MANNESMANN REXROTH	Variable Displacement Pump A7VO Series 6, for open circuits axial tapered piston, bent axis design		RE 92202/07.95
Brueninghaus Hydromatik	Sizes 55...160	Nominal Pressure 350 bar Peak Pressure 400 bar	replaces 01.91

Variable displacement pump with axial tapered piston rotary group of bent axis design, for open circuit hydraulic drives.
This pump is suitable for both mobile and industrial applications.
Comprehensive program of control devices available. The robust taper roller drive shaft bearings are designed to give long service life.
Output flow is proportional to drive speed and pump displacement is steplessly variable between maximum and zero ($V_{g\,max}$ to $V_{g\,min} = 0$).

Ordering Code / Standard Program

Fluid

Mineral oil (no code)

Axial piston unit

Variable displacement, bent axis design	**A7V**

Mode of operation

Pump in open circuit	**O**

Sizes

≙ Displacement $V_{g\ max}$ in cm^3	**55**	**80**	**107**	**160**	250	355	500	1000

Sizes 250, 355, 500, 1000 see RE 92203

Control and adjustment devices

								55	80	107	160	
Constant power control	LR							●	●	●	●	**LR**
	LR					H1		●	●	●	●	**LRH1**
	LR					H2		●	●	●	●	**LRH2**
	LR					H5		●	●	●	●	**LRH5**
	LR					H6		●	●	●	●	**LRH6**
	LR				U			●	●	●	●	**LRU**
	LR		D					●	●	●	●	**LRD**
	LR			G				●	●	●	●	**LRG** [1]
	LR		D			H1		●	●	●	●	**LRDH1**
	LR		D			H2		●	●	●	●	**LRDH2**
	LR		D			H5		●	●	●	●	**LRDH5**
	LR		D			H6		●	●	●	●	**LRDH6**
	LR		D		U			●	●	●	●	**LRDU**
Constant pressure control	DR							●	●	●	●	**DR**
	DR			G				●	●	●	●	**DRG**
Hydraulic control, pilot pressure dependent	HD	1						●	●	●	●	**HD1**
	HD	2						●	●	●	●	**HD2**
	HD	1		G				●	●	●	●	**HD1G**
	HD	2		G				●	●	●	●	**HD2G**
Electrical control with proportional solenoid	EP							●	●	●	●	**EP**
	EP			G				●	●	●	●	**EPG**

Constant power control:
- D: Pressure cut-off integral (fixed setting)
- G: Remote pressure cut-off
- H1 ≙ hydr. stroke limiter $\Delta p = 25$ bar, neg. control
- H2 ≙ hydr. stroke limiter $\Delta p = 25$ bar, pos. control
- H5 ≙ hydr. stroke limiter $\Delta p = 10$ bar, neg. control
- H6 ≙ hydr. stroke limiter $\Delta p = 10$ bar, pos. control
- U ≙ electrical stroke limiter

Constant pressure control:
- G: Remote constant pressure control

Hydraulic control:
- 1 ≙ pilot pressure increase $\Delta p = 10$ bar
- 2 ≙ pilot pressure increase $\Delta p = 25$ bar
- G: Remote pressure cut-off

Electrical control:
- G: Remote pressure cut-off

[1]) The constant power control with remote pressure cut-off LRG is also available with hydr. or electrical stroke limiter (e.g. LRGH1).

(shaded) = Preferred program (LRH1, LRD, DR, EP)

A7V	O			/	6	3		–		Z	B	01

Axial piston unit

Mode of operation

Sizes

Control and adjustment devices

Series

	6

Index

	3

Direction of rotation

		55	80	107	160	
viewed on shaft end	clockwise	●	●	●	●	R
	counter-clockwise	●	●	●	●	L

Seals

	55	80	107	160	
NBR - nitril caoutchouc / shaft seal FPM	●	●	●	●	N
FPM - flour caoutchouc	●	●	●	●	V

Shaft end

	55	80	107	160	
splined DIN 5480	●	●	●	●	Z

Mounting flange

	55	80	107	160	
ISO 4-hole	●	●	●	●	B

Service line connections

		55	80	107	160	
Pressure port Suction port	SAE at rear (metric mounting threads) SAE at rear (metric mounting threads)	●	●	●	●	01

When ordering with pressure cut-off/pressure control please state the setting values in clear text.
The minimum and maximum displacement is set to limiting values $V_{g\,max}$ and $V_{g\,min}$ = 0.
If other setting values are desired please state in clear text.
Setting screws are factory fitted with protective tamper proof caps to prevent subsequent resetting.

● = available

Preferred types, when ordering please state type and ident-number

Type	Ident-Number	Type	Ident-Number
A7VO55LRH1/63R-NZB01	9610373	A7VO107LRH1/63R-NZB01	9610393
A7VO55LRD/63R-NZB01	9610555	A7VO107LRD/63R-NZB01	9610559
A7VO55DR/63R-NZB01	9610374	A7VO107DR/63R-NZB01	9610394
A7VO55EP/63R-NZB01	9610376	A7VO107EP/63R-NZB01	9610396
A7VO80LRH1/63R-NZB01	9610383	A7VO160LRH1/63R-NZB01	9610403
A7VO80LRD/63R-NZB01	9610557	A7VO160LRD/63R-NZB01	9610561
A7VO80DR/63R-NZB01	9610384	A7VO160DR/63R-NZB01	9610404
A7VO80EP/63R-NZB01	9610386	A7VO160EP/63R-NZB01	9610406

Technical Data

Hydraulic fluid

We request that before starting a project detailed information about the choise of hydraulic fluids and application conditions are taken from our catalogue sheets RE 90220 (mineral oil), RE 90221 (environmentally acceptable hydraulic fluids) and RE 90223 (fire resistant fluids, HF).

When using HF fluids or environmentally acceptable hydraulic fluids respectively possible limitations for the technical data have been taken into consideration. If necessary please contact our technical department (please indicate type of the hydraulic fluid used in your application when ordering).

Operating viscosity range

We recommend that the operating viscosity (at operating temperature), for both efficiency and life of the unit, be chosen within the optimum range of:

ν_{opt} = opt. operating viscosity 16...36 mm²/s

referred to tank temperature at open circuit.

Viscosity limits

The limiting values for viscosity are as follows:

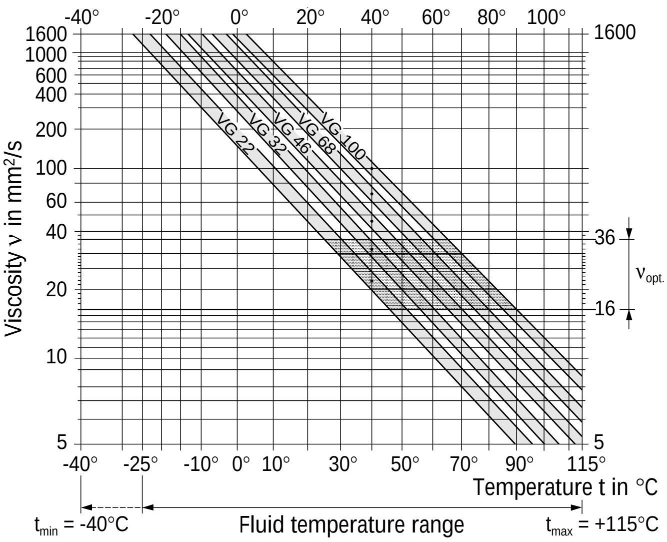
ν_{min} = 5 mm²/s,
short term at a max. permissible temp. of t_{max} = 115°C.

Please note that the max. fluid temperature of 115°C is also not exceeded in certain areas (for instance bearing area).

ν_{max} = 1600 mm²/s,
short term on cold start, t_{min} = -40°C.

At temperatures of -25°C up to -40°C special measures may be required for certain installation positions. Please contact us for further information.

Selection diagram



Notes on the selection of the hydraulic fluid

In order to select the correct fluid, it is necessary to know the operating temperature in the tank (open circuit) in relation to the ambient temperature.

The hydraulic fluid should be selected so that within the operating temperature range, the operating viscosity lies within the optimum range (ν_{opt}) (see shaded section of the selection diagram). We recommend that the higher viscosity grade is selected in each case.

Example: At an ambient temperature of X°, the operating temperature in the tank is 60°C. In the optimum viscosity range ν_{opt} (shaded area), this corresponds to viscosity grades VG 46 or VG 68, VG 68 should be selected.

Important: The leakage fluid temperature is influenced by pressure and speed and is typically higher than the tank temperature. However, maximum temperature at any point in the system must be less than 115°C.

If the above conditions cannot be met due to extreme operating conditions, or with a high ambient temperature, we recommend that port U be used for bearing flushing.

Flushing flow	Size	55	80	107	160
	$q_{V\,Sp}$ L/min	4	6	8	12

Temperature of flushing fluid ≤ tank temperature

Filtration of fluid

The finer the filtration the better the achieved purity grade of the pressure fluid and the longer the life of the axial piston unit.

To ensure the functioning of the axial piston unit a minimum purity grade of:

9 to NAS 1638
6 to SAE
18/15 to ISO/DIS 4406 is necessary.

At very high temperatures of the hydraulic fluid (90°C to max. 115°C) at least cleanless class

8 to NAS 1638
5 to SAE
17/14 to ISO/DIS 4406 is necessary.

If above mentioned grades cannot be maintained please consult us.

Direction of flow

Clockwise rotation	Counter-clockwise rotation
S to **B**	**S** to **A**

Installation position

Optional. The pump housing must be filled with fluid prior to commissioning, and must remain full whenever it is operating. For pump installation positions above the tank special measures are necessary.

For extensive information on installation position, please consult our data sheet RE 90270 before completing your design work.

Operating pressure range – inlet side

Absolute pressure at port S (suction inlet)

$p_{abs\,min}$ ______ 0,8 bar

Max. pressure $p_{abs\,max}$ is dependent upon shaft speed (see page 5).

Operating pressure range – outlet side

Max. pressure at ports A or B

Drive shaft	Nominal pressure p_n	Peak pressure p_{max}
no radial loading (coupling)	350 bar	400 bar
with radial loading (pinion or belt drive)	315 bar [1])	400 bar

(pressure data to DIN 24312)

[1]) wtih smallest permissible pinion or pulley diameter (see page 5).

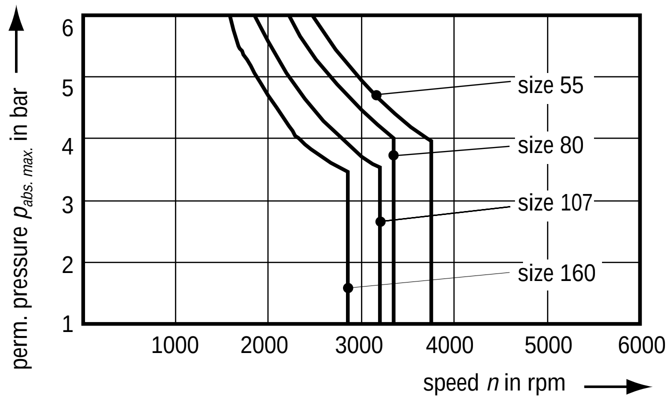
Technical Data

Case drain fluid
The leakage oil chamber is connected to the suction chamber. A case drain line is therefore not necessary (both ports R are plugged).

Case drain pressure
Shaft seal ring **FPM** (fluor-caoutchouc)
The lower the speed and the case drain pressure the higher the life expectation of the shaft seal ring.

