Driven to succeed.

HYDRAULIK NORD FLUIDTECHNIK

Priority valve LPS

Data sheet

Nominal sizes	40 – 160
Series	1x
Nominal pressure	250 bar
Maximum flow	40 – 160 l / min

HE 27548 / 11.2015

1. Features

→ The LPS priority valve is used in conjunction with steering units using load sensing.
→ The priority valves guarantee the priority supply of steering circuits, before all other actuators, with pressure fluid as defined in the statutory regulations.
→ The steering circuit is supplied with priority independently of pressure. Pressure fluid that is not required for steering is returned to tank or is made available to other actuators. For supplying the steering system and other actuators, e. g. working hydraulics, only one pump is required.
→ With the aid of priority valves it is possible, in conjunction with variable displacement pumps, to create energy saving hydraulic systems.
→ In conjunction with other valves priority valves can also be used as sequencing valve, flow divider or pressure relief valve.

2. Ordering details

LP	S			1x	/	LD	–			/	*

Priority valve

Design

Standard	= S

Nominal size

l / min	A [1]	p [1]	R [1]	
40	●	●	●	= 40
80	●	●	●	= 80
120			●	= 120
160			●	= 160

Connection typpe

flangeable	= A
Pump mounting	= P
Line mounting	= R

Component series

10 to 19	= 1x
(10 to 19: unchanged installation and connection dimension)	

Load Sensing

dynamic load signal	=LD

Control pressure differential

bar	A [1]	p [1]	R [1]	
4	●	◑	◑	= 4
7	●	●	●	= 7
10			●	= 10

Special specifications
Please clarify with our sales organization

Pipe connections P, T, L, R/LD

01 = ●	Rohrgewinde nach DIN 3852
02 = ◑	metr. ISO-Gewinde nach DIN 3852
12 = ◑	UNF-Gewinde nach SAE

[2, 3] LD damping orifice

3 = ●	1,5 mm

[2] LD dynamic orifice

4 = ◑	0,8 mm
6 = ●	1,0 mm

[2] PP damping orifice

4 = ●	0,8 mm
6 = ●	1,0 mm

● = Standard programme

◑ = Extended programme

1) Connection type
2) When testing the machine, the system can be optimised by changing the orifices.
3) Please take note! The LD damping orifice has to be larger than the LD dynamic orifice.

3. Function, section

The type LPS priority valves are used in conjunction with steering systems of closed centre - load sensing design. They distribute the pump flow between the steering and work hydraulics, whereby the steering supply has priority (see the sectional view in its initial position).

In conjunction with variable displacement pumps it is possible to create energy-saving hydraulic systems.

The priority valve works in the same way as a 3-way flow control valve. The controlled flow (CF) is made available to the steering and the remaining flow (EF) is passed to the work hydraulics.

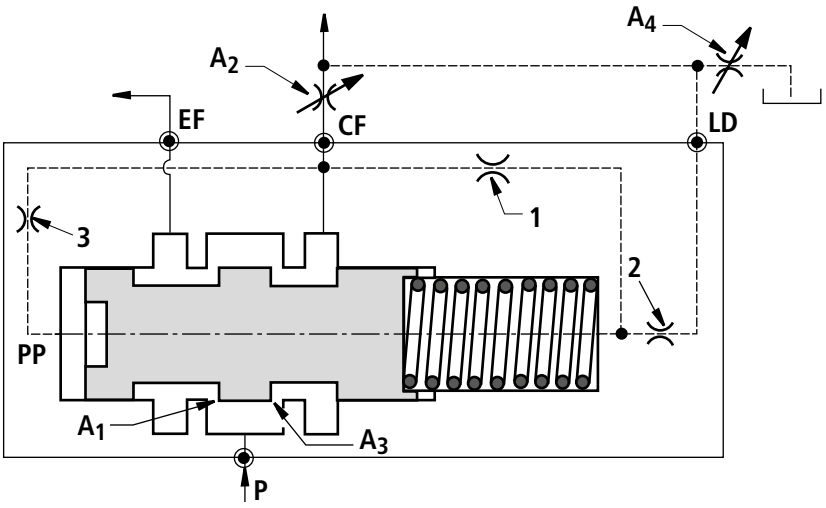
The metering orifice A2 and A4 in this system is not in the flow control valve, but in the steering control valve. A2 is closed in the neutral position of the steering (no steering action) and is opened depending on the required flow. The load signal is sensed behind the metering orifice.

