

Linde

BPV pumps

**Compact and efficient!
The pump for
closed loop circuit**

1. Description

1.1 Design and components

The variable hydraulic pumps type BPV . . are axial piston pumps of swash plate design suitable for closed loop hydrostatic transmissions.

They are equipped with all components required for closed loop operation:

- integral auxiliary pump, optionally with internal or external suction
- 10 µm full boost flow cartridge filter
- high pressure relief valves
- boost check valves
- cold start valve (cooler protection)
- boost pressure relief valve
- short circuit device

1.2 Technical features

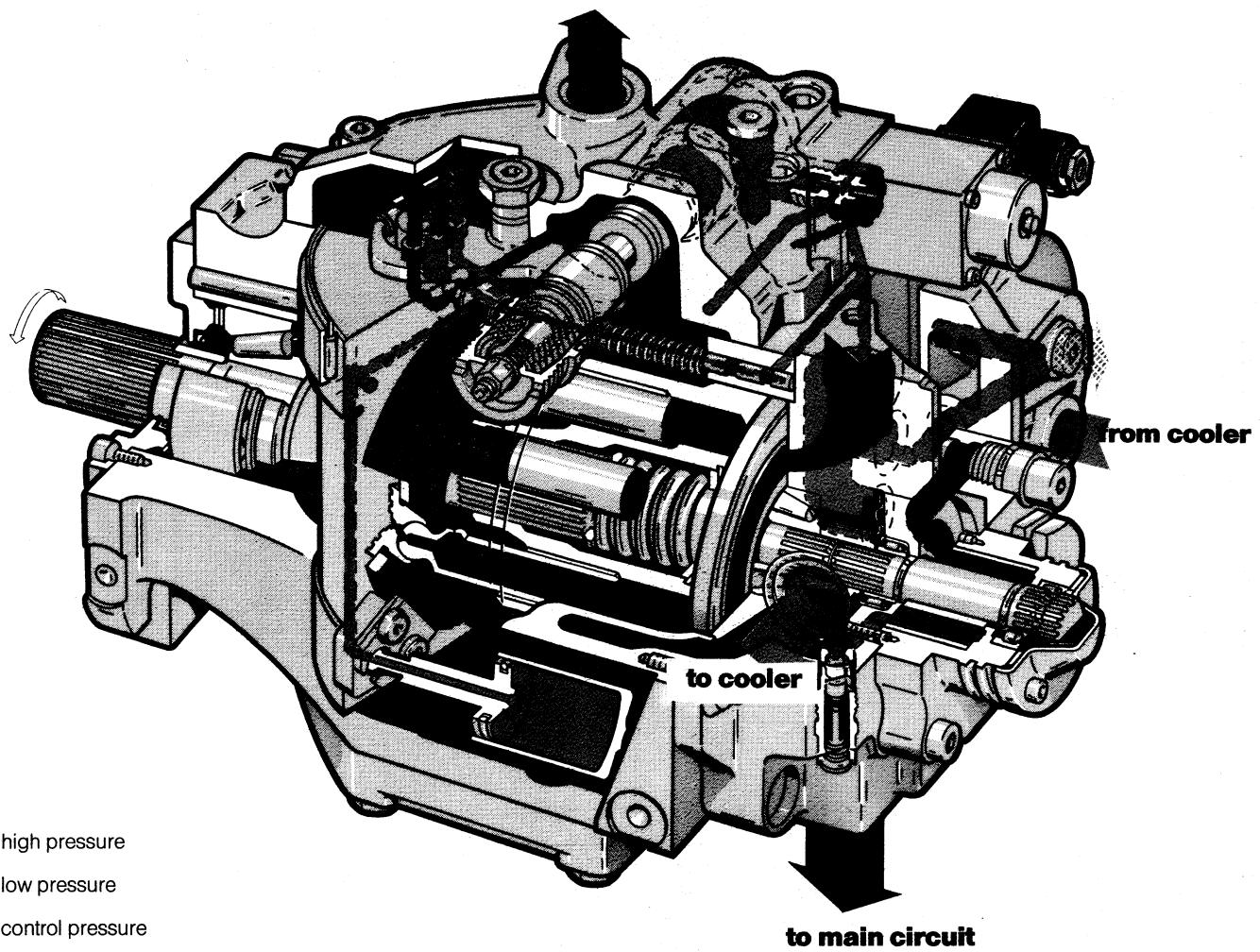
- through-shaft for tandem version or PTO connection for auxiliary drives
- radial loads on drive shaft permissible
- all control components integrated in control cover
- identical spigot mounting diameter for sizes 35, 50, 70 and 100
- identical drive shaft diameter for sizes 35, 50 and 70
- mounting flange suitable for both DIN and SAE pitch circles
- SAE high pressure ports
- clockwise or counterclockwise rotation
- pressure cut-off optional

1.3 Control options

- cam control with positive stretched neutral
- hydraulic remote control
- electro-hydraulic control
- automotive control
- torque control

1.4 Functional diagram

Leakage oil, ventilation

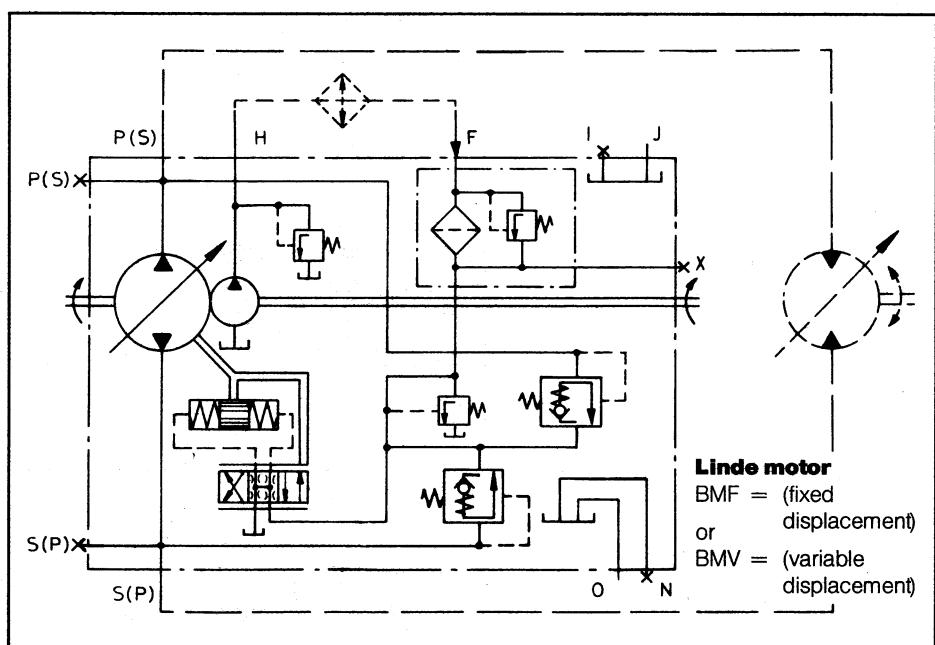


Variable pump BPV .. EH for electro-hydraulic control

1.5 Standard circuit diagram

Legend:

$P(S)$ and $S(P)$	= pressure ports
I, J, N and O	= vent ports or oil filling, resp. drain ports, depending on mounting position
F and H	= cooler ports
$\rightarrow X$	= control pressure port
$\rightarrow P(S)$ and $\rightarrow S(P)$	= check ports for working pressure



1.6 Product range

Design versions		Page	Nominal size				
			35	50	70	100	200
Controls	Cam control KS	10 and 20	•	•	•	•	
	Hydraulic remote control HF without pressure cut-off	12 and 21	•	•	•	•	•
	with pressure cut-off		•	•	•	•	
	pilot valves		see "CONTROL VALVE RANGE"				
	Electro-hydraulic control EH without pressure cut-off	14 and 22	•	•	•	•	
	with pressure cut-off		•	•	•	•	upon request
	control valves		see "CONTROL VALVE RANGE"				
	Automotive control AU	16 and 23	•	•	•	•	
	Torque control TC	18 and 24	•	•	•	•	
	pilot valves		see "CONTROL VALVE RANGE"				
Rotation	clockwise		•	•	•	•	•
	counterclockwise		•	•	•	•	•
Auxiliary pump	with internal suction	25	•	•	•	•	
	with external suction	25	•	•	•	•	•
Coupling flanges	standard version	27	•	•	•	•	•
	cardan version	27	•	•	•	•	
Through-shaft	PTO flange	27	•	•	•	•	•
	tandem version		upon request				

1.7 Type designation

BPV

Variable displacement pump _____
(Series B)

Nominal sizes 35, 50, 70, 100, 200 _____

Rotation

clockwise = R
counterclockwise = L

Controls

Cam control	= KS
Hydraulic remote control	= HF
Electro-hydraulic control	= EH
Automotive control	= AU
Torque control	= TC

2. Characteristics

2.1 Main pump

2.1.1 Pressure

Peak pressure*

500 bar

Rated pressure (= max. working pressure)

420 bar

Permissible housing internal pressure

1,5 bar

Nominal size	35	50	70	100	200
2.1.2 Max. displacement cm ³ /rev	34,9	50,8	70,9	100,3	202,6
2.1.3 Speeds					
Max. speed (100% duty cycle) rpm	3400	3200	3000	2800	2100

Peak speed rpm

3700 3500 3300 3100

2400

2.2 Auxiliary pump (Gerotor type, sizes 35 ... 100 and gear pump, size 200)

Boost pressure

16 bar

Cold start pressure

21 bar

standard valve setting

Inlet pressure at ports

0,2 bar

below atmospheric

T₁ and T₂

pressure ... 2 bar

(for external suction of

sizes 35 ... 100, refer to page 27)

Nominal size	35	50	70	100	200
Displacement cm ³ /rev	12	12 or 18,3	18,3	18,3	38

* Transient pressure over the max. working pressure at which the unit will still function.

2.3 Additional drives (PTO) at auxiliary pump

see Fig. 15, page 26, para 14.4

Nominal sizes	35	50	70	100	200
Permissible output torques at aux. pump shaft					
max. output torque at 10% d.c.	Nm	140	200	250	250
continuous torque	Nm	70	100	140	200
when using standard mounting parts acc. to figures page 27, para 14.6.3.					
continuous output torque in Nm					
pilot-Ø d_{10} = 80 mm	60	60	60	60	—
pilot-Ø d_{10} = 105 mm	70	100	120	120	120

2.4 Auxiliary pumps (optional)

see pump dimensions page 27

3.1 Weight

see dimension tables

3.2 Pressure fluid

Mineral oil HL or HLP per DIN 51524,
other pressure media upon request

- 3.2.1 Pressure fluid temperature range
- 3.2.2 Working viscosity range
- 3.2.3 Optimum working viscosity range
- 3.2.4 Max. viscosity

–20° ... + 90°C
10 ... 80 mm²/s
15 ... 25 mm²/s
1000 mm²/s (intermittent for starting)

Recommendations:

Working tem- peratures of approx.	Viscosity class (mm²/s = cSt)	
	HL or HLP	
30 ... 40°C		22 mm²/s at 40°C
60 ... 70°C		68 mm²/s at 40°C
80 ... 90°C		100 mm²/s at 40°C

Beside the minimum requirements of DIN 51524 a brand name hydraulic oil must comply with all requirements of high pressure hydraulic installations. This applies especially to so called HLPD (detergent) oils.

Linde recommend using only pressure fluids which are confirmed by the producer as suitable for high pressure hydraulic installations.

For the correct choice of the suitable pressure fluid it is indispensable to know the working temperature of the hydraulic circuit (closed loop).

When selecting the pressure fluid it must be taken into consideration that the working viscosity is within the optimum working viscosity range (see 3.2.3).

Attention! Due to pressure and speed influences the leakage oil temperature is always higher than the circuit temperature. At no point of the hydraulic installation the temperature should exceed 90°C.

For special applications where the given directions cannot be kept, please ask the manufacturer.