The values shown in the diagram are permissible limiting values at intermittend pressurisation of the drive shaft seal ring and shall not be exceeded.
In case of excess of the limit values or at stationary pressure loads in the range of the max. admissible leakage pressure a reduction of the life experience of the seal ring will result.
For a short period (t < 5 min.) pressure loads up to 5 bar independent from rotational speeds are permissible respectively at lower speeds up to 6 bar.

Special operation conditions may require limitations of these values.



Note:
Maximum permissible speeds (speed limit) are given in the table on page 6.

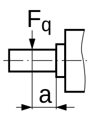
Maximum permissible casing pressure $p_{abs. max}$ ______ 6 bar.

The pressure in the housing must be the same as or greater than the external pressure on the shaft seal.

Pump drive
Radial and axial loading on the drive shaft
The values shown are maximum values and are not permitted for continuous operation.

Size		55	80	107	160
a	mm	17,5	20	22,5	25
$F_{q\,max}$	N	9280	11657	13580	18062
F_q/bar	N/bar	23,2	29,1	34,0	45,2
$\pm F_{ax\,max}$	N	500	710	900	1120
$\pm F_{ax\,zul.}/bar$	N/bar	7,5	9,6	11,3	15,1

Code explanation



a = distance of F_q from shaft shoulder

$F_{q\,max}$ = max. occurring radial force

F_q/bar = radial force / bar working pressure at gear drive (DIN 867) with smallest PCD of pinion $D_{R\,min}$ and $V_{g\,max}$ ($D_{R\,min}$ = 2,5 x dia. of drive shaft)

= preload required / bar working pressure (radial force) to transmit torque at V-belt drive (DIN 7753) with smallest pulley diameter $D_{K\,min}$ and $V_{g\,max}$ ($D_{K\,min}$ = 5 x dia. of drive shaft)

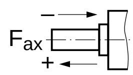
$\pm F_{ax\,max}$ = max. permissible axial force when stationary or when axial piston unit is running at zero pressure

$\pm F_{ax\,zul.}$/bar = permissible axial bar working pressure

The direction of the max. permissible axial force must be noted:

$- F_{ax\,max}$ = increases bearing life

$+ F_{ax\,max}$ = reduces bearing life (avoid if possible)



Optimal force direction of F_q

By means of appopriate force directions of F_q the bearing load caused by inside rotary group forces can be reduced.
An optimal life expectation of the bearing can be reached.

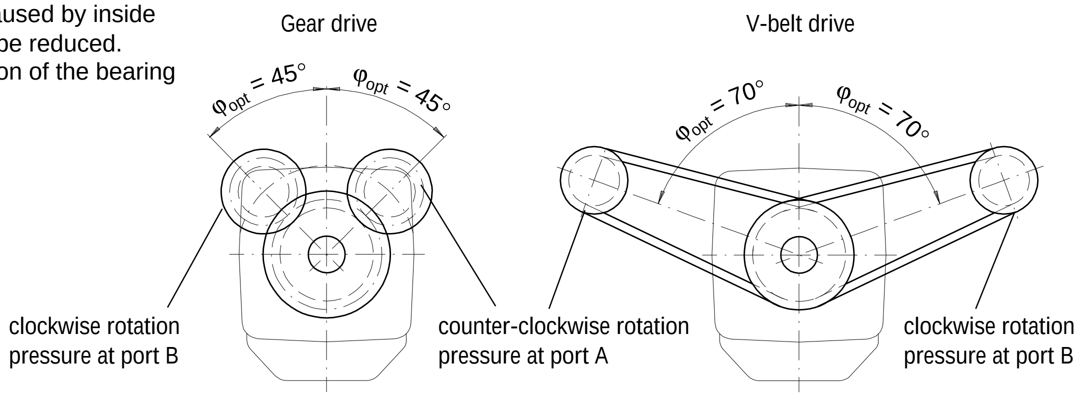


Table of values (theoretical values, without considering mech-hyd. and volumetric efficiency; values rounded)

Size				**55**	**80**	**107**	**160**
Displacement		$V_{g\ max}$	cm³	54,8	80	107	160
		$V_{g\ min}$	cm³	0	0	0	0
Max. speed [1])	at $V_{g\ max}$	$n_{max\ 1}$	rpm	2500	2240	2150	1900
	at $V_g < V_{g\ max}$ (see diagram)	$n_{max\ 2}$	rpm	3400	3000	2900	2560
Max. perm. speed (speed limit) with increased inlet pressure p_{abs} at suction inlet S (see diagram)		$n_{max\ zul.}$	rpm	3750	3350	3200	2850
Max. perm flow [2])	at $n_{max\ 1}$ ($V_{g\ max}$)	$q_{V\ max\ 1}$	L/min	133	174	223	295
Max. power (Δp = 350 bar)	at $q_{V\ max\ 1}$	$P_{max\ 1}$	kW	80	105	134	177
Torque constants	at $V_{g\ max}$	T_k	Nm/bar	0,87	1,27	1,70	2,55
Perm. torque at $V_{g\ max}$	at continuous operation (Δp = 350 bar)	T_n	Nm	305	446	596	891
	max. perm., short-term (Δp = 400 bar)	T_{max}	Nm	348	510	681	1018
Moment of inertia about the drive axis		J	kgm²	0,0042	0,0080	0,0127	0,0253
Weight (approx.)		m	kg	25	40	49	71

[1]) The values shown are valid for an absolute pressure (p_{abs}) of 1 bar at the suction inlet S and when operated on mineral oil. By increasing the inlet pressure (p_{abs} > 1 bar) the speed may be increased to the max. permissible speed (speed limit), see diagram.

[2]) 3 % flow losses included.

Calculation of Size

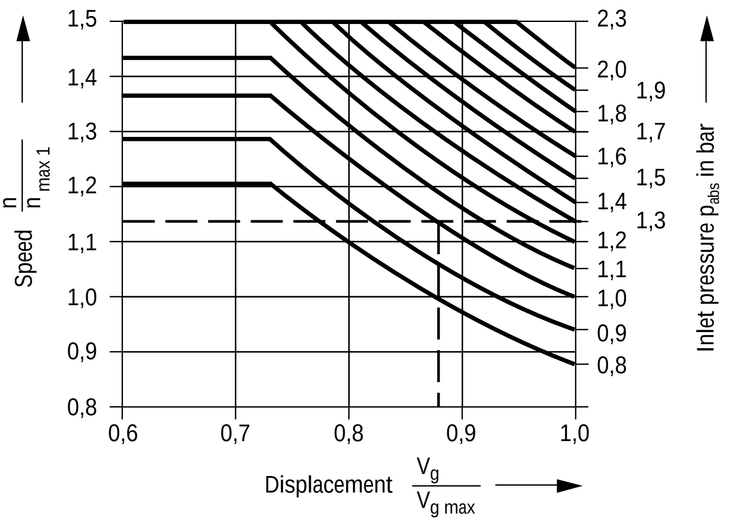
Flow $$q_V = \frac{V_g \cdot n \cdot \eta_v}{1000}$$ in L/min

Drive torque $$T = \frac{V_g \cdot \Delta p}{20 \cdot \pi \cdot \eta_{mh}} = \frac{1{,}59 \cdot V_g \cdot \Delta p}{100 \cdot \eta_{mh}}$$ in Nm

Drive power $$P = \frac{2\,\pi \cdot T \cdot n}{60\,000} = \frac{T \cdot n}{9549} = \frac{q_V \cdot \Delta p}{600 \cdot \eta_t}$$ in kW

V_g = geom. displacement per rev. in cm³
T = torque in Nm
Δp = differential pressure in bar
n = speed in rpm
η_v = volumetric efficiency
η_{mh} = mech-hyd. efficiency
η_t = overall efficiency ($\eta_t = \eta_v \cdot \eta_{mh}$)

Calculation of inlet pressure p_{abs} at suction inlet S or of the reduction in pump displacement for an increase in speed



Example:

Given: Size 80
Drive speed 2560 rpm

Required: Required pressure p_{abs} at suction inlet S

Solution: Speed ratio

$$\frac{n}{n_{max\ 1}} = \frac{2560}{2240} = 1{,}14$$

This gives an inlet pressure p_{abs} = 1,3 bar at max. swivel angle ($V_{g\ max}$).
If, for example, free inlet flow can only be obtained with p_{abs} = 1 bar, then pump displacement must be reduced to $0{,}88 \cdot V_{g\ max}$

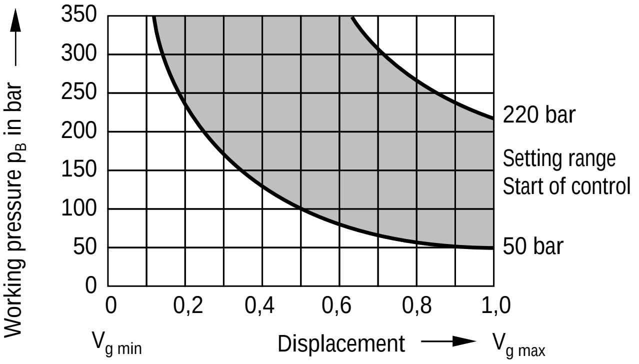
Note:
- max. perm. speed $n_{max\ zul.}$ (speed limit).
- min. and max. perm. pressure at port S.
- perm. values of the shaft seal ring.

LR Constant Power Control

The constant power control controls the output volume of the pump in relation to the working pressure so that, at a constant drive speed, the preset drive power is not exceeded.

$$p_B \cdot V_g = \text{constant}$$

p_B = working pressure, V_g = pump displacement

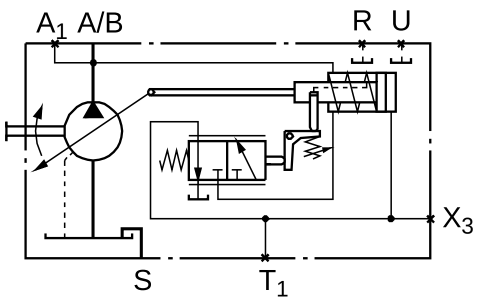


Optimum power usage is obtained by accurately following the power hyberbola.
Working pressure applies a force on a piston within the control piston on to a rocker arm. An externally adjustable spring force is applied to the other side of the rocker arm to determine the power setting.
Should the working pressure exceed the set spring force, the pilot control valve is operated via the rocker arm, allowing the pump to swivel towards zero output. This in turn reduces the effective moment on the arm of the rocker, thus allowing the working pressure to rise in the same ratio by which the output flow is reduced ($p_B \cdot V_g$ = constant).
In unoperated (zero pressure) condition, the pump is swivelled to its starting position ($V_{g\,max}$) by means of a control spring.
The start of control is adjustable from 50 bar to 220 bar.

The output power (performance curve) is influenced by the efficiency of the pump.

When ordering, state in clear text:
Input power P in HP or kW
Input speed n in rpm
Max. output flow $q_{V\,max}$ in L/min
After all technical details have been clarified, a power diagram can be produced by computer.