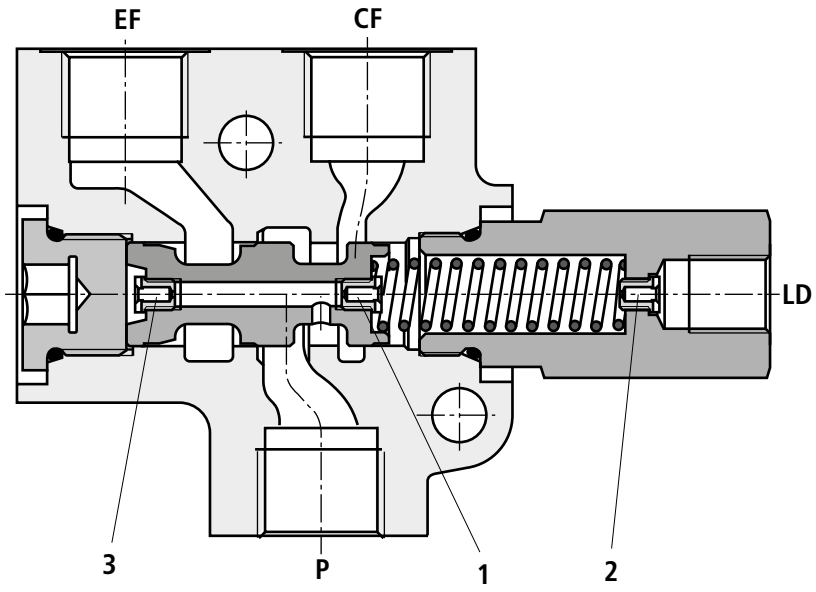
In the neutral position of the steering system the load signal line is connected to tank, i. e. A4 is open.

As with a 3-way flow control valve the priority valve, by controlling the flow at the control orifice A1, controls the pressure differential at the metering orifice A2 and thereby achieves a balanced between the forces acting on the control spool. The required pressure-independent supply to the steering is thereby guaranteed (see the principle shown in the control position).

The type LPS priority valve works independently of the steering pressure and of the work hydraulics pressure. This is achieved via a second control orifice A3. It moves into its working position when the pressure in the work hydraulics is higher than the steering pressure.

Fig.1: Section LPS





P Pump
CF Steering (control flow)
EF Work hydraulics (excess flow)
A1 Control orifice
A2 Metering orifice (in steering unit)
A3 Control orifice
A4 Tank unloading (in steering power unit)

1 LD dynamic orifice
2 LD damping orifice
3 PP damping orifice

4. Versions, symbols

Standard version – flangeable

The LPS..A.. priority valve is directly flanged onto the steering unit. Both components result in a compact unit. No piping is required between the priority valve and the steering unit. This design is available with the nominal flows of 40 and 80 l / min. It is suitable for steering units up to 200 cm^3/U. The pilot control pressure relief valve for limiting the steering pressure is contained within the steering unit.

Standard version – line mounting and pump mounting

The LPS..R.. priority valve is a version suitable for line mounting. These priority valves are available with the nominal flows of 40, 80, 120 and 160 l / min. When using the type LPS..R.. care has to be taken that the pressure relief valve, for the load signal line, is integrated into the steering unit. If a LPS..R.. is used in conjunction with a steering unit without a pressure relief valve, then the load signal lines have to be externally protected.

The LPS..P.. version is designed to be directly mounted onto a gear pump. 40 and 80 l / min version are available.

Special version – with throttle check valve as PP damper [1)]

The priority valve with an additional check valve for by-passing the PP dampening orifice in the direction of opening is provided only for use in conjunction with variable displacement pumps and was specifically developed for this purpose.