3.3 Filtration

by built-in 10 µm cartridge filter (resistant against pulsation up to 25 bar)

3. General characteristics

4. Drive

4.1 Couplings

Drive via suitable coupling elements

(for special cases please ask the manufacturer)

4.2 Moment of inertia

Nominal sizes	35	50	70	100	200
Moment of inertia kgm ²	0,0077	0,0110	0,0169	0,0280	0,1350

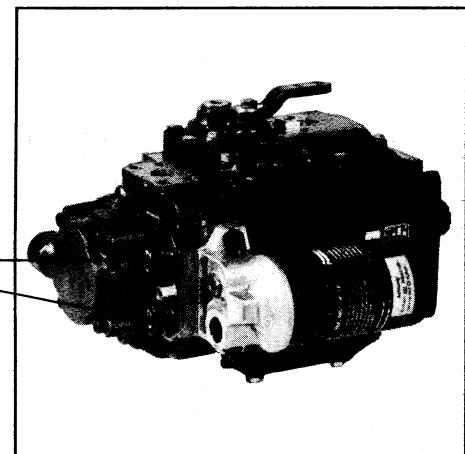
5. Short circuit operation

5.1 Short circuiting

by untightening the two valve cartridges
(retighten again afterwards)

Fig. 1. Variable hydraulic pump
BPV...KS with auxiliary pump
with external suction

valve cartridges



5.1.1 Opening stroke

approx. 3 mm = 2 turns at sizes 35...100
approx. 6 mm = 3 turns at size 200

5.1.2 Tightening torque

85 Nm at sizes 35 ... 70
130 Nm at size 100
200 Nm at size 200

6. Pressure medium cooling

6.1 Required cooling performance

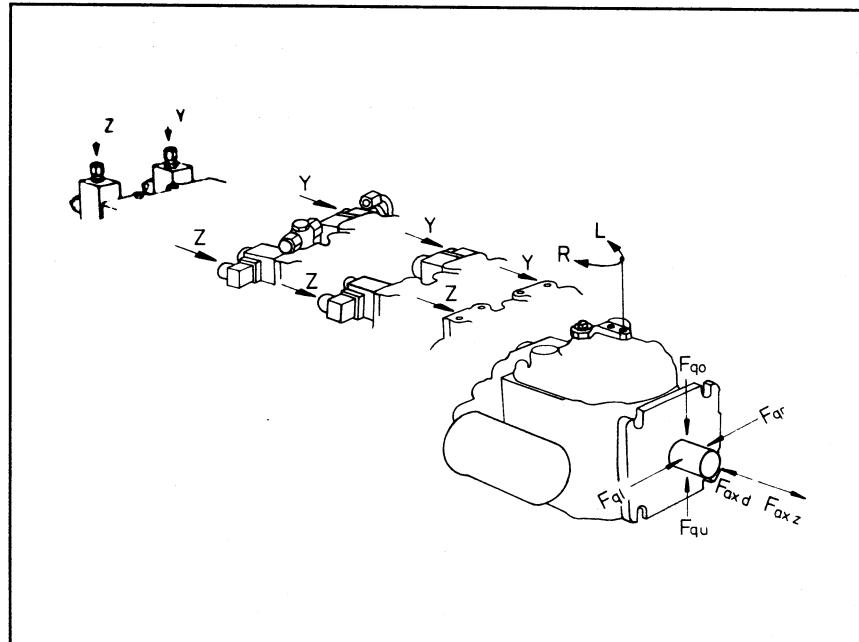
approx. 20 ... 25% of the installed input power (normally)

7. Radial and axial loads

7.1 Max. radial and axial forces F_{q0} and F_{ax}

at continuous pressure = 250 bar
and max. speed

Relating to shaft end center.
Values are valid for cw and ccw rotation



Pump size (NG)	kN	F_{q0}	F_{qu}	F_{ar}		F_{ql}		F_{axd}	F_{axz}
				Position R, Y	Position L, Z	Position R, Y	Position L, Z		
35	kN	3	3	0,8	3,5	3,5	0,8	0,8	3
50	kN	5,2	5,2	2,3	4,7	4,7	2,3	2,2	2,7
70	kN	8,2	8,2	3,9	5,8	5,8	3,9	2,7	5,6
100	kN	9,5	9,5	7,3	7,8	7,8	7,3	4,1	4,6
200	kN	12	12	3,2	13,4	13,4	3,2	5,9	10,9

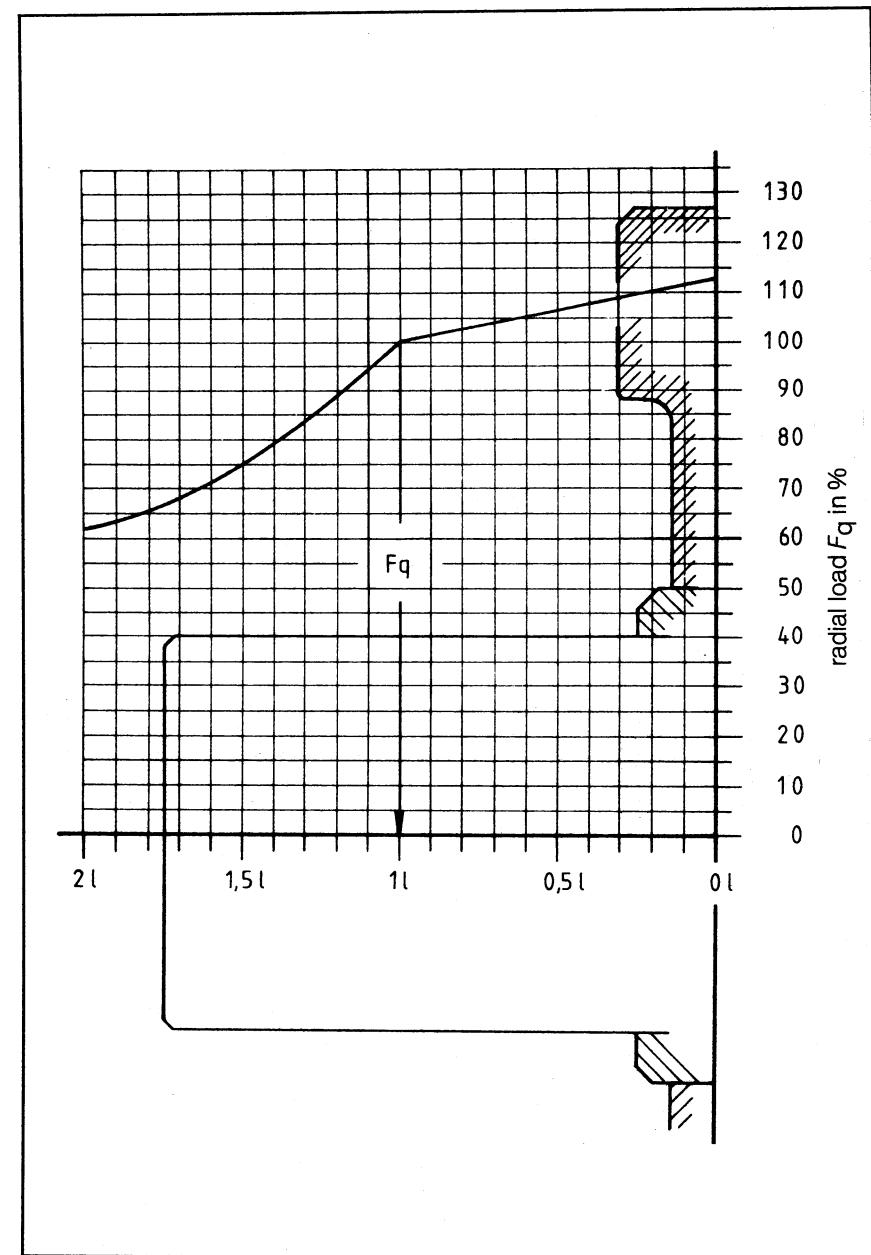
double the load is permitted intermittently*

* For special applications exceeding the given permissible values, please ask the manufacturer.

7.2 **I-F_q** characteristic

at continuous pressure = 250 bar
and max. speed

percentage radial force F_q % depending
on load distance l /

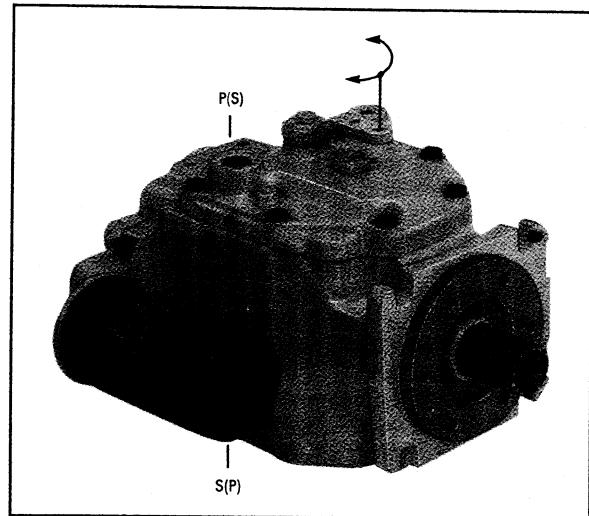


Nominal size	35	50	70	100	200
Point of impact l / (from front flange to shaft)	mm	32	32	32	32

8. "Cam control" KS version

with mechanical cam
control and progressive
control characteristic

Fig. 2. Variable pump BPV .. KS



8.1 Control

By turning the control lever flow rate and direction of pump flow are controlled via a cam plate with progressive characteristic.

8.2 Flow direction

changes depending on sense of rotation and swivel direction of the swash plate

- 8.2.1 Control from neutral position (control lever on top)

clockwise

counterclockwise

clockwise
counterclockwise

$S(P) \rightarrow P(S)$
 $P(S) \rightarrow S(P)$

$P(S) \rightarrow S(P)$
 $S(P) \rightarrow P(S)$

8.3 Control force

17 ... 22 N (see page 20)

8.4 Control angle

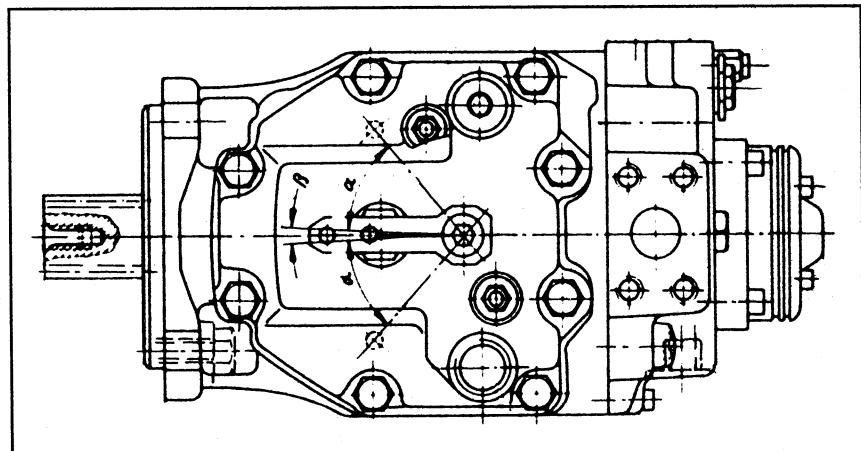
$50^\circ = 48^\circ + \frac{\text{neutral range}}{2}$ in each direction

- 8.4.1 From neutral range to one end position

$\alpha = 48^\circ$

- 8.4.2 Neutral range

$\beta = 4^\circ$



8.5 Control torque

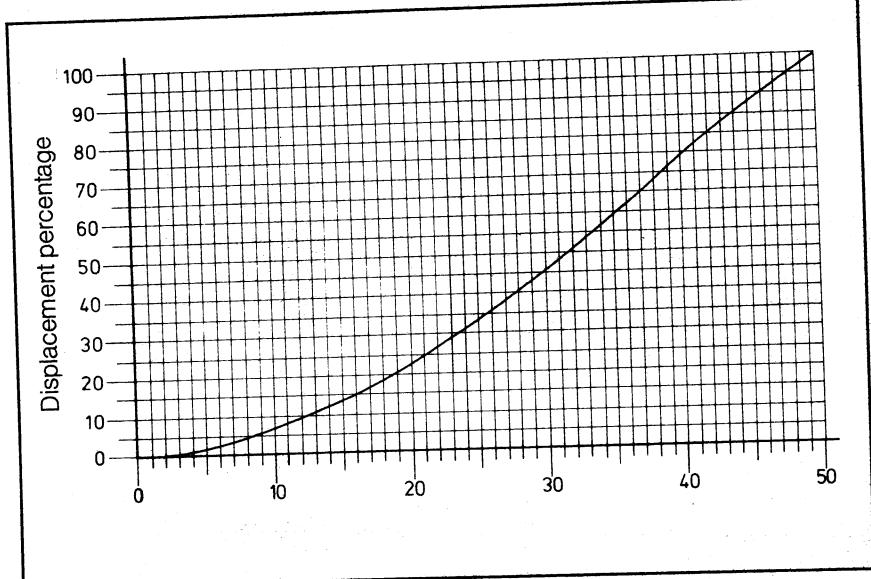
1,19 ... 1,54 Nm

8.6 Minimum response time

$\geq 0,8$ s, other response times possible using special restrictors

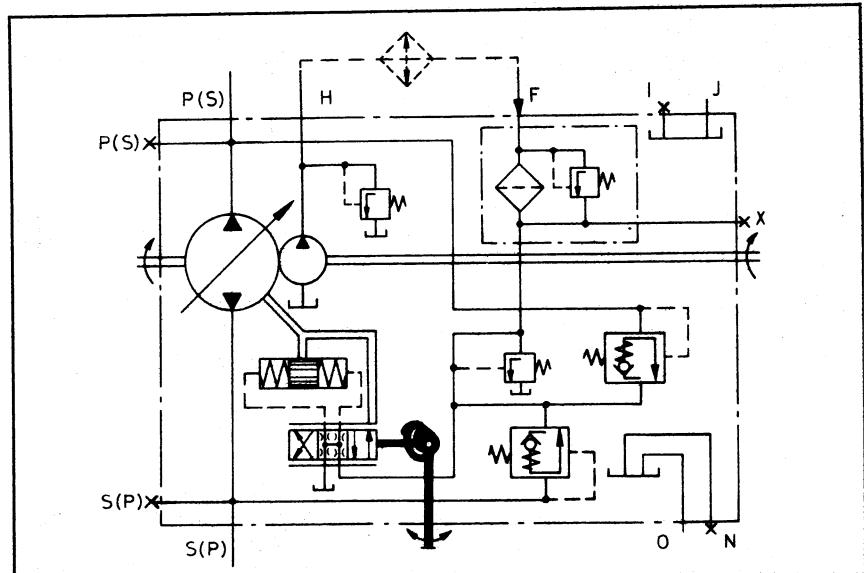
**"Cam control"
KS version**

**8.7 Displacement
depending on
control angle**



The cam plate has a progressive control characteristic and stretched neutral position. This provides an especially sensitive displacement of the pump swash angle from neutral and vice versa.