Circuit diagram
Constant power control LR



Variation: Remote pressure cut-off (G)

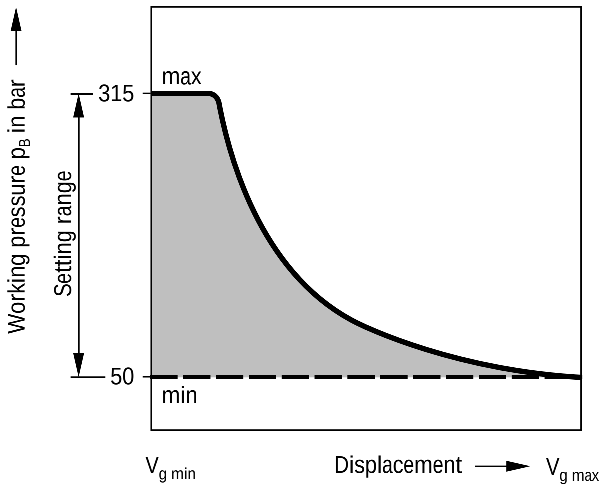
A sequence valve with subplate takes over the function of the pressure cut-off. The valve is mounted separate from the pump, and the simple piping length should not exceed 5 m. High pressure is supplied from the pump to the valve via port A_1, and the valve control oil is fed back to the pump via port X_3, causing the pump to swivel back towards $V_{g\,min}$. Port T of the sequence valve and T_1, the pilot drain from the pump must be connected back to tank (cooler).
Setting range from 50 bar to 315 bar

Any pressure relief valve included in the circuit to limit the max. pressure must be set to a cracking pressure at least 20 bar above the pressure control setting.

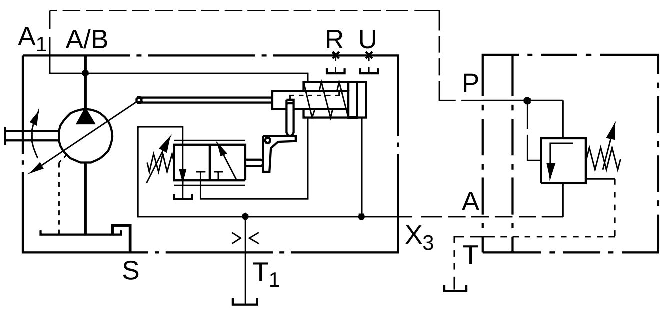
The sequence valve and subplate must be ordered separately.

Sequence valve: DZ5DP2-1X/315 YMSO21 (Id.-Nr. 154 869)
Subplate: G 115/1 (Id.-Nr. 153 138)

When ordering, state in clear text:
Setting of the pressure cut-off



Circuit diagram
Constant power control with remote pressure cut-off, LRG



Unit dimensions LR / LRG
see pages 17...20

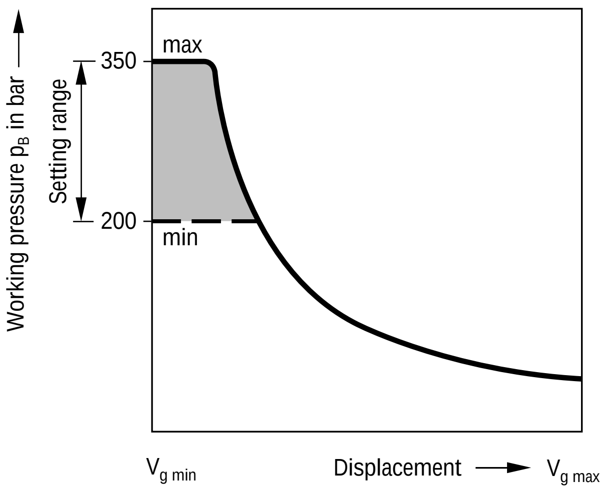
LRD Constant Power Control...

Variation: Integral pressure cut-off (fixed setting), (D)

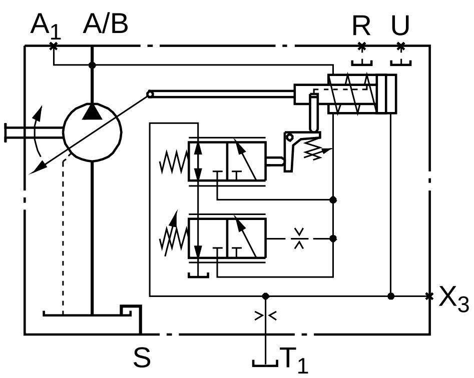
The pressure cut-off is in effect a constant pressure control which swivels the pump back to $V_{g\,min}$ when the preset working pressure is reached.
This function overrides the constant power control, i.e. the constant power control is effective below the preset working pressure.
The valve is integrated into the control housing and is set in the factory to a fixed pressure, within the range 200 bar to max. 350 bar.
Note, however, that the max. permissible setting between start of control and pressure cut-off is start of control x 5.
Example:
Start of control (constant power control): 50 bar
Max. setting of pressure cut-off:
50 bar • 5 = 250 bar
When T_1 is plugged and T_{tank} ≤ 50°C the maximum duration of operation is ≤ 2 min.

Any pressure relief valve included in the circuit to limit the max. pressure must be set to a cracking pressure at least 20 bar above the pressure control setting.

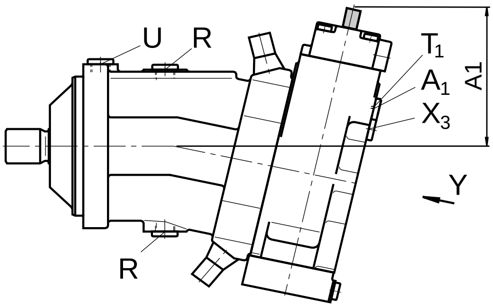
When ordering, state in clear text:
Setting of the pressure cut-off



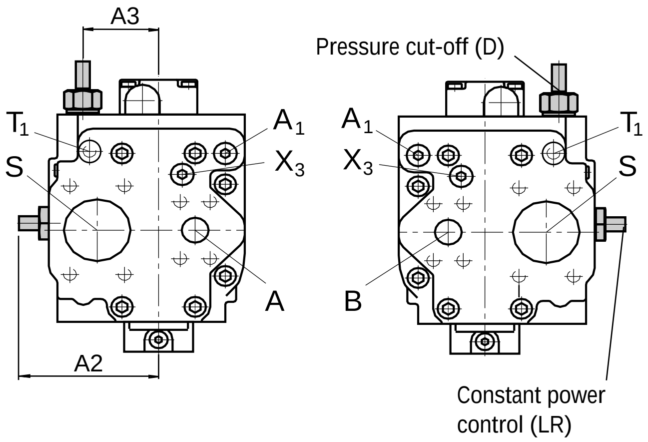
Circuit diagram
Constant power control with integral pressure cut-off (fixed setting) LRD



Unit dimensions LRD
general dimensions and connections see pages 17...20



View Y
counter-clockwise rotation — clockwise rotation



Size	A1	A2	A3
55	128	121	62
80	132	132	70
107	138	136	74
160	150	147	84

LR.U Constant Power Control...

Variation: Electrical stroke limiter (U)

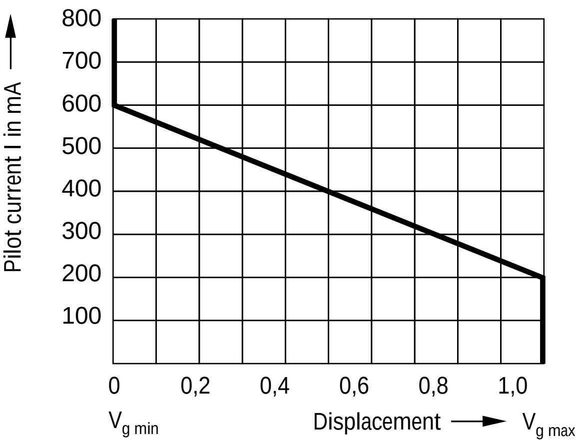
The electrical stroke limiter allows the maximum displacement to be infinitely varied or limited as required.
The displacement is set by means of the pilot current generated by the proportional solenoid.
A 24V DC supply and a current of between 200 and 600 mA are required for the control of the proportional solenoid.
The electrical stroke limiter is overriden by the constant power control, i.e. below the power curve (power hyperbola), displacement is adjusted in relation to the pilot current. If the set flow or the working pressure is such that the power curve is exceeded, the constant power control overrides the stroke limiter and reduces displacement until the power hyperbola is restored.

As the pilot current increases, the pump swivels to a lower displacement.
In unoperated (zero pressure) condition, the pump is swivelled to its starting position ($V_{g\,max}$) by means of a control spring.

Start of control (at $V_{g\,max}$) ________________ 200 mA

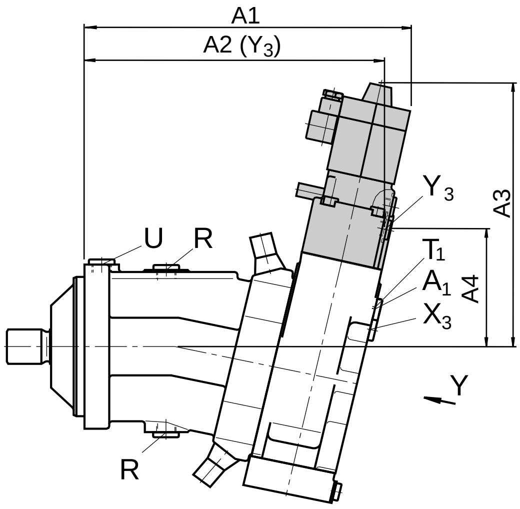
End of control (at $V_{g\,min}$) ________________ 600 mA

Control from $V_{g\,max}$ to $V_{g\,min}$



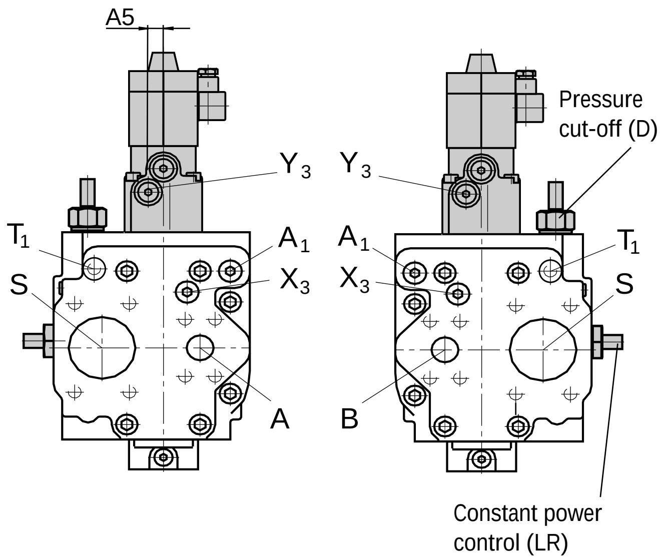
Unit dimensions LRDU

general dimensions and connections see pages 17...20



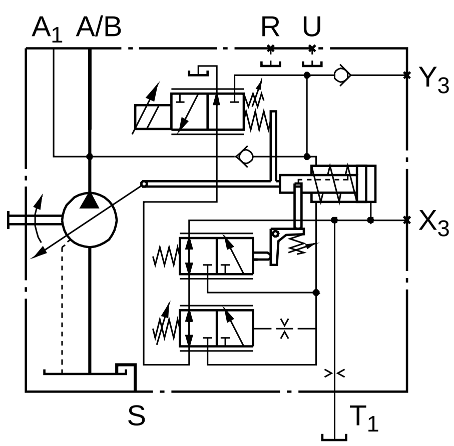
View Y

counter-clockwise rotation   clockwise rotation



Circuit diagram:

Constant power control with pressure cut-off and electrical stroke limiter, LRDU



Connections

Y_3 Remote control pressure M14x1,5 (plugged)

Size	A1	A2	A3	A4	A5
55	276	251	245	105	12
80	304	279	257	116	14
107	321	295	264	122	18
160	360	334	282	140	19

LR.H. Constant Power Control...

