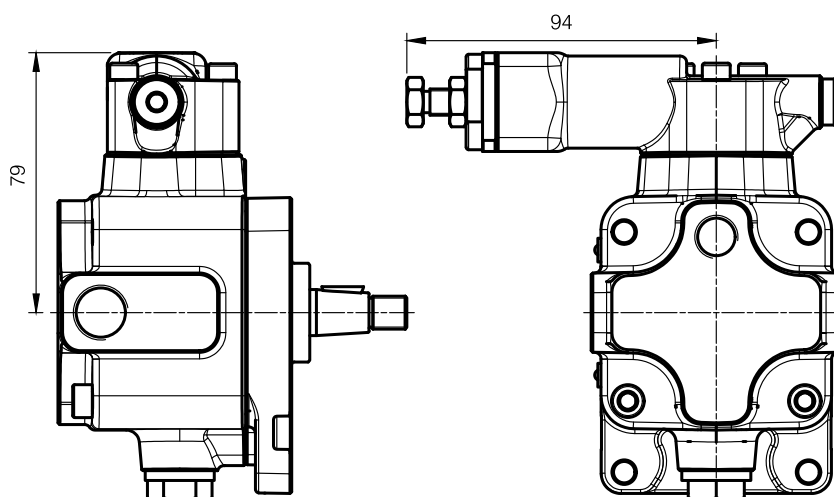
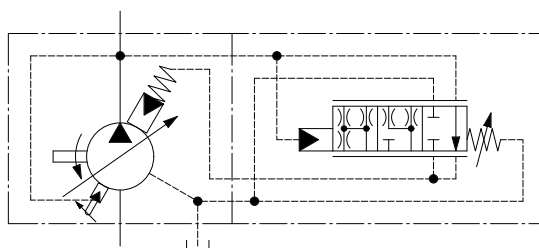
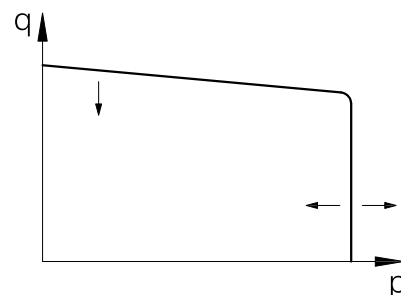
- ① Inlet – 3/8" Gas BSP
- ② Outlet – 3/8" Gas BSP
- ③ Drain – 1/4" Gas BSP

S control

Single stage of pressure

This standard control enables the pump displacement to be adjusted (until zero flow setting condition) according to the flow rate required by the