8.8 Circuit diagram



Cam control

P(S) and S(P)

I, J, N and O

F and H

→ X

→ P(S) and → S(P)

= pressure ports

= vent ports, or oil filling, resp. drain ports,
depending on mounting position

= cooler ports

= control pressure port

= check ports for working pressure

9. "Hydraulic remote control" HF version

with double acting
pressure cut-off
as an option

with hydraulic pilot control
with linear control characteristic

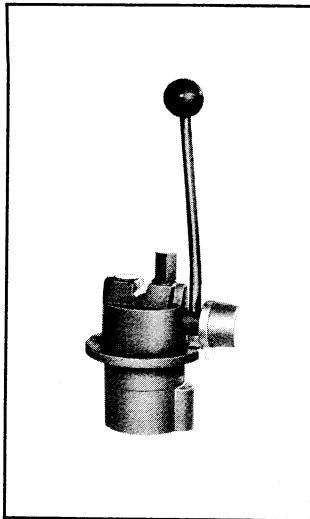


Fig. 3. Pilot valve for stepless hydraulic remote control

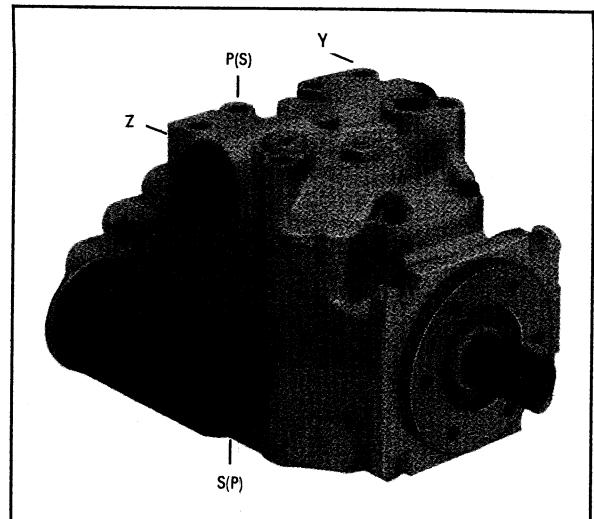


Fig. 4. Variable pump BPV .. HF (without pressure cut-off)

9.1 Control

By pressurizing the control ports Y or Z by means of a pilot valve (Fig. 3, see also prospectus "Control Valve Range") flow rate and direction of pump flow are controlled (see 9.6).

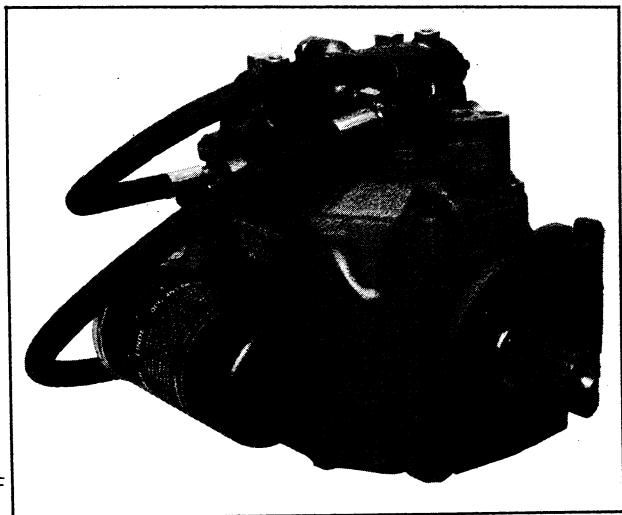


Fig. 5. Variable pump BPV .. HF (with pressure cut-off)

At hydraulic remote controls which are combined with a pressure cut-off (Fig. 5) the pump flow is reduced as soon as it reaches the cut-off pressure, thus replacing the leakage oil of the system only and maintaining the system pressure.

9.2 Flow direction

changes depending on sense of rotation and swivel direction of the swash plate

Sense of rotation

9.2.1 Control from neutral position

clockwise

counterclockwise

Pressurization at port Y

S(P) → P(S)

P(S) → S(P)

Pressurization at port Z

P(S) → S(P)

S(P) → P(S)

9.3 Control pressure range

2...8 bar = pressure difference between Y and Z

9.4 Control volume

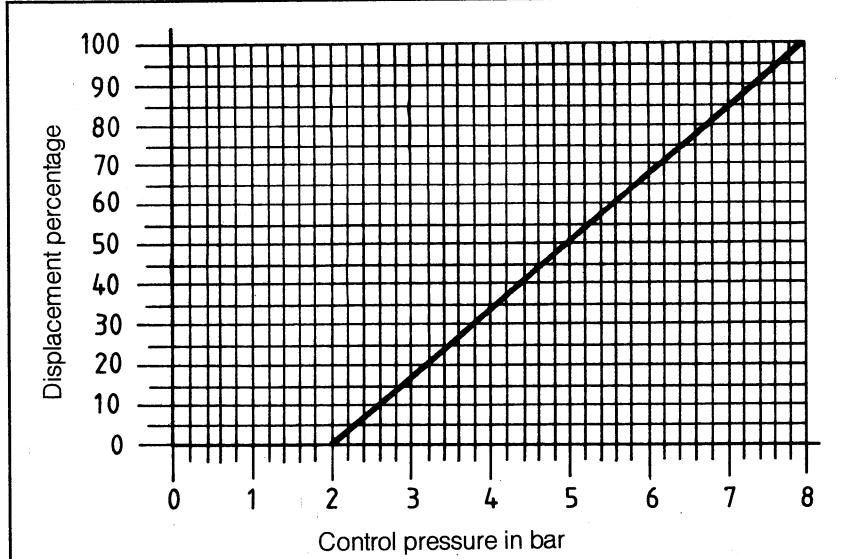
8,6 cm³ for sizes 35 ... 100;
12,3 cm³ for size 200

9.5 Minimum response time

0,8 s, other response times possible using special restrictors

**"Hydraulic remote control"
HF version**

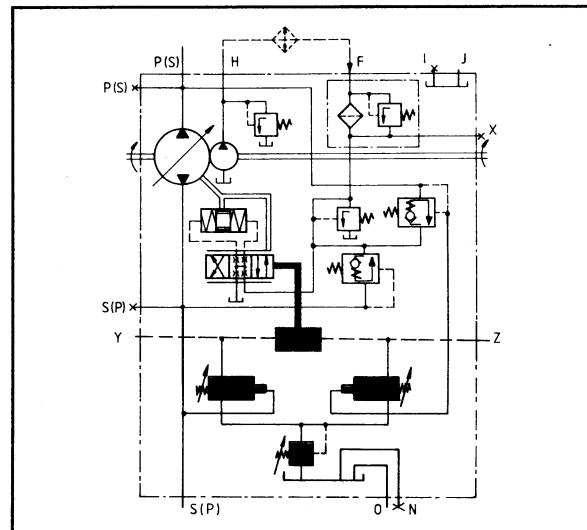
**9.6 Displacement
depending on
control pressure**



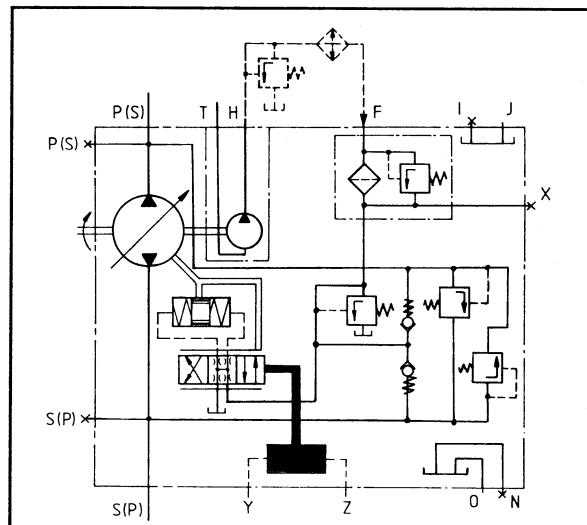
9.7 Circuit diagram

Sizes 35 ... 100
Hydr. remote control

Pressure cut-off



Size 200
Hydr. remote control



P(S) and S(P)
I, J, N and O

T

F and H

Y and Z

→ X

→ P(S) and → S(P)

- = pressure ports
- = vent ports or oil filling, resp. drain ports, depending on mounting position
- = tank port
- = cooler ports
- = control ports for hydr. users
- = control pressure gauge port
- = gauge ports for working pressure

10. "Electro-hydraulic control" EH version

**with double acting
pressure cut-off
as an option**

with electro-hydraulic pilot control with linear control characteristic

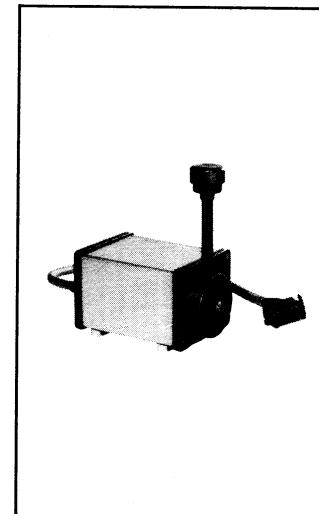


Fig. 6. Pilot valve for stepless electronic pump control

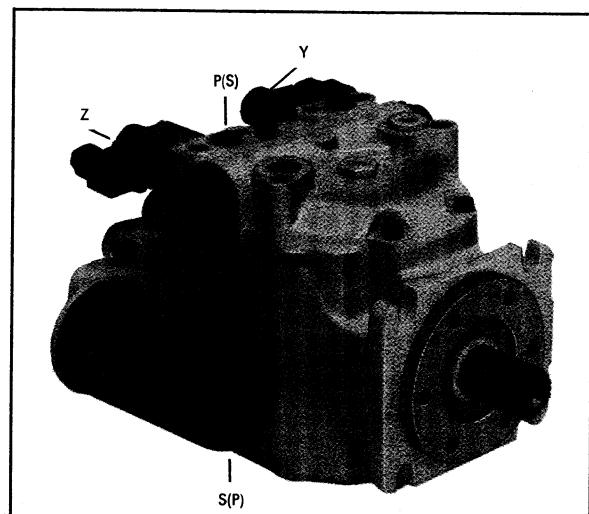


Fig. 7. Variable pump BPV .. EH (without pressure cut-off)

10.1 Control

By means of a pilot valve (Fig. 6, see also prospectus "Control Valve Range") flow rate and pump flow direction are controlled via two control solenoids (see 10.11).



Fig. 8. Variable pump BPV .. EH (with pressure cut-off)

At electro-hydraulic controls which are combined with a pressure cut-off (Fig. 8) the pump flow is reduced as soon as it reaches the cut-off pressure, thus replacing the leakage oil of the system only and maintaining the system pressure.

10.2 Flow direction

changes depending upon sense of rotation and swivel direction of the swash plate

Sense of rotation

- 10.2.1 Control from neutral position
Electric voltage on solenoid Y
Electric voltage on solenoid Z

clockwise
 $S(P) \rightarrow P(S)$
 $P(S) \rightarrow S(P)$

counterclockwise
 $P(S) \rightarrow S(P)$
 $S(P) \rightarrow P(S)$

10.3 Rated voltage = continuous voltage limit

12 V or 24 V

10.4 Voltage type

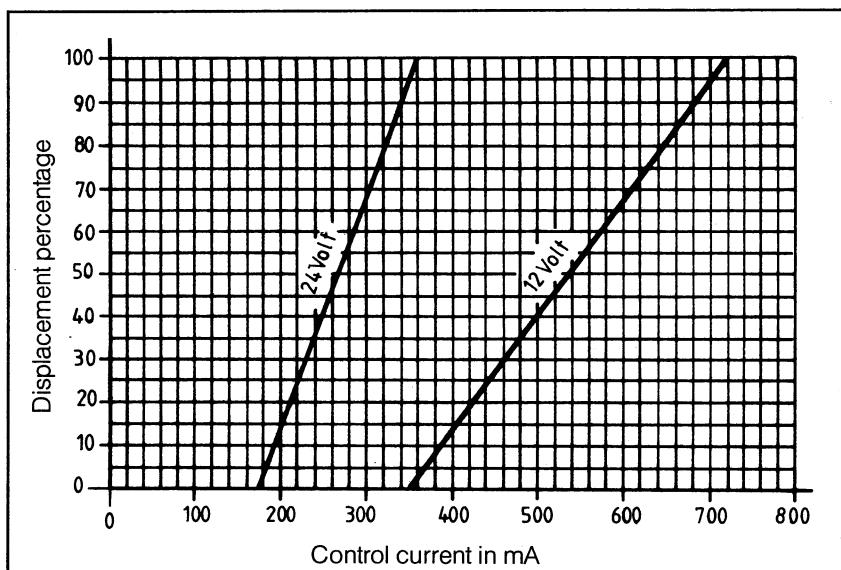
d.c. voltage

10.5 Power input

26 W

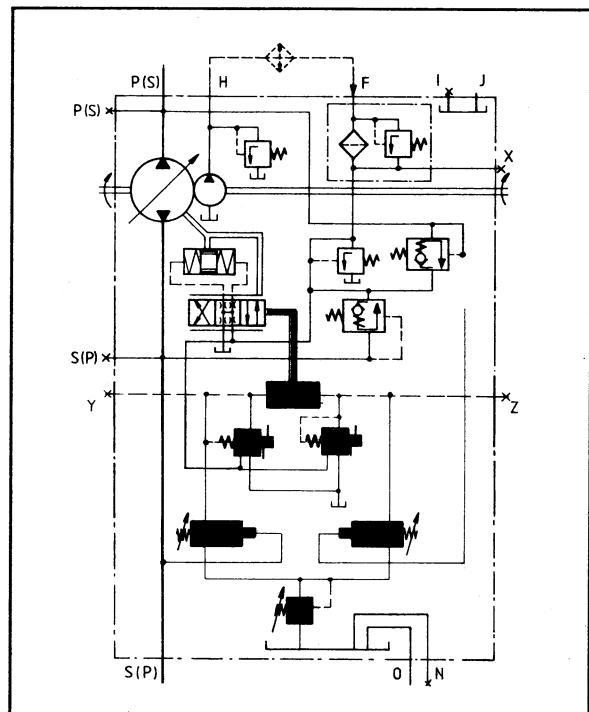
**"Electro-hydraulic control"
EH version**

