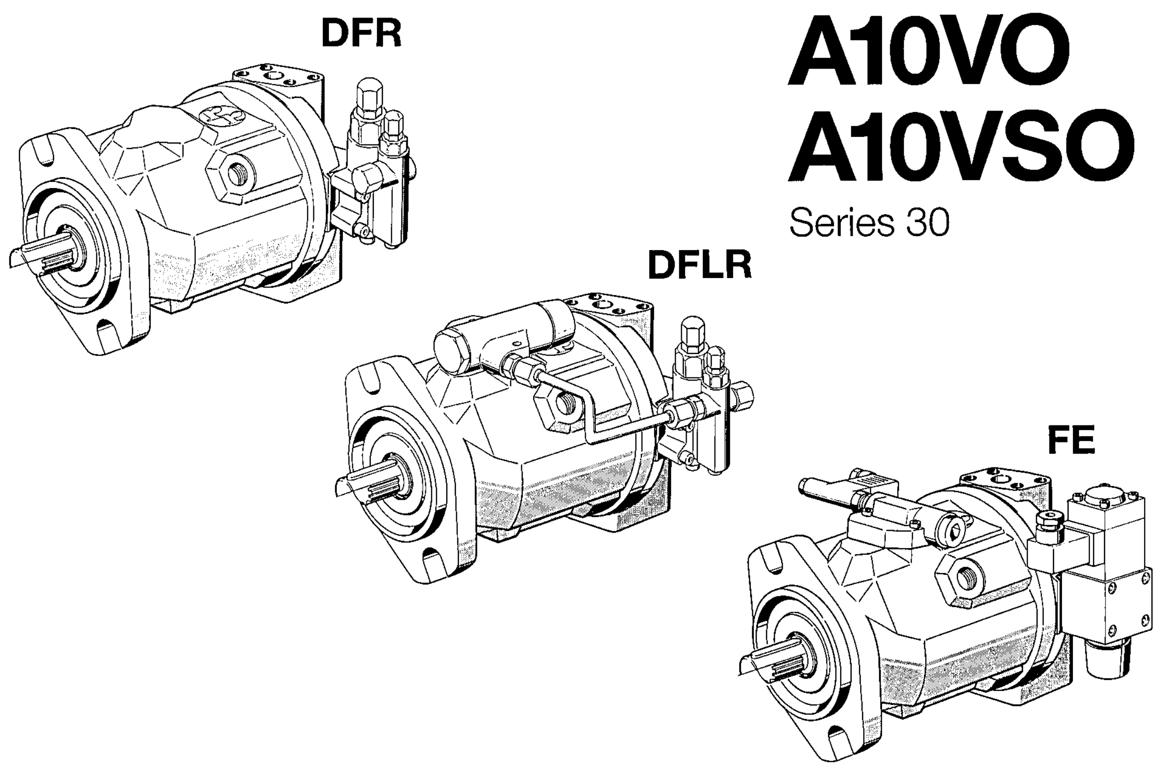
MANNESMANN
REXROTH

Brueninghaus Hydraulik

B

Operating Instructions