hydraulic system, keeping the working pressure constant and equal to the value set on the compensator device.

The pressure value setting of the compensator device is adjusted by means of the pressure setting screw and locked using the locknut.



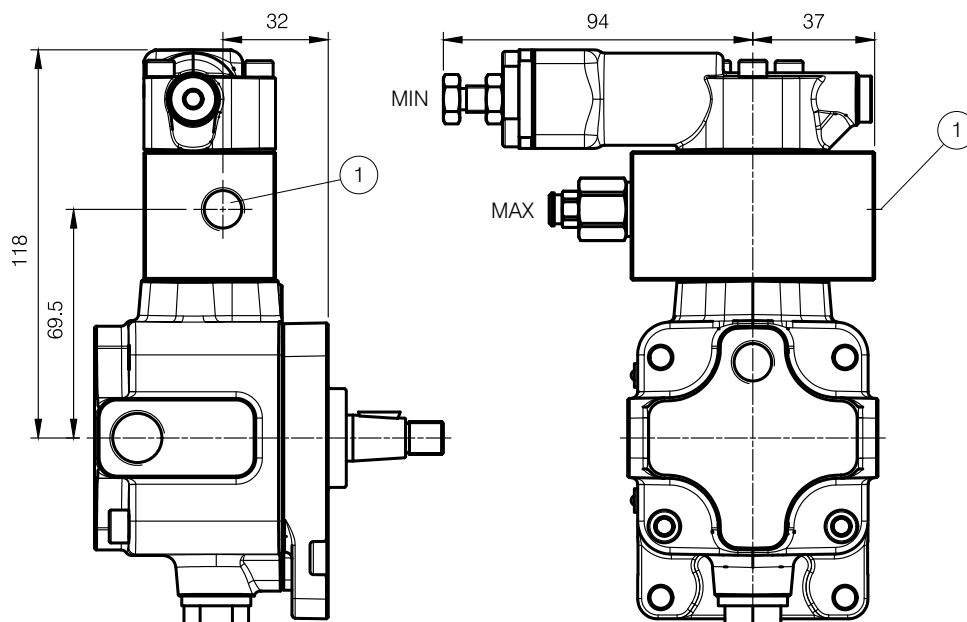
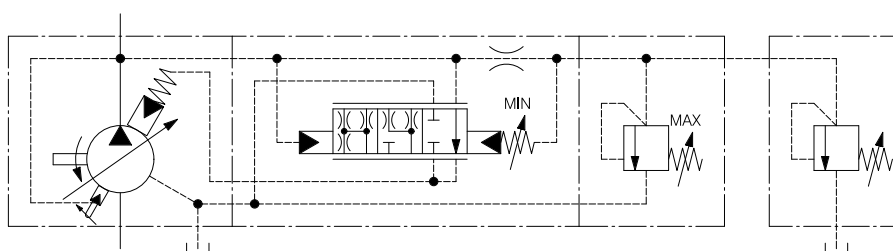
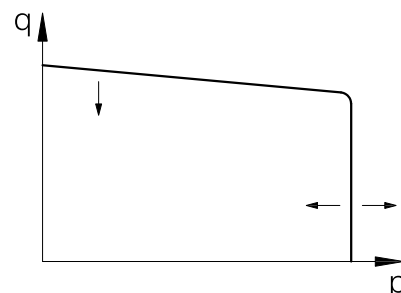
R control