	12 V regulated solenoid	24 V regulated solenoid
10.6 Rated current (continuous current limit)	1300 mA	650 mA
10.6.1 Regulation current		
Swash begin	350 ± 10 mA	175 ± 10 mA
Swash end	720 mA	360 mA
10.7 Relative duty cycle	100% ED	
10.8 Protection class	IP 54 as per DIN 40050	
10.9 Dither signal	35 Hz rectangle, pulse ratio 1:1 350 mA 175 mA peak-peak superimposed	
10.10 Minimum response time	0,8 s, other response times possible using special restrictors	
10.11 Displacement depending on regulation current		



10.12 Circuit diagram

P(S) and S(P)
 = pressure ports
I, J, N and O
 = vent ports or oil filling,
 resp. drain ports,
 depending on
 mounting position
F and H
 = cooler ports
→ X
 = control pressure
 take-off port
→ P(S) and → S(P)
 = gauge ports for
 working pressure
→ Y and → Z
 = gauge ports for
 control pressure

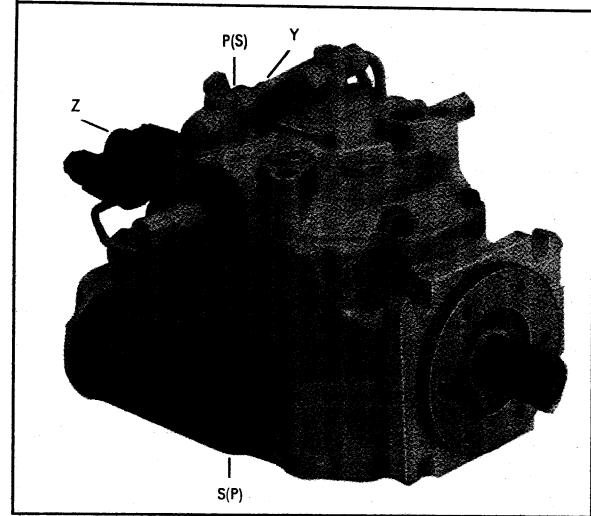


electro-hydraulic control
pressure cut-off

11. "Automotive control" Au version

prime mover speed dependant servo control

Fig. 9. Variable pump BPV .. AU



11.1 Control

The pump displacement depends on the prime mover speed and is determined via the accelerator pedal (see 11.10).

At low idle the pump is in neutral position and starts stroking as soon as an adjustable speed is reached. This means max. pump displacement at max. engine speed.

When operating the accelerator pedal the travel speed of the vehicle is increased, and when releasing it the speed is reduced with normal deceleration. Braking with fast deceleration is done by operating the inching valve.

The stroking direction of the pump can be preselected electrically.

11.2 Flow direction

changes depending upon sense of rotation and swivel direction of the swash plate

Sense of rotation

11.2.1	Control from neutral position Electric voltage on solenoid Y Electric voltage on solenoid Z	clockwise $S(P) \rightarrow P(S)$ $P(S) \rightarrow S(P)$	counterclockwise $P(S) \rightarrow S(P)$ $S(P) \rightarrow P(S)$
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11.3 Rated voltage

12 V or 24 V

11.4 Voltage type

d.c. voltage

11.5 Power input

26 W

11.6 Max. current

2,5 A or 1,25 A

11.7 Relative duty cycle of control solenoids

100% ED

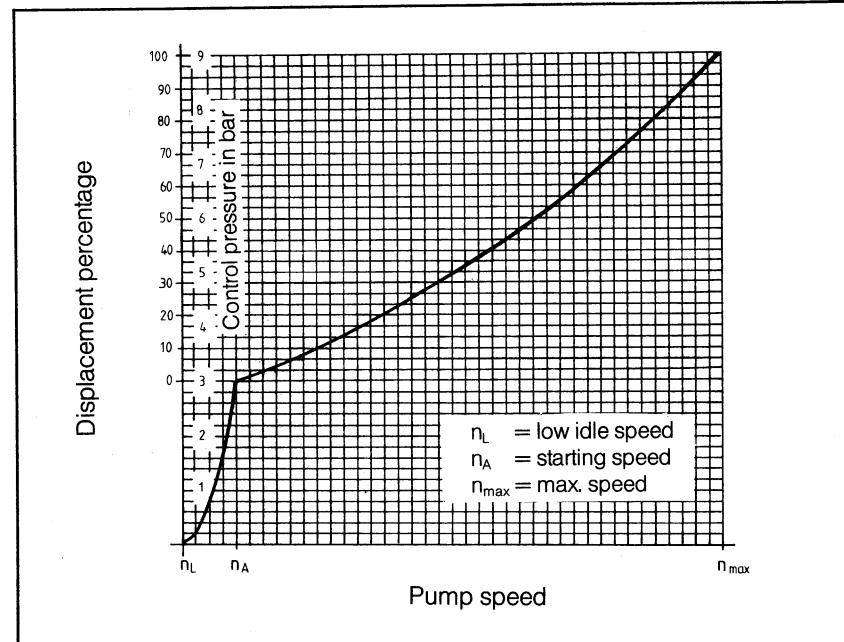
11.8 Protection class of control solenoids

IP 54 as per DIN 40 050

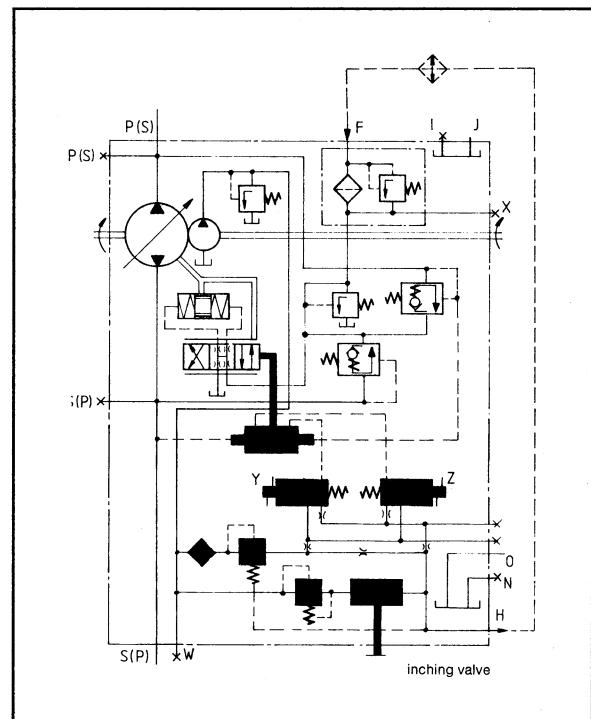
11.9 Minimum response time

0,8 s, other response times possible using special restrictors

11.10 Displacement depending on speed



11.11 Circuit diagram



automotive control

- $P(S)$ and $S(P)$ = pressure ports
 I, J, N and O = vent ports or oil filling, resp. drain ports, depending on mounting position
 F and H = cooler ports
 $\rightarrow X$ = control pressure gauge port
 $\rightarrow P(S)$ and $\rightarrow S(P)$ = gauge ports for working pressure
 $\rightarrow W$ = gauge port for boost pump pressure

12. "Torque control" TC version

with hydraulic pilot control
with deliberately variable
holding pressure setting

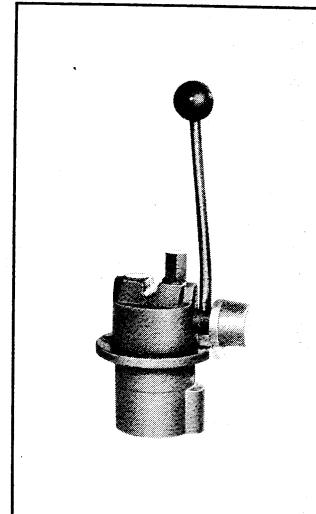


Fig. 10. Pilot valve for stepless hydraulic control

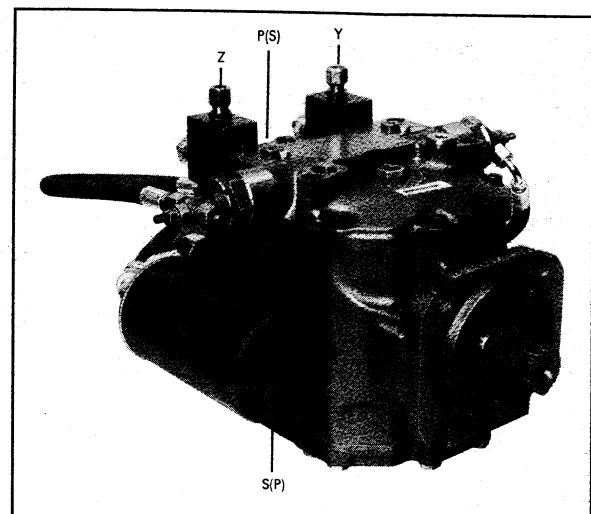


Fig. 11. Variable pump BPV .. TC

12.1 Control

Pump flow rate and direction are determined by the control pressure at port Y or Z (see 9.1).

This signal is, however, opposed by the working pressure, so that the pump flow depends on control and working pressure. The function corresponds to a constant pressure control with deliberately variable holding pressure.

12.2 Flow direction

changes depending upon sense of rotation
and swivel direction of the swash plate

Sense of rotation

12.2.1	Control from neutral position	clockwise	counterclockwise
	Pressurization at port Y	$S(P) \rightarrow P(S)$	$P(S) \rightarrow S(P)$
	Pressurization at port Z	$P(S) \rightarrow S(P)$	$S(P) \rightarrow P(S)$

12.3 Control pressure range

$\Delta p = 2,5$ bar between neutral position and
max. displacement

12.3.1	Control pressure at neutral	8 ... 10,5 bar
12.3.2	Control pressure at working pressure	see diagram 12.6

12.4 Control volume

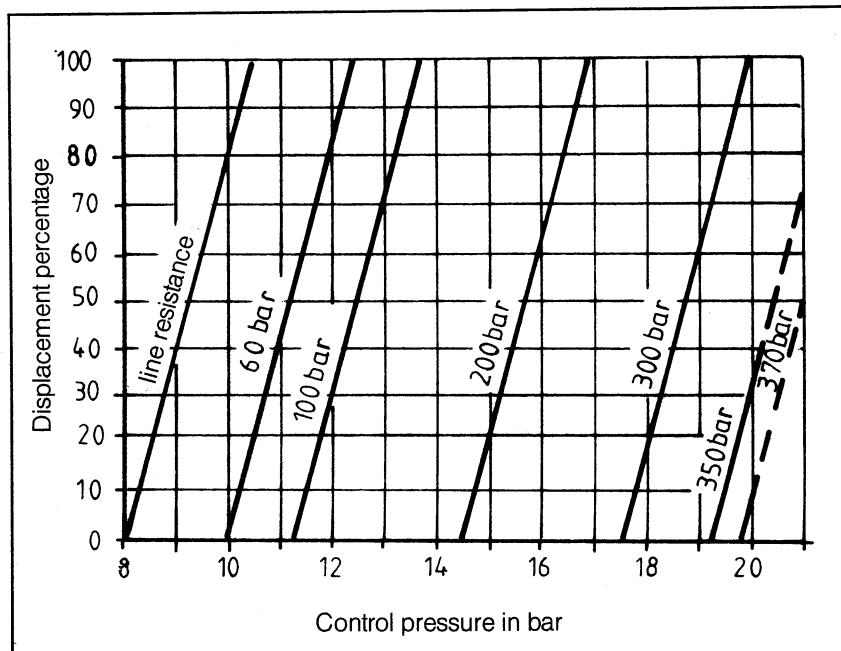
$8,6 \text{ cm}^3$

12.5 Minimum response time

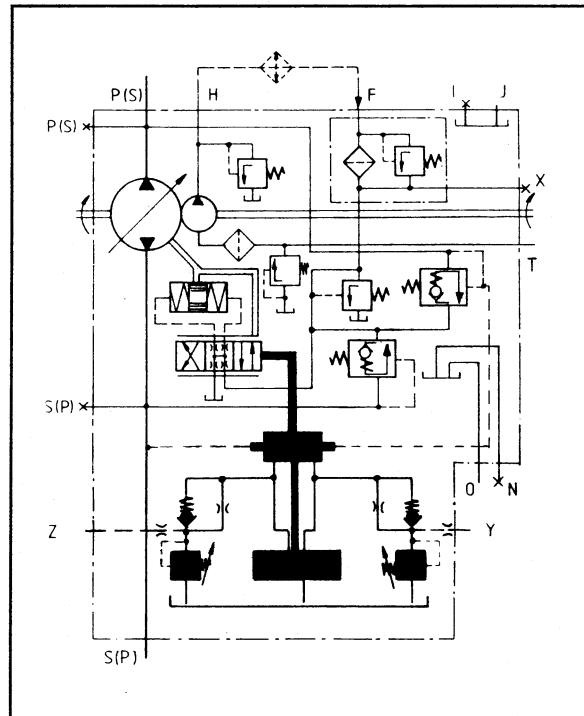
0,8 s at line resistance, other response
times possible using special restrictors