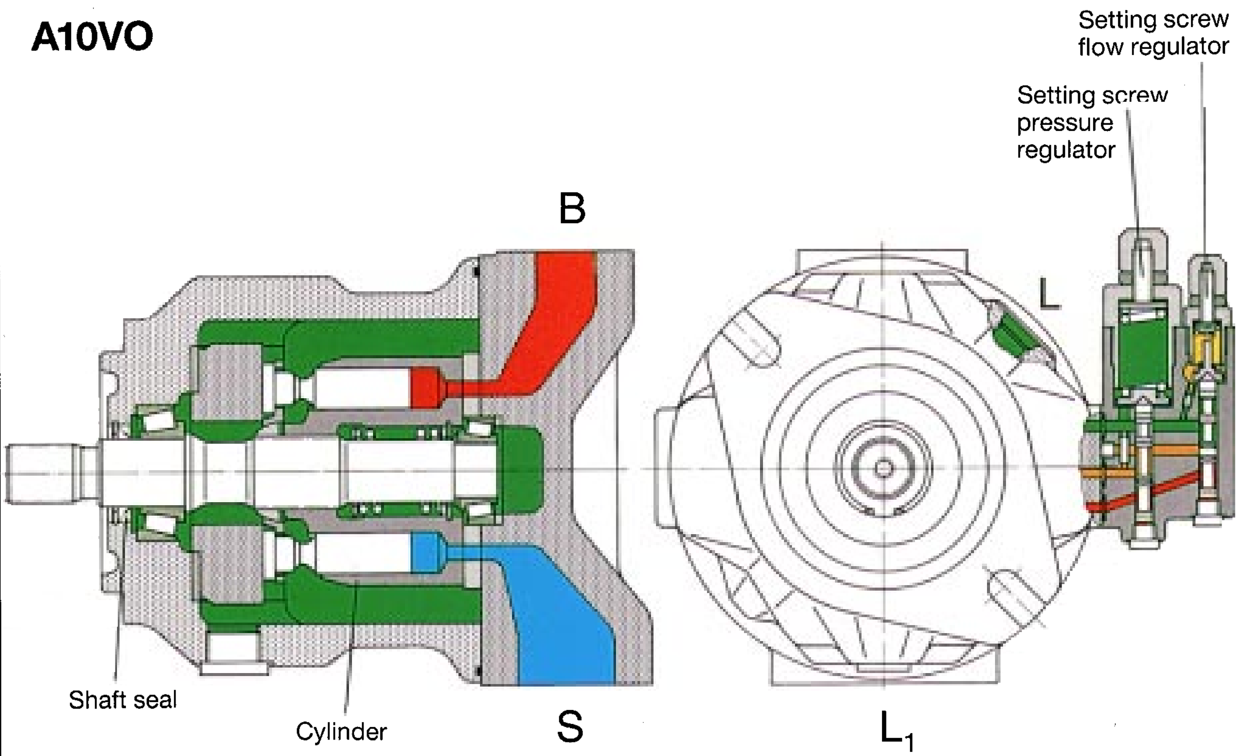


A10VO A10VSO

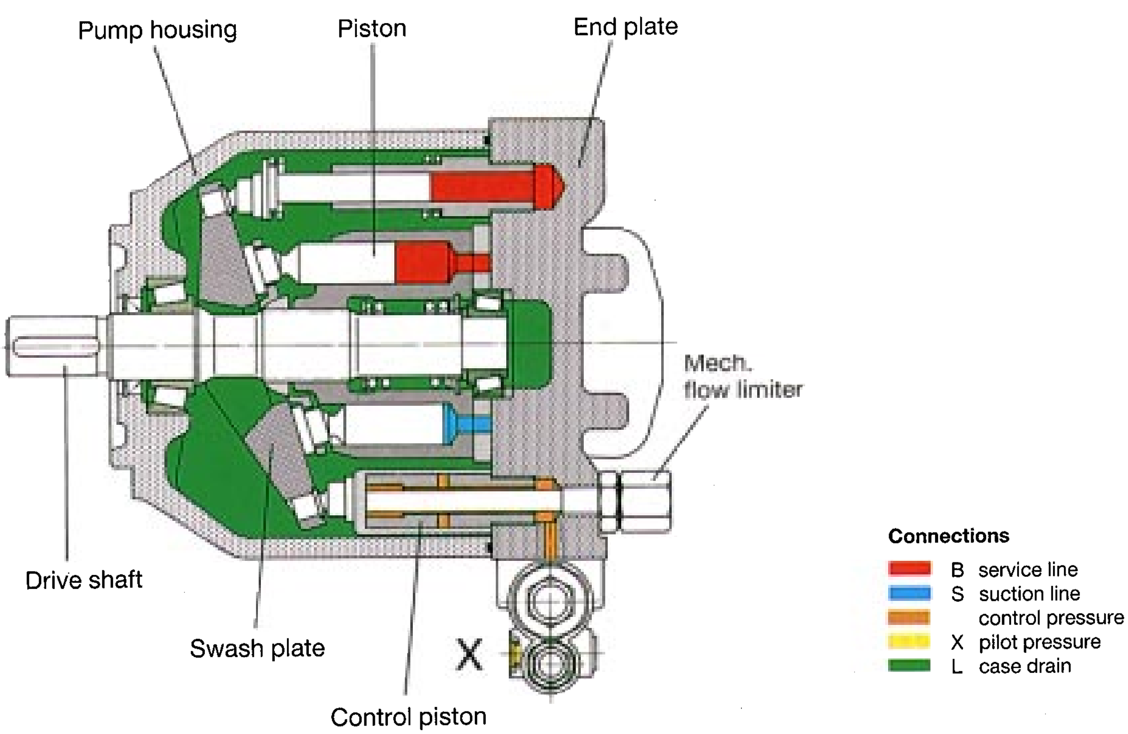
Series 30

