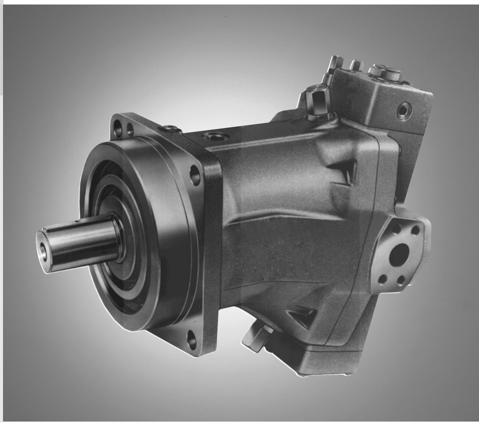
Rexroth
Bosch Group

Axial piston variable pump A7VO

RE 92203/06.09
Replaces: 05.99

Data sheet



Series 63
Sizes NG250 to 500
Nominal pressure 350 bar
Peak pressure 400 bar
Open circuit

Contents

Features

– Variable axial piston pump with tapered piston rotary group in bent axis design for hydrostatic drives in open circuits

– For operation in mobile and industrial applications

– The flow is proportional to the drive speed and the displacement and steplessly variable from $q_{v\,max}$ to $q_{v\,min} = 0$

– Wide range of controls and adjustment devices

– Compact, robust bearing system for long service life

– Available with Long Life bearings for special fluids and extreme service life requirements

– Pressure control is standard

– Optical or electric swivel angle indicator available

Type code for standard program

	A7V		O			/	63		–	V				
01	02	03	04	05	06		07	08		09	10	11	12	13

Fluid / Version

		250	355	500	
01	Mineral oil and HFD. HFD only in conjunction with Long-Life-Lagerung „L" (no code)	●	●	●	
	For operation on HFC, special high performance version A4VSO...F see RE 92053	●	●	–	
	High-Speed-Version (only mineral oil)	●	–	–	H [1]

Axial piston unit

02	Bent axis design, variable, nominal pressure 350 bar, peak pressure 400 bar	A7V

Drive shaft bearings

		250	355	500	
03	Mechanical bearings (no code)	●	●	●	
	Long-Life-bearings	●	●	●	L

Type of operation

04	Pump, open circuit	O

Size

05	Displacement $V_{g\,max}$ [cm³]	250	355	500
	NG28 to160 see RE 92202			

Control devices

			250	355	500	
06	Pressure control		●	●	●	DR
	Pressure control, remotely adjustable		●	●	●	DRG
	Power control					
	with integrated pressure control (fixed setting)		●	●	●	LRD
	hydraulic stroke limiter initial position $V_{g\,max}$	Δp = 10 bar	●	●	●	LRDH1
		Δp = 25 bar	●	●	●	LRDH2
		Δp = 35 bar	●	●	●	LRDH3
	hydraulic stroke limiter initial position $V_{g\,min}$	Δp = 10 bar	●	●	●	LRDN1
		Δp = 25 bar	●	●	●	LRDN2
		Δp = 35 bar	●	●	●	LRDN3
	with pressure control remotely adjustable		●	●	●	LRG
	hydraulic stroke limiter initial position $V_{g\,max}$	Δp = 10 bar	●	●	●	LRGH1
		Δp = 25 bar	●	●	●	LRGH2
		Δp = 35 bar	●	●	●	LRGH3
	hydraulic stroke limiter initial position $V_{g\,min}$	Δp = 10 bar	●	●	●	LRGN1
		Δp = 25 bar	●	●	●	LRGN2
		Δp = 35 bar	●	●	●	LRGN3
	Hydraulic control, pilot pressure dependent,					
	with integrated pressure control (fixed setting)	Δp = 10 bar	●	●	●	HD1D
		Δp = 25 bar	●	●	●	HD2D
		Δp = 35 bar	●	●	●	HD3D
	with pressure control, remotely adjustable	Δp = 10 bar	●	●	●	HD1G
		Δp = 25 bar	●	●	●	HD2G
		Δp = 35 bar	●	●	●	HD3G
	Hydraulic control, with electric proportional valve [2]					
	with integrated pressure control (fixed setting)	Control voltage 12 V	●	●	●	EP1D
		Control voltage 24 V	●	●	●	EP2D
	with pressure control, remotely adjustable	Control voltage 12 V	●	●	●	EP1G
		control voltage 24 V	●	●	●	EP2G

[1] recommended for new projects
[2] for operation on HFD-fluids please observe RE 29181 (proportional pressure reducing valve type DRE4K)

Type code for standard program

	A7V		O			/	63		–	V				
01	02	03	04	05	06		07	08		09	10	11	12	13

	Series		250	355	500	
07	Series 6, Index 3		●	●	●	63

	Direction of rotation		250	355	500	
08	with view on drive shaft	clockwise	●	●	●	R
		counter clockwise	●	●	●	L

	Seals		250	355	500	
09	FKM (Fluoro-rubber)		●	●	●	V

	Drive shaft		250	355	500	
10	Splined shaft to DIN 5480		●	●	●	Z
	Keyed parallel shaft to DIN 6885		●	●	●	P

	Mounting flange		250	355	500	
11	Similar to ISO 3019-2	4-hole	●	–	–	B
		8-hole	–	●	●	H

	Service line connections		250	355	500	
12	SAE-flanged port B or A, at rear (metric fixing bolts) SAE flanged port S, at rear(metric fixing bolts)		●	●	●	01
	SAE- flanged ports B or A, on opposite side (metric fixing bolts) SAE- flanged port S, on opposite side (metric fixing bolts)		●	●	●	02

	Swivel angle indicator		250	355	500	
13	Without swivel angle indicator (no code)		●	●	●	
	With optical swivel angle indicator		●	●	●	V
	With electric swivel angle indicator		●	●	●	E

Note

Exact value for $V_{g\,min}$ and $V_{g\,max}$ (displacement) must be stated in clear text when ordering ($V_{g\,min}$ ......cm³/rev., $V_{g\,max}$ .....cm³/rev.)

Setting range $V_{g\,min}$: 0 to 0.2 • $V_{g\,max}$

$V_{g\,max}$: $V_{g\,max}$ down to 0.8 • $V_{g\,max}$

● = Available – = Not available ▒ = Preferred program

Technical data

Hydraulic fluid

For extensive information on the selection of hydraulic fluids and application conditions please consult our data sheets RE 90220 (mineral oils), RE 90221 (ecologically acceptable fluids) and RE 90223 (HF-fluids).

The variable pump A7VO is not suitable for operation on HFA fluids. When operating on HFD or ecologically acceptable fluids, limitations to the technical data and seals according to RE 90223 and RE 90221 must be observed.

For the sizes 250 and 355 with **operation on HFC-fluids**, the **A4VSO..*F*** must be used. For certain selected HFC fluids the same pressures and speeds are permissible as for operation on mineral oil. See RE 92053.

When ordering, state the fluid to be used in clear text.

Operating viscosity range

In order to obtain optimum efficiency and service life, we recommend that the operating viscosity (at operating temperature) be selected in the range

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

referred to tank temperature (open circuit).

Limit of viscosity range

For critical operating conditions the following values apply:

ν_{min} = 10 mm²/s
for short periods (t < 3 min)
at max. permissible case drain temperature
t_{max} = +90°C.

ν_{max} = 1000 mm²/s
for short periods (on cold start maximum operating viscosity of 100 mm²/s should be reached within 15 min)
t_{min}= −25°C

Note, that the maximum fluid temperature of 90°C may not be exceeded at any point (e.g. around the bearings). The fluid temperature in the bearing area is influenced by drive speed and pressure, and is typically 12 K higher than the average case drain temperature.

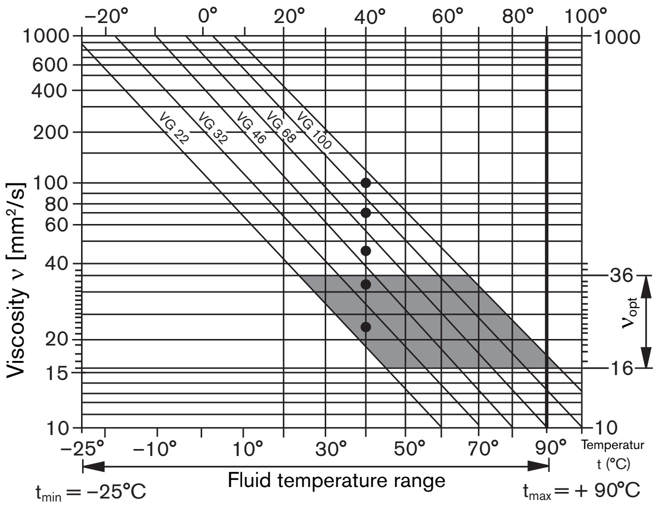
Temperature range

(see selection diagram)

t_{min} = −25°C
t_{max} = +90°C

For detailed information on operation with low temperatures see RE 90300-03-B.

Selection diagram



Notes on the selection of hydraulic fluids

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 viscosity lies within the optimum range (ν_{opt}) see shaded section in the selection diagram. We recommend, that the higher viscosity grade is selected in each case.

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

Important:
The case drain temperature is influenced by pressure and speed and is always higher than the tank temperature. However the max. temperature at any point in the system may not exceed 90° C.

If the above conditions cannot be met, due to extreme operating parameters we recommend a housing flushing via port U.

Filtration

The finer the filtration, the better the achieved cleanliness of the fluid and the longer the life of the axial piston pump.

To ensure a reliable functioning of the axial piston unit, a minimum cleanliness class of

20/18/15 acc. to ISO 4406 is necessary.

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Technical data

Operating pressure range

Depending on the operating fluid, limitations may apply, see the chapter on hydraulic fluids, page 4.

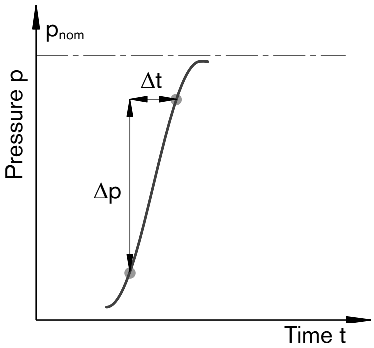
Pressure at the outlet ports (pressure ports) A or B

Nominal pressure p_{nom} ________ 350 bar absolute

Peak pressure p_{max} ________ 400 bar absolute
Total operating period ________ 300 h
Individual operating period ________ 1 s

Minimum pressure (in pump outlet) ________ 10 bar
For a lower pressure, please consult us.

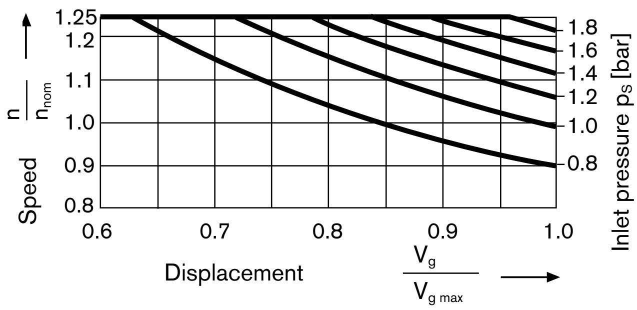
Rate of pressure change R_A ________ 16000 bar/s



Under pulsating load conditions above 315 bar we recommend the use of a splined shaft (to DIN 5480).

Pressure at the inlet port S (Suction)
Minimum inlet pressure $p_{S\,min}$ ________ 0.8 bar absolute
Maximum inlet pressure $p_{S\,max}$ ________ 8 bar absolute

Minimum inlet pressure
In order to avoid damage to the axial piston pump a certain minimum inlet pressure at the pump's suction port S is necessary This minimum inlet pressure is dependent on the drive speed and the displacement of the axial piston unit.



Note

– Maximum speed n_{max}
(Speed limit, see table of values, page 8)

– Minimum and maximum pressure at port S

– Permissible values for the shaft seal
(see diagram on page 7)

An increase in inlet pressure results in a higher control begin of the **LR**-control curve as well as a rise of the LR.**H**- and LR.**N**-pilot pressure characteristics.
Factory setting of the control begin is done at an inlet pressure $p_{S.}$=1 bar absolute.
Exact details of the shifts in the control curves on request.

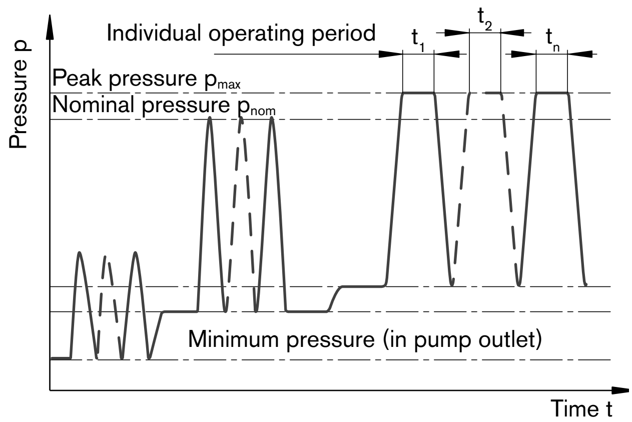
Definition

Nominal pressure p_{nom}
The nominal pressure corresponds to the maximum design pressure.

Peak pressure p_{max}
The peak pressure corresponds to the maximum pressure within the individual operating period. The total of the individual operating periods must not exceed the total operating period.

Minimum pressure (in pump outlet)
Minimum pressure in the pump outlet side (port A or B) that is required in order to prevent damage to the axial piston unit.

Rate of pressure change R_A
Maximum permissible pressure build-up and pressure reduction speed with a pressure change over the entire pressure range.



Total operating period = $t_1 + t_2 + ... + t_n$

Direction of flow

Direction of rotation, with view on shaft end	
clockwise	counter clockwise
S to **B**	**S** to **A**

Technical data

Long-Life-Bearings (L)

For long service life requirements and when using HFD-fluids. Identical external dimensions as units with standard bearings. A retroactive conversion to Long-Life Bearings is possible. It is recommended, that the bearings and housing be flushed via port U.

Bearing flushing

Flushing flows (recommended)

NG	250	355	500
q_{flow} (L/min)	10	16	16

Operation in standby (in pressure control mode)

Operation in standby, without external flushing via port U is only permissible for short periods:

A7VO maximum 15 min at 200 bar
3 min at 350 bar

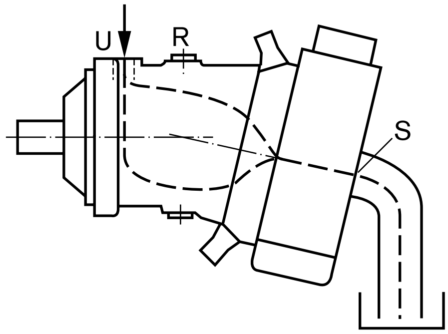
HA7VO maximum 5 min at 200 bar
1 min at 350 bar

For other pressure levels information on request

Influence of drive speed can be neglected

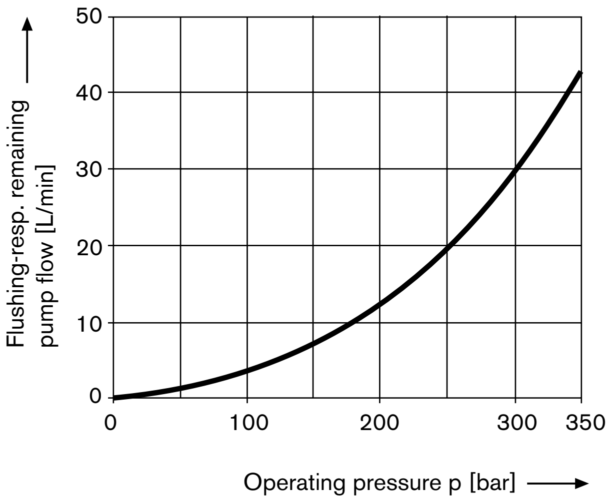
At tank temperature ≤ 50° C

For longer periods of standby operation it is necessary to implement housing flushing vie port U.



Flushing flows for A7VO same as bearing flushing

Flushing flows HA7VO (High-Speed-version)



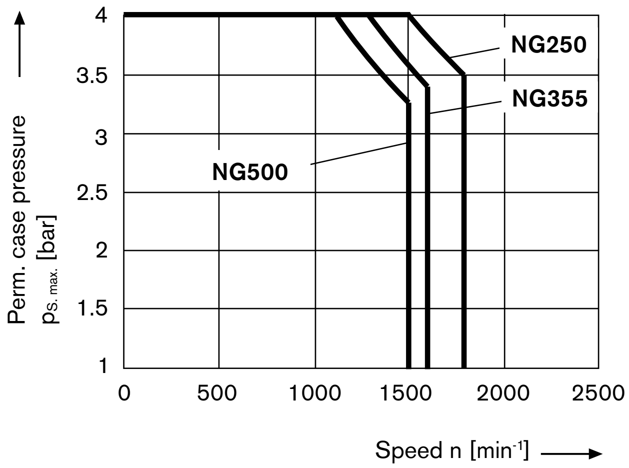
Technical data

Shaft seal FKM (Fluoro-rubber)

Permissible case pressure

The service life of the shaft seal is influenced by pump drive speed and case pressure. It is recommended not to exceed the continuous averaged case pressure of 3 bar abs. (max. perm. case pressure 4 bar abs. at reduced speed, see diagram).

The case pressure must be equal to or higher than the external pressure on the shaft seal (in case of the standard version). For the High-Speed-version please consult us.



Special operating conditions may make it necessary to restrict these values .

Important:

– maximum permissible drive speed of variable pump (see table of values, page 8)

– max. permissible case pressure $p_{S\,max}$ __________ 4 bar

– an increase in case pressure results in a higher control begin of the **HD**- and **DR**- controls.

  Exact details of the shift in control characteristics on request.

  Factory setting of the control begin at $p_S = 1$ bar.

Temperature range

The FKM shaft seal is suitable for case temperatures of -25° C to +90°C.

Technical data

Table of values (theoretical values, without considering η_{mh} and η_v; values rounded off)

Size			NG	250		355	500
		High-Speed-Version			250H		
Displacement		$V_{g\ max}$[1]	cm³	250	250	355	500
		$V_{g\ min}$[1]	cm³	0	0	0	0
Speed maximum [2)4)]	at $V_{g\ max}$	n_{nom}	rpm	1500	1800	1320	1200
Speed maximum [3)4)]	at $V_g \leq V_{g\ max}$	n_{max}	rpm	1800	–	1600	1500
Maximum flow [4)]	at n_{nom} ($V_{g\ max}$)	$q_{v\ max\ nom}$	L /min	375	450	469	600
Maximum power [4)]	at $q_{v\ nom}$ and $\Delta p = 350$ bar	P_{nom}	kW	219	262	273	350
Torque [4)]	at $V_{g\ max}$ and $\Delta p = 350$ bar (continuous operation)	T_{max}	Nm	1391	1391	1978	2785
Rotary stiffness	$V_{g\ max}$ to $0.5 \cdot V_{g\ max}$	c_{min}	Nm/rad	59500	59500	74800	115000
	$0.5 \cdot V_{g\ max}$ to $0_{(interpolated)}$	c_{max}	Nm/rad	181000	181000	262000	391000
Moment of inertia rotary group		J_{TW}	kgm²	0.061	0.061	0.102	0.178
Angular acceleration maximum		α	rad/s²	10000	10000	8300	5500
Case volume		V	L	3	3	5	7
Weight approx.		m	kg	102	102	173	234

1) Standard setting for limitation of the swivel angle. If another setting is required, please state in clear text.
Setting range $V_{g\ max}$: $V_{g\ max}$ to $0.8 \cdot V_{g\ max}$
$V_{g\ min}$: 0 to $0.2 \cdot V_{g\ max}$

2) Nominal speed in self priming operation with an absolute pressure (p_S) of 1 bar at inlet port S and mineral oil with a density of 0,88 kg/L

3) The values apply for $V_g \leq V_{g\ max}$ or an increase in inlet pressure p_S at the inlet port S (see diagram page 5)

4) Depending on the type of fluid, restrictions may be necessary, see chapter hydraulic fluids page 4

Important
Exceeding the maximum or falling below the minimum permissible values can lead to a loss of function, a reduction in operational service life or total destruction of the axial piston unit. More details on limiting values for speed fluctuations, reduction in angular acceleration dependent on the frequency and the permissible starting angular acceleration (below the maximum angular acceleration) can be found in data sheet RE 90261.