**"Torque control"
TC version**

**12.6 Displacement
depending on
control and
working pressure**



12.7 Circuit diagram



torque control

$P(S)$ and $S(P)$	= pressure ports
I, J, N and O	= vent ports or oil filling, resp. drain ports, depending on mounting position
T	= tank port
F and H	= cooler ports
Y and Z	= control ports for hydraulic users
$\rightarrow X$	= control pressure gauge port
$\rightarrow P(S)$ and $\rightarrow S(P)$	= gauge ports for working pressure
$\rightarrow Y$ and $\rightarrow Z$	= gauge ports for control pressure

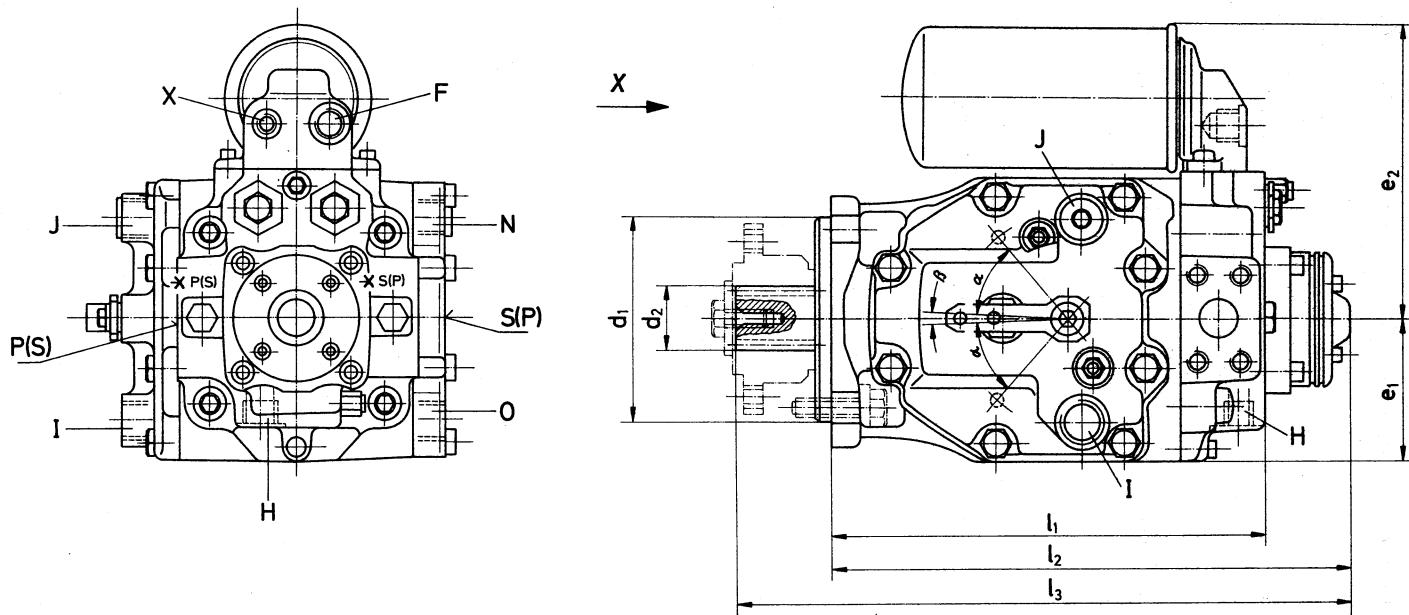
13. Pump dimensions

13.1 "Cam control"

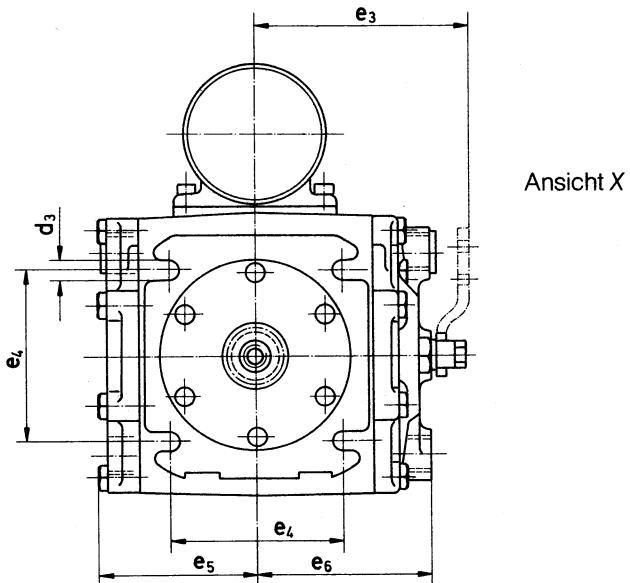
KS version

P(S) and S(P)
 I, J, N and O
 F and H
 X
 = pressure ports
 = vent ports or oil filling, resp. drain ports,
 depending on mounting position
 = cooler ports, M 22 x 1,5
 = control port, M 14 x 1,5

"Internal suction" version
 (for external suction see 14 in Annex)



Installation position preferably horizontal in relation to the drive shaft and the upper control pivot, other installation positions on request.



Dimensions (in mm)

Nominal size	d_1 h8	d_2 DIN 5480	d_3	e_1	e_2	e_3	e_4	e_5	e_6	l_1	l_2	l_3	α in °	β in °	P(S) and S(P) Size	Pressure series	Weight in kg
35		W 35x2x9 g													$\frac{3}{4}"$	High pressure	34,8
50		W 35x2x9 g													$\frac{3}{4}"$		37,5
70		W 35x2x9 g													1"		50,5
100	127	W 40x2x9 g	15	82,5	175,5	130	114,6	89	104,5	246,5	293	349	48	4	1"		64
				84	179	134		93	108,5	257	304	360					
				93,5	196	142		107,5	116,7	282,5	341,5	397,5					
				103	205	151		115,5	125,5	306,5	366	422					

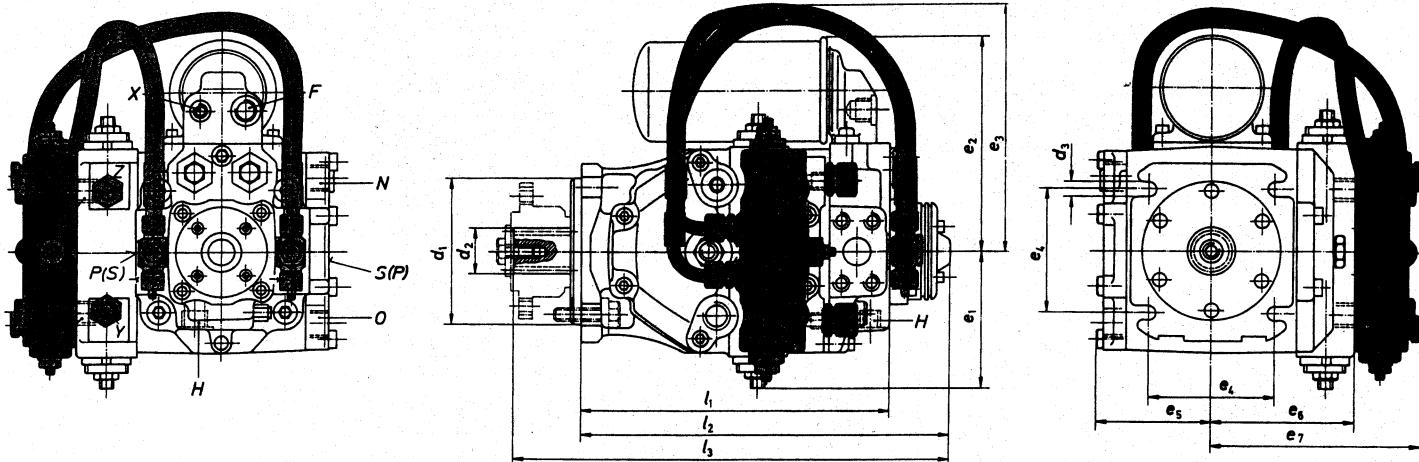
13.2 "Hydraulic remote control" HF version

Installation position preferably horizontal in relation to the drive shaft and the upper pivot, other installation positions on request.

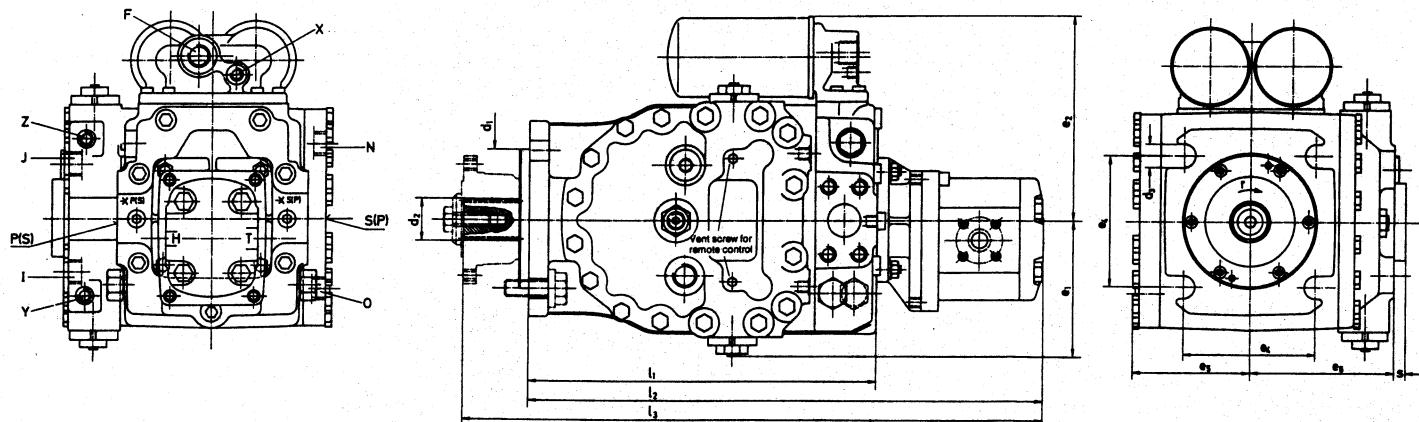
Nominal sizes 35 . . . 100, "internal suction" version
(for external suction see 14 in Annex)

Pressure cut-off

		Size 35...100	Size 200
<i>P(S) and S(P)</i>	pressure ports		
<i>i, J, N and O</i>	vent ports or oil filling, oil drain ports, depending on mounting position		
<i>F</i>	cooler port	M 22x1,5	M 28x1,5
<i>H</i>	cooler port	M 22x1,5	M 28x1,5
<i>T</i>	tank port (inlet)	M 22x1,5	18 Ø
<i>X, Y and Z</i>	control ports	—	26 Ø



Nominal size 200, "external suction" version
(not available with internal suction)



Dimensions (in mm)

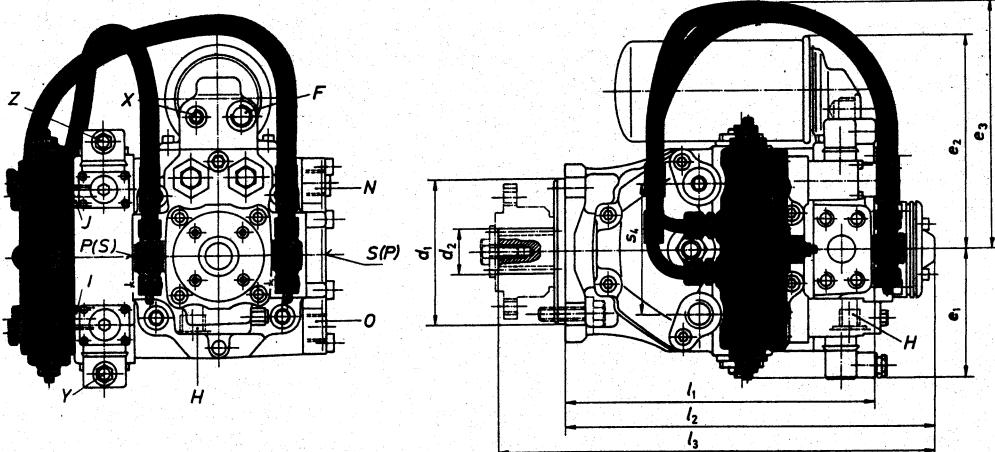
Please refer to installation drawings for exact dimensions or those not shown — design changes are reserved in the interest of technical progress.