RE 92701-B
06.89

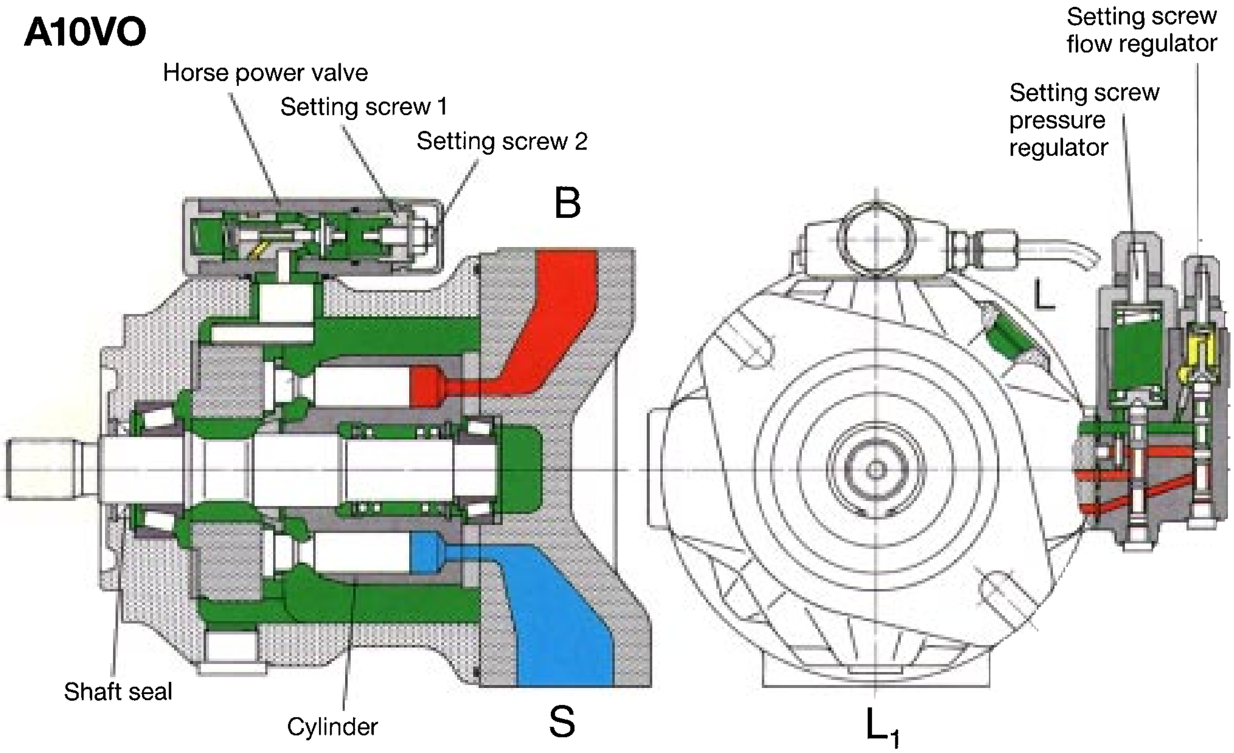
A10VO



A10VSO



A10VO