This special variant provides fast closing of control orifice A_1 and suppresses a pressure drop in CF for power-assisted steering in the case of a sudden pressure drop in work hydraulics EF.

1) Only available as 160 l / min variant for in-pipe installation

Special version – with throttle check valve and CF max. pressure relief valve in PP

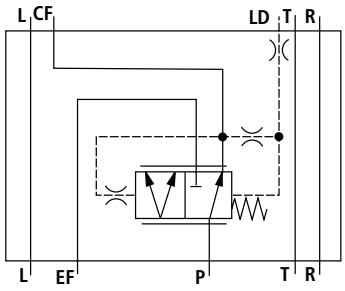
In addition to the special version with check valve in PP, with this version a pressure relief valve is integrated in PP. This pressure relief valve opens, when the pressure in the CF line is by approx. 30 bar higher than the pressure on the PP side.

Control orifice A_1 opens abruptly, and any pressure peaks occurring in the P or CF line are reduced.

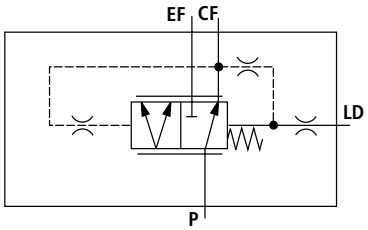
Load signal dynamic

Via the LD dynamic orifice a continuous small flow is passed into the load signal lines from the CF pressure connection. It is therefore guaranteed that the load signal lines are always full. This leads to the priority valve having short reaction times. The dynamic orifice also takes over the unloading the CF connection when the steering does not accept any oil flow and the other actuators are being operated with high pressure.

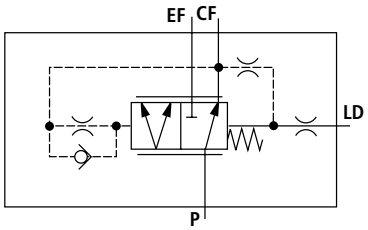
Symbol
LPS..A..



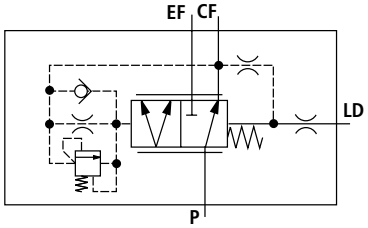
Symbol
LPS..R..; LPS..P..



With throttle check valve as PP damper



With throttle check valve and pressure relief valve in PP



P Pump
CF Steering
EF Work hydraulics
T Tank
LD Load signal (dynamic)
R; L Cylinder

5. Technical data

for applications outside these parameters, please consult us!

General			
Ambient temperature range	ϑ	°C	- 20 to + 80
Hydraulic			
Nominal pressure	p	bar	300
Max. pressure - Port P, EF - Port CF, LD	$p_{max.}$ $p_{max.}$	bar bar	300 210
Pressure fluid			see page 8
Pressure fluid temperature range	ϑ	°C	- 20 to + 80
Viscosity range	ν	mm^2/s	10 to 800
Maximum permissible degree of contamination of the pressure fluid is to ISO 4406 (c)			class 19 / 16 / 13 [1)]

1) The cleanliness classes specified for components must be adhered to in hydraulic systems. Effective filtration prevents malfunction and, at the same time, prolongs the service life of components. For the selection of filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086, RE 50087 and RE 50088.

6. Pressure fluid technical data

Pressure fluids

Before carrying out any engineering please refer to the extensive information regarding pressure fluid selection and application conditions in our catalogue sheets RE 90220 (mineral oil) and RE 90221 (environmentally compatible fluids). These catalogue sheets refer to axial piston units, however, the details can be analogously applied to the steering units. For pressure fluids that require FKM seals please contact ourselves.

Operating viscosity

We recommend that the operating viscosity (at operating temperature) for efficiency and service life, is selected within the optimum range of

v_{opt} = optimum operating viscosity range 16 to 46 mm²/s

with reference to the temperature.