Variation: Hydraulic stroke limiter (H...)

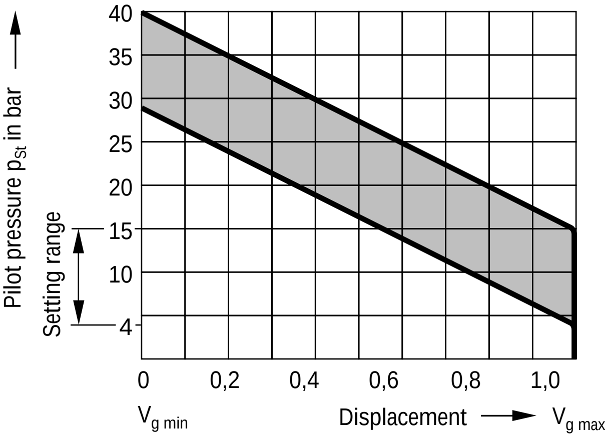
The hydraulic stroke limiter allows the maximum displacement to be infinitely varied or limited as required.
Control range $V_{g\,max}$ to $V_{g\,min}$.
The displacement is set by means of the pilot pressure applied at port X_1.
The hydraulic stroke limiter is overriden by the constant power control, i.e. below the power curve (power hyperbola), displacement is adjusted in relation to pilot pressure. If the set flow or the working pressure is such that the power curve is exceeded, the constant power control overrides the stroke limiter and reduces displacement until the power hyperbola is restored.

H1/H5 → Function: $V_{g\,max}$ to $V_{g\,min}$ (negative control)
As pilot pressure increases the pump swivels towards *lower* displacement.
In unoperated (zero pressure) condition, the pump is swivelled to its starting position ($V_{g\,max}$) by means of a control spring.

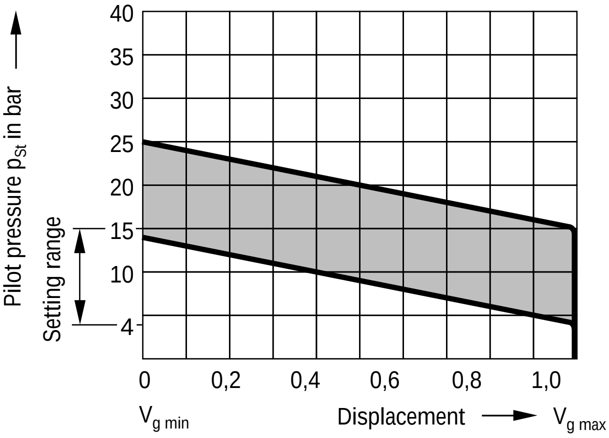
Start of control, (at $V_{g\,max}$), adjustable from 4 bar to 15 bar.

When ordering, please state required start of control in clear text.

H1 → pilot pressure increase ($V_{g\,max} – V_{g\,min}$) ____ Δp = 25 bar

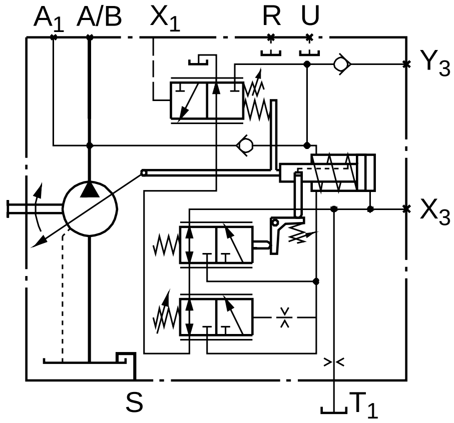


H5 → pilot pressure increase ($V_{g\,max} – V_{g\,min}$) ____ Δp = 10 bar

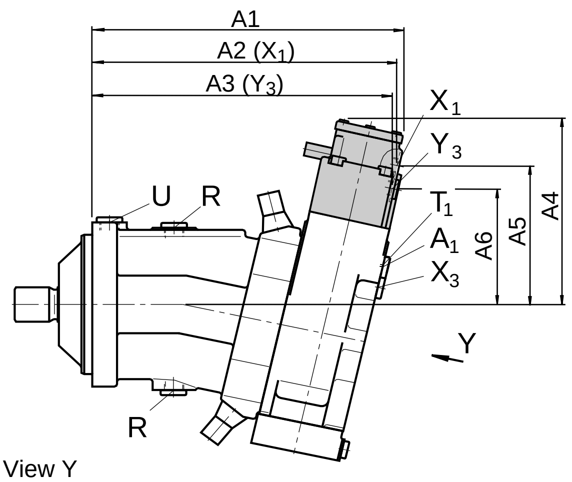


A pressure of 40 bar is necessary to operate the control. The required control oil is taken from the high pressure circuit.
If necessary, a boost pressure of ≥ 40 bar should be applied at port Y_3.
If the H-function is used for two-point switching control only ($V_{g\,max}$ - $V_{g\,min}$), pilot pressure at port X_1 must not exceed 40 bar.

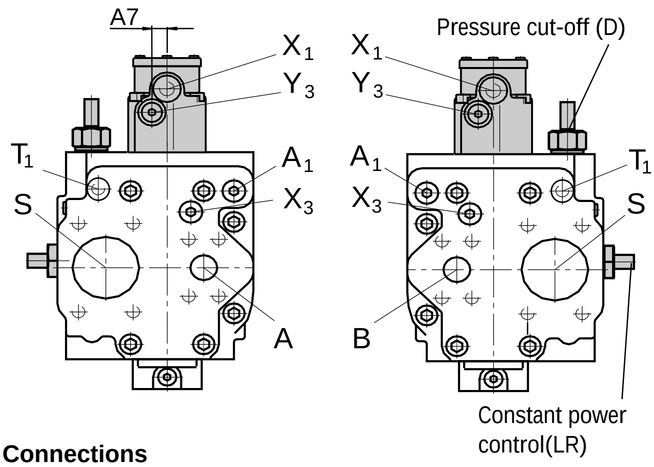
Circuit diagram:
Constant power control with pressure cut-off and hydraulic stroke limiter (negative control), LRDH1, LRDH5



Unit dimensions LRDH1, LRDH5
general dimensions and connections see pages 17...20



View Y
counter-clockwise rotation
clockwise rotation



Connections

Y_3	Remote control pressure	M14x1,5 (plugged)
X_1	Pilot pressure	M14x1,5

Size	A1	A2	A3	A4	A5	A6	A7
55	262	257	252	170	127	105	12
80	290	284	279	182	138	116	14
107	309	300	295	189	144	122	18
160	351	340	334	207	162	140	19

H2/H6 → Function: $V_{g\,min}$ to $V_{g\,max}$ (positive control)

As pilot pressure increases the pump swivels towards *higher* displacement.

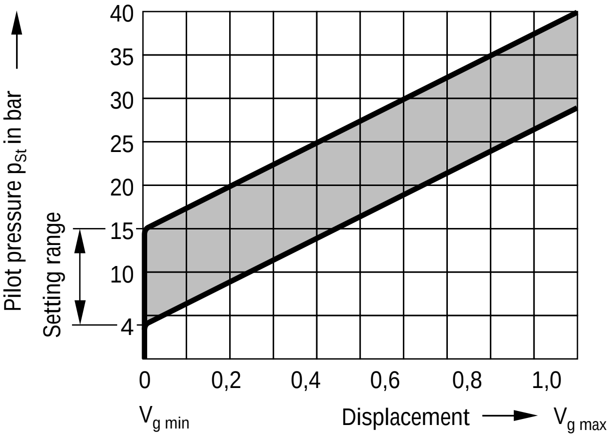
In unoperated (zero pressure) condition, the pump is swivelled to its starting position ($V_{g\,max}$) by means of a control spring.

If the working pressures is ≥ 40 bar, the pump swivels from $V_{g\,max}$ to $V_{g\,min}$ (pilot pressure ≤ start of control).

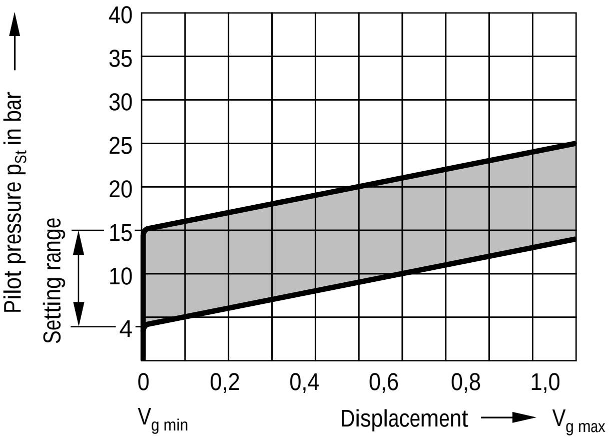
Start of control, (at $V_{g\,min}$), adjustable from 4 bar to 15 bar

When ordering, please state required start of control in clear text.

H2 → pilot pressure increase ($V_{g\,min}$ – $V_{g\,max}$) ______ Δp = 25 bar



H6 → pilot pressure increase ($V_{g\,min}$ – $V_{g\,max}$) ______ Δp = 10 bar



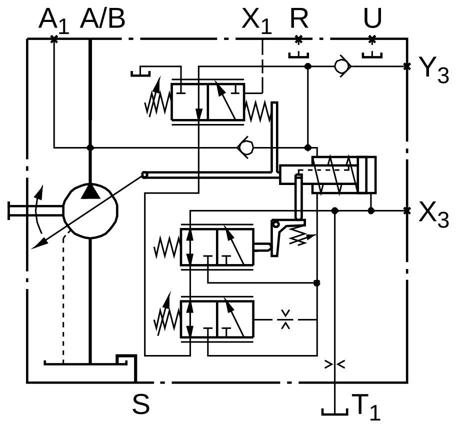
A pressure of 40 bar is necessary to operate the control. The required control oil is taken from the high pressure circuit.

If necessary, a boost pressure of ≥ 40 bar should be applied at port Y_3.

If the H-function is used for two-point switching control only ($V_{g\,min}$ - $V_{g\,max}$), pilot pressure at port X_1 must not exceed 40 bar.