Determination of size

Flow $$q_V = \frac{V_g \cdot n \cdot \eta_V}{1000} \quad \text{[L/min]}$$

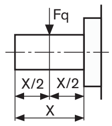
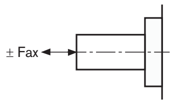
Drive torque $$T = \frac{V_g \cdot \Delta p}{20 \cdot \pi \cdot \eta_{mh}} \quad \text{[Nm]}$$

Power $$P = \frac{2\pi \cdot T \cdot n}{60000} = \frac{q_V \cdot \Delta p}{600 \cdot \eta_t} \quad \text{[kW]}$$

V_g = Geometr. displacement per revolution in cm³
Δp = Differential pressure in bar
n = Speed in rpm
η_V = Volumetric efficiency
η_{mh} = Mechanical-hydraulic efficiency
η_t = Overall efficiency ($\eta_t = \eta_V \cdot \eta_{mh}$)

Technical data

Permissible radial and axial forces on the drive shaft

Size		NG		250	355	500
Radial force, maximum [1] (at $p_{A,B} = 1\,bar$)		$F_{q\,max}$	N	1200	1500	1900
Axial force, maximum [2] (at $p_{A,B} = 1\,bar$)		$+ F_{ax\,max}$	N	4000	5000	6250
		$- F_{ax\,max}$	N	1200	1500	1900

[1] When at standstill or pressureless circulation of the axial piston unit. Under pressurized condition higher forces are permissible, please consult us

[2] Maximum permissible axial force at standstill or pressureless circulation of the axial piston unit

Regarding the permissible axial force, the direction of the force must be taken into consideration:

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

$+ F_{ax\,max}$ = decrease of bearing life

Influence of the radial force F_q on the bearing life

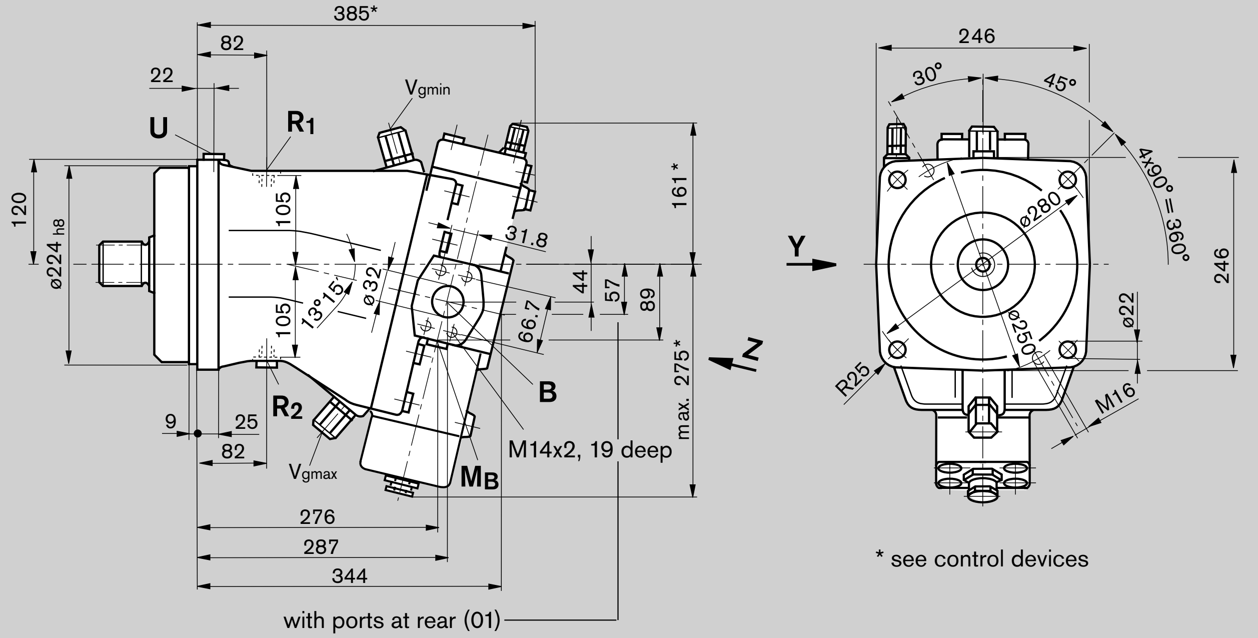
Through a favourable direction of the actuating radial force F_q,the internal load on the bearings can be compensated for and in this manner an optimum on bearing life can be obtained, please consult us.

Dimensions size 250

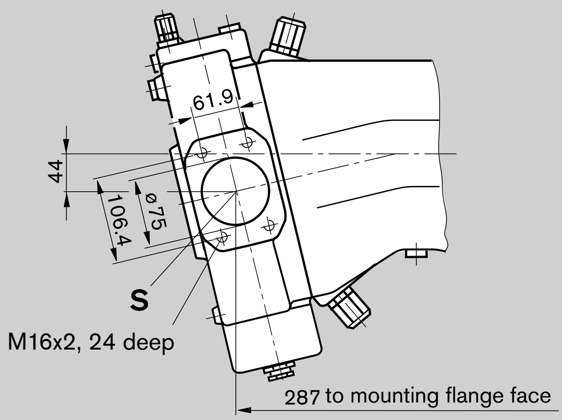
Before finalizing your design, request a binding installation drawing. Dimensions in mm.

Ports A (B) and S on opposite sides (02), clockwise rotation

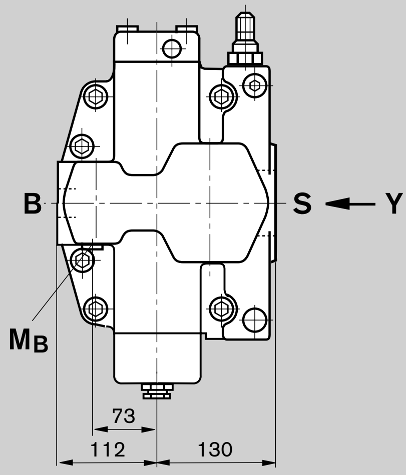
(without control devices)



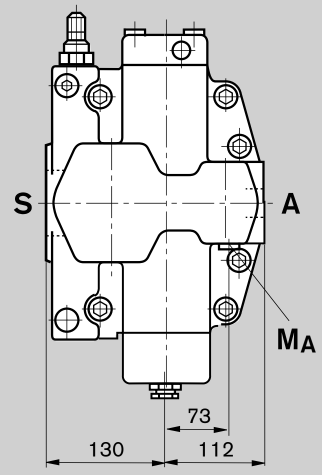
View Y



View Z clockwise rotation



View Z counter clockwise rotation

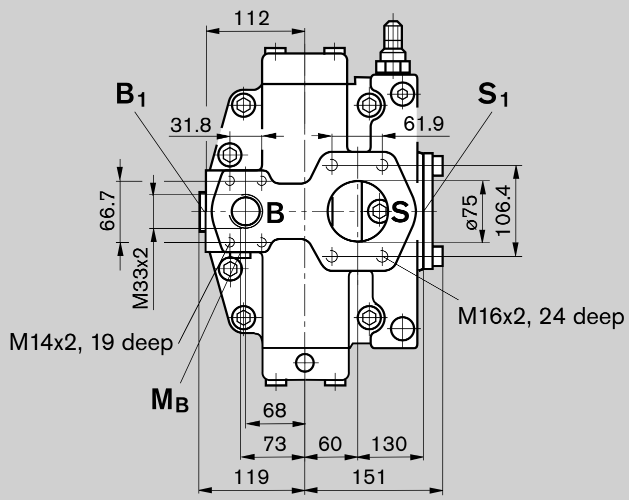


Dimensions size 250

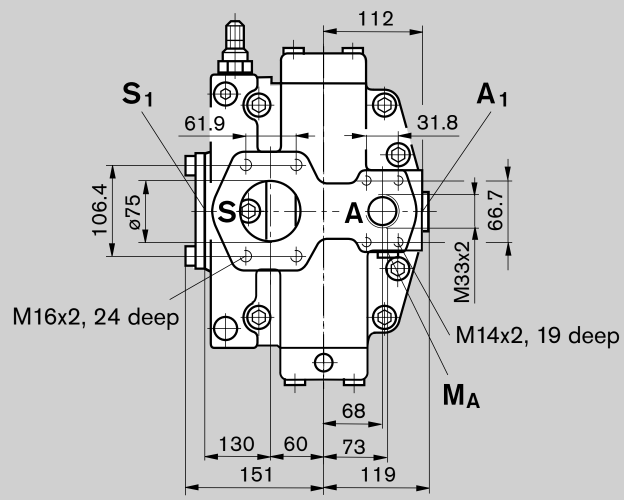
Before finalizing your design, request a binding installation drawing. Dimensions in mm.

Ports A (B) and S at rear (01)

View Z clockwise rotation

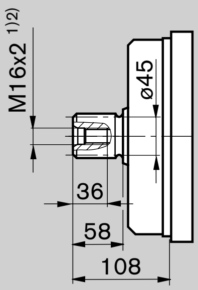


View Z counter clockwise rotation

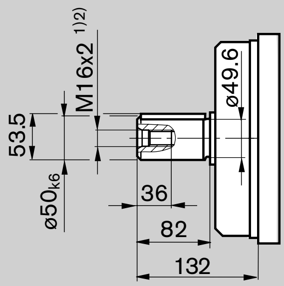


Drive shafts

Z Splined shaft DIN 5480
W50x2x24x9g



P Parallel keyed shaft
DIN 6885, AS14x9x80



1) Centering bore to DIN 332
(Thread to DIN 13)

Ports

Designation	Port for	Standard	Size[2]	Peak pressure [bar][3]	State
A, (B)	Pressure outlet (high pressure range) Fixing thread	SAE J518[4] DIN 13	1 1/4in M14x2; 19 deep	400	O
S	Suction (standard pressure range) Fixing thread	SAE J518[4] DIN 13	3 in M16x2; 24 deep	7	O
U	Flushing	DIN 3852	M14x1.5; 12 deep	3	X
R_1	Case drain	DIN 3852	M22x1.5; 14 deep	3	O
R_2	Case drain	DIN 3852	M22x1.5; 14 deep	3	X
M_A, M_B	Measuring pressure A, B	DIN 3852	M14x1.5; 12 deep	400	X

2) For the max. tightening torques the general information on page 52 must be observed

3) Depending on the application, momentary pressure spikes can occur. Take this into consideration when selecting the measuring devices and fittings.

4) Only dimensions to SAE J518

O = Must be connected (closed on delivery)

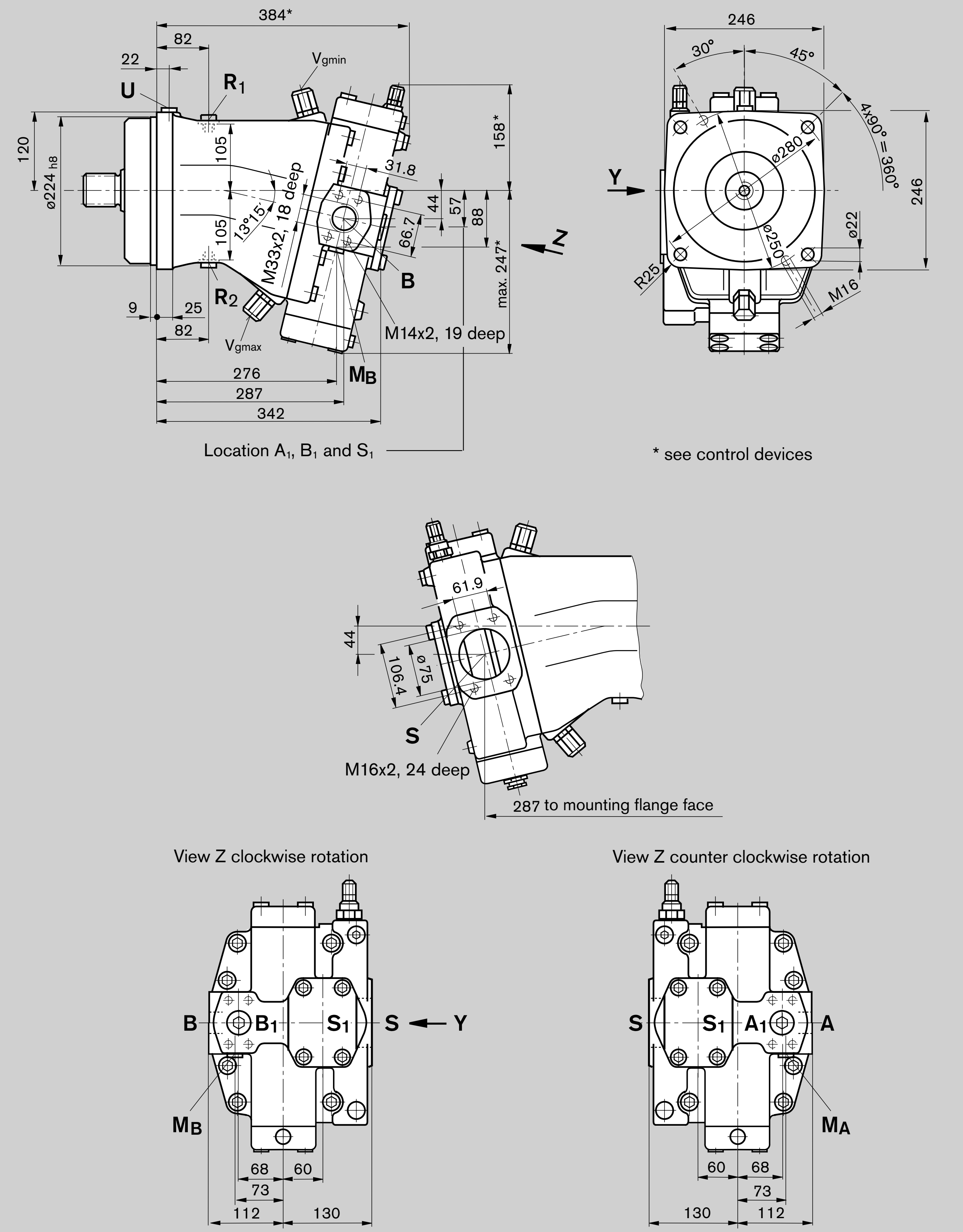
X = Plugged (in normal operation)

Dimensions size 250 High-Speed-Version

Before finalizing your design, request a binding installation drawing. Dimensions in mm.

Ports A (B) and S on opposite sides (02), clockwise rotation

(without control devices)



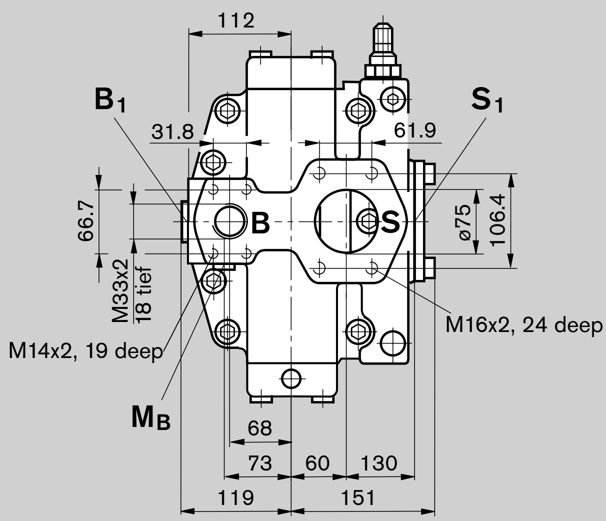
Ports A_1, B_1 and S_1 closed pressure tight with plug or flange plate, Dimensions like A, B and S

Dimensions size 250 High-Speed-Version

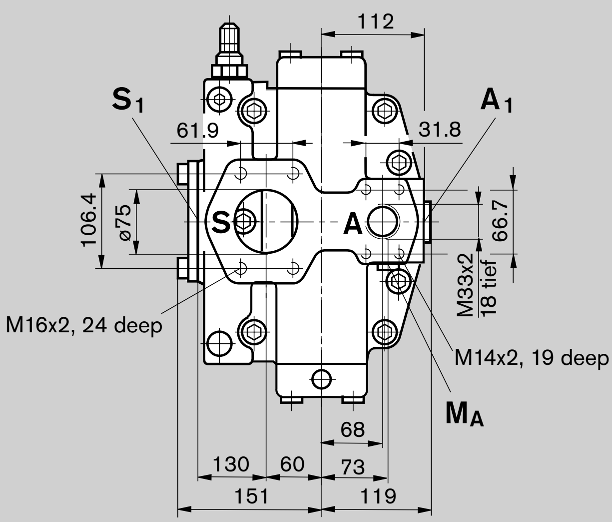
Before finalizing your design, request a binding installation drawing. Dimensions in mm.

Ports A (B) and S at rear (01)

View Z clockwise rotation

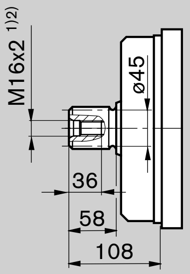


View Z counter clockwise rotation

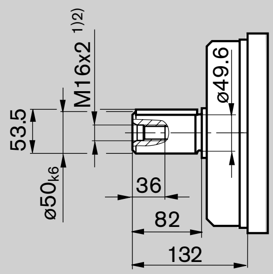


Drive shafts

Z Splined shaft DIN 5480 W50x2x24x9g



P Parellel keyed shaft DIN 6885, AS14x9x80



[1] Centering bore to DIN 332 (Thread to DIN 13)

Ports

Designation	Port for	Standard	Size[2]	Peak pressure [bar][3]	State
A, (B)	Pressure outlet (high pressure series) Fixing thread	SAE J518[4] DIN 13	1 1/4in M14x2; 19 deep	400	O
A_1, (B_1)	2. Pressure outlet (high pressure series) Fixing thread	SAE J518[4] DIN 13	1 1/4in M14x2; 19 deep	400	X [5]
S	Suction (standard pressure series) Fixing thread	SAE J518[4] DIN 13	3 in M16x2; 24 deep	3[6]	O
S_1	2. Suction (standard pressure series) Fixing thread	SAE J518[4] DIN 13	3 in M16x2; 24 deep	3[6]	X[7]
U	Flushing	DIN 3852	M14x1.5; 12 deep	3	X
R_1, R_2	Case drain	DIN 3852	M22x1.5; 14 deep	3	X[8]
M_A, M_B	Measuring outlet pressure A, B	DIN 3852	M14x1.5; 12 deep	400	X

[2] For the max. tightening torques the general information on page 52 must be observed

[3] Depending on the application momentary pressure spikes can occur. Take this into consideration when selecting the measuring devices and fittings.

[4] Only dimensions to SAE J518

[5] Closed pressure tight with plug M33x2

[6] Note: suction chamber and leakage chamber are connected inside pump housing, observe permissible pressure load on shaft seal, see page 7

[7] Closed pressure tight with flange plate

[8] Both ports are plugged. Leakage chamber is connected with suction chamber. Separate case drain line to tank is not necessary.

O = Must be connected (closed on delivery)

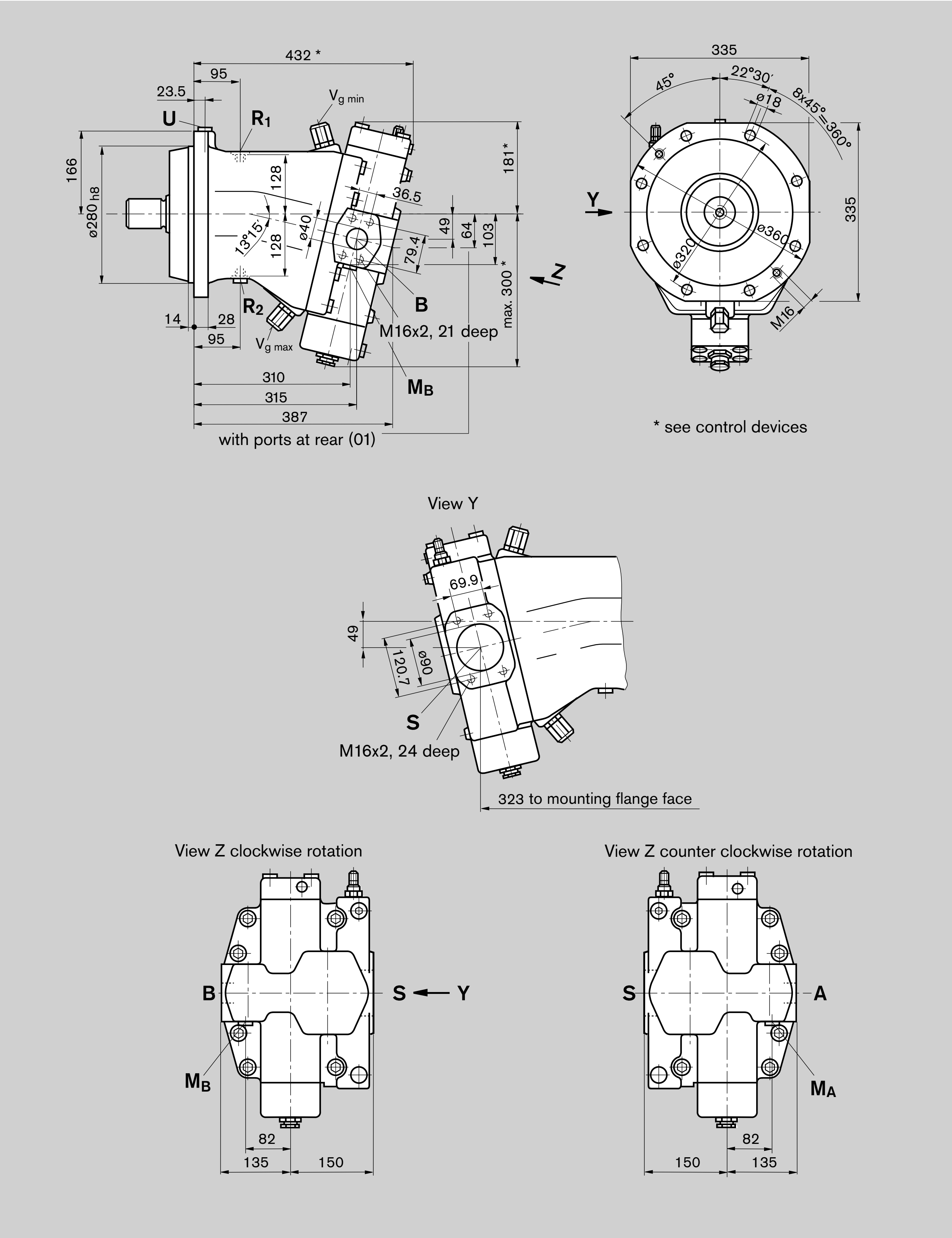
X = Plugged (in normal operation)

Dimensions size 355

Before finalizing your design, request a binding installation drawing. Dimensions in mm.