Limiting viscosity

For the limiting conditions the following values apply:

→ v_{min} = 10 mm²/s at a max. permissible temperature of ϑ_{max} = +80 °C

→ v_{max} = 800 mm²/s

Temperature range (see selection diagram)

→ ϑ_{min} = – 20 °C

→ ϑ_{max} = +80 °C

If there is the possibility of there being a temperature difference of more than 20 °C between the steering unit and the pressure fluid, then either a LD or LDA version or an open center version for warming the steering unit should be fitted.

Further on the selection of pressure fluids

A prerequisite to being able to select the correct pressure fluid is knowing the operating temperature and the ambient temperature. The pressure fluid should be so selected that the operating viscosity at the working temperature lies within the optimum range (see selection diagram).
We recommend that the next higher viscosity class is selected.

Example:
For an ambient temperature of X °C the tank temperature stabilises at 60 °C. To achieve the optimum viscosity, this relates to the viscosity classes of VG 46 or VG 68; → VG 68 should be selected.

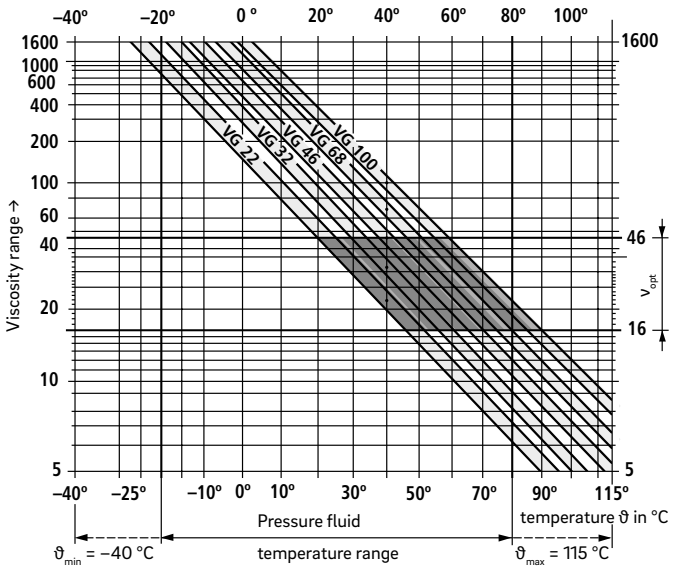
Pressure fluid filtration

The finer the filtration the higher the cleanliness class of the pressure fluid is achieved and so the higher the service life of the entire hydraulic system.

> **☞ Note**
> To ensure the functionability of the steering pump a minimum pressure fluid cleanliness class of 19 / 16 / 13 to ISO 4406 is necessary (see technical data page 7).