Single stage of pressure with remote control

The function of this control is the same as the S control with the possibility of adjusting the working pressure by means of an additional maximum pressure relief valve (**not supplied**) installed in a remote position, far from the pump.

Control performances depends on the additional valve type (**not supplied**) and on its distance from the pump.

To obtain the best performance, it is recommended to use maximum pressure relief valves with flow rates from 2 to 5 l/min and not to exceed 5 meters of pipe length.



Ports

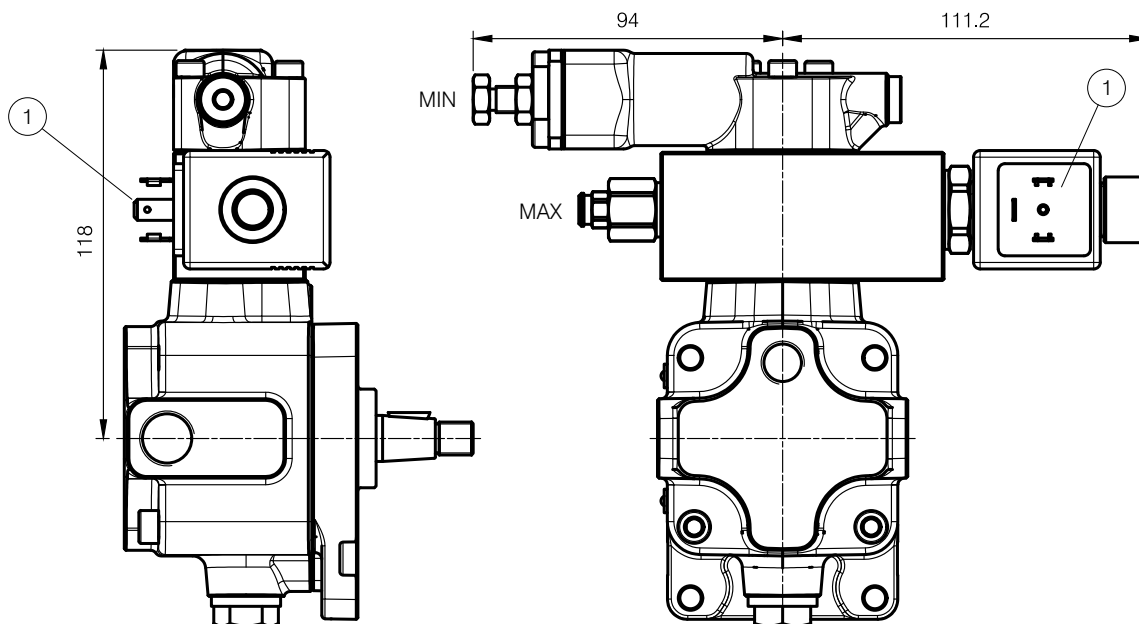
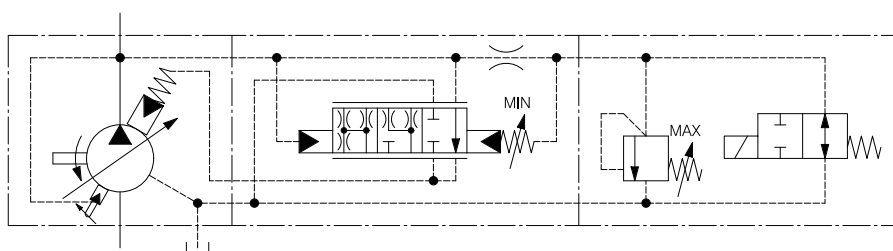
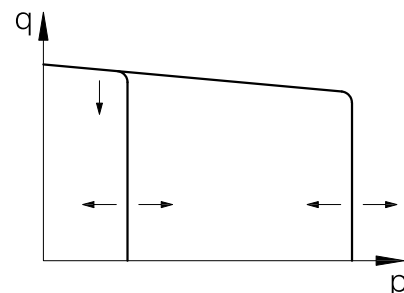
- ① Remote control – 1/4" Gas BSP