**13.3 "Electro-hydraulic control"
EH version**

P(S) and S(P)	= pressure ports
I, J, N and O	= vent ports or oil filling, resp. drain ports, depending on mounting position, M 22 x 1,5
F and H	= cooler ports, M 22 x 1,5
X	= control port, M 14 x 1,5

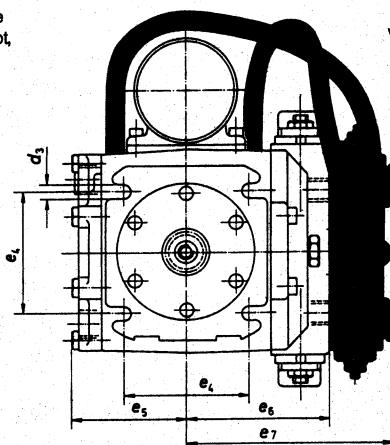
"Internal suction" version
(for external suction see 14 in Annex).

Pressure cut-off



Installation position preferably horizontal in relation to the drive shaft and the upper control pivot, other installation positions on request.

View X



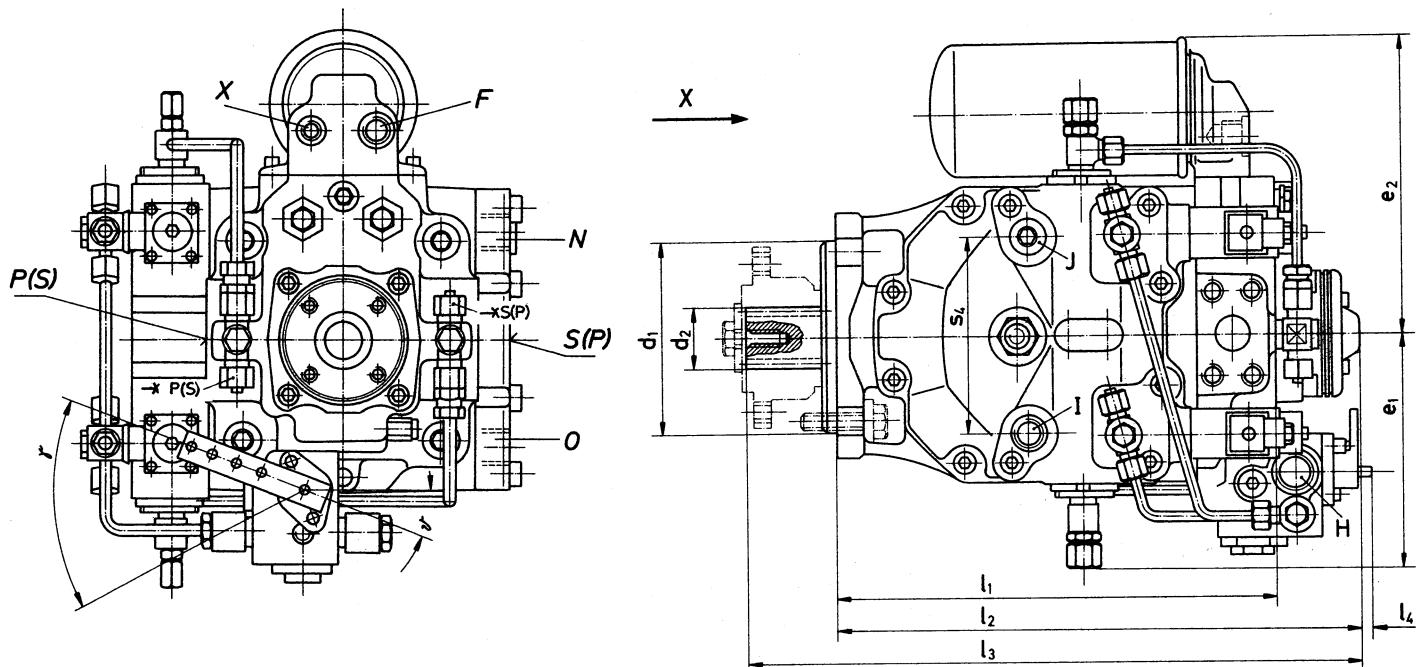
Dimensions (in mm)

| Nominal size | d₁ NB | d₂ DIN 5460 | d₃ | d₄ | d₅ | d₆ | d₇ | d₈ | d₉ | d₁₀ | d₁₁ | d₁₂ | d₁₃ | d₁₄ | d₁₅ | d₁₆ | d₁₇ | d₁₈ | d₁₉ | d₂₀ | d₂₁ | d₂₂ | d₂₃ | d₂₄ | d₂₅ | d₂₆ | d₂₇ | d₂₈ | d₂₉ | d₃₀ | d₃₁ | d₃₂ | d₃₃ | d₃₄ | d₃₅ | d₃₆ | d₃₇ | d₃₈ | d₃₉ | d₄₀ | d₄₁ | d₄₂ | d₄₃ | d₄₄ | d₄₅ | d₄₆ | d₄₇ | d₄₈ | d₄₉ | d₅₀ | d₅₁ | d₅₂ | d₅₃ | d₅₄ | d₅₅ | d₅₆ | d₅₇ | d₅₈ | d₅₉ | d₆₀ | d₆₁ | d₆₂ | d₆₃ | d₆₄ | d₆₅ | d₆₆ | d₆₇ | d₆₈ | d₆₉ | d₇₀ | d₇₁ | d₇₂ | d₇₃ | d₇₄ | d₇₅ | d₇₆ | d₇₇ | d₇₈ | d₇₉ | d₈₀ | d₈₁ | d₈₂ | d₈₃ | d₈₄ | d₈₅ | d₈₆ | d₈₇ | d₈₈ | d₈₉ | d₉₀ | d₉₁ | d₉₂ | d₉₃ | d₉₄ | d₉₅ | d₉₆ | d₉₇ | d₉₈ | d₉₉ | d₁₀₀ | d₁₀₁ | d₁₀₂ | d₁₀₃ | d₁₀₄ | d₁₀₅ | d₁₀₆ | d₁₀₇ | d₁₀₈ | d₁₀₉ | d₁₁₀ | d₁₁₁ | d₁₁₂ | d₁₁₃ | d₁₁₄ | d₁₁₅ | d₁₁₆ | d₁₁₇ | d₁₁₈ | d₁₁₉ | d₁₂₀ | d₁₂₁ | d₁₂₂ | d₁₂₃ | d₁₂₄ | d₁₂₅ | d₁₂₆ | d₁₂₇ | d₁₂₈ | d₁₂₉ | d₁₃₀ | d₁₃₁ | d₁₃₂ | d₁₃₃ | d₁₃₄ | d₁₃₅ | d₁₃₆ | d₁₃₇ | d₁₃₈ | d₁₃₉ | d₁₄₀ | d₁₄₁ | d₁₄₂ | d₁₄₃ | d₁₄₄ | d₁₄₅ | d₁₄₆ | d₁₄₇ | d₁₄₈ | d₁₄₉ | d₁₅₀ | d₁₅₁ | d₁₅₂ | d₁₅₃ | d₁₅₄ | d₁₅₅ | d₁₅₆ | d₁₅₇ | d₁₅₈ | d₁₅₉ | d₁₆₀ | d₁₆₁ | d₁₆₂ | d₁₆₃ | d₁₆₄ | d₁₆₅ | d₁₆₆ | d₁₆₇ | d₁₆₈ | d₁₆₉ | d₁₇₀ | d₁₇₁ | d₁₇₂ | d₁₇₃ | d₁₇₄ | d₁₇₅ | d₁₇₆ | d₁₇₇ | d₁₇₈ | d₁₇₉ | d₁₈₀ | d₁₈₁ | d₁₈₂ | d₁₈₃ | d₁₈₄ | d₁₈₅ | d₁₈₆ | d₁₈₇ | d₁₈₈ | d₁₈₉ | d₁₉₀ | d₁₉₁ | d₁₉₂ | d₁₉₃ | d₁₉₄ | d₁₉₅ | d₁₉₆ | d₁₉₇ | d₁₉₈ | d₁₉₉ | d₂₀₀ | d₂₀₁ | d₂₀₂ | d₂₀₃ | d₂₀₄ | d₂₀₅ | d₂₀₆ | d₂₀₇ | d₂₀₈ | d₂₀₉ | d₂₁₀ | d₂₁₁ | d₂₁₂ | d₂₁₃ | d₂₁₄ | d₂₁₅ | d₂₁₆ | d₂₁₇ | d₂₁₈ | d₂₁₉ | d₂₂₀ | d₂₂₁ | d₂₂₂ | d₂₂₃ | d₂₂₄ | d₂₂₅ | d₂₂₆ | d₂₂₇ | d₂₂₈ | d₂₂₉ | d₂₃₀ | d₂₃₁ | d₂₃₂ | d₂₃₃ | d₂₃₄ | d₂₃₅ | d₂₃₆ | d₂₃₇ | d₂₃₈ | d₂₃₉ | d₂₄₀ | d₂₄₁ | d₂₄₂ | d₂₄₃ | d₂₄₄ | d₂₄₅ | d₂₄₆ | d₂₄₇ | d₂₄₈ | d₂₄₉ | d₂₅₀ | d₂₅₁ | d₂₅₂ | d₂₅₃ | d₂₅₄ | d₂₅₅ | d₂₅₆ | d₂₅₇ | d₂₅₈ | d₂₅₉ | d₂₆₀ | d₂₆₁ | d₂₆₂ | d₂₆₃ | d₂₆₄ | d₂₆₅ | d₂₆₆ | d₂₆₇ | d₂₆₈ | d₂₆₉ | d₂₇₀ | d₂₇₁ | d₂₇₂ | d₂₇₃ | d₂₇₄ | d₂₇₅ | d₂₇₆ | d₂₇₇ | d₂₇₈ | d₂₇₉ | d₂₈₀ | d₂₈₁ | d₂₈₂ | d₂₈₃ | d₂₈₄ | d₂₈₅ | d₂₈₆ | d₂₈₇ | d₂₈₈ | d₂₈₉ | d₂₉₀ | d₂₉₁ | d₂₉₂ | d₂₉₃ | d₂₉₄ | d₂₉₅ | d₂₉₆ | d₂₉₇ | d₂₉₈ | d₂₉₉ | d₃₀₀ | d₃₀₁ | d₃₀₂ | d₃₀₃ | d₃₀₄ | d₃₀₅ | d₃₀₆ | d₃₀₇ | d₃₀₈ | d₃₀₉ | d₃₁₀ | d₃₁₁ | d₃₁₂ | d₃₁₃ | d₃₁₄ | d₃₁₅ | d₃₁₆ | d₃₁₇ | d₃₁₈ | d₃₁₉ | d₃₂₀ | d₃₂₁ | d₃₂₂ | d₃₂₃ | d₃₂₄ | d₃₂₅ | d₃₂₆ | d₃₂₇ | d₃₂₈ | d₃₂₉ | d₃₃₀ | d₃₃₁ | d₃₃₂ | d₃₃₃ | d₃₃₄ | d₃₃₅ | d₃₃₆ | d₃₃₇ | d₃₃₈ | d₃₃₉ | d₃₄₀ | d₃₄₁ | d₃₄₂ | d₃₄₃ | d₃₄₄ | d₃₄₅ | d₃₄₆ | d₃₄₇ | d₃₄₈ | d₃₄₉ | d₃₅₀ | d₃₅₁ | d₃₅₂ | d₃₅₃ | d₃₅₄ | d₃₅₅ | d₃₅₆ | d₃₅₇ | d₃₅₈ | d₃₅₉ | d₃₆₀ | d₃₆₁ | d₃₆₂ | d₃₆₃ | d₃₆₄ | d₃₆₅ | d₃₆₆ | d₃₆₇ | d₃₆₈ | d₃₆₉ | d₃₇₀ | d₃₇₁ | d₃₇₂ | d₃₇₃ | d₃₇₄ | d₃₇₅ | d₃₇₆ | d₃₇₇ | d₃₇₈ | d₃₇₉ | d₃₈₀ | d₃₈₁ | d₃₈₂ | d₃₈₃ | d₃₈₄ | d₃₈₅ | d₃₈₆ | d₃₈₇ | d₃₈₈ | d₃₈₉ | d₃₉₀ | d₃₉₁ | d₃₉₂ | d₃₉₃ | d₃₉₄ | d₃₉₅ | d₃₉₆ | d₃₉₇ | d₃₉₈ | d₃₉₉ | d₄₀₀ | d₄₀₁ | d₄₀₂ | d₄₀₃ | d₄₀₄ | d₄₀₅ | d₄₀₆ | d₄₀₇ | d₄₀₈ | d₄₀₉ | d₄₁₀ | d₄₁₁ | d₄₁₂ | d₄₁₃ | d₄₁₄ | d₄₁₅ | d₄₁₆ | d₄₁₇ | d₄₁₈ | d₄₁₉ | d₄₂₀ | d₄₂₁ | d₄₂₂ | d₄₂₃ | d₄₂₄ | d₄₂₅ | d₄₂₆ | d₄₂₇ | d₄₂₈ | d₄₂₉ | d₄₃₀ | d₄₃₁ | d₄₃₂ | d₄₃₃ | d₄₃₄ | d₄₃₅ | d₄₃₆ | d₄₃₇ | d₄₃₈ | d₄₃₉ | d₄₄₀ | d₄₄₁ | d₄₄₂ | d₄₄₃ | d₄₄₄ | d₄₄₅ | d₄₄₆ | d₄₄₇ | d₄₄₈ | d₄₄₉ | d₄₅₀ | d₄₅₁ | d₄₅₂ | d₄₅₃ | d₄₅₄ | d₄₅₅ | d₄₅₆ | d₄₅₇ | d₄₅₈ | d₄₅₉ | d₄₆₀ | d₄₆₁ | d₄₆₂ | d₄₆₃ | d₄₆₄ | d₄₆₅ | d₄₆₆ | d₄₆₇ | d₄₆₈ | d₄₆₉ | d₄₇₀ | d₄₇₁ | d₄₇₂ | d₄₇₃ | d₄₇₄ | d₄₇₅ | d₄₇₆ | d₄₇₇ | d₄₇₈ | d₄₇₉ | d₄₈₀ | d₄₈₁ | d₄₈₂ | d₄₈₃ | d₄₈₄ | d₄₈₅ | d₄₈₆ | d₄₈₇ | d₄₈₈ | d₄₈₉ | d₄₉₀ | d₄₉₁ | d₄₉₂ | d₄₉₃ | d₄₉₄ | d₄₉₅ | d₄₉₆ | d₄₉₇ | d₄₉₈ | d₄₉₉ | d₅₀₀ | d₅₀₁ | d₅₀₂ | d₅₀₃ | d₅₀₄ | d₅₀₅ | d₅₀₆ | d₅₀₇ | d₅₀₈ | d₅₀₉ | d₅₁₀ | d₅₁₁ | d₅₁₂ | d₅₁₃ | d₅₁₄ | d₅₁₅ | d₅₁₆ | d₅₁₇ | d₅₁₈ | d₅₁₉ | d₅₂₀ | d₅₂₁ | d₅₂₂ | d₅₂₃ | d₅₂₄ | d₅₂₅ | d₅₂₆ | d₅₂₇ | d₅₂₈ | d₅₂₉ | d₅₃₀ | d₅₃₁ | d₅₃₂ | d₅₃₃ | d₅₃₄ | d₅₃₅ | d₅₃₆ | d₅₃₇ | d₅₃₈ | d₅₃₉ | d₅₄₀ | d₅₄₁ | d₅₄₂ | d₅₄₃ | d₅₄₄ | d₅₄₅ | d₅₄₆ | d₅₄₇ | d₅₄₈ | d₅₄₉ | d₅₅₀ | d₅₅₁ | d₅₅₂ | d₅₅₃ | d₅₅₄ | d₅₅₅ | d₅₅₆ | d₅₅₇ | d₅₅₈ | d₅₅₉ | d₅₆₀ | d₅₆₁ | d₅₆₂ | d₅₆₃ | d₅₆₄ | d₅₆₅ | d₅₆₆ | d₅₆₇ | d₅₆₈ | d₅₆₉ | d₅₇₀ | d₅₇₁ | d₅₇₂ | d₅₇₃ | d₅₇₄ | d₅₇₅ | d₅₇₆ | d₅₇₇ | d₅₇₈ | d₅₇₉ | d₅₈₀ | d₅₈₁ | d₅₈₂ | d₅₈₃ | d₅₈₄ | d₅₈₅ | d₅₈₆ | d₅₈₇ | d₅₈₈ | d₅₈₉ | d₅₉₀ | d₅₉₁ | d₅₉₂ | d₅₉₃ | d₅₉₄ | d₅₉₅ | d₅₉₆ | d₅₉₇ | d₅₉₈ | d₅₉₉ | d₆₀₀ | d₆₀₁ | d₆₀₂ | d₆₀₃ | d₆₀₄ | d₆₀₅ | d₆₀₆ | d₆₀₇ | d₆₀₈ | d₆₀₉ | d₆₁₀ | d₆₁₁ | d₆₁₂ | d₆₁₃ | d₆₁₄ | d₆₁₅ | d₆₁₆ | d₆₁₇ | d₆₁₈ | d₆₁₉ | d₆₂₀ | d₆₂₁ |
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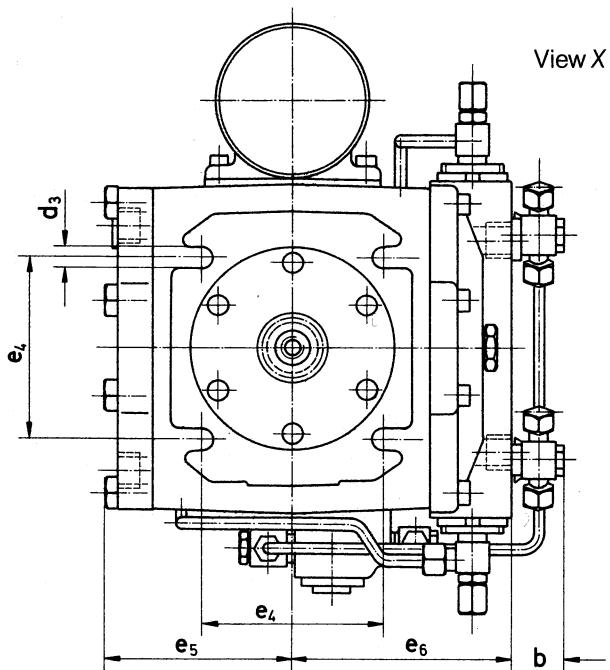
13.4 "Automotive control" AU version