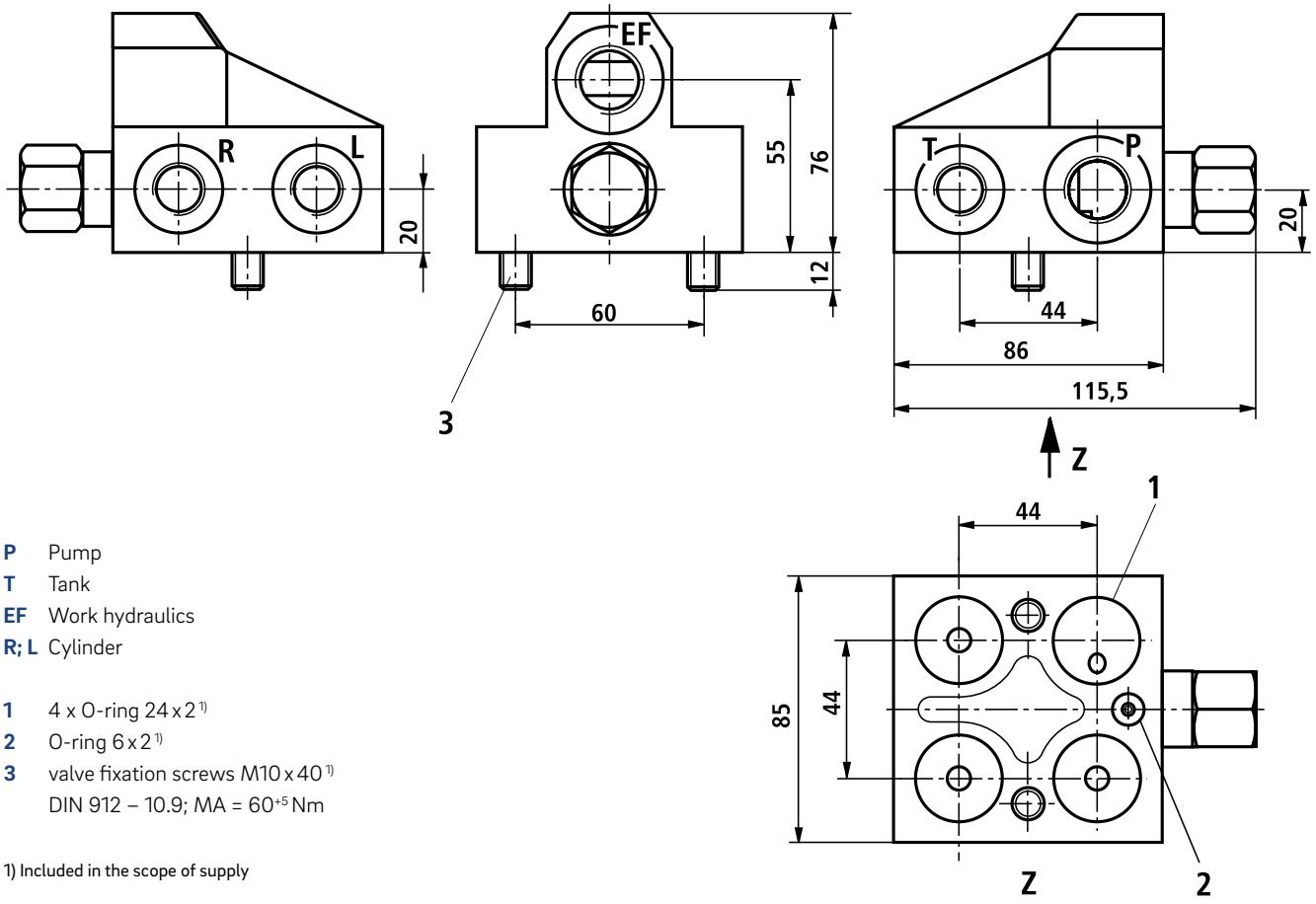
> **⚠ Caution**
> Operating the unit with contaminated hydraulic fluid may lead to the steering system failing.

Fig. 2: Selection diagram



7. Unit dimension: Type LPS / A; NG40 and 80

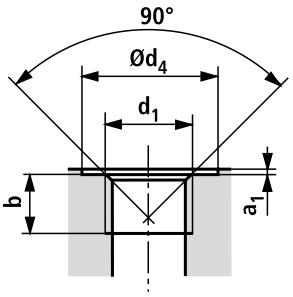
(dimensions in mm)



P Pump
T Tank
EF Work hydraulics
R; L Cylinder

1 4 x O-ring 24 x 2 [1)]
2 O-ring 6 x 2 [1)]
3 valve fixation screws M10 x 40 [1)]
DIN 912 – 10.9; MA = 60^{+5} Nm