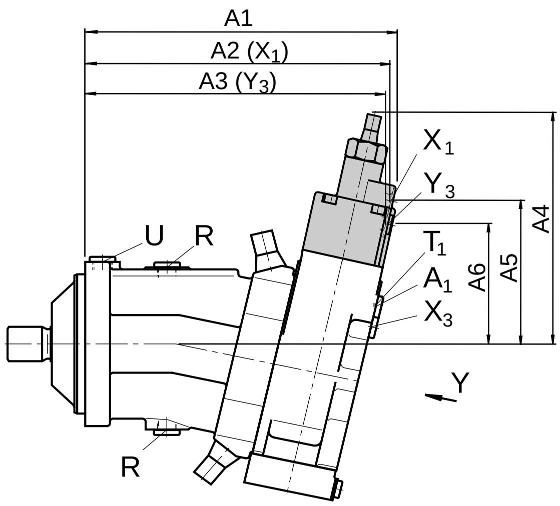
Circuit diagram:

Constant power control with pressure cut-off and hydraulic stroke limiter (positive control), LRDH2, LRDH6



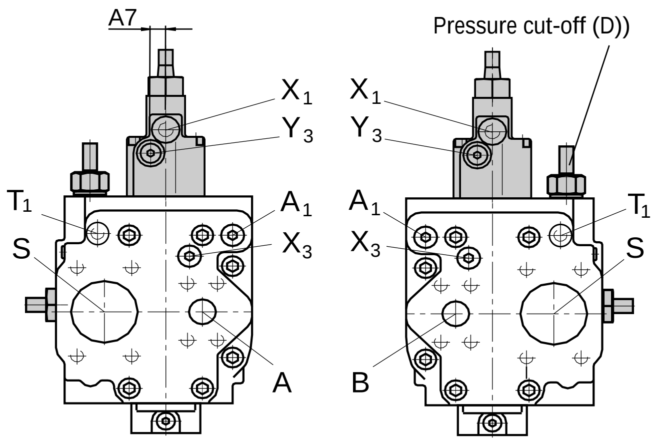
Unit dimensions LRDH2, LRDH6

general dimensions and connections see pages 17...20



View Y

counter-clockwise rotation clockwise rotation



Connections see LRDH1/H5 page 10

Size	A1	A2	A3	A4	A5	A6	A7
55	261	256	251	211	127	105	12
80	289	284	281	225	141	120	14
107	308	299	295	232	145	125	18
160	352	341	334	250	163	144	19

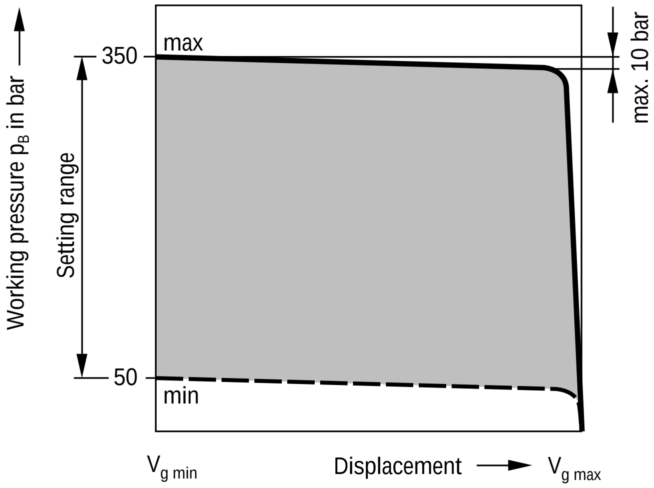
DR Constant Pressure Control

The constant pressure control maintains the pressure in a hydraulic system constant whithin its control range in spite of changing pump flow requirements. The variable pump supplies only the volume of fluid required by the consumer. Should working pressure exceed the set pressure, the pump is automatically swivelled back to a smaller angle and the deviation in control corrected.
In unoperated (zero pressure) condition, the pump is swivelled to its starting position ($V_{g\ max}$) by means of a control spring.

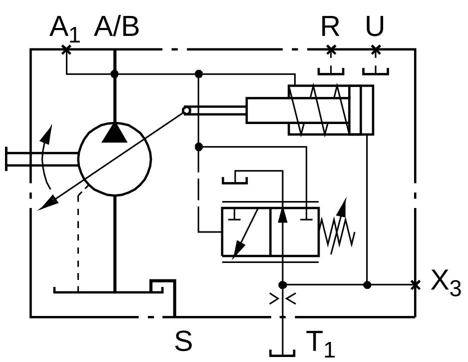
Setting range from 50 bar to 350 bar

When ordering, state in clear text:
Setting of the constant pressure control

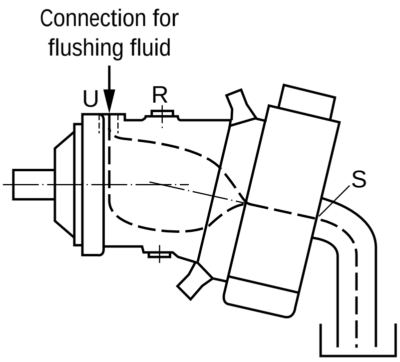
Any pressure relief valve included in the circuit to limit the max. pressure must be set to a cracking pressure at least 20 bar above the pressure control setting.



Circuit diagram:
Constant pressure control DR (integral valve), fixed setting



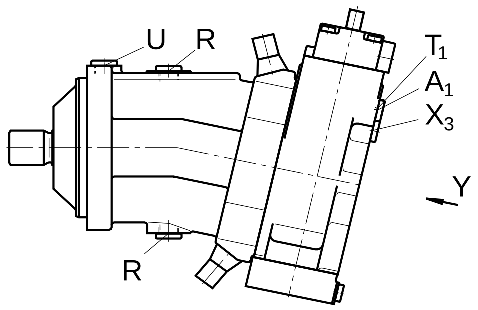
Zero stroke operation
The standard pump unit is designed for intermittent constant pressure operation.
Short-term operation at zero stroke (< 10 min.; ~50 % duty) is permissible up to a working pressure p_{max} = 315 bar at a tank temperature of ≤ 50°C.
For long-term periods of zero stroke operation, port U should be used for bearing flushing.



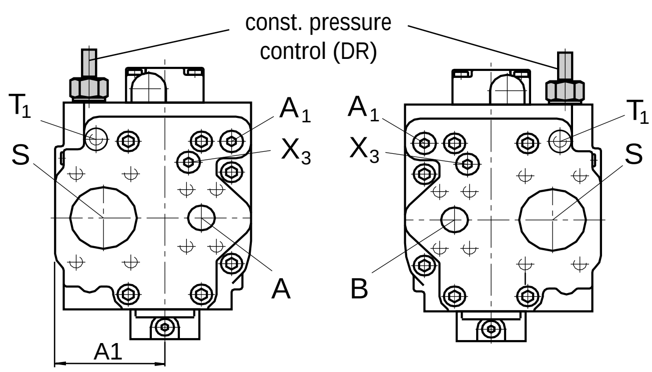
Flushing flow	Size	55	80	107	160
	$q_{V\ Sp}$ in L/min	4	6	8	12

Temperature of flushing fluid ≤ tank temperature

Unit dimensions DR
general dimensions and connections see pages 17...20



View Y
counter-clockwise rotation clockwise rotation



Size	A1
55	92,5
80	102
107	106
160	126

Variation: Remote constant pressure control (G)

A sequence valve with subplate takes over the pressure control function. The valve is mounted separate from the pump, and the simple piping length should not exceed 5 m. High pressure is supplied from the pump to the valve via port A_1, and the valve control oil is fed back to the pump via port X_3, causing the pump to swivel back towards $V_{g\,min}$. Port T of the sequence valve and T_1, the pilot drain from the pump must be connected back to tank (cooler).

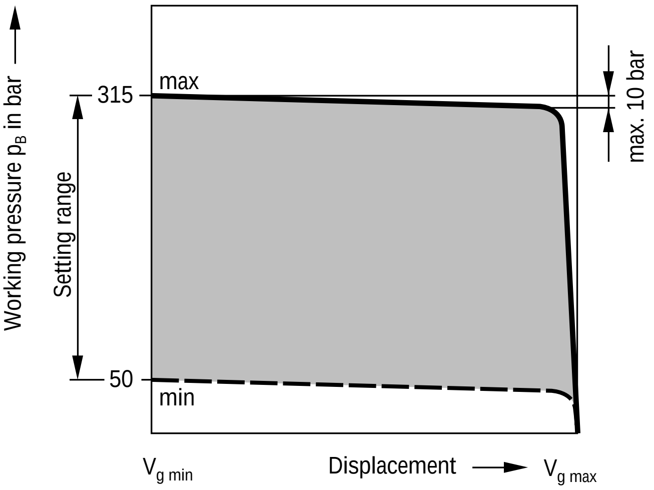
Setting range from 50 bar to 315 bar.

Any pressure relief valve included in the circuit to limit the max. pressure must be set to a cracking pressure at least 20 bar above the pressure control setting.

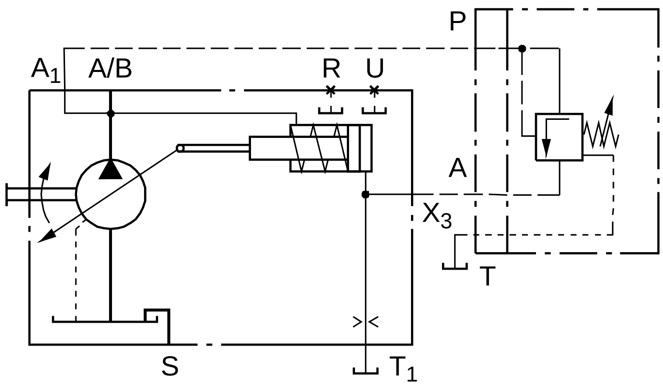
The sequence valve and subplate must be ordered separately.

Sequence valve: DZ5DP2-1X/315YMSO21 (Id.-Nr. 154 869)
Subplate: G 115/1 (Id.-Nr. 153 138)

When ordering, state in clear text:
Setting of the constant pressure control



Circuit diagram:
Remote constant pressure control DRG



Unit dimensions DRG
see control device DR,
general dimensions and connections see pages 17...20

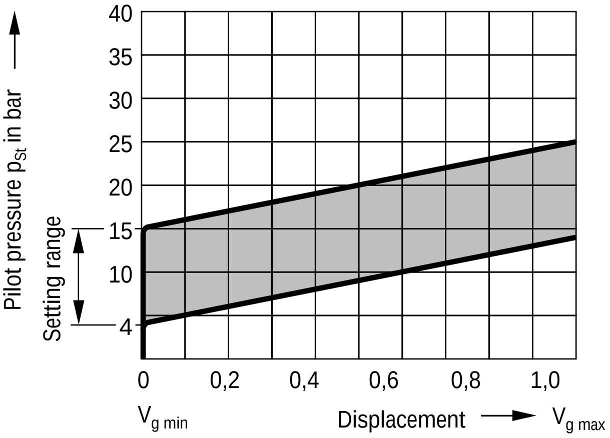
Ports A_1 and X_3 are open

HD Hydraulic Control, Pilot Pressure Related

The pilot pressure related hydraulic control allows stepless setting of the pump displacement in relation to pilot pressure. Control is proportional to the pilot pressure applied to port X_1.
Start position in zero pressure condition at $V_{g\,min}$.
Control from $V_{g\,min}$ to $V_{g\,max}$.

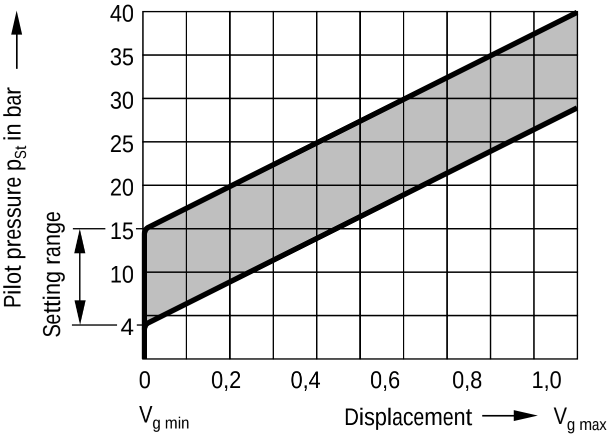
HD1

Pilot pressure increase ($V_{g\,min}$ – $V_{g\,max}$) ______________ Δp = 10 bar
Start of control (at $V_{g\,min}$), adjustable _____________ from 4 – 15 bar
When ordering, please state required start of control in clear text.