Ports A (B) and S on opposite sides (02), clockwise rotation

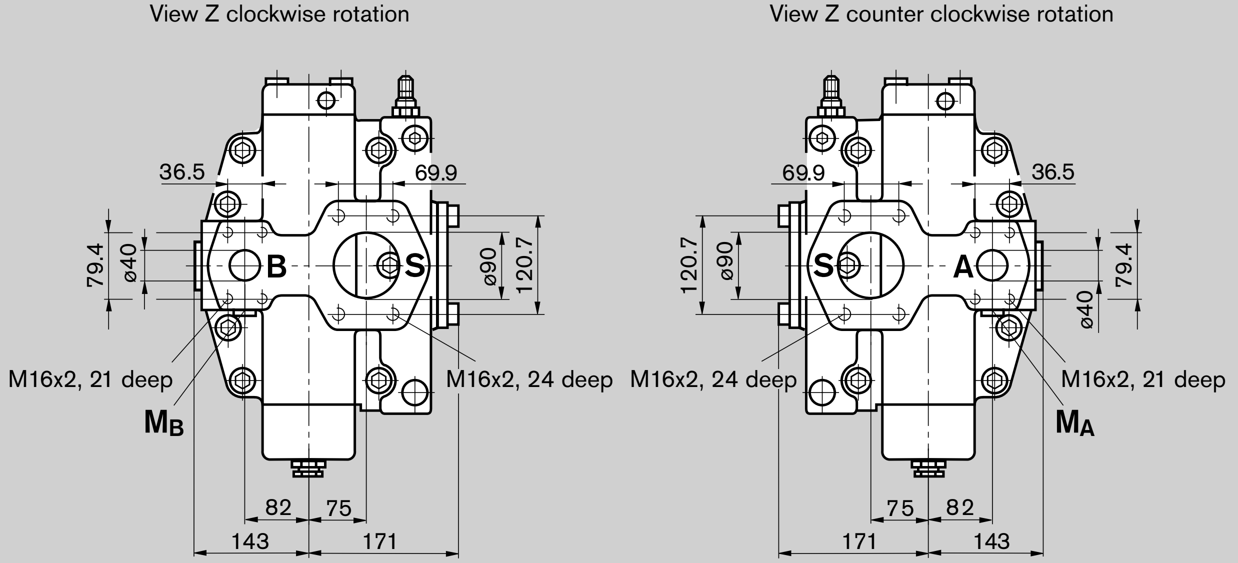
(without control devices)



Dimensions size 355

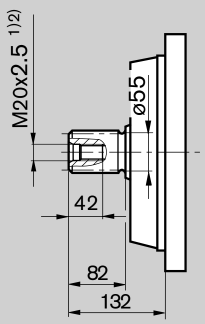
Before finalizing your design, request a binding installation drawing. Dimensions in mm.

Ports A (B) and S at rear (01)

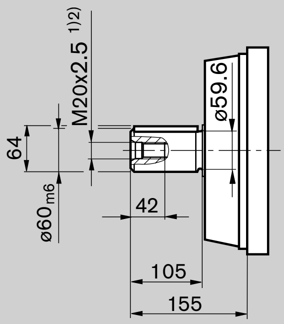


Drive shafts

Z Splined shaft DIN 5480 W60x2x28x9g



P Parallel keyed shaft DIN 6885, AS18x11x100



1) Centering bore to DIN 332 (Thread to DIN 13)

Ports

Designation	Port for	Standard	Size2)	Peak pressure [bar]3)	State
A, (B)	Pressure outlet (high pressure range) Fixing thread	SAE J518 4) DIN 13	1 1/2in M16x2; 21 deep	400	O
S	Suction (standard pressure range) Fixing thread	SAE J518 4)) DIN 13	3 1/2 in M16x2; 24 deep	7	O
U	Flushing	DIN 3852	M14x1.5; 12 deep	3	X
R_1	Case drain	DIN 3852	M33x2; 18 deep	3	O
R_2	Case drain	DIN 3852	M33x2; 18 deep	3	X
M_A, M_B	Measuring outlet pressure A, B	DIN 3852	M14x1.5; 12 deep	400	X

2) For the max. tightening torques the general information on page 52 must be observed

3) Depending on the application momentary pressure spikes can occur. Take this into consideration when selecting the measuring devices and fittings.

4) Only dimensions to SAE J518

O = Must be connected (closed on delivery)

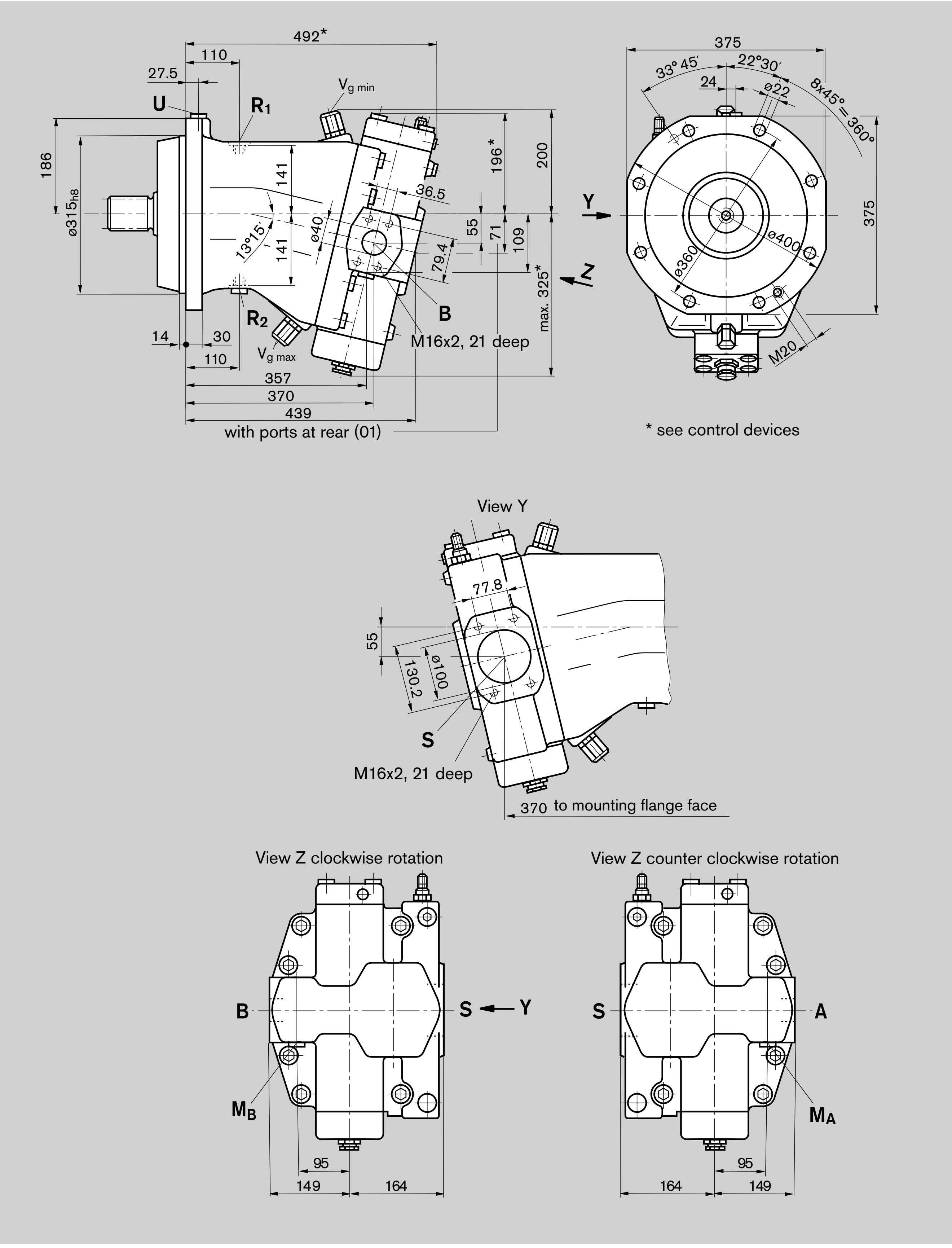
X = Plugged (in normal operation)

Dimensions size 500

Before finalizing your design, request a binding installation drawing. Dimensions in mm.

Ports A (B) and S on opposite sides (02), clockwise rotation

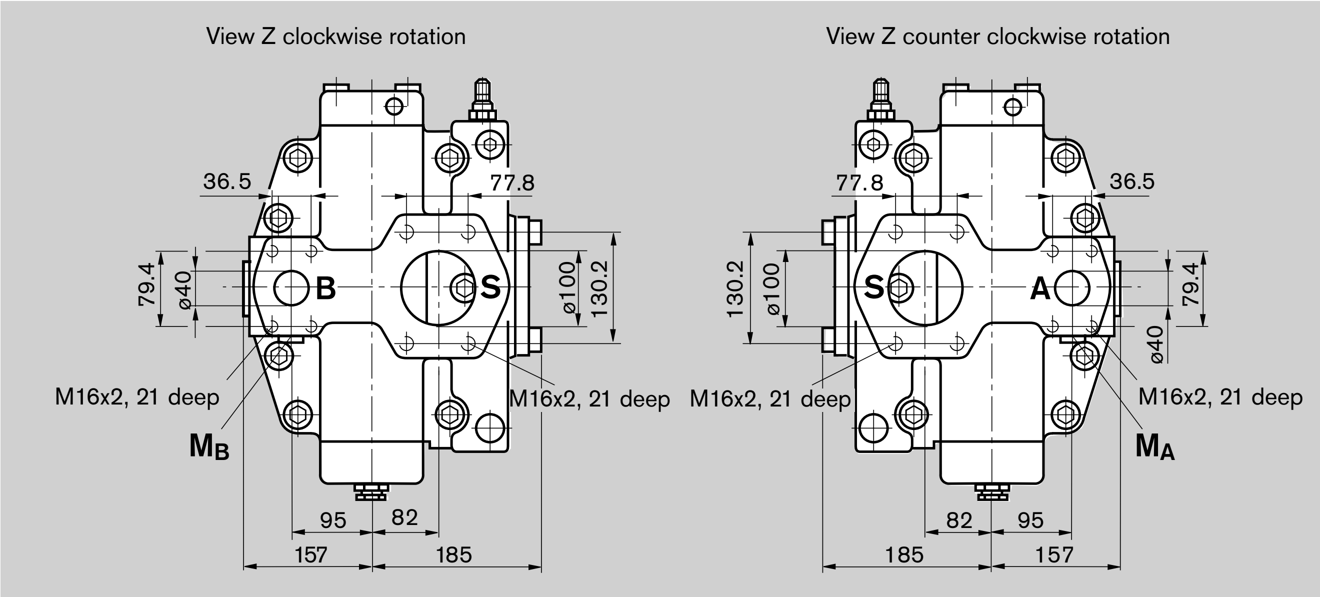
(without control devices)



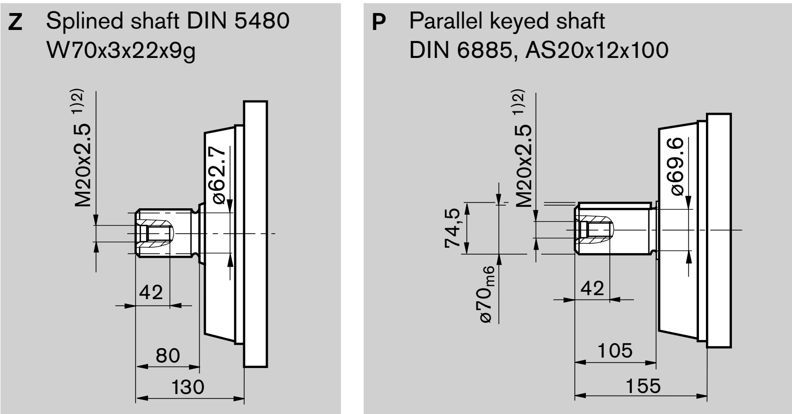
Dimensions size 500

Before finalizing your design, request a binding installation drawing. Dimensions in mm.

Ports A (B) and S at rear (01)



Drive shafts



[1] Centering bore to DIN 332
(Thread to DIN 13)

Ports

Designation	Port for	Standard	Size[2]	Peak pressure [bar][3]	State
A, (B)	Pressure outlet (high pressure range) Fixing thread	SAE J518[4] DIN 13	1 1/2in M16x2, 21 deep	400	O
S	Suction (standard pressure range) Fixing thread	SAE J518[4] DIN 13	4 in M16x2, 21 deep	7	O
U	Flushing	DIN 3852	M18x1.5; 12 deep	3	X
R_1	Case drain	DIN 3852	M33x2; 18 deep	3	O
R_2	Case drain	DIN 3852	M33x2; 18 deep	3	X
M_A, M_B	Measuring outlet pressure A, B	DIN 3852	M14x1.5; 12 deep	400	X

[2] For the max. tightening torques the general information on page 52 must be observed

[3] Depending on the application momentary pressure spikes can occur. Take this into consideration when selecting the measuring devices and fittings.

[4] Only dimensions to SAE J518

O = Must be connected (closed on delivery)

X = Plugged (in normal operation)

DR Pressure control

Initial position: $V_{g\,max}$ in pressureless condition

The pressure control limits the maximum pump output pressure within the control range of the pump. This max. pressure level can be set at the integrated control valve. When reaching this preset level, the pump destrokes and supplies only the amount of flow as needed by the users (actuators).

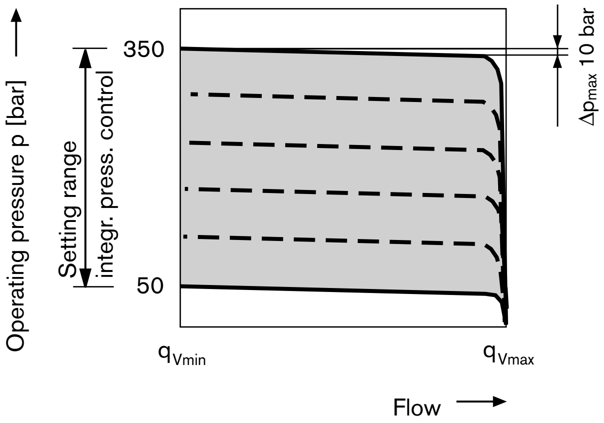
Setting range of the pressure control _______50 to 350 bar
Standard setting is 350 bar.

If another setting is required please state in clear text.

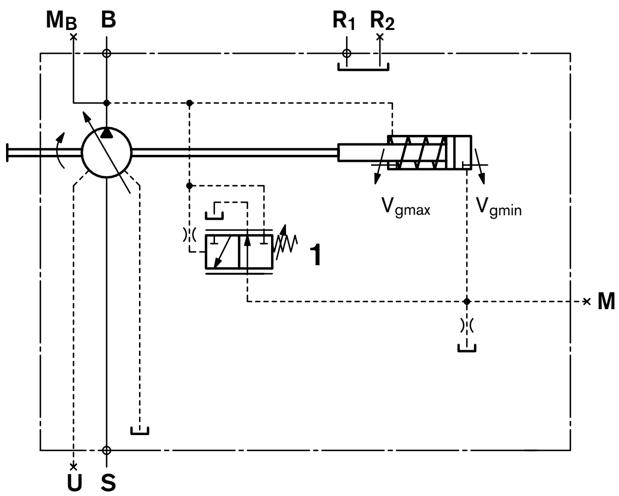
Important

- A recommended main line relief valve in the system to safeguard against excessive pressure spikes must have a cracking pressure at least 20 bar above the DR control setting.
- The control begin and the DR-control characteristic is influenced by housing pressure. An increase in housing pressure results in a higher control begin and thus a parallel shifting of the control curve (see page 7).
- Operation in standby see page 6.

Characteristic



Schematic



Sub assemblies

1 Integrated pressure control valve

Ports for

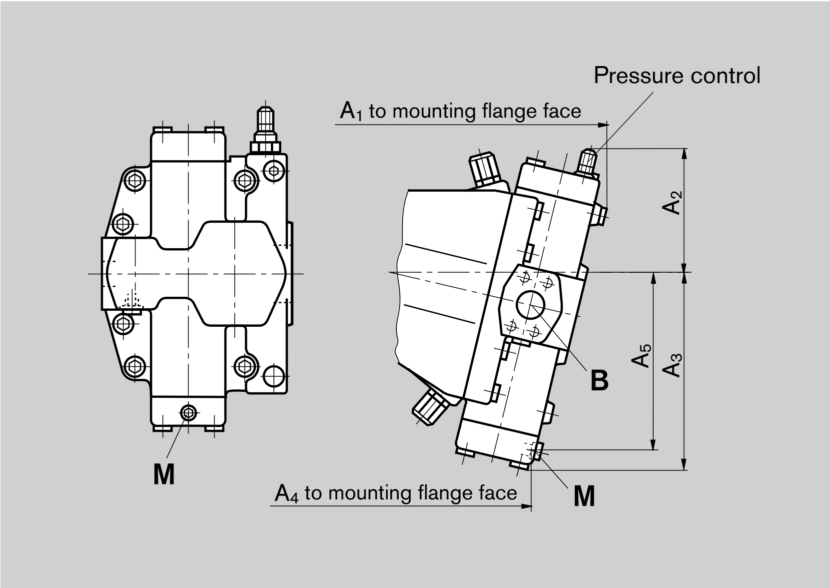
M Measuring pressure on control piston (plugged)

Dimensions **DR**

Before finalizing your design, request a binding installation drawing. Dimensions in mm.

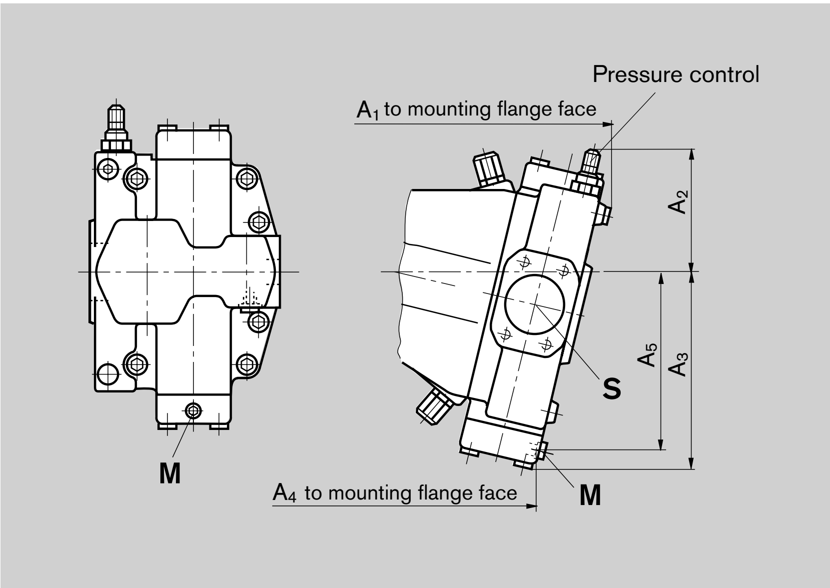
For general dimensions see pages 10 to 17

Clockwise rotation



NG	A_1	A_2	A_3	A_4	A_5
250	385	161	248	297	227
355	430	175	279	333	257
500	490	200	306	382	284

Counter clockwise rotation



Ports

Designation	Port for	Standard	Size[2]	Peak pressure [bar][3]	State
M	Measuring pressure on control piston	DIN 3852	M14x1.5; 12 deep	400	X

[2] For the max. tightening torques the general information on page 52 must be observed

[3] Depending on the application momentary pressure spikes can occur. Take this into consideration when selecting the measuring devices and fittings.

X = Plugged (in normal operation)

DRG Pressure control remotely adjustable

Initial position: $V_{g\ max}$ in pressureless condition

In order to obtain a remote adjustment of the pressure control level a separate pilot pressure relief (item 2) valve must be connected to port X_3. This relief valve is not included in the supply of the DRG control.

Setting range of the pressure control ________50 to 350 bar

The spring force on the pressure compensator spool causes a differential pressure between pump output pressure and pressure at X_3 (as soon as the relief valve opens and the pressure control function takes place). Standard setting of this differential pressure 25 bar.