1) Included in the scope of supply



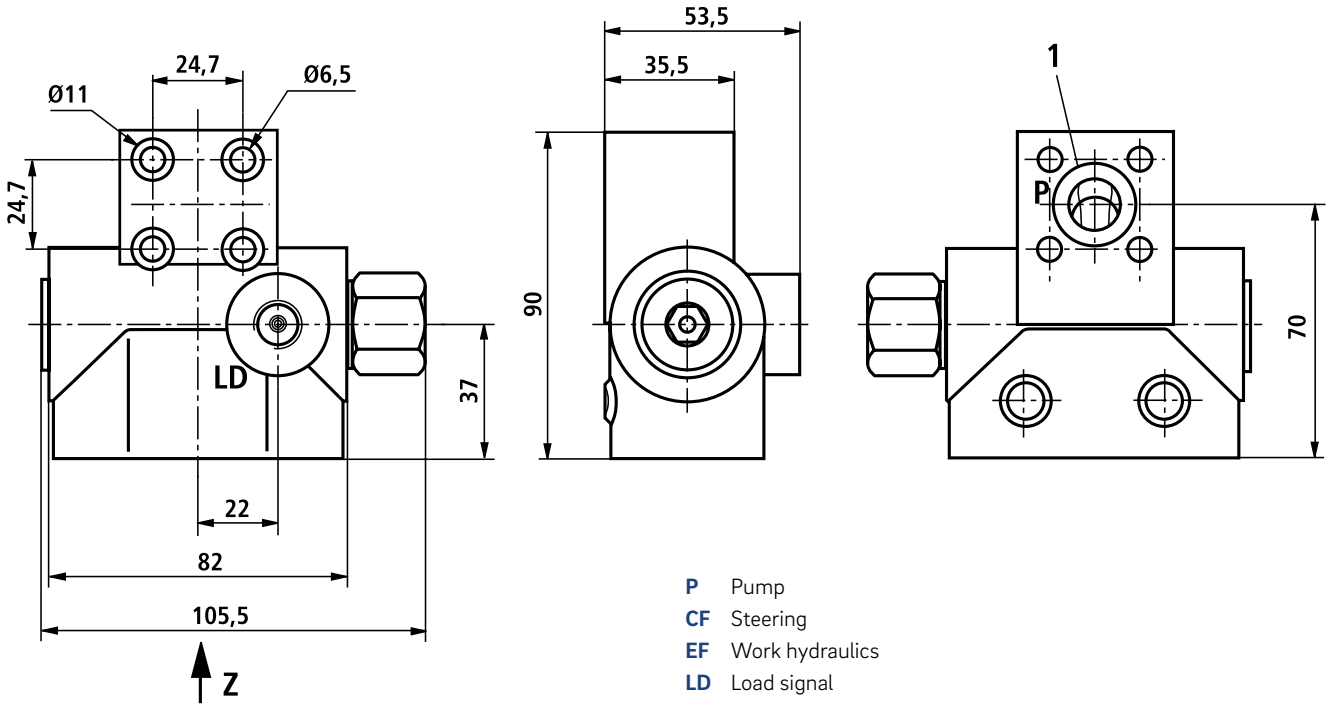
Thread version 01 and 02
(Inch, metric)

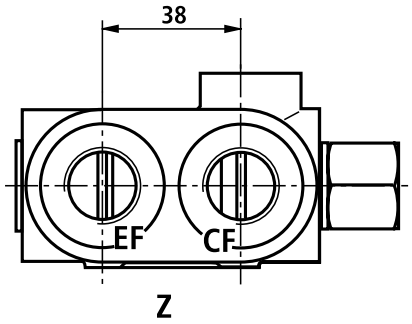
Thread type

Size	Port	Version	d_1	Ø d4 $^{+0,4}$	$b_{min.}$	a_1 $^{\pm 0,5}$
40, 80	P, EF	01	G 1/2	34	14	1
		02	M22 x 1,5	28	16	1
	T, L, R	01	G 3/8	28	12	1
		02	M18 x 1,5	24	12	1

7. Unit dimensions: Type LPS / P; NG40 and 80

(dimensions in mm)



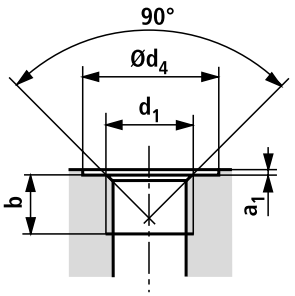


P Pump
CF Steering
EF Work hydraulics
LD Load signal

1 O-ring 20 x 2,5 [1]

Valve fixation:
Cylinder screws according to ISO 4762
M6 x 35–10.9 [2] ; M_A =15 Nm

1) Included in the scope of supply
2) Not included in the scope of supply



Thread version 01 (Inch)