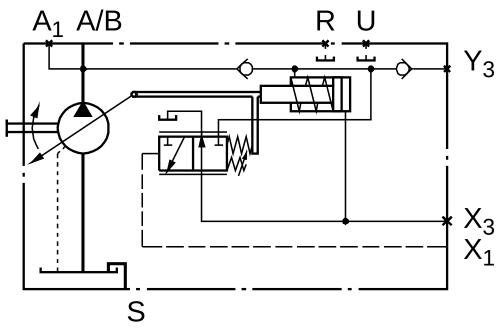
HD2

Pilot pressure increase ($V_{g\,min}$ – $V_{g\,max}$) _______________ Δp = 25bar
Start of control (at $V_{g\,min}$), adjustable _____________ from 4 - 15 bar
When ordering, please state required start of control in clear text.

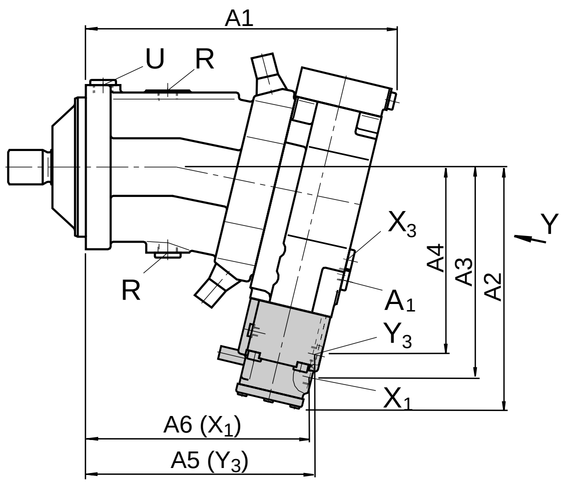


A pressure of 40 bar is necessary to operate the control. The required control oil is taken from the high pressure circuit.
If the working pressure equals or exceeds 40 bar and minimum displacement ($V_{g\,min}$) is greater than zero, then no external control pressure is required.
In other cases, an external control pressure with min. 40 bar should be connected at port Y_3.
If the HD control is only required as a 2-point switching control ($V_{g\,min}$ - $V_{g\,max}$), the pilot pressure at port X_1 must not exceed 40 bar.

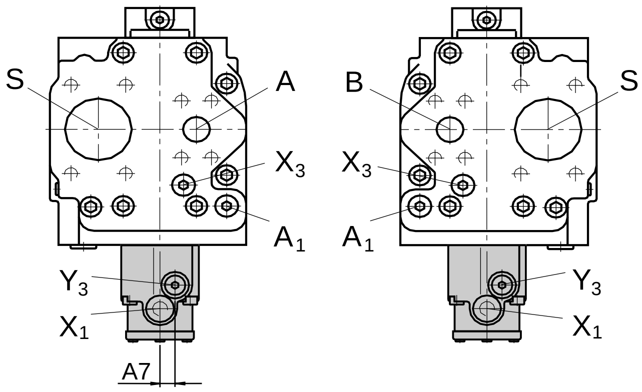
Circuit diagram:
Hydraulic control, pilot pressure related, HD1, HD2



Unit dimensions HD1, HD2
general dimensions and connections see pages 17...20



View Y
counter-clockwise rotation clockwise rotation



Connections

Y_3	External control pressure	M14x1,5 (plugged)
X_1	Pilot pressure	M14x1,5

Size	A1	A2	A3	A4	A5	A6	A7
55	256	221	192	170	190	186	12
80	287	240	209	187	212	207	14
107	306	252	221	199	225	220	18
160	348	278	248	225	253	249	19

Variation: Remote pressure cut-off (G)

A sequence valve with subplate takes over the function of the pressure cut-off. The valve is mounted separate from the pump, and the simple piping length should not exceed 5 m. High pressure is supplied from the pump to the valve via port A_1.
The control oil of the pump is directed to the valve via the port X_3 and led into the tank at port A located on the subplate of the sequence valve. In this case the pump is regulated to $V_{g\,min}$ in case of access of the set-point pressure value.
Note: Port A of the sequence valve must be connected back to tank (cooler).

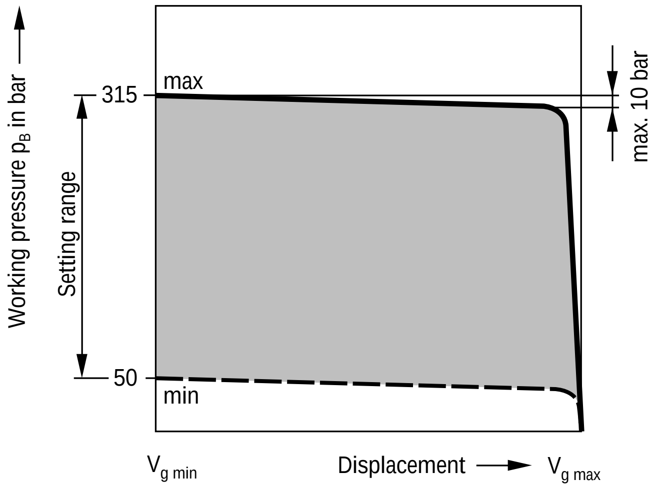
Setting range from 50 bar to 315 bar.

Any pressure relief valve included in the circuit to limit the max. pressure must be set to a cracking pressure at least 20 bar above the pressure control setting.

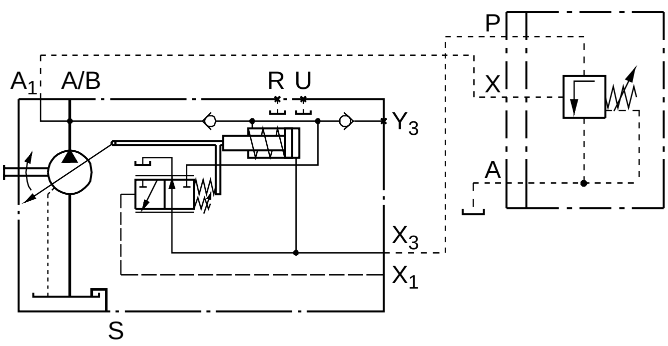
The sequence valve and subplate must be ordered separately.

Sequence valve: DZ5DP2-1X/315XSO20 (Id.-Nr. 154 768)
Subplate: G 115/1 (Id.-Nr. 153 138)

When ordering, state in clear text:
Setting of the pressure cut-off



Circuit diagram:
Hydraulic control, pilot pressure related with remote pressure cut-off, HD1G, HD2G



Unit dimensions HD1G/HD2G
see control device HD1/HD2,
general dimensions and connections see pages 17...20

Ports A_1 and X_3 are open

EP Electrical Control with Proportional Solenoid

The electrical control with proportional solenoid allows stepless and programmable setting of the pump displacement. Control is proportional to solenoid force (current strength). The control force at the control piston is generated by a proportional solenoid. For control of the proportional solenoid, a 24 V DC supply with current levels between 200 and 600 mA is required.

Start of control (at $V_{g\,min}$) ______ 200 mA

End of control (at $V_{g\,max}$) ______ 600 mA

Insulation class IP 54

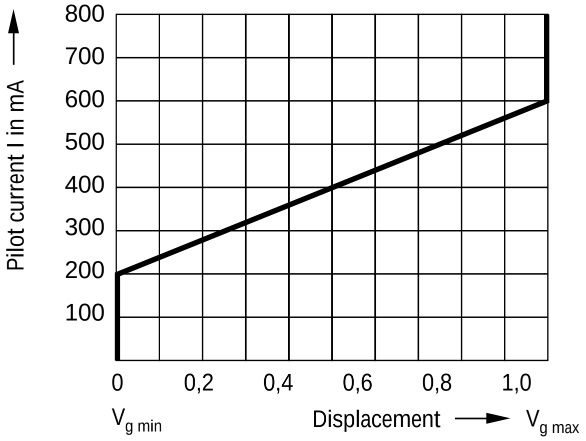
Start position in zero pressure condition at $V_{g\,min}$.

Control from $V_{g\,min}$ to $V_{g\,max}$

A pressure of 40 bar is necessary to operate the control. The required control oil is taken from the high pressure circuit.

If the working pressure equals or exceeds 40 bar and minimum displacement ($V_{g\,min}$) is greater than zero, then no external control pressure is required.

In other cases, an external control pressure with min. 40 bar should be connected at port Y_3.

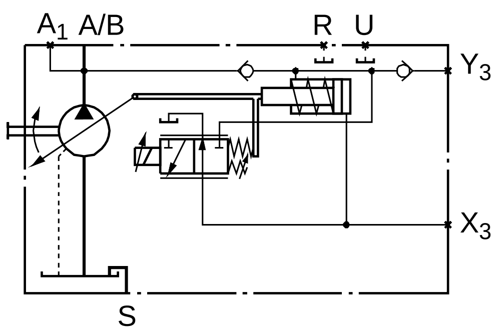


Suitable control for the proportional solenoid are proportional amplifier PV (catalogue sheet RE 95023) and chopper amplifier CV (catalogue sheet RE 95029).

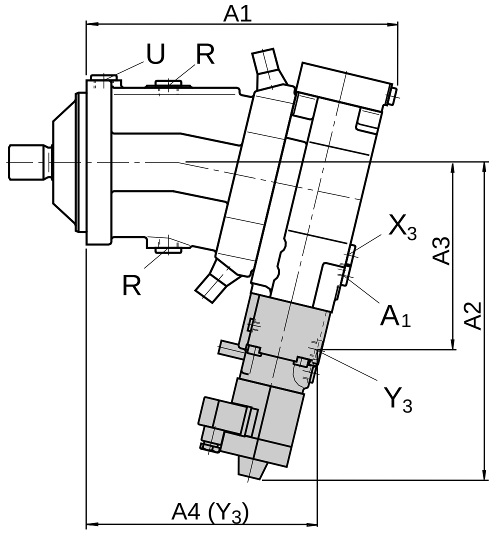
By using an electronic control card control of swivel time is also possible.

Note: Pumps with EP control may only be mounted within an oil tank when using mineral hydraulic oils and with oil temperatures in the tank of max. 80°C.