For further information see related documentation on Berarma website or contact Berarma technical sales service

D control

Two stages of pressure, both adjustable

The function of this control is the same as the S control with the possibility of switching two levels of working pressure, both adjustable.
Switching from low to high pressure occurs by sending a 24VDC electrical signal to the coil of the ON-OFF valve on the control block.



Ports

- ① Pressure switching coil – Connection DIN 43650 type A – Power supply 24VDC

For further information see related documentation on Berarma website or contact Berarma technical sales service

LR control

Load Sensing control with single stage of pressure and remote control possibility

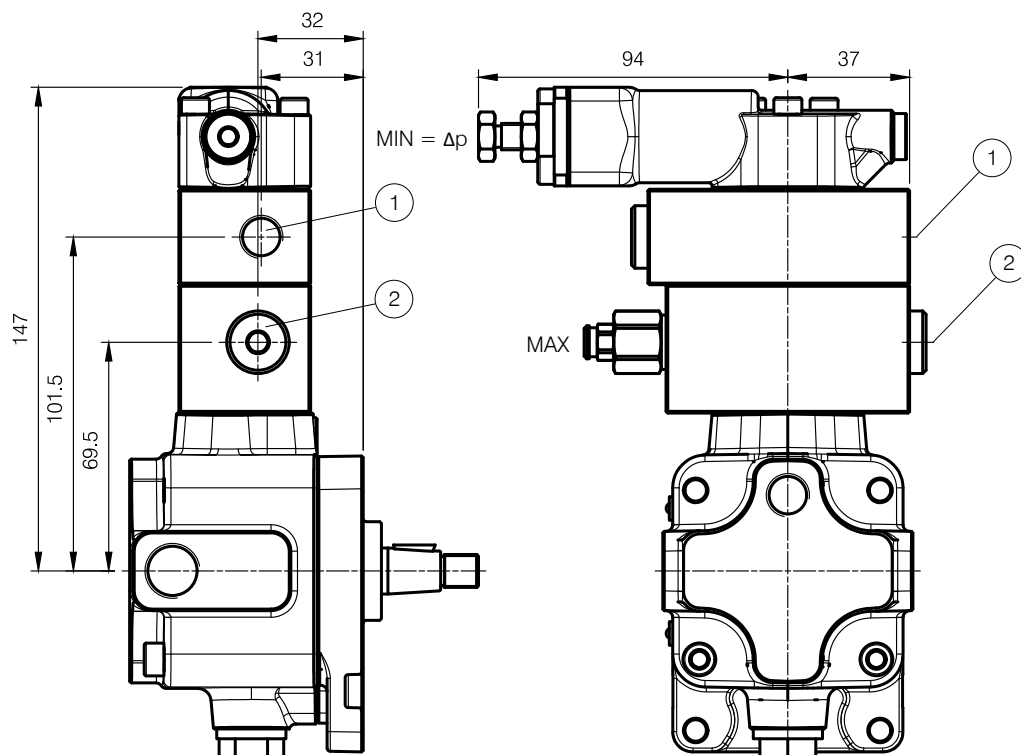
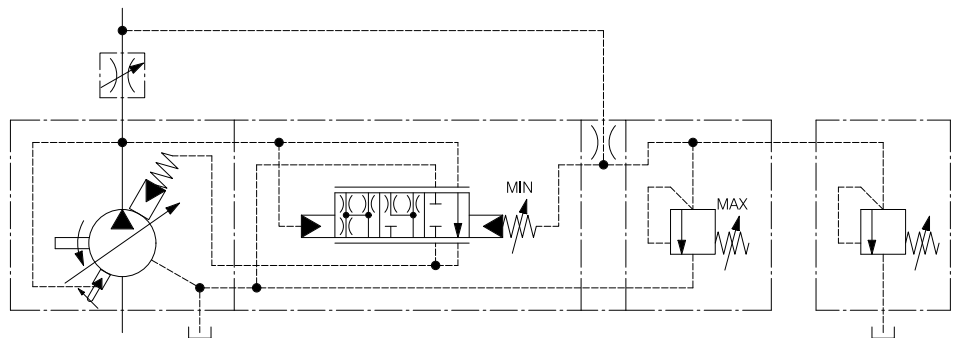
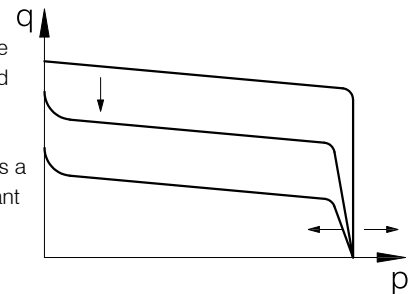
The Load Sensing control system adds to the S control the possibility to regulate the pump flow-rate according to the pressure difference Δp measured before and after a throttle valve. The pilot pressure of the Load Sensing compensator device is taken from the pump outlet line after throttle valve (**not supplied**) and before the actuators. Changing the position of the throttle valve, with a fixed pressure drop equal to the differential pressure Δp value, the Load Sensing system automatically adjusts the pump displacement independently of pressure variations that occur in the hydraulic system. The Load Sensing control produces a notable reduction in displaced power and is recommended for use in applications where there are significant variations in torque (force) and speed.