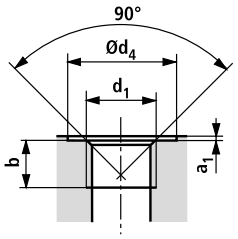
Thread version

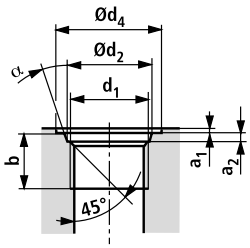
Size	Port	Version	d_1	Ø d4 $^{+0,4}$	$b_{min.}$	a_1 $^{\pm 0,5}$
40, 80	P, EF	01	G 1/2	34	14	1
	LD	01	G 1/4	-	12	-

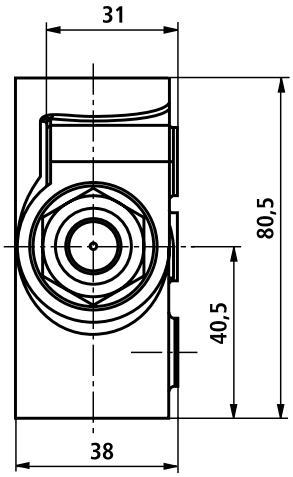
7. Unit dimensions: Type LPS / R; NG40, 80 and 120

(dimensions in mm)

P Pump
CF Steering
EF Work hydraulics
LD Load signal

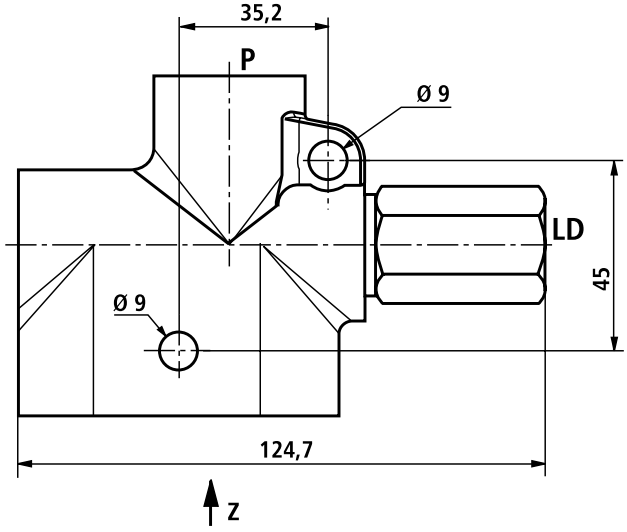


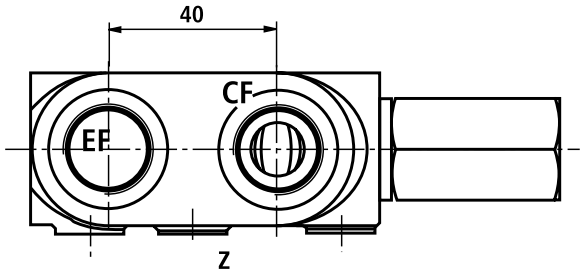




Thread version 01 and 02
(Inch, metric)

Thread version 12
(UNF)