P(S) and S(P) = pressure ports
 I, J, N and O = vent ports or oil filling, resp. drain ports,
 depending on mounting position, M 22 x 1,5
 F and H = cooler ports, M 22 x 1,5
 X = control port, M 14 x 1,5

"Internal suction" version
(for external suction see 14 in Annex)



Installation position preferably horizontal in relation to the drive shaft and the upper control pivot, other installation positions on request.



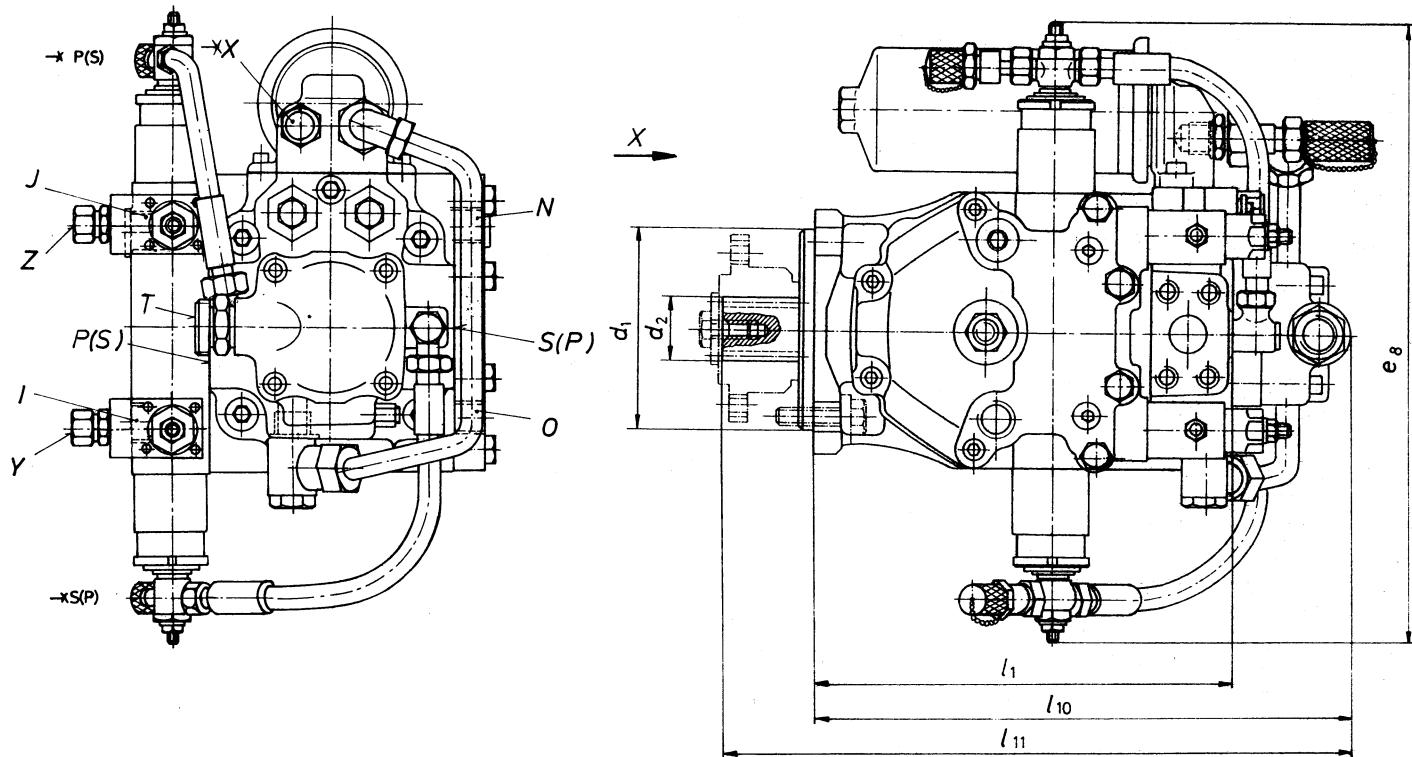
Dimensions (in mm)

Nominal size	B	d ₁	d ₂	d ₃	e ₁	e ₂	e ₄	e ₅	e ₆	l ₁	l ₂	l ₃	l ₄	P(S) and S(P)		Weight in kg		
														in "	in "	Size	Pressure series	
35	36			W 35x2x9 g	15	104	175,5		89	117	246,5	293	349	20,5		¾"		39,5
50	36	127		W 35x2x9 g		104	179	114,6	93	121	257	304	360	20	50	¾"	High pressure	42
70	31			W 35x2x9 g		113	196		107,5	129	282,5	341,5	397,5	7		1"		56
100	32			W 40x2x9 g		163	205		115,5	138	306,5	366	422	8		1"		69,5

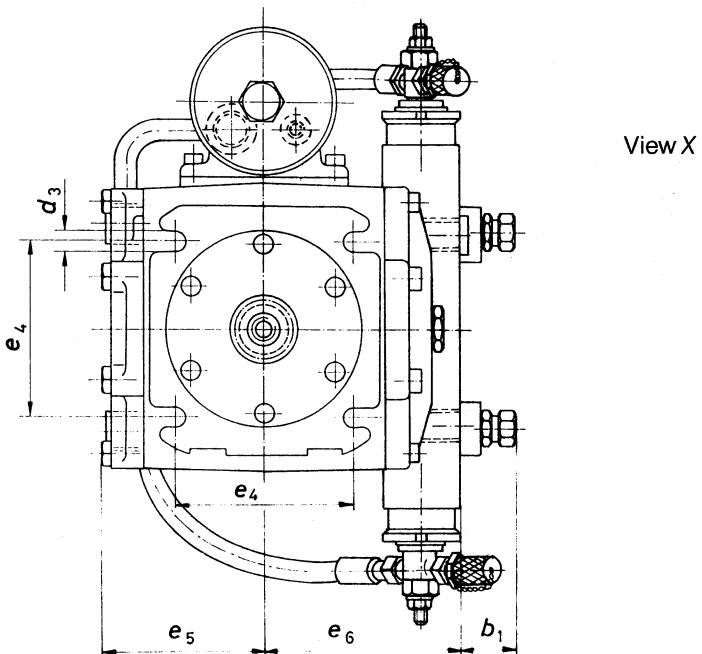
13.5 "Torque control" TC version

P(S) and S(P) = pressure ports
 I, J, N and O = vent ports or oil filling, resp. drain ports,
 depending on mounting position, M 22 x 1,5
 F and H = cooler ports, M 22 x 1,5
 X = control port, M 14 x 1,5
 Y and Z = control port for pipe Ø 10
 (with GE10 - PLM - ED V80)

"External suction" version



Installation position preferably horizontal in relation to the drive shaft and the upper control pivot, other installation positions on request.



Dimensions (in mm)

Nominal size	d_1	d_2	d_3	e_4	e_5	e_6	e_7	l_1	l_{10}	l_{11}	P(S) and S(P) Size	Weight kg
	$h8$	DIN 5480									Pressure series	
35	39,5			W 35 x 2 x 9g	89	117	415	246,5	310	366	¾"	37
70	39,5	127	W 35 x 2 x 9g	15	114,5	107,5	428	282,5	357	413	1"	53,5
100	41,5		W 40 x 2 x 9g		115,5	138	428	306,5	381	437	1"	67

14. Annex

For mounting dimensions
see page 27.

14.1 Coupling flanges

Coupling flanges are available in standard and in cardan shaft version.

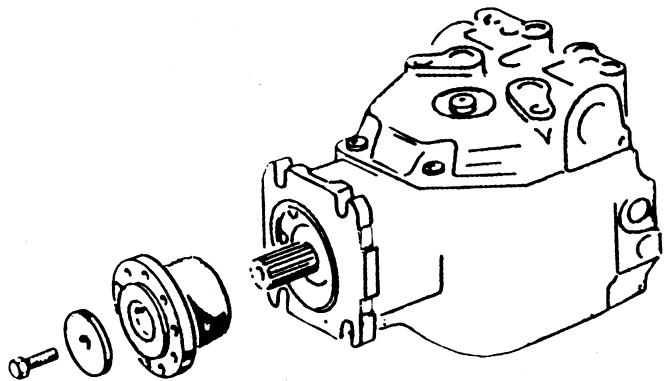


Fig. 12. Variable pump BPV .. KS with coupling flange

14.2 Auxiliary pump with internal suction

This system is an especially cost effective solution mainly for single circuit systems. Another advantage is a reduced contamination risk of the circuit.