When the throttle valve is completely closed, the pump will be in zero flow condition, keeping the working pressure constant and equal to the differential pressure Δp value.

This control also provides the possibility of adjusting the working pressure by means of an additional maximum pressure relief valve (**not supplied**) installed in a remote position, far from the pump.

Control performance depends on the type of throttle valve (**not supplied**), additional valve type (**not supplied**) and on the length/dimensions of signal pipes.

To obtain the best performance, it is recommended to use maximum pressure relief valves with flow rates from 2 to 5 l/min and not to exceed 5 meters of pipes length.



Ports

- ① Load Sensing – 1/4" Gas BSP
- ② Remote control – 1/4" Gas BSP – Normally plugged

For further information see related documentation on Berarma website or contact Berarma technical sales service

LD control

Load Sensing control with two stages of pressure, both adjustable

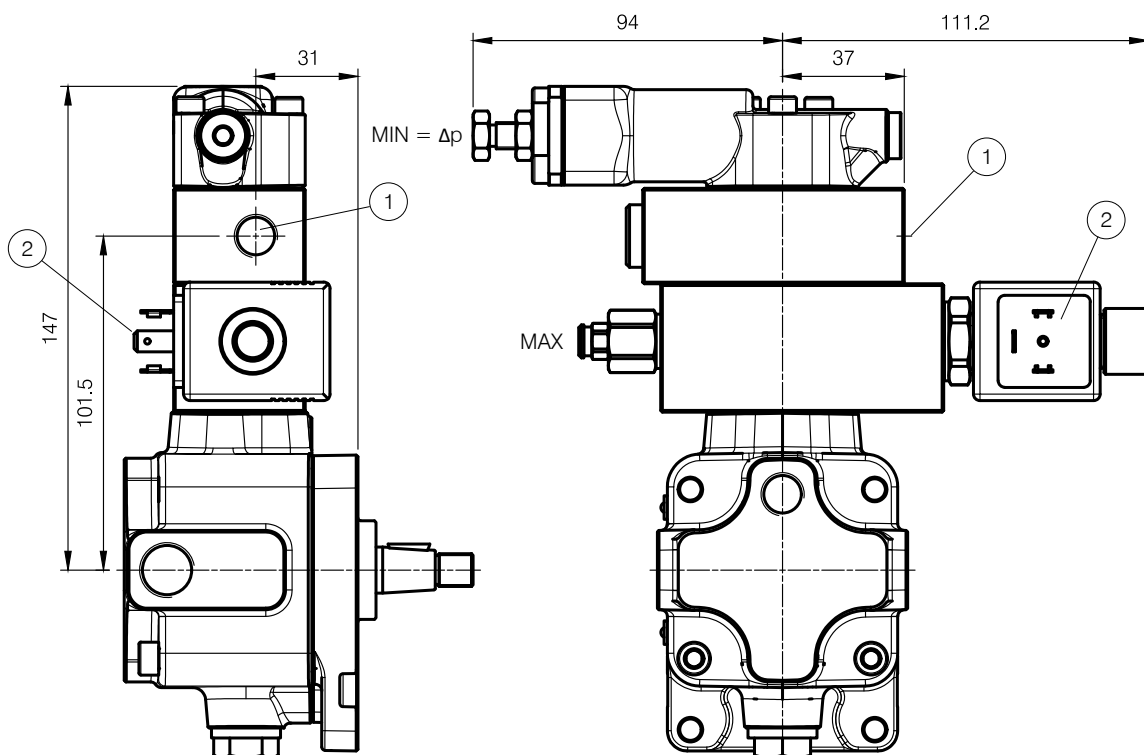
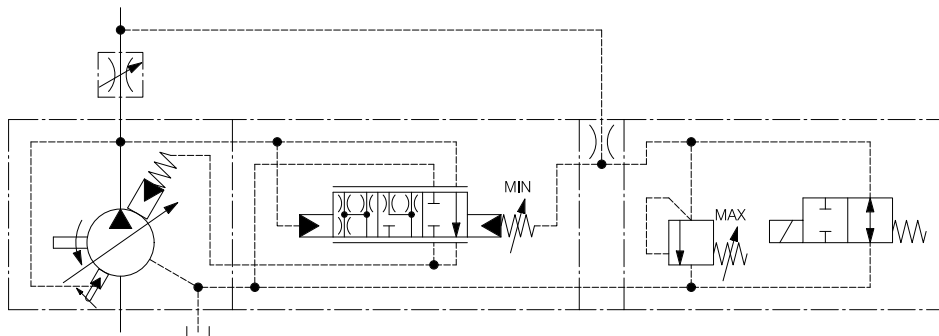
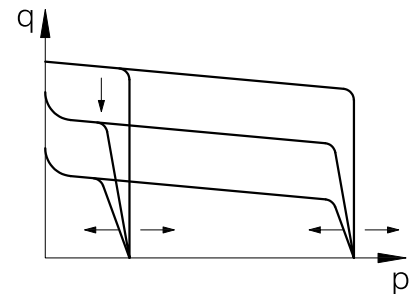
The function of this control is the same as the LR control with the possibility of switching two levels of working pressure, both adjustable.

The MIN pressure setting is equal to the Δp value of the Load Sensing control therefore, to save energy, it is advisable to keep it at low values (20bar).

Switching from low to high pressure occurs by sending a 24VDC electrical signal to the coil of the ON-OFF valve on the control block.

Control performances depends on the type of throttle valve (**not supplied**) and on the length / dimensions of Load Sensing signal pipe.

To obtain the best performance, it is recommended to not to exceed 5 meters of pipe length.



Ports

- ① Load Sensing – 1/4" Gas BSP
- ② Pressure switching coil – Connection DIN 43650 type A – Power supply 24VDC

For further information see related documentation on Berarma website or contact Berarma technical sales service