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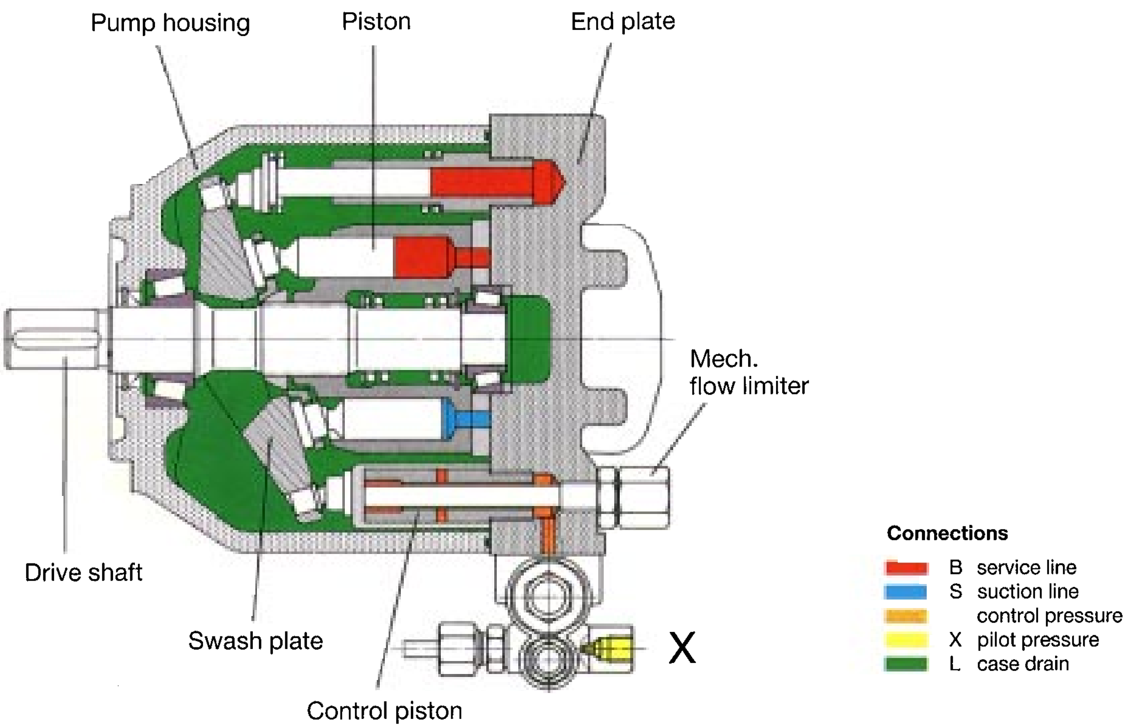
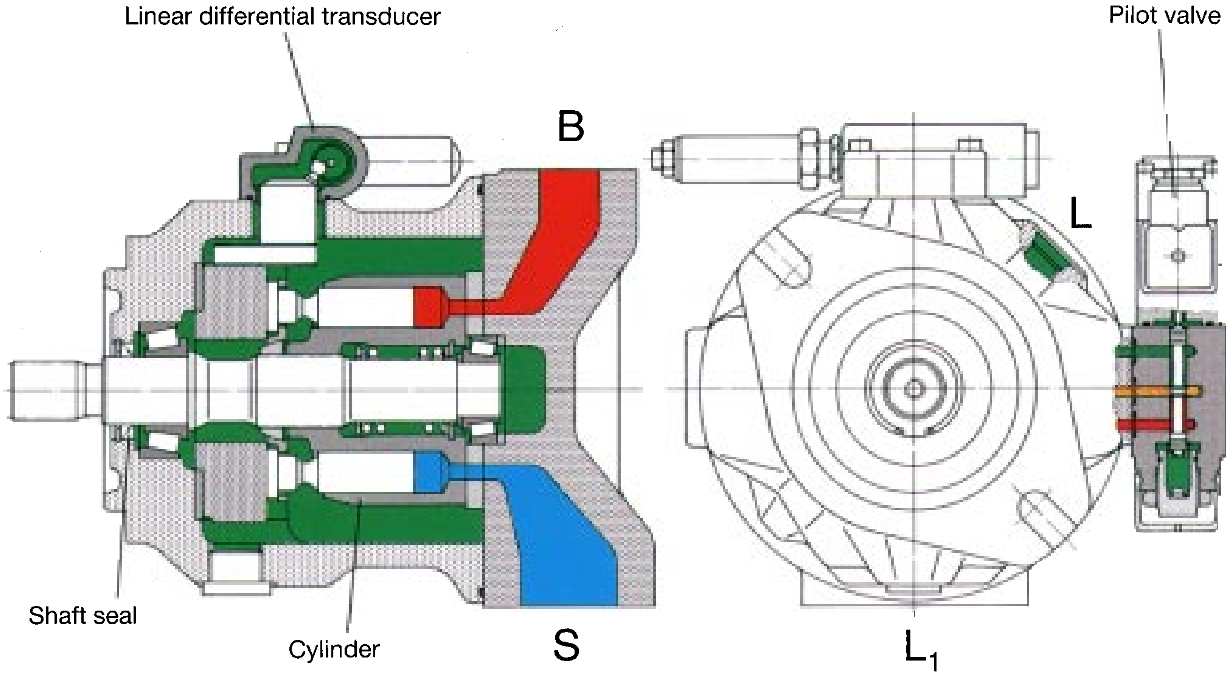