As long as the the pressure is below the set pressure of the relief valve, the pressures on both sides of the pressure compensator spool are equal and the additional spring force keeps this spool in a shifted position (Spool in equilibrium).

As soon as the set pressure of the relief valve is reached, this valve will start to open and the pilot flow will result in a differential pressure over the compensator spool, which causes this spool to shift and brings the pump to a smaller displacement. $V_{g\ min}$.

The differential pressure at the pressure compensator spool (item 1) is normally set at 25 bar, which results in a pilot flow at X_3 of approx. 2 L/min.
In case another setting (range 14 to 50 bar) is required, please state in clear text when ordering.

As a seperate pilot relief valve we recommend:

DBD 6 (hydraulic) see RE 25402

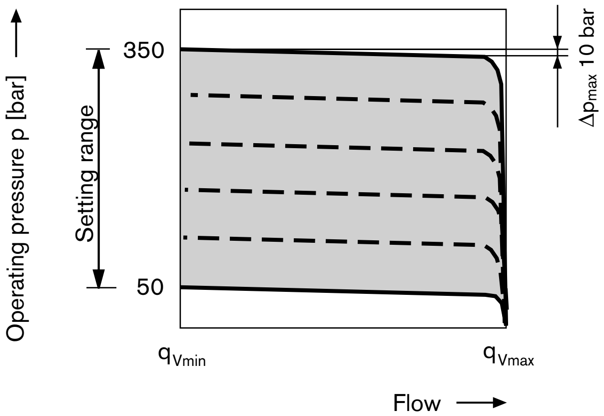
DBETR-SO 437 with dampened spool (electric) see RE 29166

The max. line lenght should not exceed 2 m.

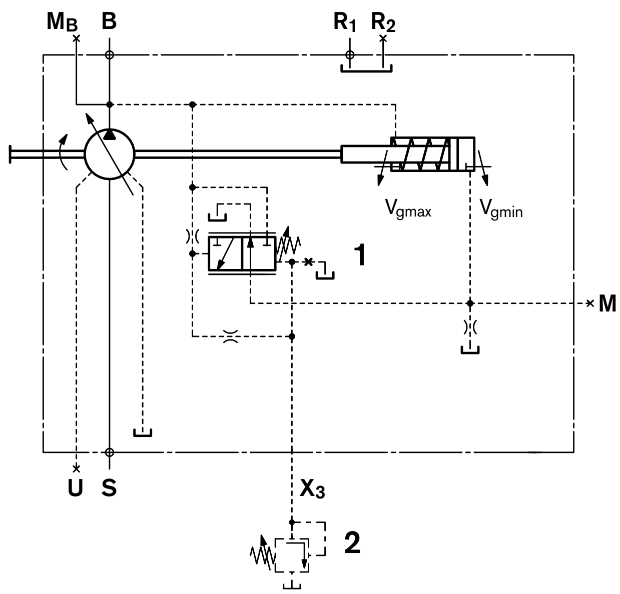
Note

- The beginning of control and the DRG control characteristic are influenced by housing pressure. An increase in housing pressure results in a higher beginning of control (see page 7) and thus a parallel shift of the control characteristic.
- Standby operation see page 6.

Characteristic



Schematic



Sub assemblies

1 Integrated pressure compensator

2 Separate pilot pressure relief valve (not in scope of supply)

Ports for

X_3 Separate pressure relief valve

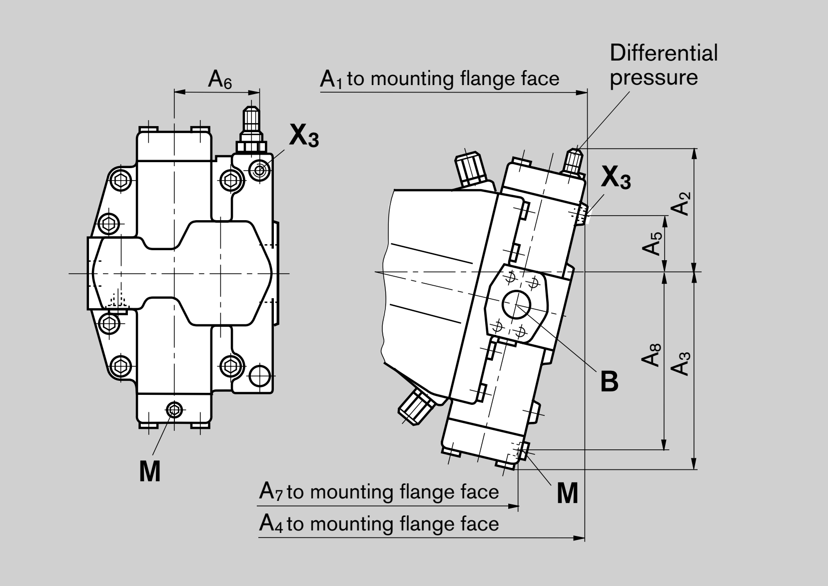
M Measuring pressure on control piston (plugged)

Dimensions DRG

Before finalizing your design, request a binding installation drawing. Dimensions in mm.

General dimensions see page 10 to 17

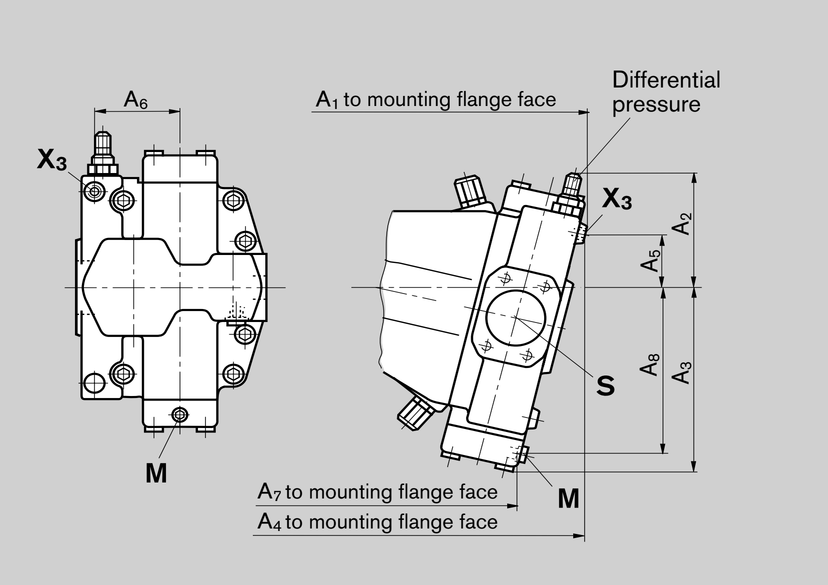
Clockwise rotation



NG	A_1	A_2	A_3	A_4	A_5
250	385	161	248	380	74
355	430	175	279	425	82
500	490	200	306	483	96

NG	A_6	A_7	A_8
250	112	297	227
355	131	333	257
500	142	382	284

Counter clockwise rotation



Ports

Designation	Ports for	Standard	Size[2]	Peak pressure [bar][3]	State
X_3	Separate pressure relief valve	DIN 3852	M14x1.5; 12 deep	400	O
M	Measuring pressure on control piston	DIN 3852	M14x1.5; 12 deep	400	X

[2] For the max. tightening torques the general information on 52 must be observed

[3] Depending on the application momentary pressure spikes can occur. Take this into consideration when selecting the measuring devices or fittings.

O = Must be connected (closed on delivery)

X = Plugged (in normal operation)

LRD Power control with integrated pressure control

Initial position: $V_{g\,max}$ in pressureless condition

Power control

The power control adjusts the pump displacement in relation to the operating pressure in such a manner, that a given drive power at constant drive speed is not exceeded .

$$p_B \cdot V_g = \text{constant (drive power)}$$

p_B = operating pressure; V_g = displacement

This precise control along the hyperbolic control characteristic permits an optimum utilisation of drive power.

The operating pressure acts on a lever mechanism via the measuring spool in the displacement control piston. It is offset by the externally set spring force which acts on the pilot valve and determines the power setting.

When the operating pressure exceeds the set spring force, the power control pilot valve is actuated via the lever mechanism and the pump swivel towards a smaller displacement $V_{g\,min}$. This in turn reduces the effective moment on the lever mechanism and the operating pressure can increase in the same ratio by which the pump output flow is reduced, without exceeding the installed drive power ($p_B \cdot V_g$ = constant).

Setting range for the control begin of the power control from________________________________50 to 300 bar.

Note

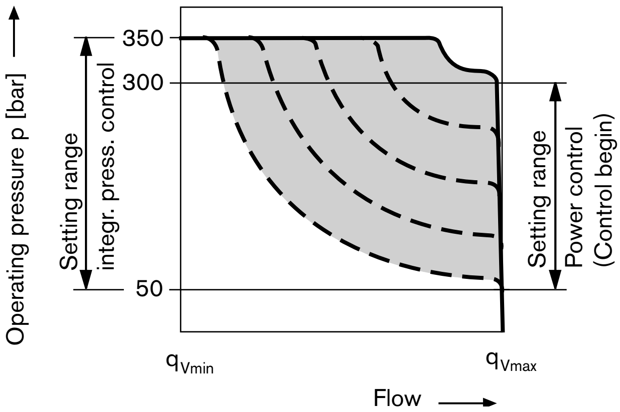
- The control begin and the LR-power control characteristic are influenced by pump inlet pressure. An increase in pump inlet pressure results in a higher control begin (see page 5) and thus a parallel shift of the control characteristic.
- The hydraulic output power (LR-characteristic) is influenced by pump efficiency

When ordering please state in clear text:

- Drive power P in kW
- Drive speed n in rpm
- Maximum flow $q_{v\,max}$ in L/min

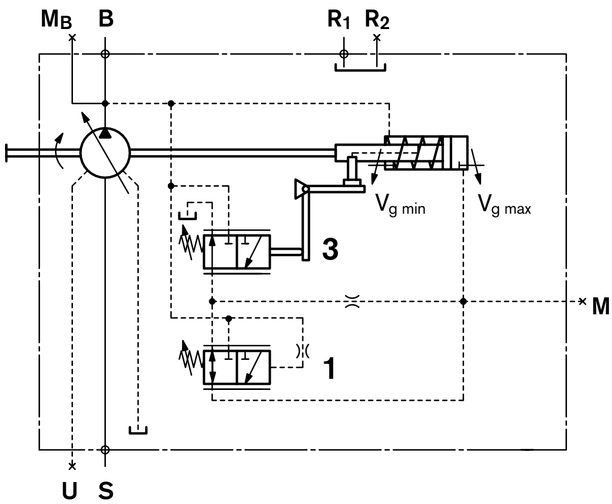
The integrated pressure control is standard and overrides the power control, description see page 24

Characteristic



Schematic

Power control with integrated pressure control



Sub assemblies

1 Pressure control

3 Power control

Port for

M Measuring pressure on control piston (plugged)

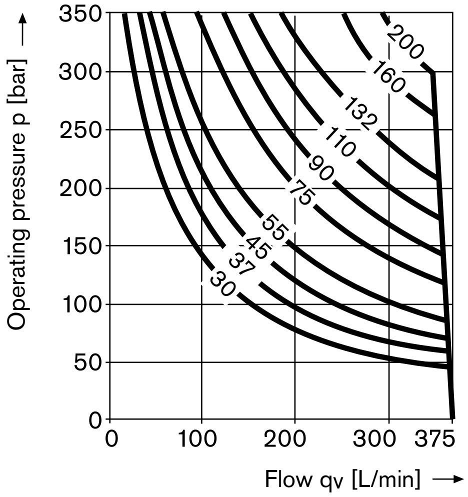
Dimensions see page 25

LRD Power control with integrated pressure control

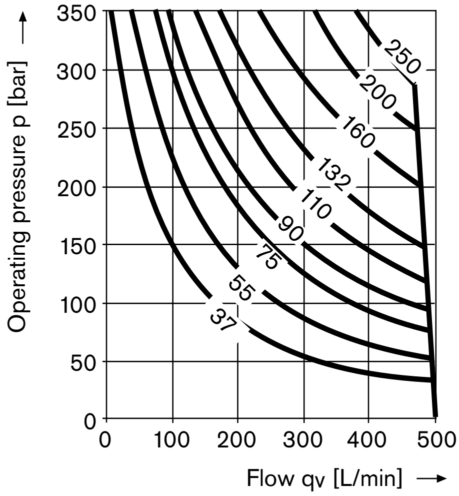
Initial position $V_{g\,max}$

Power control characteristics in kW

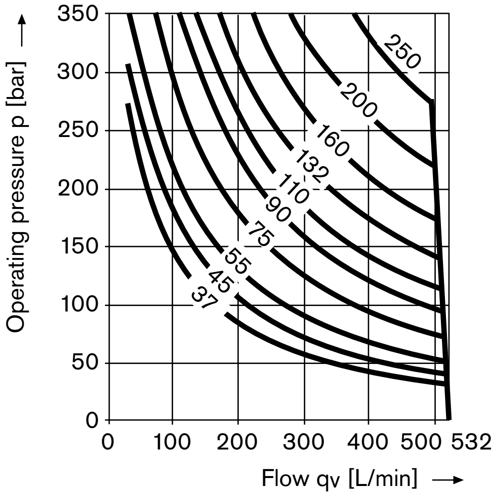
NG 250
at 1500 rpm



NG 500
at 1000 rpm



NG 355
at 1500 rpm



LRD with integrated pressure control

Initial position: $V_{g\ max}$ in pressureless condition

The pressure control is overriding the power control.

It protects the pump against excessive pressure and consequential damage.

The pressure control valve is integrated into the port plate and can be set externally.

Upon reaching the set pressure level the pump will destroke towards lower displacement.

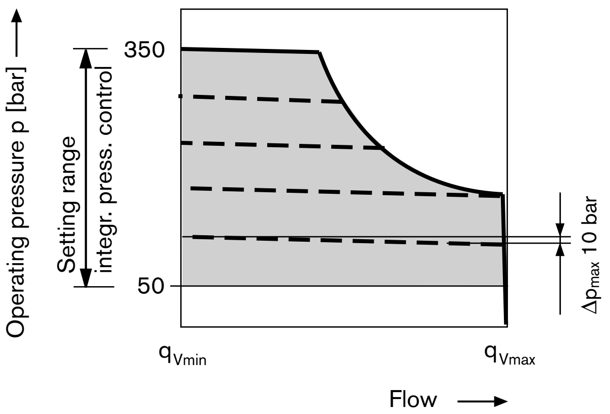
Setting range of the pressure control_______ 50 to 350 bar
Standard setting: 350 bar.

If another setting is required please state in clear text.

Note

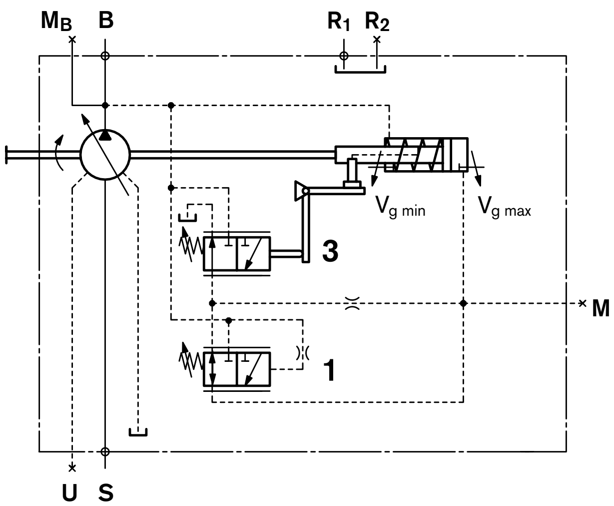
- A recommended main line relief valve in the system to safeguard against excessive pressure spikes must have a cracking pressure at least 20 bar above the pressure control setting.
- The control begin and the pressure control characteristic are influenced by housing pressure. An increase in housing pressure results in a higher control begin (see page 7) and thus a parallel shift of the characteristic.
- Standby operation see page 6.

Characteristic



Schematic

Power control with integrated pressure control



Sub assemblies

1	Pressure control
3	Power control

Port for

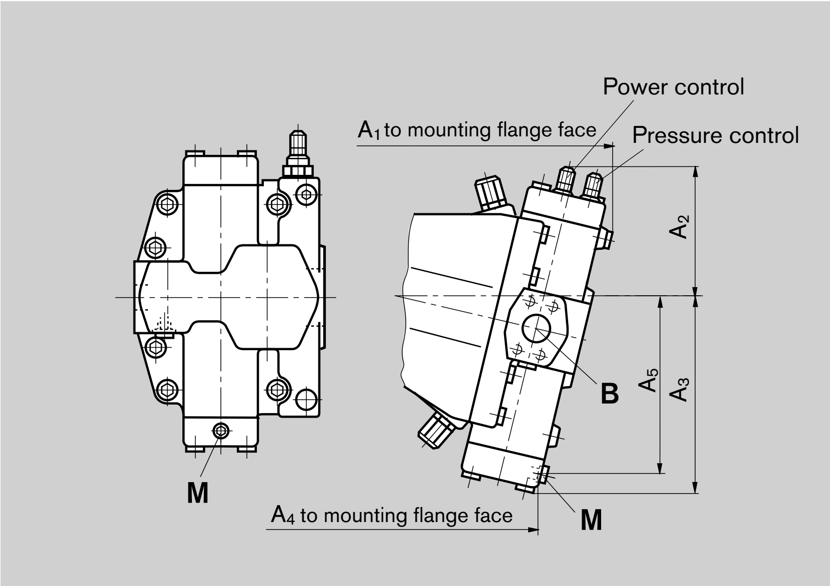
M	Measuring pressure on control piston (plugged)

Dimensions LRD

Before finalizing your design, request a binding installation drawing. Dimensions in mm.

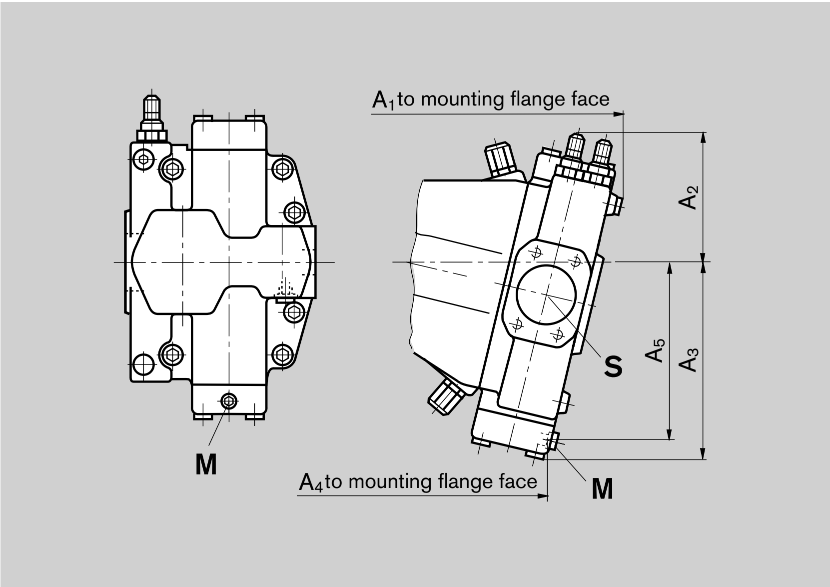
General dimensions see page 10 to 17

Clockwise rotation



NG	A_1	A_2	A_3	A_4	A_5
250	385	170	248	297	227
355	430	175	279	333	257
500	490	200	306	382	284

Counter clockwise rotation



Ports

Designation	Port for	Standard	Size[2)]	Peak pressure [bar][3)]	State
M	Measuring pressure on control piston	DIN 3852	M14x1.5; 12 deep	400	X

[2)] For the max. tightening torques the general information on page 52 must be ovserved

[3)] Depending on the application momentary pressure spikes can occur. Take this into consideration when selecting the measuring devices and fittings.

X = Plugged (in normal operation)

LRG with remotely adjustable pressure control

Initial position: $V_{g\,max}$ in pressureless condition

The remotely adjustable pressure control overrides the power control.

In order to obtain a remote adjustment of the pressure control level a separate pilot pressure relief (item 2) valve must be connected to port X_3. This relief valve is not included in the supply of the DRG control.

Setting range of the pressure control ________50 to 350 bar

The spring force on the pressure compensator spool causes a differential pressure between pump output pressure and pressure at X_3 (as soon as the relief valve opens and the pressure control function takes place). Standard setting of this differential pressure 25 bar.

As long as the the pressure is below the set pressure of the relief valve, the pressures on both sides of the pressure compensator spool are equal and the additional spring force keeps this spool in a shifted position (Spool in equilibrium).

As soon as the set pressure of the relief valve is reached, this valve will start to open and the pilot flow will result in a differential pressure over the compensator spool, which causes this spool to shift and brings the pump to a smaller displacement $V_{g\,min}$.

Upon reaching the set pressure control level (set pressure at pilot relief valve plus differential pressure at pressure control compensator) the pump will go over to the pressure control mode.

The differential pressure at the pressure compensator spool (item 1) is normally set at 25 bar, which results in a pilot flow at X_3 of approx. 2 L/min.
In case another setting (range 14 to 50 bar) is required, please state in clear text when ordering.