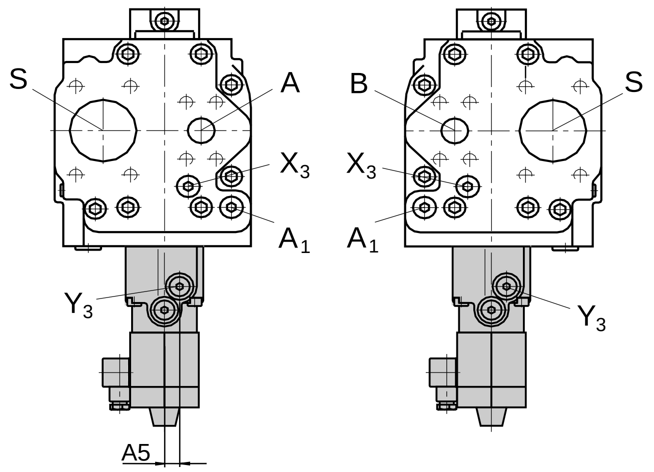
Circuit diagram:
Electrical control with proportional solenoid, EP



Unit dimensions EP
general dimensions and connections see pages 17...20



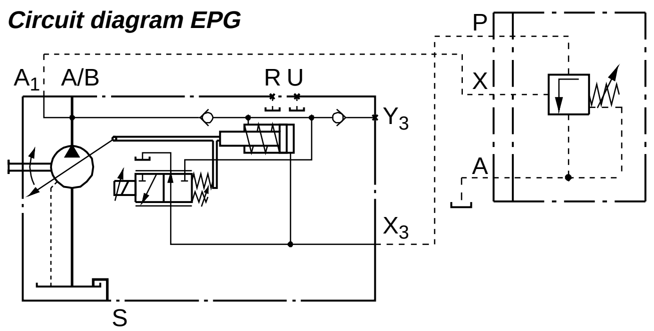
View Y
counter-clockwise rotation clockwise rotation



Connections
Y_3 External control pressure M14x1,5 (plugged)

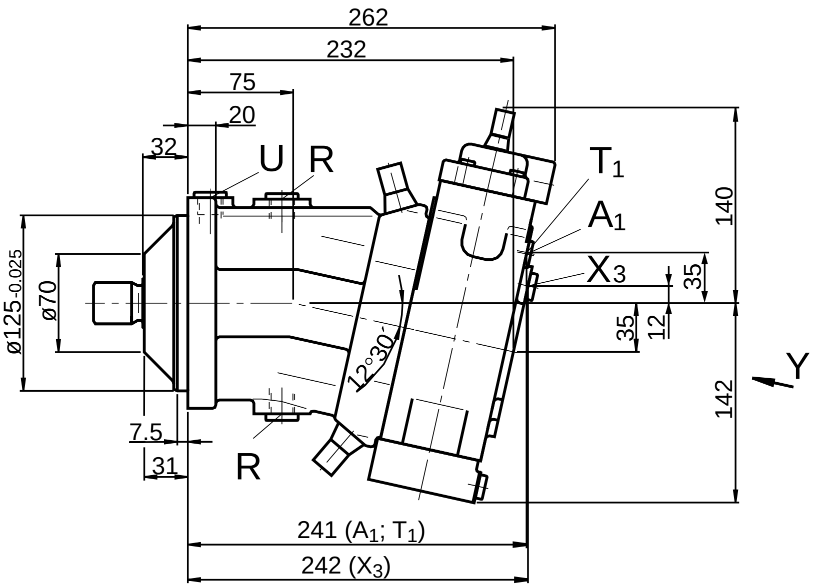
Size	A1	A2	A3	A4	A5
55	256	296	170	190	12
80	287	315	187	212	14
107	306	327	199	225	18
160	348	353	225	253	19

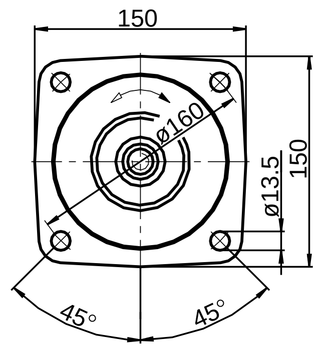
Variation: Remote pressure cut-off (G)
Description see HD1G/HD2G, page 15
Circuit diagram EPG



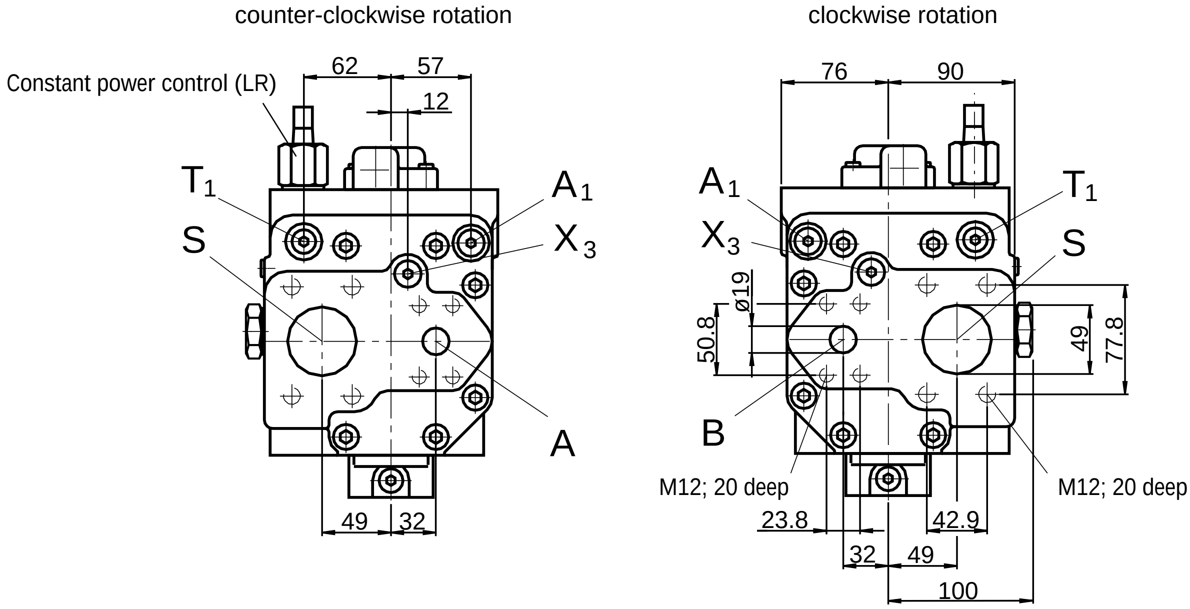
Unit Dimensions, Size 55

Constant power control LR
Variation:
Constant power control with remote pressure cut-off LRG
(ports A_1, X_3, T_1 open)

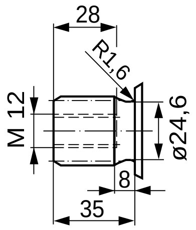




View Y



Shaft end
Z Splined shaft
W 30x2x30x14x9g
DIN 5480

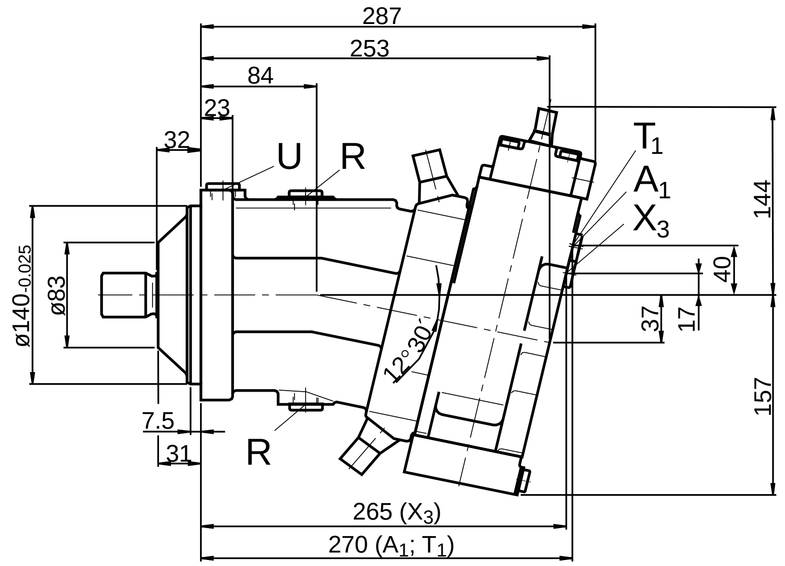


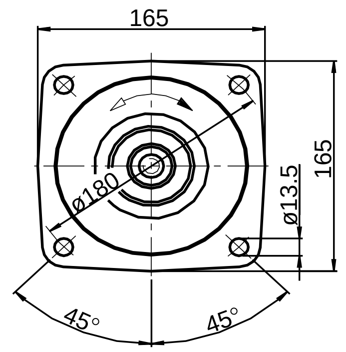
Connections

A, B	Service line ports (metric mounting threads)	SAE 3/4" 420 bar (6000 psi) High pressure series
S	Suction port (metric mounting threads)	SAE 2" 210 bar (3000 psi) Standard series
U	Bearing flushing port	M18x1,5 (plugged)
R	Bleed port	M18x1,5 (plugged)
A_1	High pressure port	M14x1,5 (plugged)
T_1	Pilot oil drain	M12x1,5 (plugged)
X_3	Port for override	M14x1,5 (plugged)

Unit Dimensions, Size 80

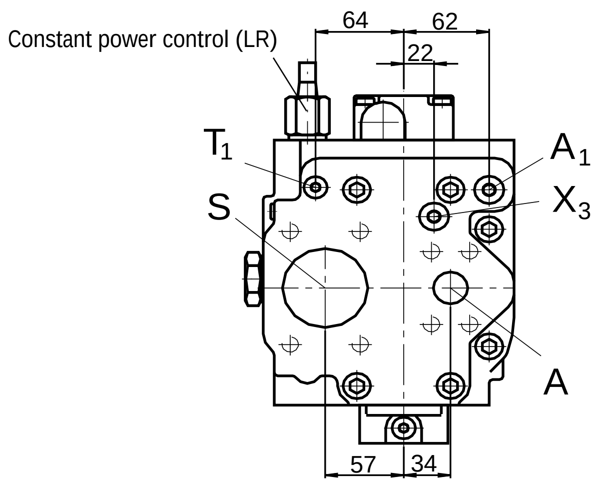
Constant power control LR
Variation:
Constant power control with remote pressure cut-off LRG
(ports A_1, X_3, T_1 open)