A10VO



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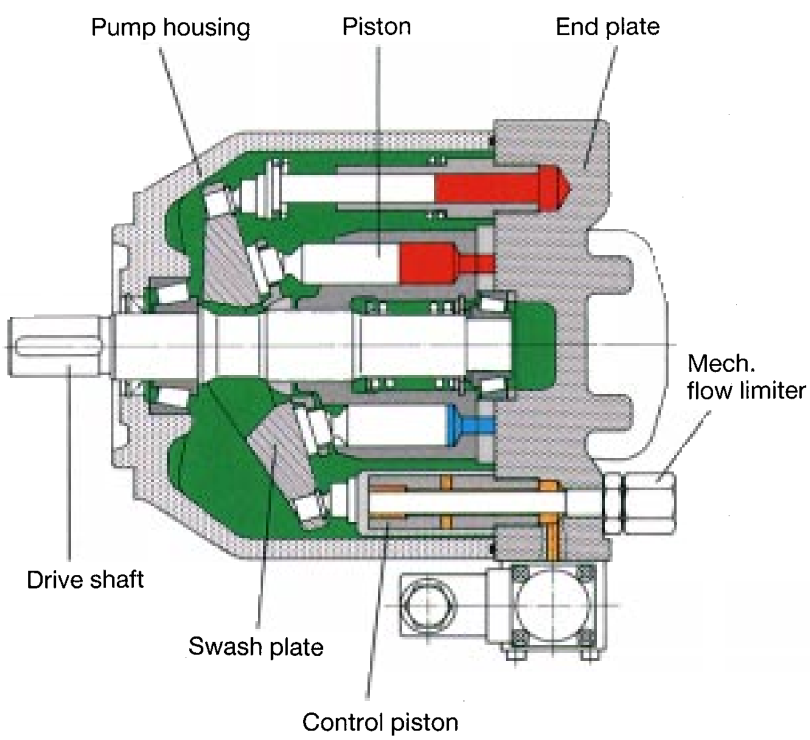


Connections

- B service line
- S suction line
- control pressure
- L case drain

1. Description

Variable displacement pumps types A10VO/A10VSO of swashplate design are axial piston pumps for hydrostatic drives in open circuit. The output flow is infinitely variable by adjusting the position of the swashplate.

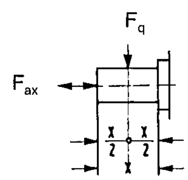
2. Technical data (theoretical values)

Size			28	45	71	100	140
Displacement	$V_{g\,max}$	cm^3	28	45	71	100	140
Max. speed[1] at $V_{g\,max}$	$n_{o\,max}$	min^{-1}	3000	2600	2200	2000	1800
Max. flow[2] at $n_{o\,max}$	$Q_{o\,max}$	l/min	81	113	152	194	244
at n_E=1450 min^{-1}		l/min	39	63	100	141	197
Max.power (Δp = 250 bar) at $n_{o\,max}$	$P_{o\,max}$	kW	35	49	65	83	105
at n_E=1450 min^{-1}		kW	17	27	43	60	85
Max. torque (Δp = 250 bar) at $V_{g\,max}$	M_{max}	Nm	111	179	282	397	557
Torque (Δp = 100 bar) at $V_{g\,max}$	M	Nm	45	72	113	159	223
Moment of inertia about the drive axis	J	kgm^2	0,0017	0,0033	0,0083	0,0167	0,0242
Filling volume		l	0.7	1.0	1.6	2.2	3.0
Weight (without oil fill) A10VO	m	kg	15	21	33	45	60
A10VSO	m	kg	15	21	33	45	60
Max. permissible axial force	$F_{ax\,max}$	N	1000	1500	2400	4000	4800
Max. permissible radial force	$F_{q\,max}$	N	2400	3600	6000	10000	12000

1) The values apply at an absolute pressure of 1 bar at suction port S. If the volumetric delivery rate is reduced or the inlet pressure is increased, the speed of rotation can be increased as shown on the diagram.

2) 3 % volumetric loss included.

Direction of force application



In special cases please consult us.

Exact alignment of the pump and motor shafts is very important for the efficient function and long service life of a pump. It is absolutely essential that the stated axial and radial forces on the drive shaft are not exceeded.

Failure to observed this requirement can lead to premature wear of the shaft seal and shaft bearings.

3. Operating pressure

Inlet	p_{abs} min. 0,8 bar	p_{abs} max. 30 bar
Outlet	p_N 250 bar	p_{max} 315 bar
Case drain	Maximum 0,5 bar higher than inlet pressure at port S, but no higher than 2 bar absolute.	