As a seperate pilot relief valve we recommend:

DBD 6 (hydraulic) see RE 25402

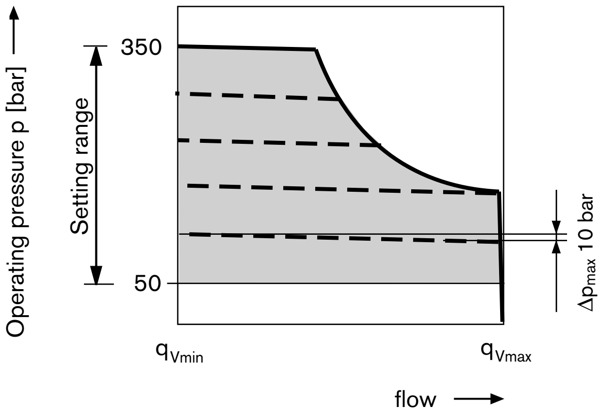
DBETR-SO 437 with dampened spool (electric) see RE 29166

The max. line lenght should not exceed 2 m.

Note

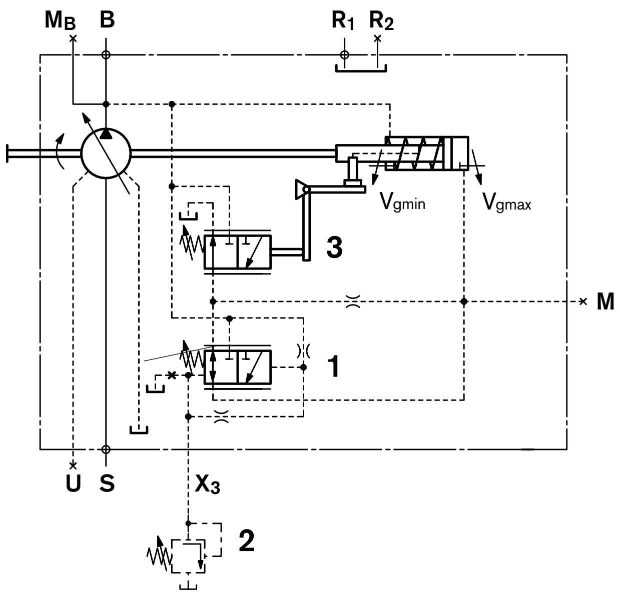
- The beginning of control and the DRG control characteristic are influenced by housing pressure. An increase in housing pressure results in a higher beginning of control (see page 7) and thus a parallel shift of the control characteristic.
- Standby operation see page 6.

Characteristic



Schematic

Power control with remotely adjustable pressure control



Sub assemblies

1 Integrated pressure control compensator

2 Separate pressure relief valve (not in scope of supply)

3 Power control

Ports for

X_3 Separate pressure relief valve

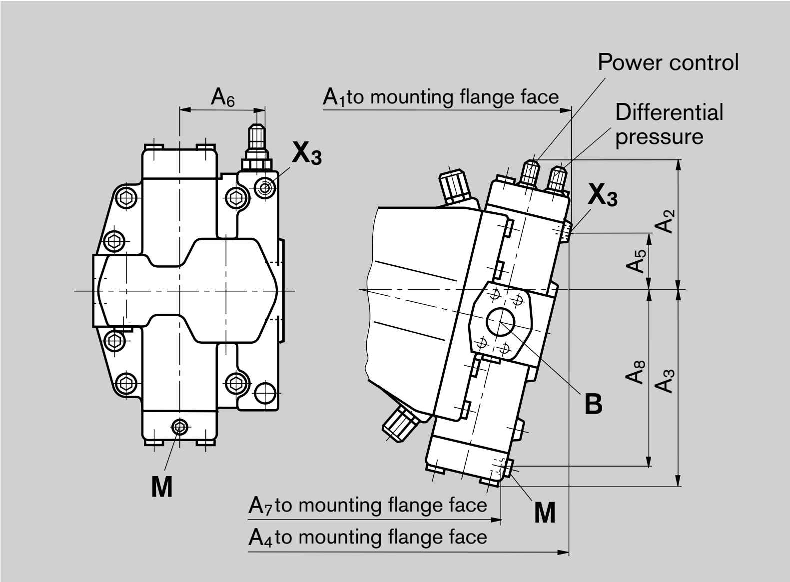
M Measuring pressure on control piston (plugged)

Dimensions LRG

Before finalizing your design, request a binding installation drawing. Dimensions in mm.

General dimensions see page 10 to 17

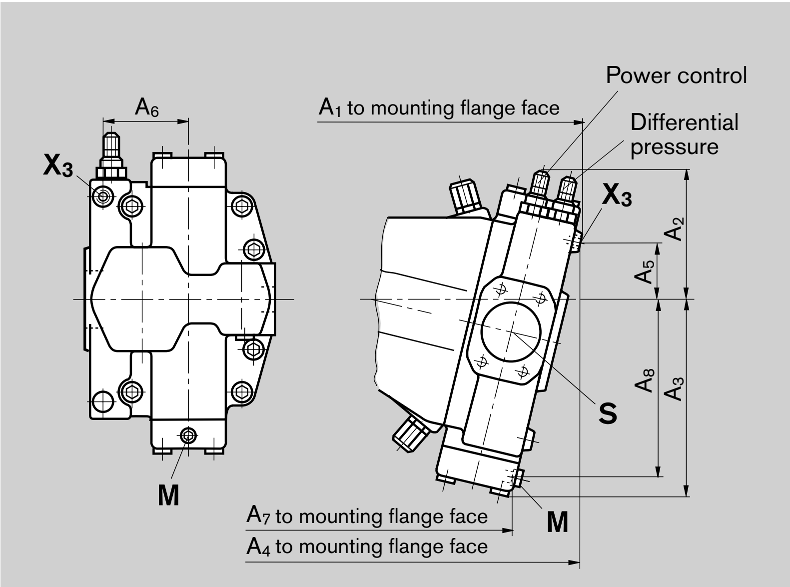
Clockwise rotation



NG	A_1	A_2	A_3	A_4	A_5
250	385	170	248	380	74
355	430	175	279	425	82
500	490	200	306	483	96

NG	A_6	A_7	A_8
250	112	297	227
355	131	333	257
500	142	382	284

Counter clockwise rotation



Ports

Designation	Ports for	Standard	Size[2]	Peak pressure [bar][3]	State
X_3	Separate pressure relief valve	DIN 3852	M14x1.5; 12 deep	400	O
M	Measuring pressure on control piston	DIN 3852	M14x1.5; 12 deep	400	X

[2] For the max. tightening torques the general information on 52 must be observed

[3] Depending on the application momentary pressure spikes can occur. Take this into consideration when selecting the measuring devices or fittings.

O = Must be connected (closed on delivery)

X = Plugged (in normal operation)

LRDH with hydraulic stroke limitation

Initial position: $V_{g\ max}$ in pressureless condition

The hydraulic stroke limitation is used for infinite adjustment of the displacement from $V_{g\ max}$ bis $V_{g\ min}$.

It is overridden by the power control.

The displacement is set by the pilot pressure applied at port X_1

Maximum permissible pilot pressure ____________ 100 bar

The hydraulic stroke limitation takes the required control pressure from the pump output pressure. It must be noted, that the pump operating pressure must be at least 40 bar.

If the pressure is lower, the pump must be supplied with an external control pressure of at least 40 bar into port X_2.

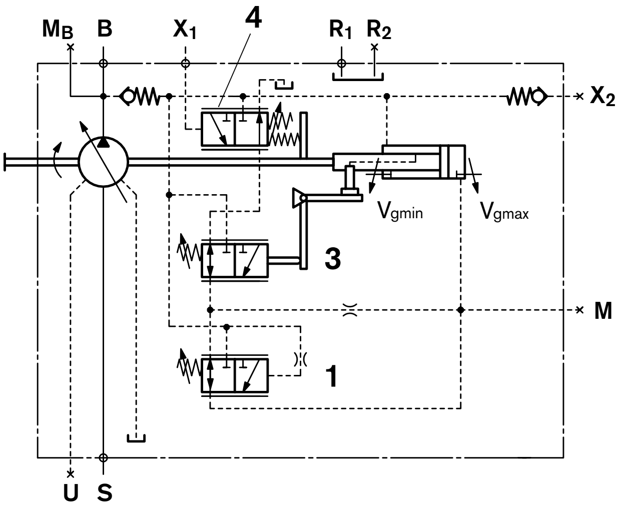
The control begin is adjustable.
Control begin (bar), please state in clear test when ordering.

Note

– The control begin and the LRDH-control characteristic are influenced by pump inlet pressure. An increase in pump inlet pressure results in a higher control begin (see page 5) and thus a parallel shift of the control characteristic.

Schematic

Power control with integrated pressure control and hydraulic stroke limitation H



Sub assemblies

1 Pressure control

3 Power control

4 Hydraulic stroke limitation H

Ports for

X_1 Pilot pressure

X_2 External control pressure (plugged)

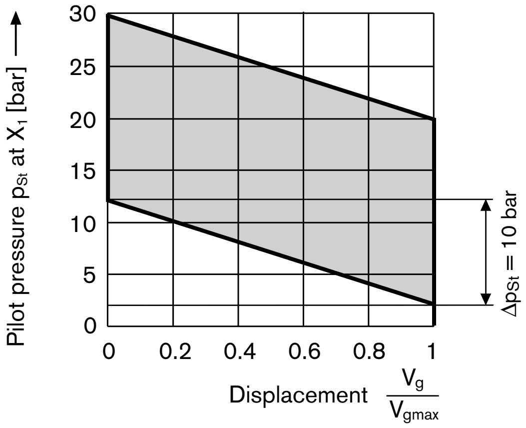
M Measuring pressure on control piston(plugged)

Dimensions see page 30

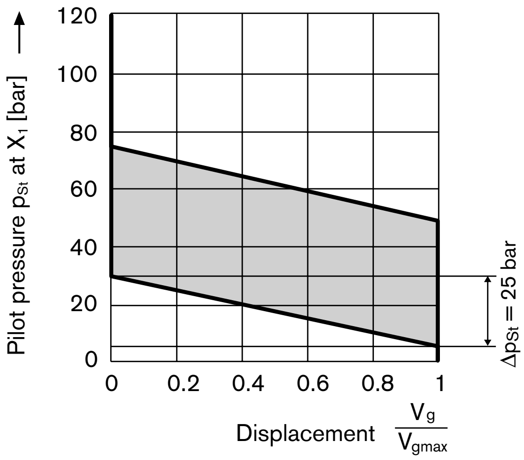
LRDH with hydraulic stroke limitation

Characteristics

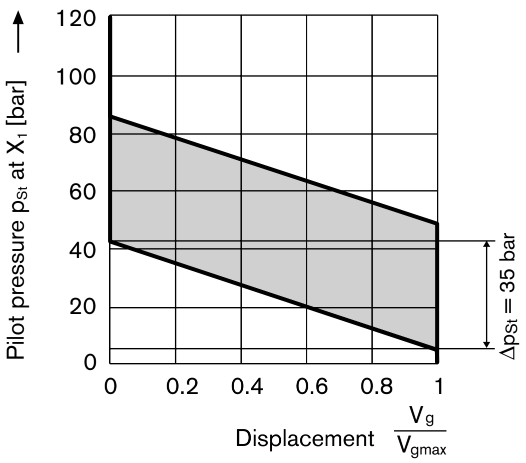
H1 Δp_{St} for hydraulic stroke limitation ____________ 10 bar
Control begin adjustable____________ 2 to 20 bar
Standard setting of control begin ____________ 5 bar



H2 Δp_{St} for hydraulic stroke limitation ____________ 25 bar
Control begin adjustable____________ 5 to 50 bar
Standard setting of control begin ____________ 10 bar



H3 Δp_{St} for hydraulic stroke limitation ____________ 35 bar
Control begin adjustable____________ 7 to 50 bar
Standard setting of control begin ____________ 10 bar

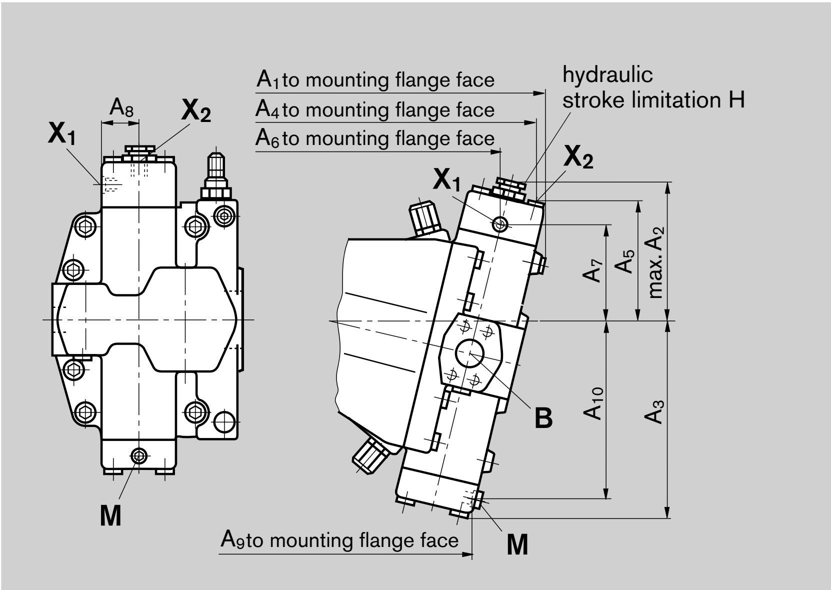


Dimensions LRDH

Before finalizing your design, request a binding installation drawing. Dimensions in mm.

General dimensions see page 10 to 17

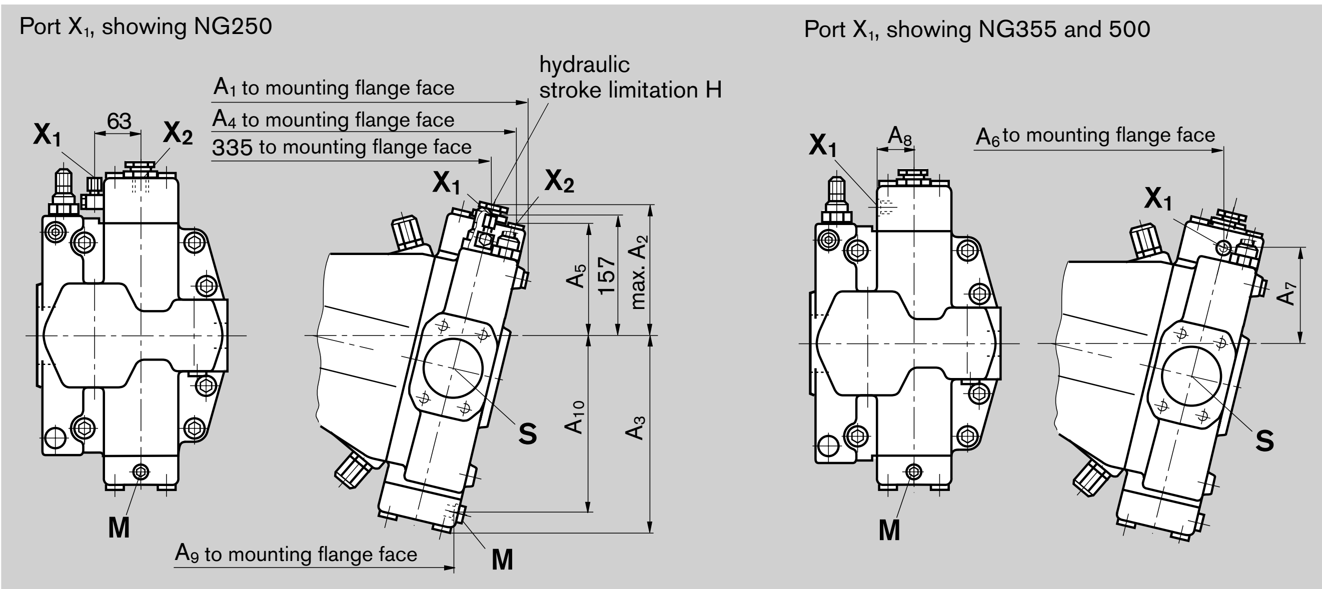
Clockwise rotation



NG	A_1	A_2	A_3	A_4	A_5
250	385	188	248	370	144
355	432	203	279	416	157
500	490	215	306	470	169

NG	A_6	A_7	A_8	A_9	A_{10}
250	327	123	49	297	227
355	366	137	54	333	257
500	417	148	61.5	382	284

Counter clockwise rotation



Ports

Designation	Ports for	Standard	Size[2)]	Peak pressure [bar][3)]	State
X_1	Pilot pressure	DIN 3852	M14x1.5; 12 deep	100	O
X_2	External control pressure	DIN 3852 DIN 3852	M14x1.5; 12 deep (NG250 a. 355) M18x1.5; 12 deep (NG500)	400 400	X X
M	Measuring pressure on control piston	DIN 3852	M14x1.5; 12 deep	400	X

[2)] For the max. tightening torques the general information on 52 must be observed

[3)] Depending on the application momentary pressure spikes can occur. Take this into consideration when selecting the measuring devices or fittings.

O = Must be connected (closed on delivery)

X = Plugged (in normal operation)

LRDN with hydraulic stroke limitation

Initial position: $V_{g\,min}$ in pressureless condition

The hydraulic stroke limitation is used for infinite adjustment of the displacement from $V_{g\,min}$ to $V_{g\,max}$.

It is overridden by the power control.

Displacement is set by the pilot pressure applied at port X_1.

Maximum permissible pilot pressure p ________ 100 bar

A minimum pressure of 40 bar is required for hydraulic stroke limitation. The necessary control fluid is taken from the pump outlet pressure side.

An external control pressure is not required when the operating pressure > 40 bar and $V_{g\,min}$ > 0. In this case the port X_2 must be plugged prior to commissioning. Otherwise an external control pressure source of at least 40 bar must be connected to port X_2.

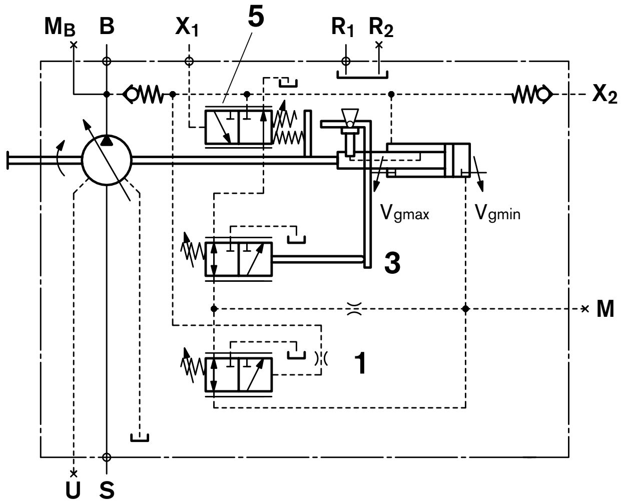
The control begin is adjustable.
Control begin (bar), please state in clear text when ordering.

Note

– The control begin and the LRDN-control characteristic are influenced by pump inlet pressure. An increase in pump inlet pressure results in a higher control begin (see page 5) and thus a parallel shift of the control characteristic.