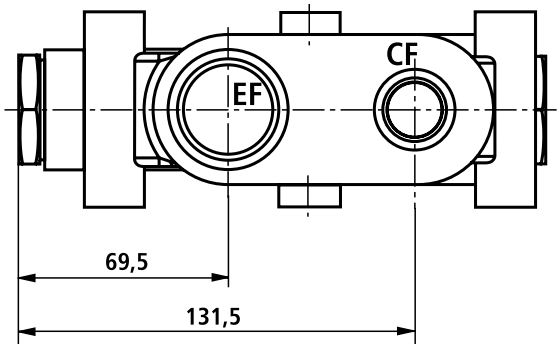




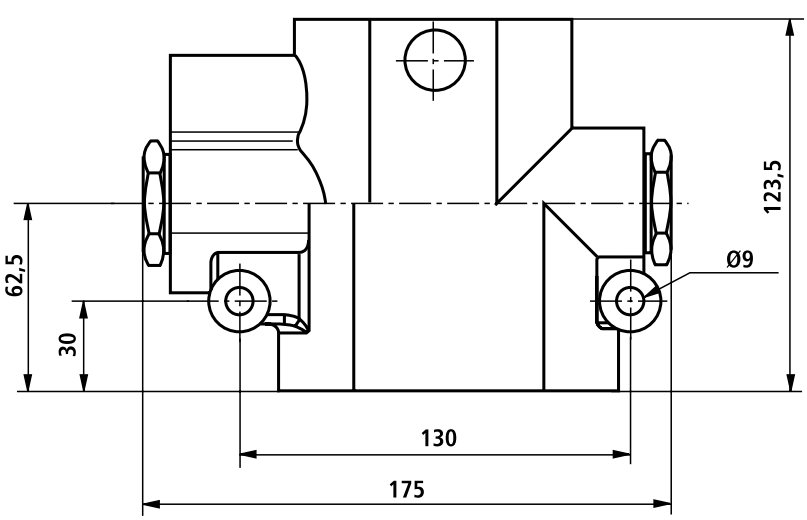
Size	Port	Version	d_1	Ø d_2 $^{+0,13}$	Ø d_4 $^{+0,4}$	$b_{min.}$	a_1	a_2 $^{\pm 0,4}$	α $^{\pm 0,5}$
40, 80	P, EF	01	G 1/2	-	27	14	$0,3^{+0,5}_{-0,2}$	-	-
		02	M22 x 1,5	-	28	14		-	-
		12	7/8-14 UNF	23,9	34	17,5		2,5	15°
	CF	01	G 1/2	-	27	14	$0,3^{+0,5}_{-0,2}$	-	-
		02	M22 x 1,5	-	28	14		-	-
		12	3/4-16 UNF	20,6	30	15		2,5	15°
	LD	01	G 1/4	-	-	12	-	-	-
		02	M22 x 1,5	-	-	12		-	-
		12	7/16-20 UNF	12,5	-	13,5		2,4	12°
120	P, EF	01	G 3/4	-	33	16	$0,3^{+0,5}_{-0,2}$	-	-
		02	M27 x 2	-	33	16		-	-
		12	11/16-12 UN	29,2	33	19		3,3	15°
	CF	01	G 1/2	-	27	14	$0,3^{+0,5}_{-0,2}$	-	-
		02	M18 x 1,5	-	24	12		-	-
		12	3/4-16 UNF	20,6	30	15		2,5	15°
	LD	01	G 1/4	-	-	12	-	-	-
		02	M12 x 1,5	-	-	12		-	-
		12	7/16-20 UNF	12,4	-	13,5		2,4	12°

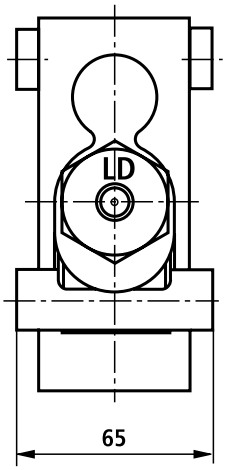
7. Unit dimensions: Type LPS ; NG160

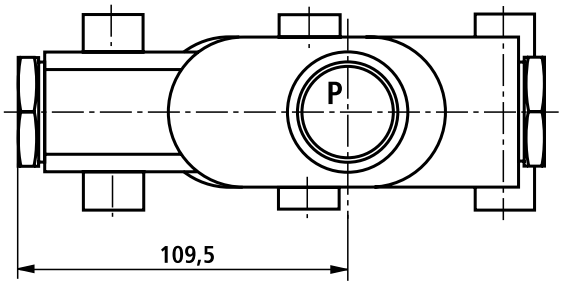
(dimensions in mm)

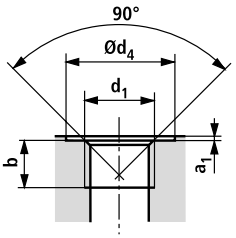


P Pump
CF Steering
EF Work hydraulics
LD Load signal









Thread version 01 and 02
(Inch, metric)

Size	Port	Version	d_1	Ø $d4^{+0,4}$	$b_{min.}$	$a_1^{\pm 0,5}$
160	P, EF	01	G 1	40	18	1
		02	M33 x 2	41	20	1
	CF	01	G 1/2	27	14	1
		02	M22 x 1,5	28	16	1
	LD	01	G 1/4	-	12	-
		02	M12 x 1,5	-	12	-

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