Settings

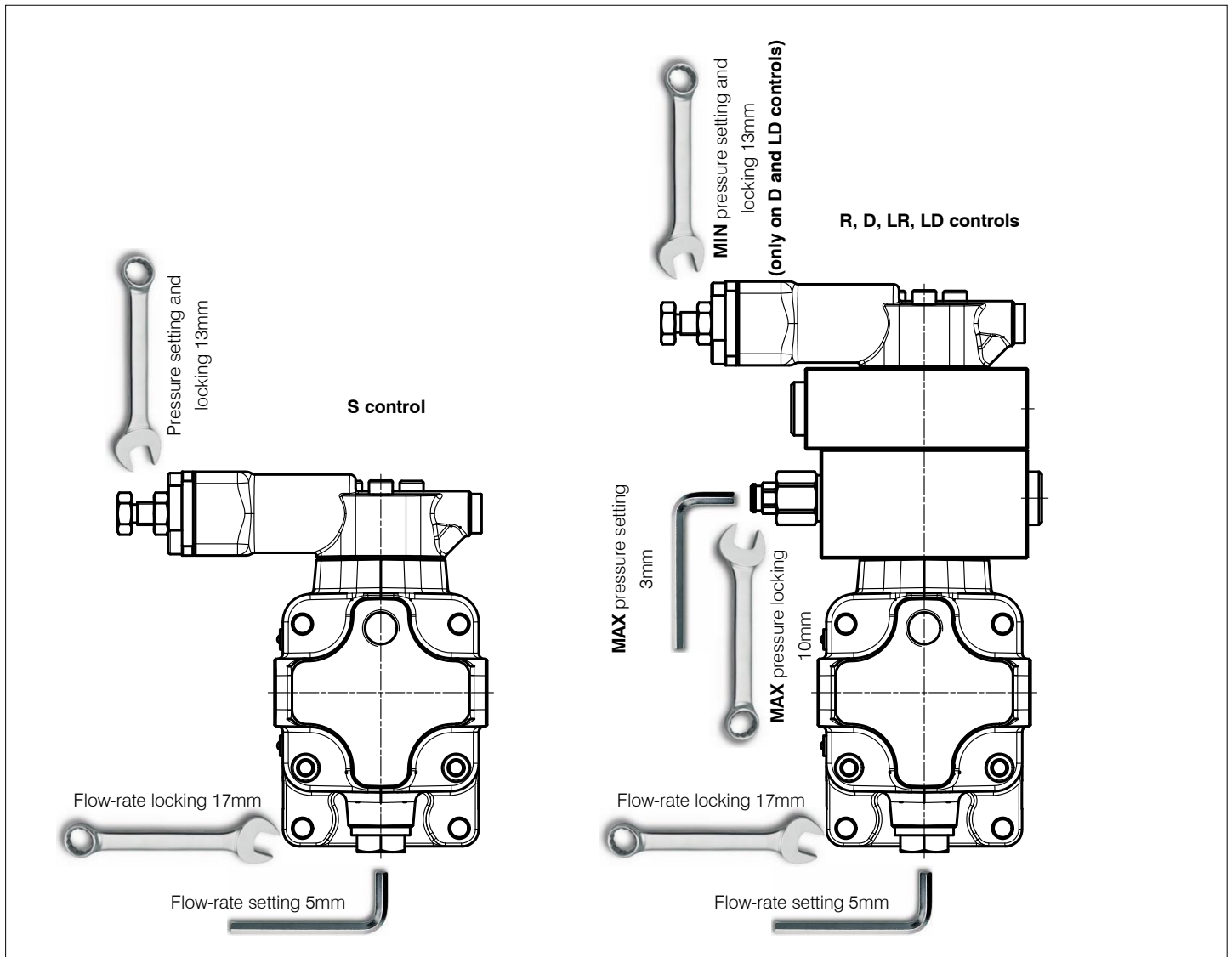
Pressure

Berarma P04 pumps can be equipped with different types of hydraulic pressure devices, through which it is possible to adjust the maximum working pressure of the pump. By screwing clockwise, the pressure increases.

Warning

Do not go out of the pressure setting range. In the **R** and **LR** controls, do not tamper the **MIN** pressure setting.

In the **LD** control, the **MIN** pressure setting is equal to the Δp value therefore, to save energy, it is advisable to keep it at low values (20bar).



Flow rate

All Berarma pumps are equipped with a flow regulator device that allow the mechanical reduction of the maximum pump displacement compared to the nominal value. By screwing clockwise, the flow rate decreases.

Pump type	Actual displacement (cm ³ /r)	Reduced displacement by screw turn (cm ³ /r)	Minimum displacement (cm ³ /r)
P04 - 8	8.4	5.3	*
Indicative values influenced by manufacturing tolerances			

Warning

***There is no lock on the minimum displacement.** Loosening the flow rate adjustment nut may cause oil to leak.

If the flow regulator device 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.