Schematic

Power control with integrated pressure control and hydraulic stroke limitation N



Sub assemblies

1 Pressure control

3 Power control

5 Hydraulic stroke limitation N

Ports for

X_1 Pilot pressure

X_2 External control pressure

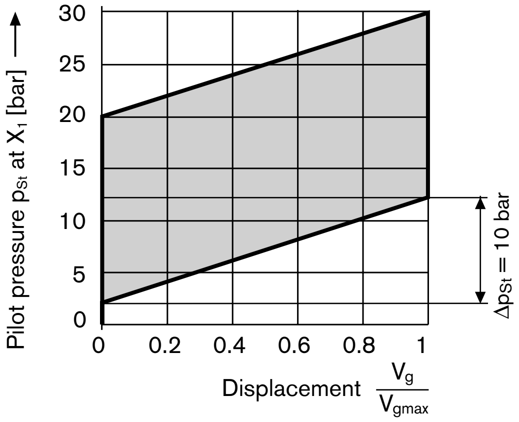
M Measuring of pressure on control piston (plugged)

Dimensions see page 33

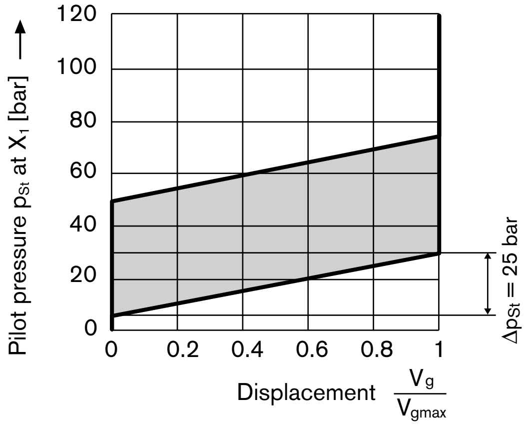
LRDN with hydraulic stroke limitation

Characteristics

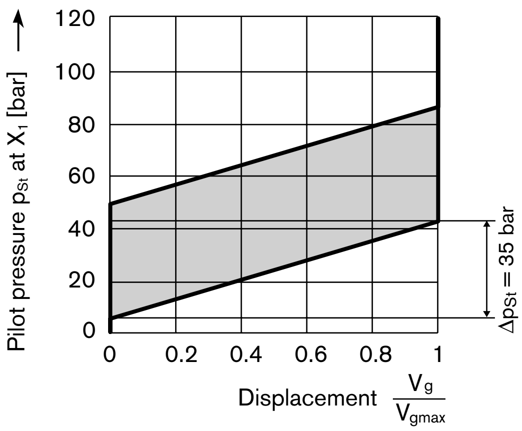
N1 Δp_{St} for hydraulic stroke limitation ________ 10 bar
Control begin adjustable ________ 2 to 20 bar
Standard setting of control begin ________ 5 bar



N2 Δp_{St} for hydraulic stroke limitation ________ 25 bar
Control begin adjustable ________ 5 to 50 bar
Standard setting of control begin ________ 10 bar



N3 Δp_{St} for hydraulic stroke limitation ________ 35 bar
Control begin adjustable ________ 7 to 50 bar
Standard setting of control begin ________ 10 bar

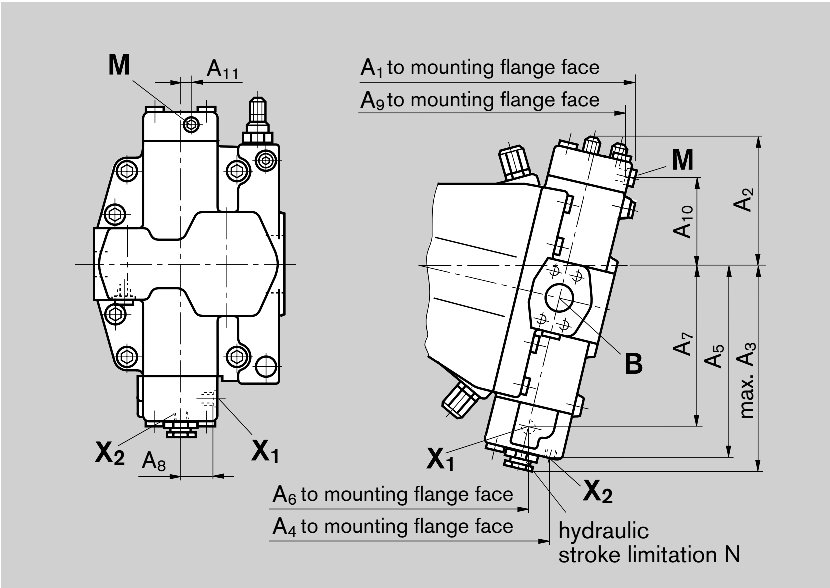


Dimensions LRDN

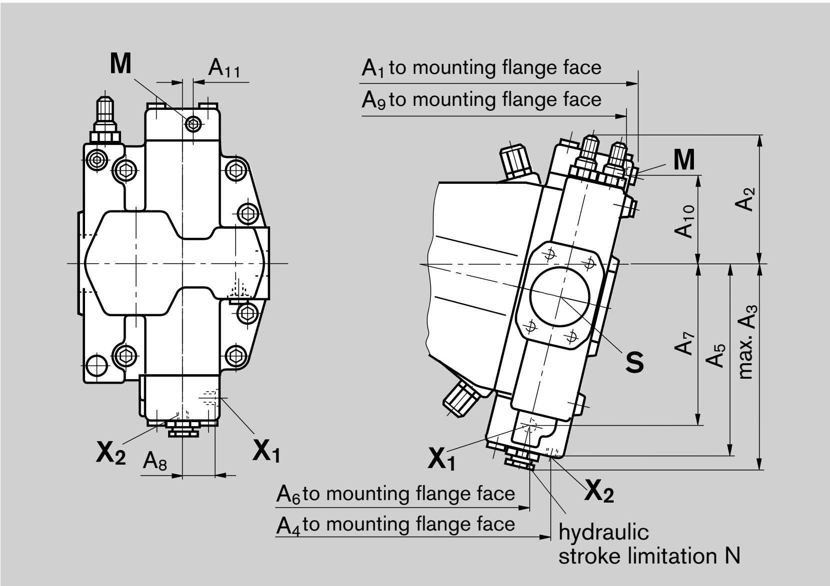
Before finalizing your design, request a binding installation drawing. Dimensions in mm.

General dimensions see page 10 to 17

Clockwise rotation



Counter clockwise rotation



NG	A_1	A_2	A_3	A_4	A_5	A_6
250	385	170	275	276	248	248
355	430	175	300	315	275	278
500	492	200	325	359	300	322

NG	A_7	A_8	A_9	A_{10}	A_{11}
250	210	49	377	116	14
355	234	54	425	132	20
500	258	61.5	483	144	20

Ports

Designation	Ports for	Standard	Size[2]	Peak pressure [bar][3]	State
X_1	Pilot pressure	DIN 3852	M14x1.5; 12 deep	100	O
X_2	External control pressure	DIN 3852 DIN 3852	M14x1.5; 12 deep (NG250 a. 355) M18x1.5; 12 deep (NG500)	400 400	O [4] O [4]
M	Measuring pressure on control piston	DIN 3852	M14x1.5; 12 deep	400	X

[2] For the max. tightening torques the general information on page 52 must be observed

[3] Depending on the application momentary pressure spikes can occur. Take this into consideration when selecting the measuring devices and fittings.

[4] If no external control pressure is connected, port X_2 must be plugged

O = Must be connected (closed on delivery)

X = Plugged (in normal operation)

HD.D Hydraulic control, pilot pressure dependent

Initial position: $V_{g\,min}$ in pressureless condition

The hydraulic pilot pressure dependent control enables an infinite adjustment of the pump displacement in accordance with the applied pilot pressure signal. The displacement setting is proportional to the pilot pressure in port X_1.

A minimum control pressure of 40 bar is required. The necessary control fluid is taken from the pump outlet pressure side.

An external control pressure is not required when the operating pressure > 40 bar and $V_{g\,min}$ > 0. In this case the port X_2 must be plugged prior to commissioning. Otherwise an external control pressure of at least 40 bar must be connected to port X_2.

Maximum permissible pilot pressure p_{St} ________ 100 bar

The control begin is adjustable.
Control begin (bar), please state in clear text when ordering.

Note

– The beginning of control and the HD control characteristic are influenced by housing pressure. An increase in housing pressure results in a higher beginning of control (see page 7) and thus a parallel shift of the control characteristic.

Integrated pressure control is standard. Description see page 37

Note

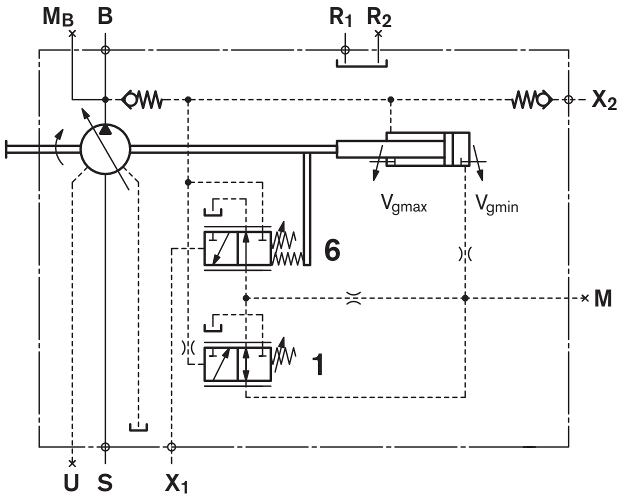
The spring return feature in the control unit is not a safety device

The spool valve inside the control unit can get stuck in an undefined position by internal contamination (contaminated hydraulic fluid, abrasion or residual contamination from system components). As a result, the axial piston unit can no longer supply the flow specified by the operator.

Check whether your application requires that remedial measures be taken on your machine in order to bring the driven consumer into a safe position (e.g. immediate stop).

Schematic

Hydraulic control, pilot pressure dependent with integrated pressure control



Sub assemblies

1	Pressure control
6	HD-pilot valve

Ports for

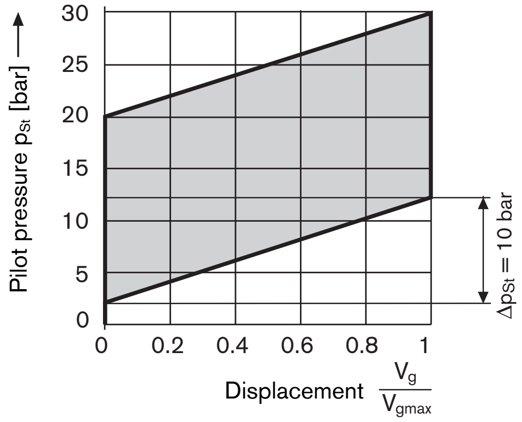
X_1	Pilot pressure
X_2	External control pressure
M	Measuring pressure on control piston

Dimensions see page 36

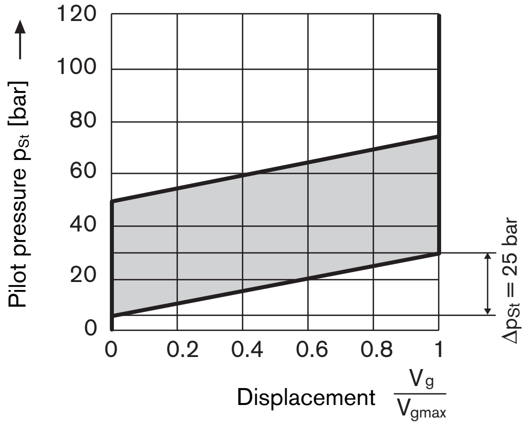
HD.D Hydraulic control, pilot pressure dependent

Characteristics

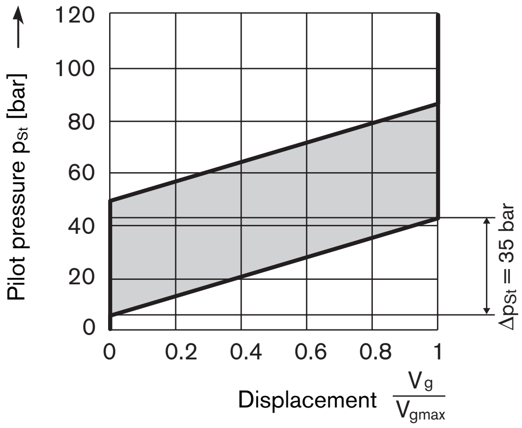
HD1D Δp_{St} ____ 10 bar
Control begin adjustable ____ 2 to 20 bar
Standard setting of control begin ____ 5 bar



HD2D Δp_{St} ____ 25 bar
Control begin adjustable ____ 5 to 50 bar
Standard setting of control begin ____ 10 bar



HD3D Δp_{St} ____ 35 bar
Control begin adjustable ____ 7 to 50 bar
Standard setting of control begin ____ 10 bar

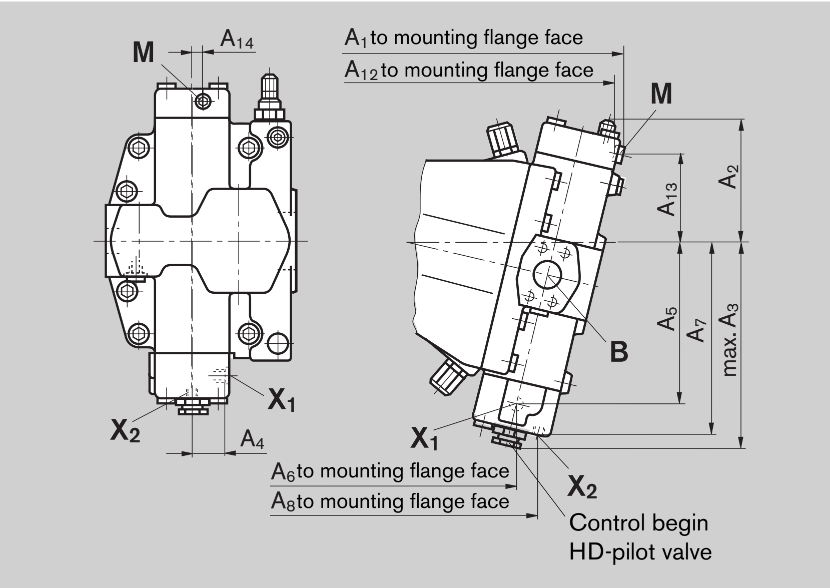


Dimensions HD.D

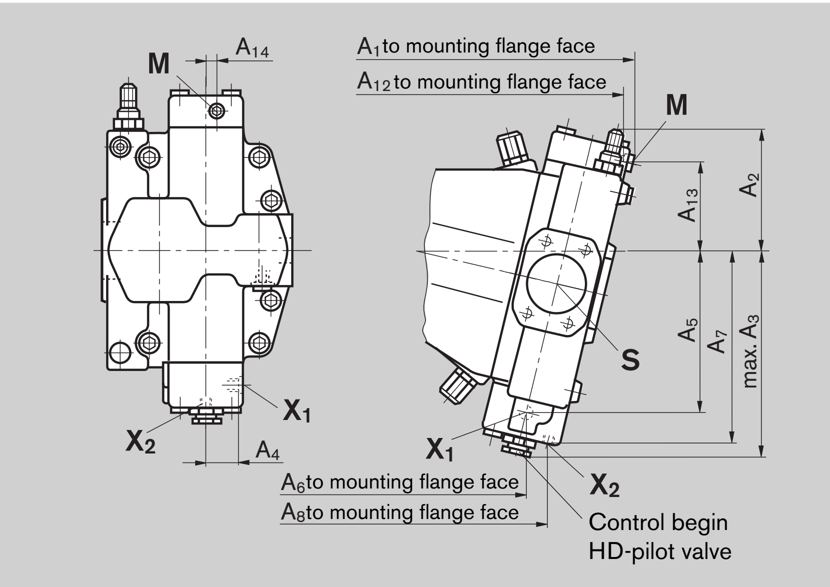
Before finalizing your design, request a binding installation drawing. Dimensions in mm.

General dimensions see page 10 to 17

Clockwise rotation



Counter clockwise rotation



NG	A_1	A_2	A_3	A_4	A_5
250	385	161	275	49	210
355	432	181	300	54	234
500	492	200	325	61.5	258

NG	A_6	A_7	A_8
250	248	248	276
355	278	275	315
500	322	300	359

NG	A_{12}	A_{13}	A_{14}
250	377	116	14
355	425	132	20
500	483	144	20

Ports

Designation	Port for	Standard	Size[2]	Peak pressure [bar][3]	State
X_1	Pilot pressure	DIN 3852	M14x1.5; 12 deep	100	O
X_2	External control pressure	DIN 3852 DIN 3852	M14x1.5; 12 deep (NG250 a. 355) M18x1.5; 12 deep (NG500)	400 400	O [4] O [4]
M	Measuring pressure on control piston	DIN 3852	M14x1.5; 12 deep	400	X

[2] For the max. tightening torques the general information on page 52 must be observed

[3] Depending on the application momentary pressure spikes can occur. Take this into consideration when selecting the measuring devices and fittings.

[4] If no external control pressure is connected, port X_2 must be plugged

O = Must be connected (closed on delivery)

X = Plugged (in normal operation)

HD.D with integrated pressure control

Initial position: $V_{g\,min}$ in pressureless condition

The pressure control overrides the HD-function i.e. below the setting of the pressure control the HD-function can be operated

It protects the pump against excessive pressure and subsequential damage.

The pressure control valve is integrated into the port plate and can be set externally.

Upon reaching the set pressure control level the pump will swivel towards a lower displacement.

Setting range of the pressure control _______ 50 to 350 bar
Standard setting at 350 bar.

If a different setting is required, please state in clear text.

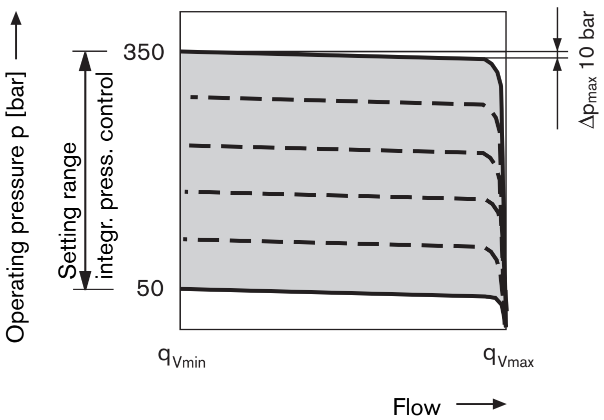
A recommended main line relief valve in the system to safeguard against excessive pressure spikes must have a cracking pressure at least 20 bar above the pressure control setting.

Note

– The beginning of control and the pressure control characteristic are influenced by housing pressure. An increase in housing pressure results in a higher beginning of control (see page 7) and thus a parallel shift of the control characteristic

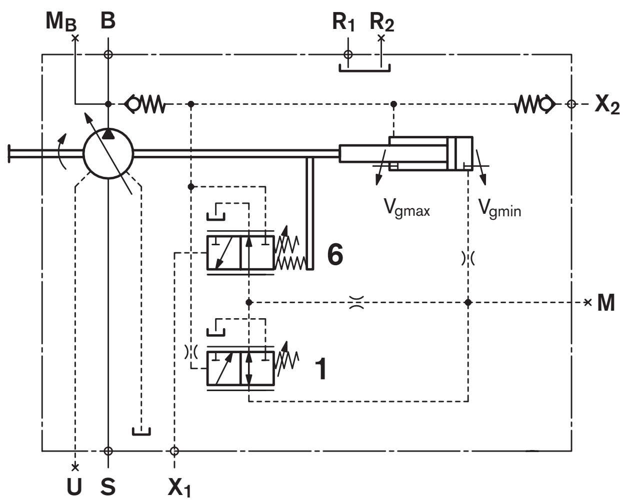
– Standby operation see page 6.

Characteristic



Schematic

Hydraulic control, pilot pressure dependent with integrated pressure control



Sub assemblies

1 Pressure control

6 HD-Pilot valve

Ports for

X_1 Pilot pressure

X_2 External control pressure

M Measuring pressure on control piston (plugged)

Dimensions see page 39

HD.G with remotely adjustable pressure control

Initial position: $V_{g\ min}$ in pressureless condition

The pressure control overrides the HD function.

In order to obtain a remote adjustment of the pressure control level a separate pilot pressure relief (item 2) valve must be connected to port X_3. This relief valve is not included in the supply of the DRG control.

Setting range of the pressure control ________50 to 350 bar

The spring force on the pressure compensator spool causes a differential pressure between pump output pressure and pressure at X_3 (as soon as the relief valve opens and the pressure control function takes place). Standard setting of this differential pressure 25 bar.

As long as the the pressure is below the set pressure of the relief valve, the pressures on both sides of the pressure compensator spool are equal and the additional spring force keeps this spool in a shifted position (Spool in equilibrium).

As soon as the set pressure of the relief valve is reached, this valve will start to open and the pilot flow will result in a differential pressure over the compensator spool, which causes this spool to shift and brings the pump to a smaller displacement $V_{g\ min}$.

Upon reaching the set pressure control level (set pressure at pilot relief valve plus differential pressure at pressure control compensator) the pump will go over to the pressure control mode.

The differential pressure at the pressure compensator spool (item 1) is normally set at 25 bar, which results in a pilot flow at X_3 of approx. 2 L/min.
In case another setting (range 14 to 50 bar) is required, please state in clear text when ordering.

As a seperate pilot relief valve we recommend:

DBD 6 (hydraulic) see RE 25402

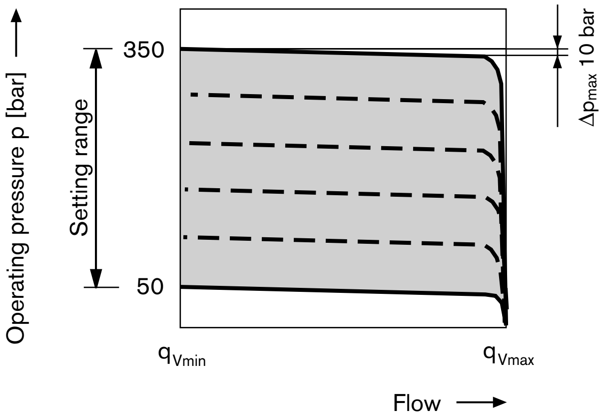
DBETR-SO 437 with dampened spool
(electric) see RE 29166

The max. line lenght should not exceed 2 m.