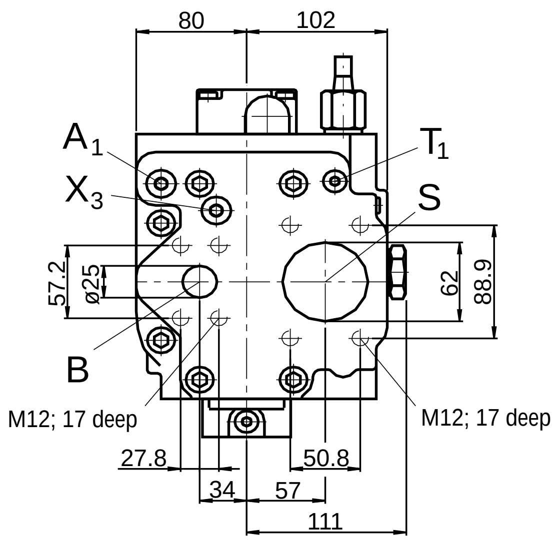


View Y

counter-clockwise rotation

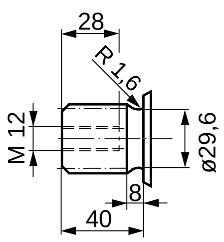


clockwise rotation



Shaft end

Z Splined shaft
W 35x2x30x16x9g
DIN 5480

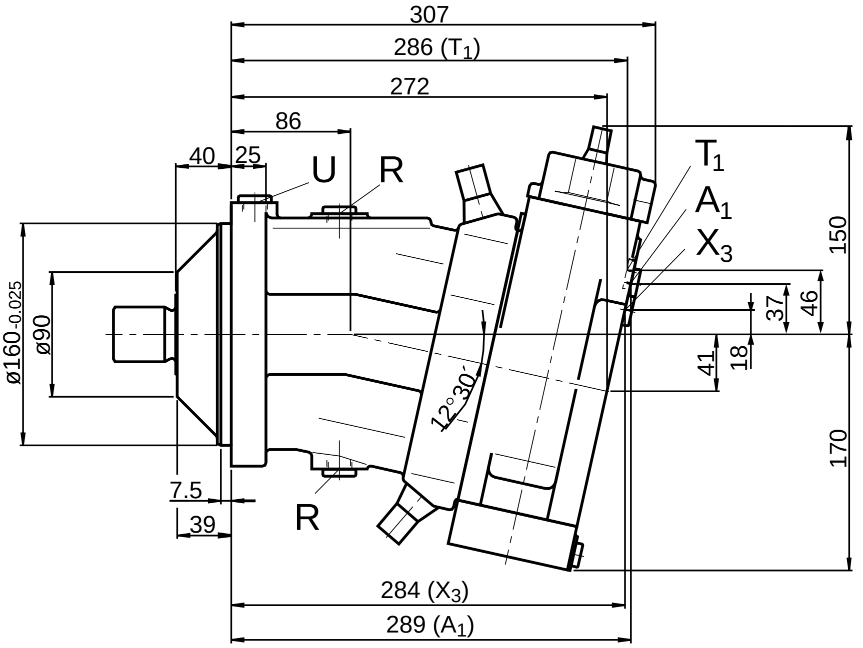


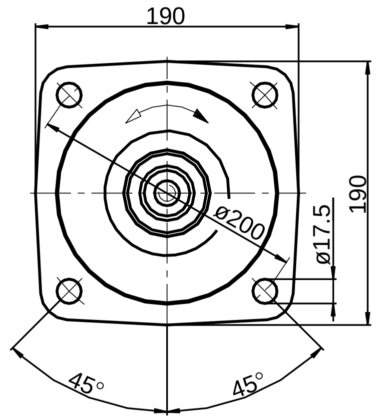
Connections

A, B	Service line ports (metric mounting threads)	SAE 1" 420 bar (6000 psi) High pressure series
S	Suction port (metric mounting threads)	SAE 2 1/2" 170 bar (2500 psi) Standard series
U	Bearing flushing port	M18x1,5 (plugged)
R	Bleed port	M18x1,5 (plugged)
A_1	High pressure port	M16x1,5 (plugged)
T_1	Pilot oil drain	M12x1,5 (plugged)
X_3	Port for override	M16x1,5 (plugged)

Unit Dimensions, Size 107

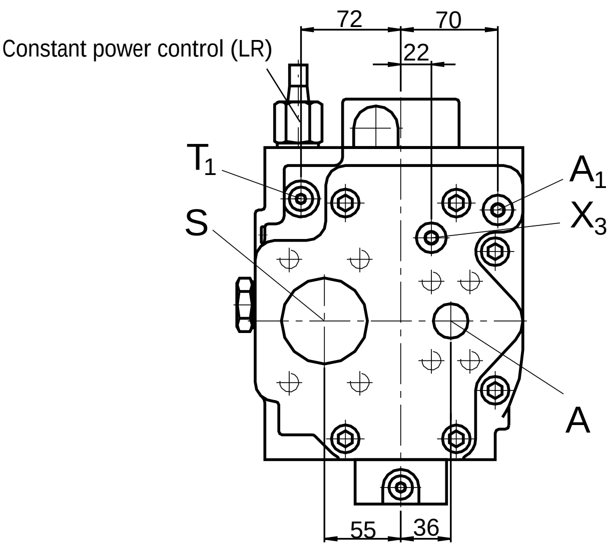
Constant power control LR
Variation:
Constant power control with remote pressure cut-off LRG
(ports A_1, X_3, T_1 open)



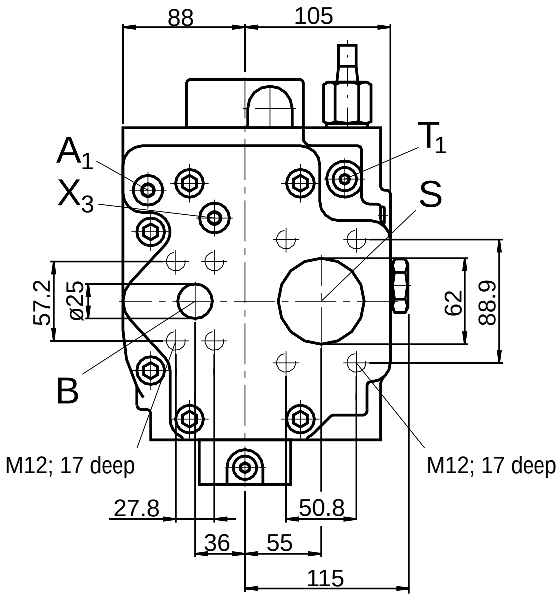


View Y

counter-clockwise rotation

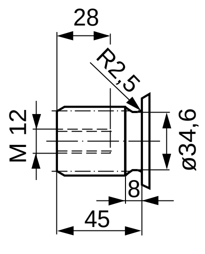


clockwise rotation



Shaft end

Z Splined shaft
W 40x2x30x18x9g
DIN 5480

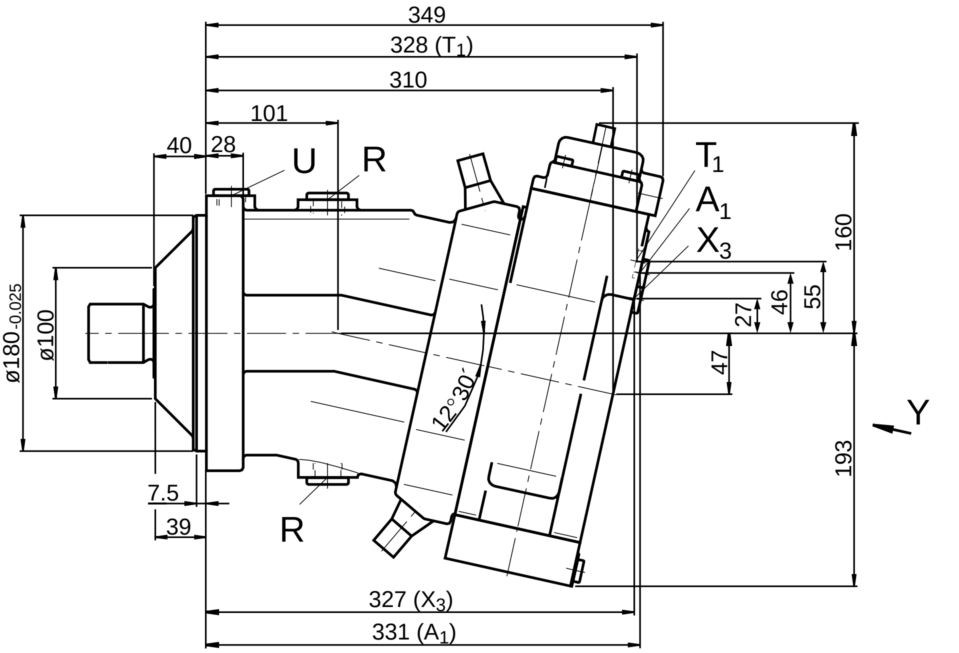


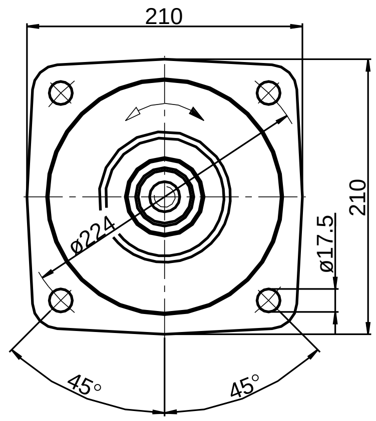
Connections

A, B	Service line ports (metric mounting threads)	SAE 1" 420 bar (6000 psi) High pressure series
S	Suction port (metric mounting threads)	SAE 2 1/2" 170 bar (2500 psi) Standard series
U	Bearing flushing port	M18x1,5 (plugged)
R	Bleed port	M18x1,5 (plugged)
A_1	High pressure port	M16x1,5 (plugged)
T_1	Pilot oil drain	M12x1,5 (plugged)
X_3	Port for override	M16x1,5 (plugged)

Unit Dimensions, Size 160

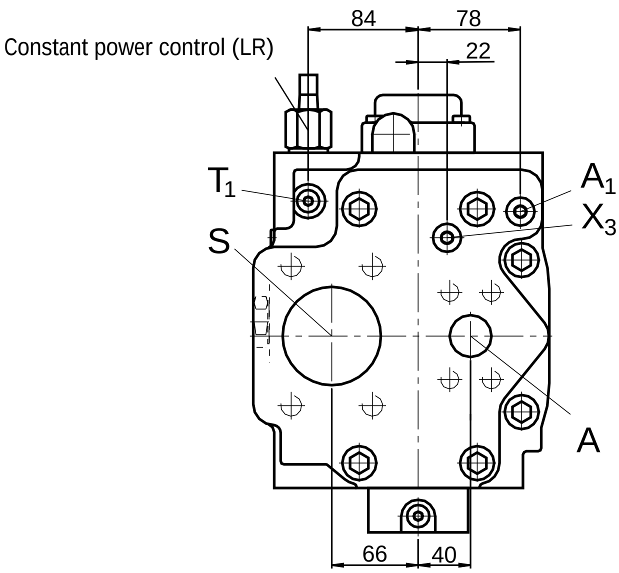
Constant power control LR
Variation:
Constant power control with remote pressure cut-off LRG
(ports A_1, X_3, T_1 open)



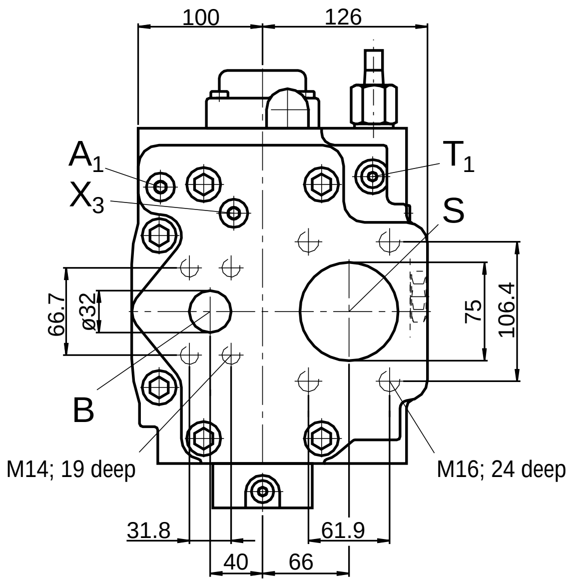


View Y

counter-clockwise rotation

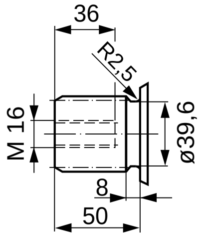


clockwise rotation



Shaft end

Z Splined shaft
W 45x2x30x21x9g
DIN 5480



Connections

A, B	Service line ports (metric mounting threads)	SAE 1 1/4" 420 bar (6000 psi) High pressure series
S	Suction port (metric mounting threads)	SAE 3" 140 bar (2000 psi) Standard series
U	Bearing flushing port	M18x1,5 (plugged)
R	Bleed port	M18x1,5 (plugged)
A_1	High pressure port	M16x1,5 (plugged)
T_1	Pilot oil drain	M12x1,5 (plugged)
X_3	Port for override	M16x1,5 (plugged)

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