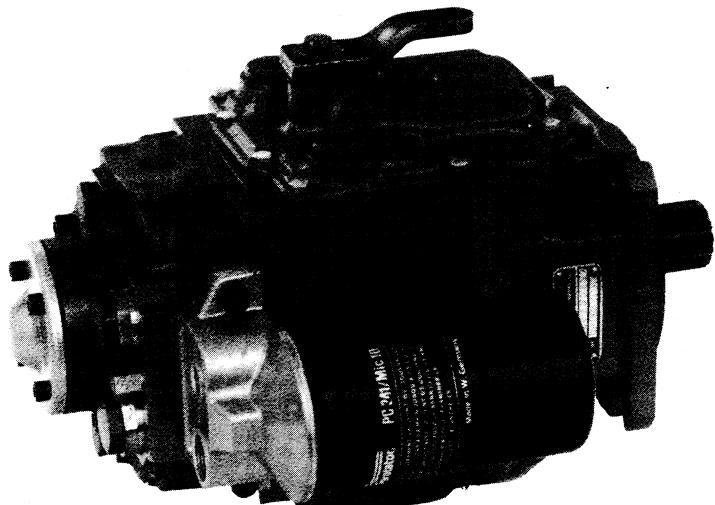


Fig. 13. Variable pump BPV .. with internal suction boost pump

14.3 Auxiliary pump with external suction

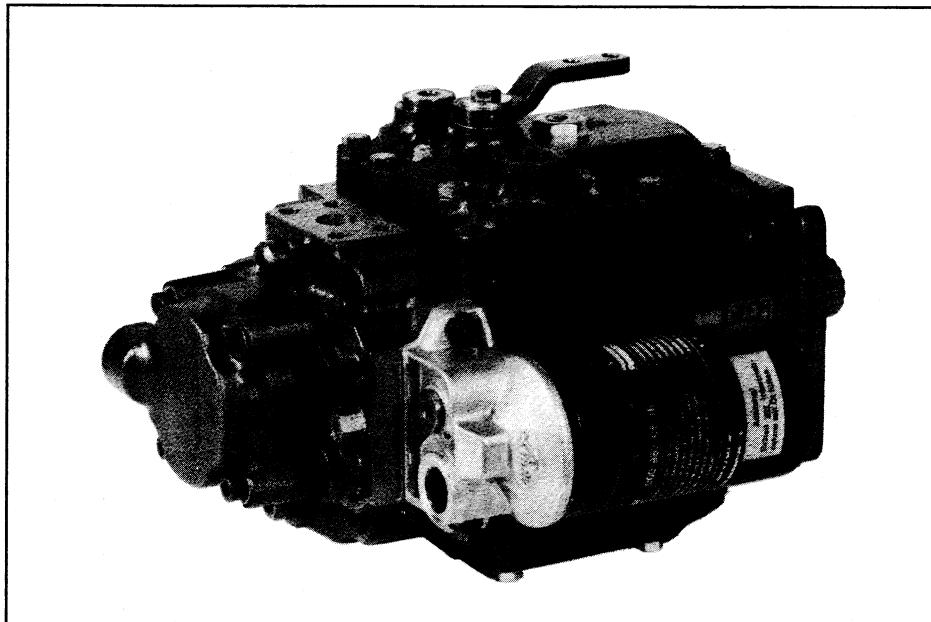


Fig. 14. Variable pump BPV .. with external suction boost pump

14.4 PTO shaft

Additional drives, e.g. auxiliary pumps, can be connected via the external spline at the end of the PTO shaft; this is possible with internal as well as external suction boost pumps.

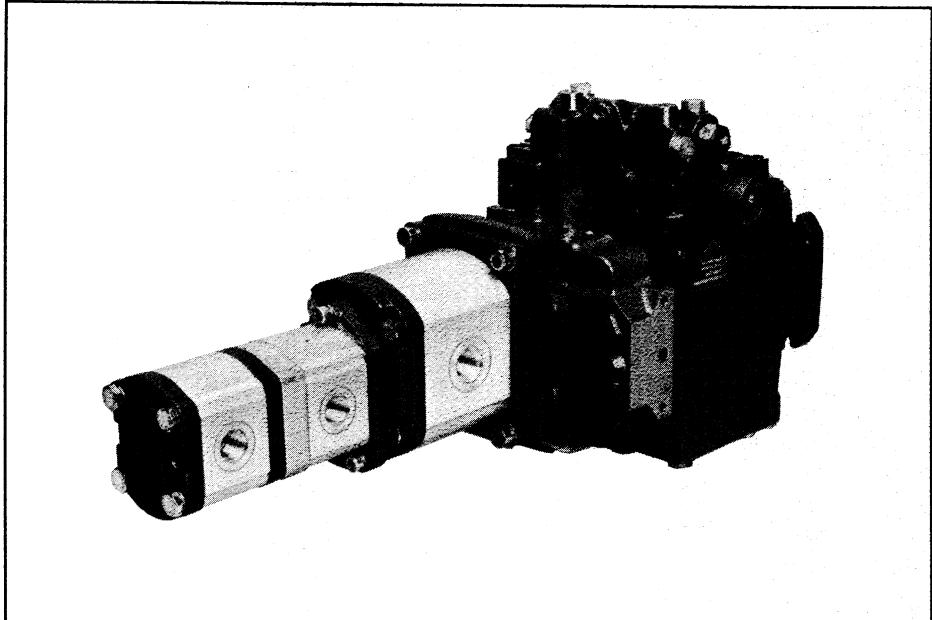


Fig. 15. Variable pump BPV .. with additionally mounted gear pump

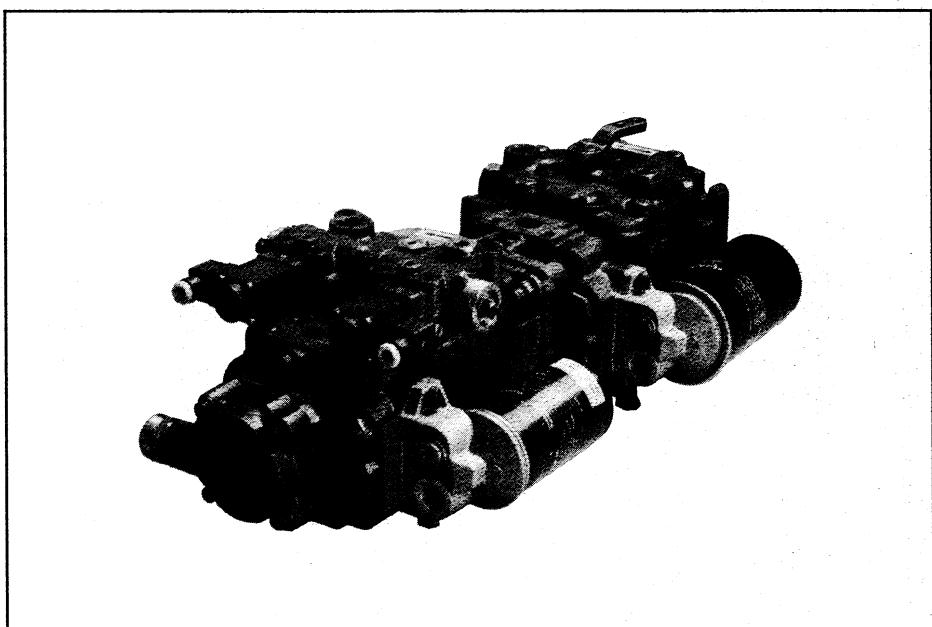


Fig. 16. Variable pump BPV .. KS and BPV .. EH in tandem version

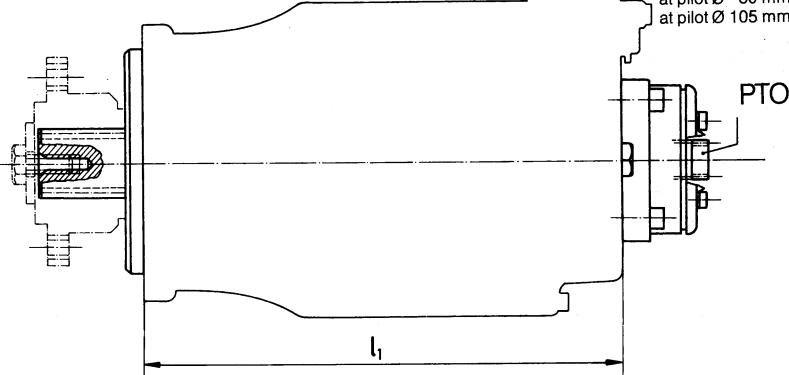
14.5 Tandem version

Tandem pumps are a cost effective drive solution for multiple circuit systems.

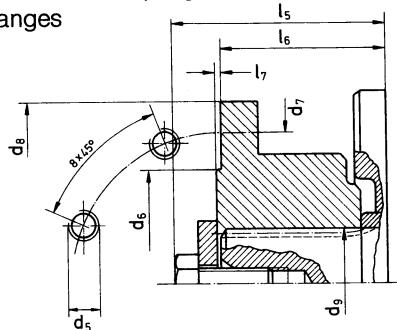
14.6 Mounting dimensions

T_1 = tank port (inlet) M 26x1,5
 T_2 = tank port (inlet) M 36x2

PTO = additional power take-off W 25x1,25x9 g - DIN 5480
 PTO (1) = additional drive for auxiliary pumps
 at pilot Ø 80 mm A 17x14
 at pilot Ø 105 mm A 28x25

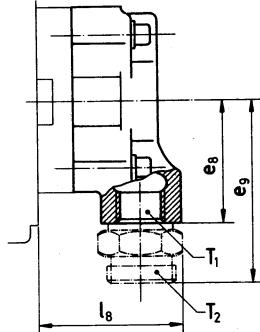


14.6.1 Drive shaft coupling flanges



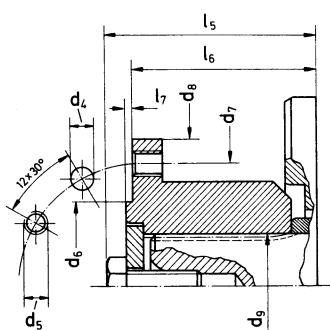
Sizes 35...100 standard version

14.6.2 Auxiliary pump with external suction

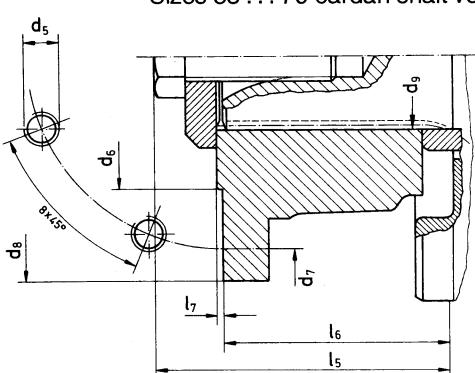


External suction (sizes 35...100)

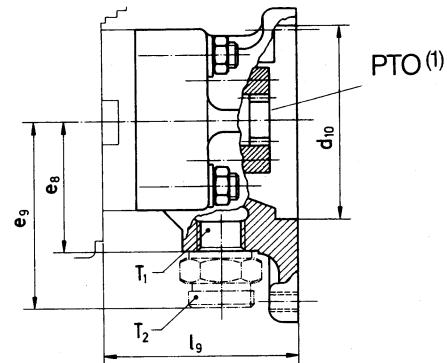
14.6.3 PTO shaft flanges



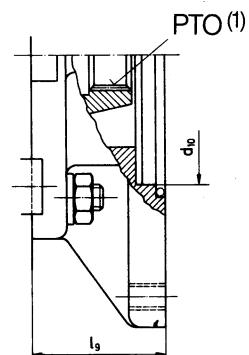
Sizes 35...70 cardan shaft version



Size 200 standard version



Flange for PTO shaft (sizes 35...100),
 port T_1 closed for internal suction



Flange for PTO shaft (size 200)

Dimensions (in mm)

Nominal Size	Displ. in cm³/rev.	d_4	d_5	d_6 (h 8)	d_7	d_8	d_9	d_{10} Pilot diam. N7	l_1	l_5	l_6	l_7	l_8	l_9 Pilot diam. 80	l_9 Pilot diam. 105	e_8 Flange for PTO	e_8 Flange for PTO	e_9 Flange for PTO	
35																			
50	12																		
70	18,3	8,2	M 10	M 8	75	57	101,5	84	120	98	W35x2x9g								
100																			
200	38		M 10	—	75	—	101,5	—	120	—	W40x2x9g	105	306,5	71	56	—	2	74,5	86,5
			M 12	—	90	—	130	—	144	—	W50x2x9g	105	406	98,6	76,6	—	2	—	104,5
																65	70	90	
																—	—	95	

A = standard version B = cardan shaft version

Please refer to installation drawings for exact dimensions or those not shown – design changes are reserved in the interest of technical progress.

The Linde logo is located on the left side of the page. It consists of the word "Linde" in a bold, black, serif font. The letter "L" is stylized with a large, sweeping flourish at the top.

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