Note

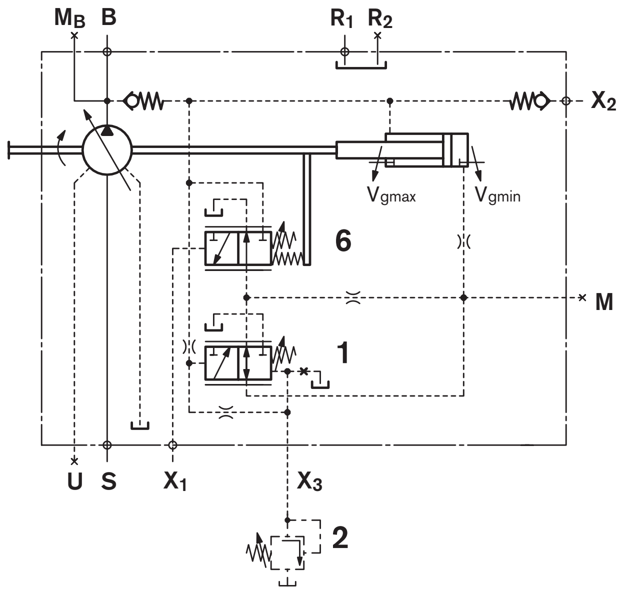
- The beginning of control and the pressure control characteristic are influenced by housing pressure. An increase in housing pressure results in a higher beginning of control (see page 7) and thus a parallel shift of the control characteristic.
- Standby operation see page 6.

Characteristic



Schematic

Hydraulic control, pilot pressure dependent with integrated pressure control



Sub assemblies

1 Integrated pressure control compensator

2 Separate pressure relief valve (not in scope of supply)

6 HD-pilot valve

Ports for

X_1 Pilot pressure

X_2 External control pressure

X_3 Separate pressure relief valve (for HDG)

M Measuring of pressure on control piston (plugged)

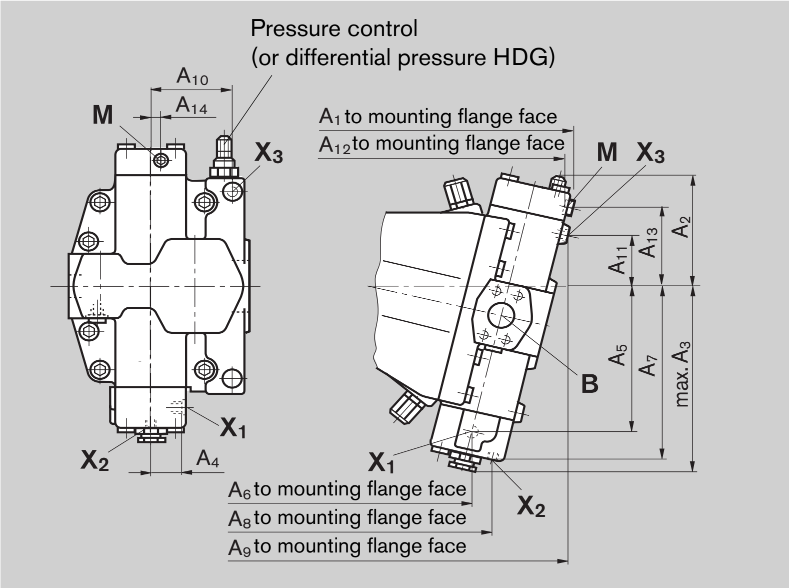
Dimensions see page 39

Dimensions HD.D and HD.G

Before finalizing your design, request a binding installation drawing. Dimensions in mm.

General dimensions see page 10 to 17

Clockwise rotation

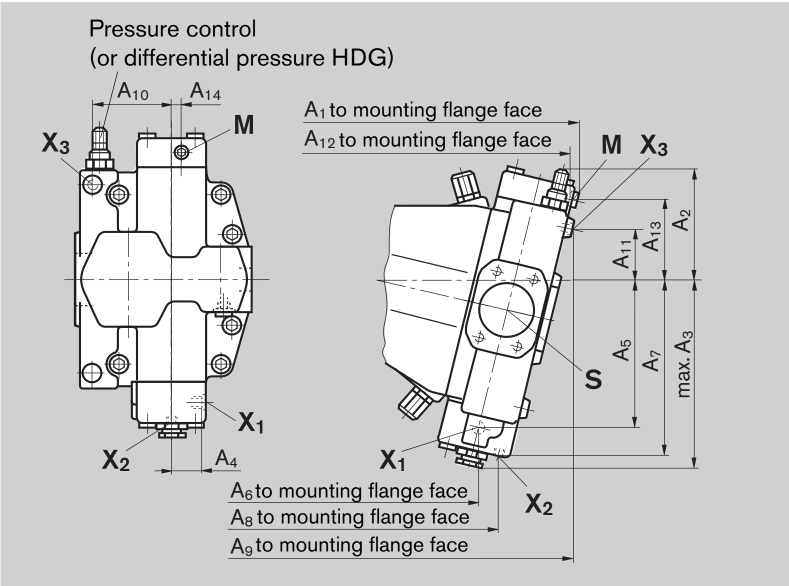


NG	A_1	A_2	A_3	A_4	A_5
250	385	161	275	49	210
355	432	181	300	54	234
500	492	200	325	61.5	258

NG	A_6	A_7	A_8	A_9	A_{10}
250	248	248	276	380	112
355	278	275	315	425	131
500	322	300	359	483	142

NG	A_{11}	A_{12}	A_{13}	A_{14}
250	74	377	116	14
355	82	425	132	20
500	96	483	144	20

Counter clockwise rotation



Ports

Designation	Port for	Standard	Size[2]	Peak pressure [bar][3]	State
X_1	Pilot pressure	DIN 3852	M14x1.5; 12 deep	100	O
X_2	External control pressure	DIN 3852	M14x1.5; 12 deep (NG250 a. 355)	400	O [4]
		DIN 3852	M18x1.5; 12 deep (NG500)	400	O [4]
X_3 (for HDG)	Separate pressure relief valve	DIN 3852	M14x1.5; 12 deep	400	O
M	Measuring of pressure on control piston	DIN 3852	M14x1.5; 12 deep	400	X

[2] For the max. tightening torques the general information on page 52 must be observed

[3] Depending on the application momentary pressure spikes can occur. Take this into consideration when selecting the measuring devices and fittings.

[4] If no external control pressure is connected, port X_2 must be plugged

O = Must be connected (closed on delivery)

X = Plugged (in normal operation)

EP.D Electric control with proportional valve

Initial position: $V_{g\,min}$ in pressureless condition

The electro-hydraulic control with proportional valve enables a stepless adjustment of the pump displacement dependent on an electric current signal.

The displacement is proportional to the current signal to the solenoid of a proportional pressure reducing valve DRE4K (see RE 29181), i.e. an increasing current signal results in an increasing displacement.

A minimum control pressure of 40 bar is required. The necessary control fluid is taken from the pump outlet pressure side.

An external control pressure is not required when the operating pressure > 40 bar and $V_{g\,min} > 0$. In this case the port X_2 must be plugged prior to commissioning. Otherwise an external control pressure of at least 40 bar must be connected to port X_2.

A pilot pressure of 30 bar is required at port P to actuate the proportional valve DRE4K.

Pilot pressure at port P

Required p_{min} ____ 30 bar

p_{max} ____ 100 bar

Important

- For operation on HF-fluids please observe the information in RE 29181
  (Proportional-pressure reducing valve Type DRE4K).
- The beginning of control and the pressure control characteristic are influenced by housing pressure. An increase in housing pressure results in a higher beginning of control (see page 7) and thus a parallel shift of the control characteristic.
- Type of protection proportional valve to IP65

Note

The spring return feature in the control unit is not a safety device

The spool valve inside the control unit can get stuck in an undefined position by internal contamination (contaminated hydraulic fluid, abrasion or residual contamination from system components). As a result, the axial piston unit can no longer supply the flow specified by the operator.

Check whether your application requires that remedial measures be taken on your machine in order to bring the driven consumer into a safe position (e.g. immediate stop).

Technical data proportional-press. reducing valve

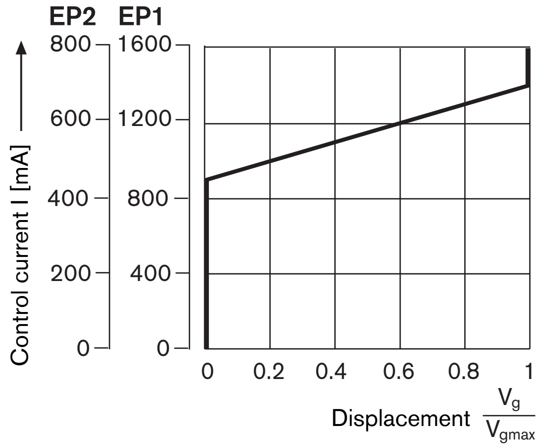
	EP1	EP2
Operating valtage (DC)	12V(±20%)	24V (±20%)
Control current		
Control begin at $V_{g\,min}$	900 mA	450 mA
Control end at $V_{g\,max}$	1400 mA	700 mA
Current limit	2,2 A	1,0 A
Nom. resistance (at 20°C)	2,4 Ω	12 Ω
Duty cycle	100 %	100 %
Type of protection (HIRSCHMANN) to DIN EN 60529	IP65	IP65

Various amplifiers for control of the proportional valve are available in the Rexroth program, see RE 29181.

Integrated pressure control EP.D is standard and overrides the EP function. Description see page 43.

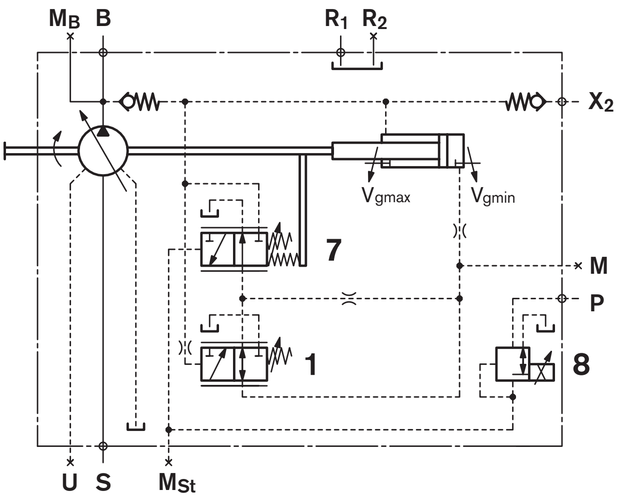
EP.D Electric control with proportional valve

Characteristic



Schematic

Electric control with proportional pressure reducing valve



Sub assemblies

1 Pressure control

7 Pilot valve

8 Proportional pressure reducing valve (see RE 29181) incl. conductor box (Hirschmann plug without suppressor diode) see page 50

Ports for

P Pilot pressure

X_2 External control pressure

M Measuring pressure on control piston (plugged)

M_{St} Measuring pilot pressure (plugged)

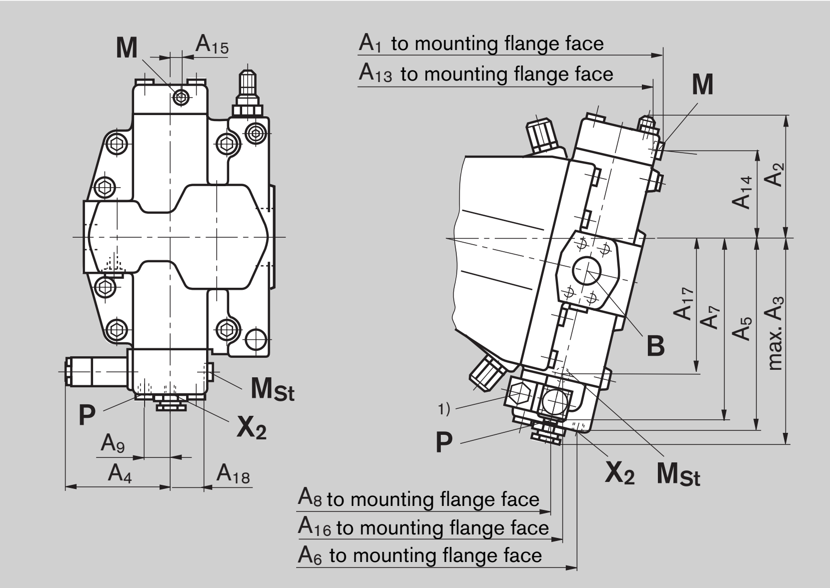
Dimensions see page 42

Dimensions EP.D

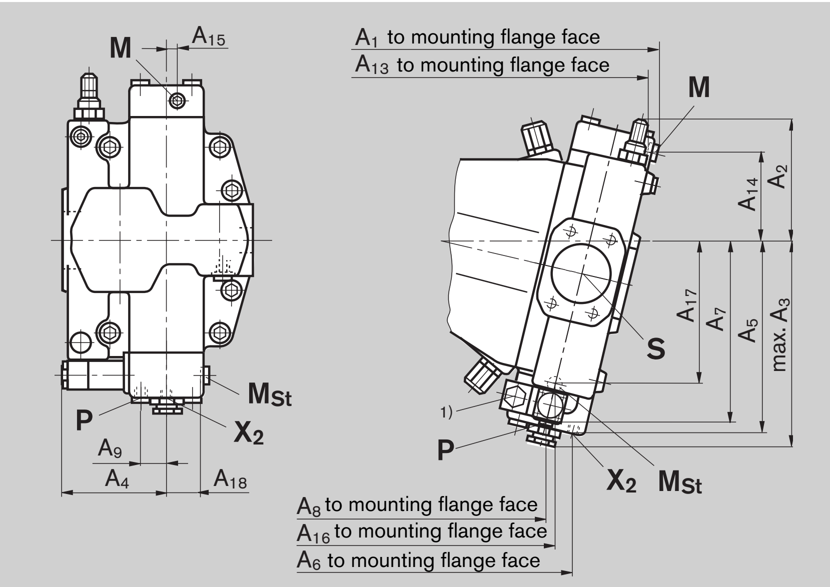
Before finalizing your design, request a binding installation drawing. Dimensions in mm.

General dimensions see page 10 to 17

Clockwise rotation



Counter clockwise rotation



NG	A_1	A_2	A_3	A_4	A_5	A_6
250	385	161	275	115	248	276
355	432	181	300	116	275	315
500	492	200	325	123	300	359

NG	A_7	A_8	A_9	A_{10}	A_{11}	A_{12}
250	238	241	36	112	380	74
355	268	286	36	131	425	82
500	294	328	43	142	483	96

NG	A_{13}	A_{14}	A_{15}	A_{16}	A_{17}	A_{18}
250	377	116	14	248	210	49
355	425	132	20	278	234	54
500	483	144	20	322	258	61.5

1) Cable connection M16x1.5 for cable diameter 4.5 to 10 mm
Plug description and dimensions see page 50

Ports

Designation	Port for	Standard	Size[2]	Peak pressure [bar][3]	State
P	Pilot pressure for proportional valve	DIN 3852	M14x1.5; 12 deep	100	O
X_2	External control pressure	DIN 3852	M14x1.5; 12 deep (NG250 a. 355)	400	O [4]
		DIN 3852	M18x1.5; 12 deep (NG500)	400	O [4]
M	Measuring pressure on control piston	DIN 3852	M14x1.5; 12 deep	400	X
M_{St}	Measuring pilot pressure	DIN 3852	M14x1.5; 12 deep	100	X

2) For the max. tightening torques the general information on page 52 must be observed

3) Depending on the application momentary pressure spikes can occur. Take this into consideration when selecting the measuring devices and fittings.

4) If no external control pressure is connected, port X_2 must be plugged

O = Must be connected (closed on delivery)

X = Plugged (in normal operation)

EP.D with integrated pressure control

Initial position: $V_{g\,min}$ in pressureless condition

The pressure control overrides the EP-function i.e. below the setting of the pressure control the EP-function can be operated.

It protects the pump against excessive pressure and subsequential damage.

The pressure control valve is integrated into the port plate and can be set externally.

Upon reaching the set pressure control level the pump will swivel towards a lower displacement.

Setting range of the pressure control_______ 50 to 350 bar
Standard setting at 350 bar.

If a different setting is required, please state in clear text.

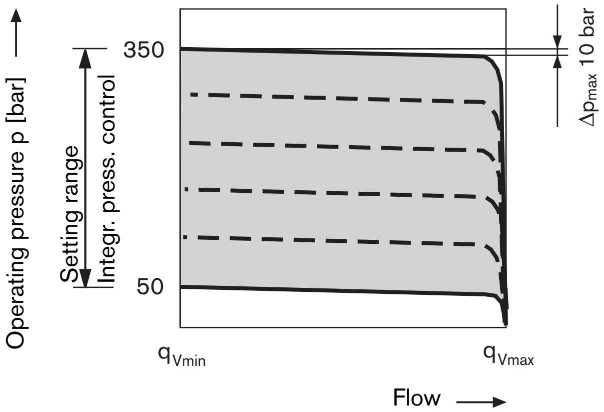
A recommended main line relief valve in the system to safeguard against excessive pressure spikes must have a cracking pressure at least 20 bar above the pressure control setting.

Note

– The beginning of control and the pressure control characteristic are influenced by housing pressure. An increase in housing pressure results in a higher beginning of control (see page 7) and thus a parallel shift of the control characteristic

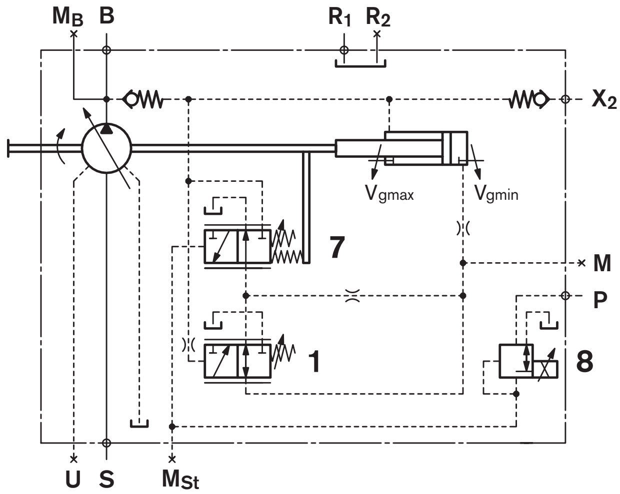
– Standby operation see page 6.

Characteristic



Schematic

Electric control with proportional pressure reducing valve



Sub assemblies

1 Pressure control

7 Pilot valve

8 Proportional pressure reducing valve
incl. conductor box (Hirschmann plug without suppressor diode) see page 46

Ports for

P Pilot pressure

X_2 External control pressure

M Measuring pressure on control piston (plugged)

M_{St} Measuring pilot pressure (plugged)

Dimensions see page 45

EP.G with remotely adjustable pressure control

Initial position: $V_{g\,min}$ in pressureless condition

The pressure control overrides the EP- function.

In order to obtain a remote adjustment of the pressure control level a separate pilot pressure relief (item 2) valve must be connected to port X_3. This relief valve must be ordered separately to the DRG control.

Setting range of the pressure control ________50 to 350 bar

The spring force on the pressure compensator spool causes a differential pressure between pump output pressure and pressure at X_3 (as soon as the relief valve opens and the pressure control function takes place). Standard setting of this differential pressure 25 bar.

As long as the the pressure is below the set pressure of the relief valve, the pressures on both sides of the pressure compensator spool are equal and the additional spring force keeps this spool in a shifted position (Spool in equilibrium).

As soon as the set pressure of the relief valve is reached, this valve will start to open and the pilot flow will result in a differential pressure over the compensator spool, which causes this spool to shift and brings the pump to a smaller displacement $V_{g\,min}$.

Upon reaching the set pressure control level (set pressure at pilot relief valve plus differential pressure at pressure control compensator) the pump will go over to the pressure control mode.

The differential pressure at the pressure compensator spool (item 1) is normally set at 25 bar, which results in a pilot flow at X_3 of approx. 2 L/min.
In case another setting (range 14 to 50 bar) is required, please state in clear text when ordering.

As a seperate pilot relief valve we recommend:

DBD 6 (hydraulic) see RE 25402

DBETR-SO 437 with dampened spool
(electric) see RE 29166

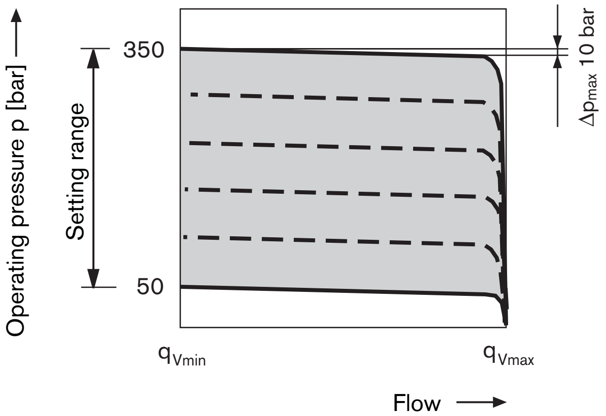
The max. line lenght should not exceed 2 m.

Note

– The beginning of control and the pressure control characteristic are influenced by housing pressure. An increase in housing pressure results in a higher beginning of control (see page 7) and thus a parallel shift of the control characteristic.

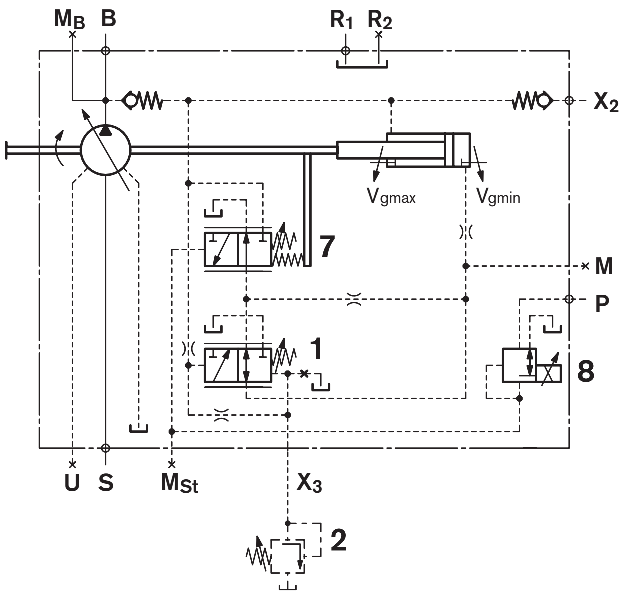
– Standby operation see page 6.

Characteristic



Schematic

Electric control with proportional pressure reducing valve and remotely adjustable pressure control



Sub assemblies

1 Integrated pressure control compensator

2 Separate pressure relief valve
(not in scope of supply)

7 Pilot valve

8 Proportional pressure reducing valve

Ports for

P	Pilot pressure for proportional valve
X_2	External control pressure
X_3	Separate pressure relief valve (EPG)
M	Measuring pressure on control piston (plugged)
M_{St}	Measuring pilot pressure (plugged)

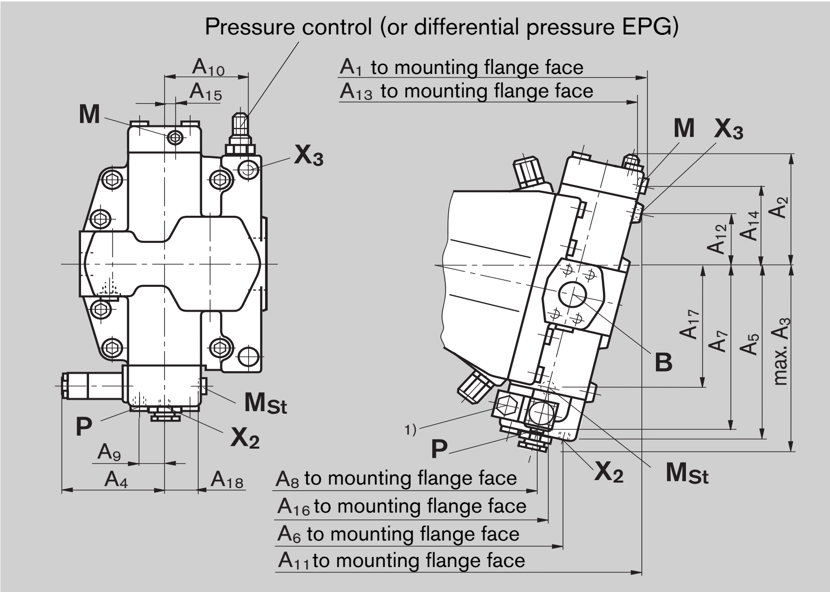
Dimensions see page 45

Dimensions EP.D and EP.G

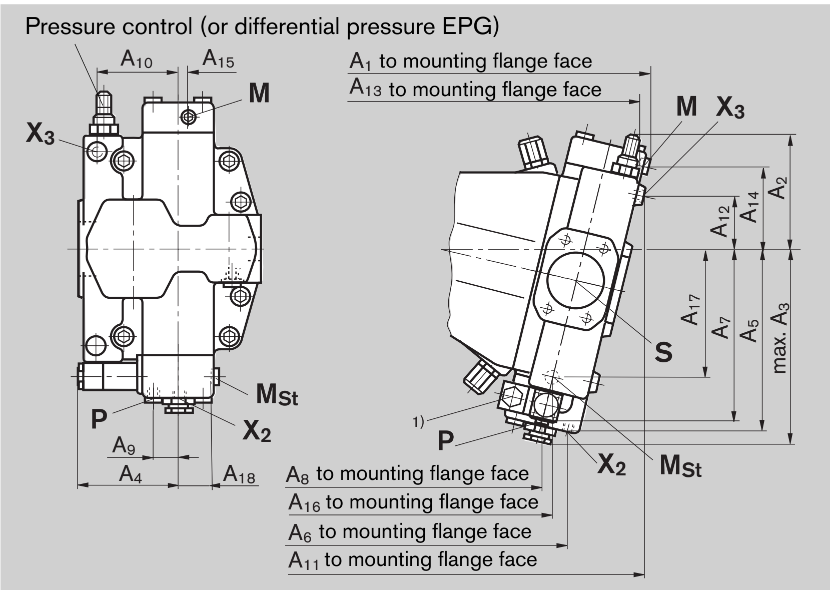
Before finalizing your design, request a binding installation drawing. Dimensions in mm.

General dimensions see page 10 to 17

Clockwise rotation



Counter clockwise rotation



NG	A_1	A_2	A_3	A_4	A_5	A_6
250	385	161	275	115	248	276
355	432	181	300	116	275	315
500	492	200	325	123	300	359

NG	A_7	A_8	A_9	A_{10}	A_{11}	A_{12}
250	238	241	36	112	380	74
355	268	286	36	131	425	82
500	294	328	43	142	483	96

NG	A_{13}	A_{14}	A_{15}	A_{16}	A_{17}	A_{18}
250	377	116	14	248	210	49
355	425	132	20	278	234	54
500	483	144	20	322	258	61.5

1) Cable connection M16x1.5 for cable diameter 4.5 to 10 mm
Plug description and dimensions see page 50

Ports

Designation	Port for	Standard	Size[2]	Peak pressure [bar][3]	State
P	Pilot pressure for proportional valve	DIN 3852	M14x1.5; 12 deep	100	O
X_2	External control pressure	DIN 3852	M14x1.5; 12 deep (NG250 a. 355)	400	O
		DIN 3852	M18x1.5; 12 deep (NG500)	400	O
X_3 (for EPG)	Separate pressure relief valve	DIN 3852	M14x1.5; 12 deep	400	O
M	Measuring pressure on control piston	DIN 3852	M14x1.5; 12 deep	400	X
M_{St}	Measuring pilot pressure	DIN 3852	M14x1.5; 12 deep	100	X

2) For the max. tightening torques the general information on page 52 must be observed

3) Depending on the application momentary pressure spikes can occur. Take this into consideration when selecting the measuring devices and fittings.

4) If no external control pressure is connected, port X_2 must be plugged

O = Must be connected (closed on delivery)

X = Plugged (in normal operation)

Visual swivel angle indicator

Before finalizing your design, request a binding installation drawing. Dimensions in mm.

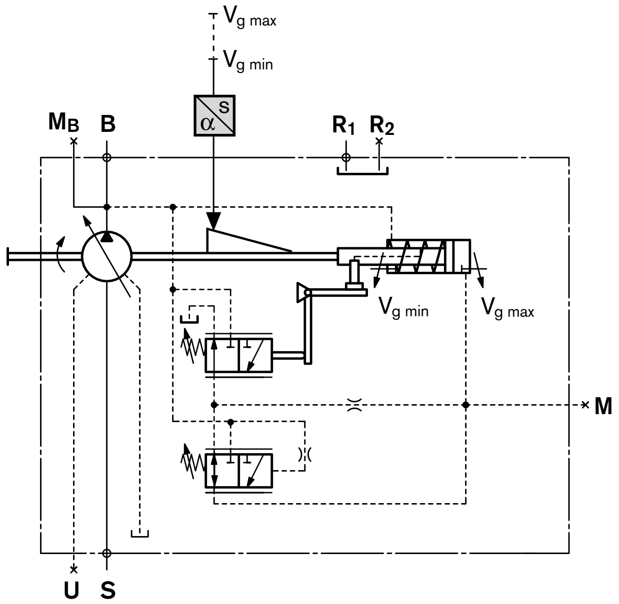
The swivel angle is indicated by a pin at the side of the port plate (the cap nut must be removed).

The protruding lenght of the pin varies in accordance with the position of the lens plate.

The pump is at zero if the pin is flush with the port plate.

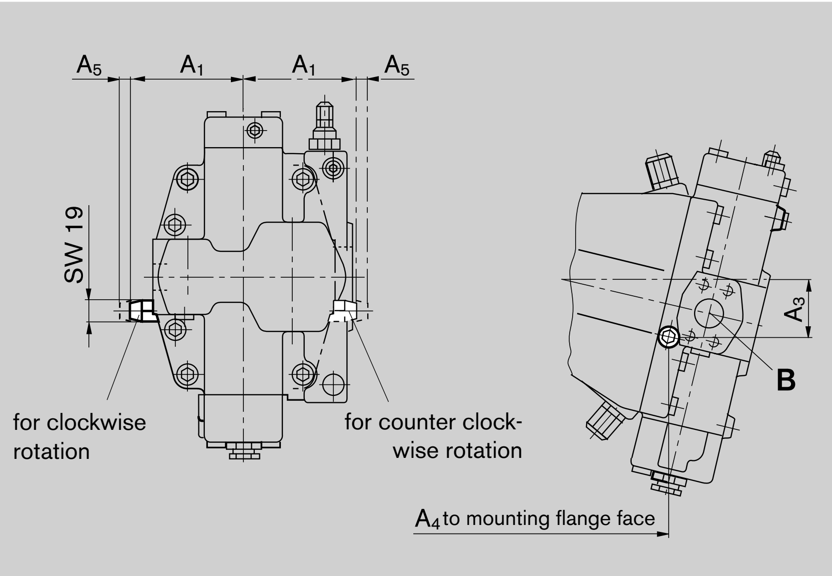
The lenght of the pin is approx. 8 mm when swivelled to max. angle $V_{g\ max}$.

Schematic example LRD – intial position $V_{g\ max}$



Dimensions

General dimensions see page 10 to 17



NG	A_1	A_3	A_4	A_5*
250	136.5	73	238	11
355	159.5	84	266	11
500	172.5	89	309	11

* Dimension to remove the cap nut

Electric swivel angle indicator

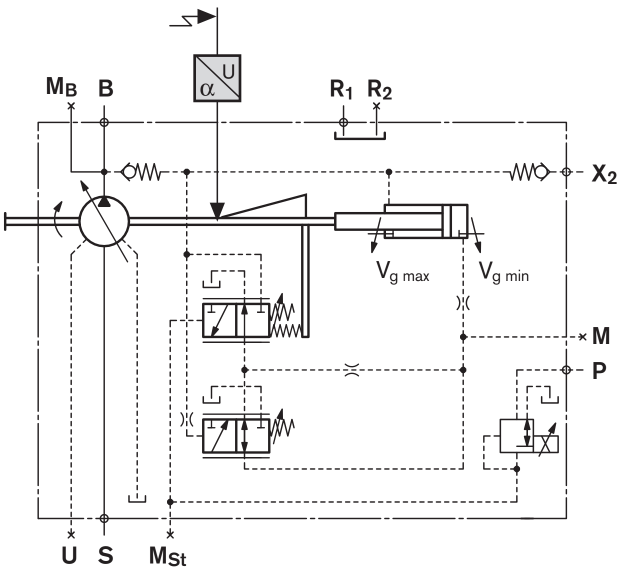
Before finalizing your design, request a binding installation drawing. Dimensions in mm.

In this case the pump swivel angle is indicated via an inductive position transducer.

It converts the displacement of the control device into an electrical signal This signal can be used to feed the value of swivel angle to an amplifier card for example.

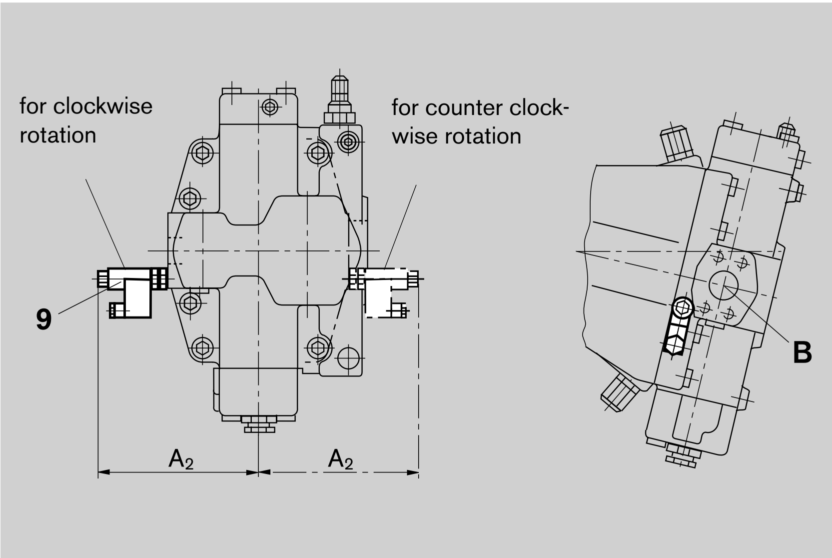
Inductive transducer Type IW9 – 03 – 01

Schematic example EPD – intial position $V_{g\,min}$



Dimensions

General dimensions see page10 to 17



NG	A_2
250	182
355	205
500	218

Sub assemblies

9 Inductive transducer IW9-03-01
with conductor box (mating plug) Hirschmann plug without suppressore diode, with cable connection M16x1.5 for cable diameter 4.5 to 10 mm
Plug description and dimensions see page 50

Installation instructions standard version

General

During commissioning and operation the axial piston unit must be full with fluid at all times and must be deaerated. This is also important after prolonged periods of standstill since the system can empty itself via the hydraulic lines

The leakage fluid in the housing must be drained to tank via the highest positioned case drain port.

Under all operating conditions the case drain line and the suction line inside the reservoir must be below the minimum fluid level

The minimum inlet pressure at port S may not fall below 0.8 bar absolute.

Installation position

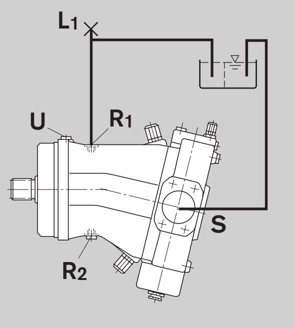
See examples below. Further installation positions are possible, please consult us.

Mounting below the reservoir (standard)

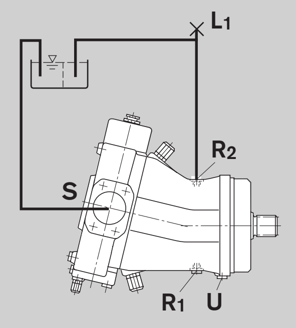
Pump below the minimum reservoir fluid level

Recommemded installation position: 1 and 2

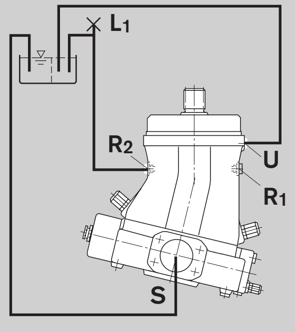
1



2



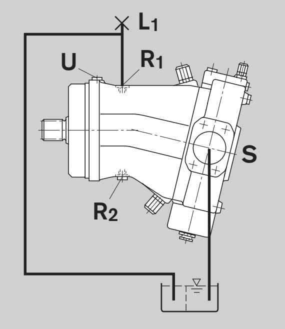
3



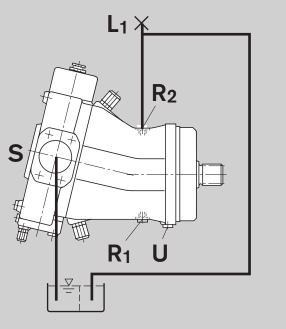
Installation position	Deaerate	Filling
1	–	R_1 (L_1)
2	–	R_2 (L_1)
3	U	R_2 (L_1)

Mounting above the reservoir

4



5



Installation position	Deaerate	Filling
4	–	R_1 (L_1)
5	–	R_2 (L_1)

Installation instructions High-Speed-version

General

During commissioning and operation the axial piston unit must be full with fluid at all times and must be deaerated. This is also important after prolonged periods of standstill since the system can empty itself via the hydraulic lines

The leakage chamber and suction chamber are connected inside the pump housing. A case drain line to tank is not necessary.

The suction line inside the reservoir must end up below the minimum fluid level under all operating conditions.
The minimum inlet pressure at port S may not fall below 0.8 bar absolute.

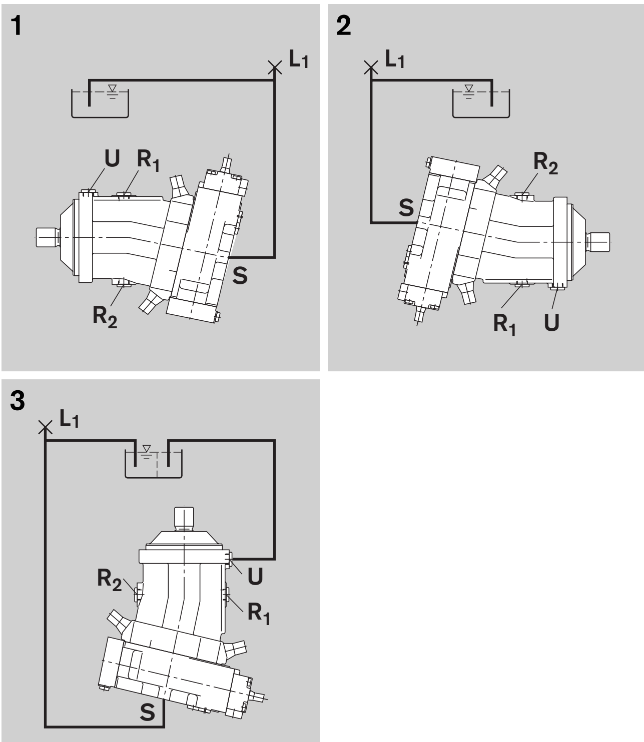
Installation position

See examples below. Further installation positions are possible, please consult us

Mounting below the reservoir (standard)

Pump below the minimum reservoir fluid level

Recommended installation position: 1 and 2.



Installation position	Deaerate	Filling
1	R_1	S (L_1)
2	R_2	S (L_1)
3	U	S (L_1)

Plug

On EP-control and electric swivel angle indicator E

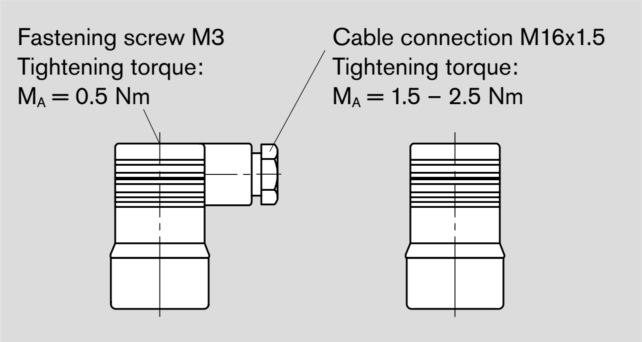
HIRSCHMANN DIN EN 175 301-803-A /ISO 4400

Without bi-directional suppressor diode

Type of protection to DIN/EN 60529: IP65

The sealing ring in the cable connection is suitable for a cable diameter of 4.5 mm to 10 mm.

The HIRSCHMANN-plug is included in the delivery of the pump.



Notes

Safety information

– The pump A7VO was designed for operation in open loop circuits

– Systems design, installation and commissioning requires trained technicians or tradesmen.

– All hydraulic ports can only be used for the fastening of hydraulic service lines.

– During and shortly after operation of a pump the housing and especially a solenoid can be extremely hot, avoid being burned; take suitable safety measures (wear protective clothing).

– Dependent on the operating conditions of the axial piston pump (operating pressure, fluid temperature) deviations in the performance curves can occur.

– Pressure ports:
All materials and port threads are selected and designed in such a manner, that they can withstand the peak pressures.
The machine and system manufacturer must ensure, that all connecting elements and hydraulic lines are suitable for the actual operating conditions (pressures, flow, fluid, temperature) in accordance with the necessary safety factors.

– All given data and information must be adhered to..

– The product has not been released as a component in the safety concept of a total machine system acc. to DIN EN ISO 13849.

– The following tightening torques are valid:

- Female threads in the axial piston unit:
the maximum permissible tightening torques M_{GMax} are maximum values for the female threads in the pump casting and may not be exceeded. For values see table below. -

- Fittings:
please comply with the manufacturer's information regarding the max. permissible tightening torques for the used fittings.

- Fastening bolts:
for fastening bolts to DIN 13 we recommend to check the permissible tightening torques in each individual case to VDI 2230.

- Plugs:
for the metal plugs, supplied with the axial piston unit the following min. required tightening torques M_V apply (see table)

Port thread size		Max. perm. tightening torque in female threads $M_{G\,max}$	Required tightening torque of plugs or fittings M_V	Across the flats in Allan screws
M14x1.5	DIN 3852	80 Nm	35 Nm	6 mm
M18x1.5	DIN 3852	140 Nm	60 Nm	8 mm
M22x1.5	DIN 3852	210 Nm	80 Nm	10 mm
M33x2	DIN 3852	540 Nm	225 Nm	17 mm

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