4. Pipe connections

Size		28	45	71	100	140
SAE flange	Suction port	1 1/4"	1 1/2"	2"	2 1/2"	2 1/2"
	Pressure port	3/4"	1"	1 1/4"	1 1/4"	1 1/4"
Threaded connections	Case drain A10VO	3/4"-16 UNF-2B	7/16"-20 UNF-2B	7/8"-14 UNF-2B	1 1/6"-12 UN-2B	1 1/16"-12 UN-2B
	Case drain A10VSO	M 18x1,5	M 22x1,5	M 22x1,5	M 27x2	M 27x2

5. Installation position

The installation position is optional. The pump housing must be filled with hydraulic fluid when the pump is set into operation and during operation. In order to achieve favourable noise values, all the connection lines (suction, pressure and leakage oil ports) have to be isolated from the reservoir via flexible elements.
A check valve in the leakage oil line should be avoided. In individual cases this is possible - after consulting us.
It has to be guaranteed that in any case the given limits are observe (please note for example the waving fluid surface in the reservoir in mobile application, in the ship building industry etc.).

5.I. Vertical installation (shaft upwards)

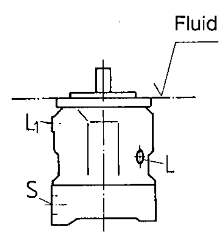
The following installation conditions must be observed:

5.I.1 Arrangement in a tank

Before installing the pump, fill the pump housing with the pump in a horizontal position.

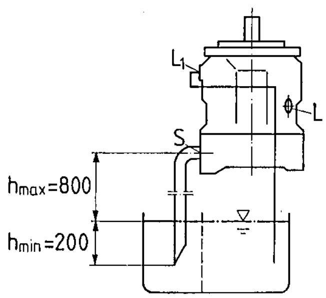
a) If the minimum fluid level is equal to or above the pump mounting surface, open ports "L", "L_1" and "S" (see fig 1).

fig. 1



b) If the minimum fluid level lies below the pump mounting flange, connect port "L_1" and possible "S" according to fig. 2.
Plug port "L" according to item 5.I.2.1.

fig. 2



5.I.2 Installation outside a tank

Before installing the pump, fill the pump with housing in the horizontal position.
For mounting above a tank see fig. 2.

5.I.2.1 Limiting conditions

Minimum pump inlet pressure $p_{in\ min}$ = 0,8 bar both static and dynamic conditions.

Note: Avoid mounting above a tank wherever possible in order to achieve a low noise level.

The permissible suction height h comes from the overall pressure loss, but may not be greater than h_{max} = 800 mm (immersion depth h_{min} = 200 mm).

Overall pressure loss $\Delta p_{O/all} = \Delta p_1 + \Delta p_2 + \Delta p_3 \leq (1 - p_{in\ min})$= 0,2 bar

Δp_1: Pressure loss in pipe due to accelerating column of fluid

$$\Delta p_1 = \frac{\rho \cdot l \cdot dv}{dt} \cdot 10^{-5} \text{ (bar)}$$

ρ = Density (kg/m^3)
l = Pipe length (m)
dv/dt = Change in rate suction (m/s^2)

Δp_2: Pressure loss due to static head

$$\Delta p_2 = h \cdot \rho \cdot g \cdot 10^{-5} \text{ (bar)}$$

h = Head (m)
ρ = Density (kg/m^3)
g = Gravity = 9,81 m/s^2

Δp_3: Line losses (elbows etc.)

This calculation is valid for the following regulators: DR, DFR, DFLR.

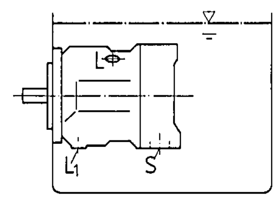
5.II. Horizontal installation

The pump must be installed, so that "L" or "L_1" is at the top.

5.II.1 Installation within a tank

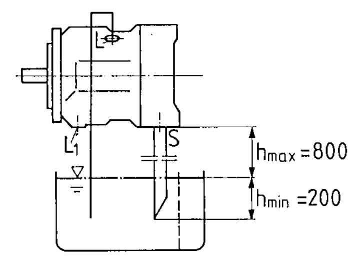
a) If the minimum fluid level is equal to or above the top of the pump, ports "L","L1" and "S" should remain open (see fig. 3.).

fig. 3



b) If the minimum fluid level is below the top of the pump, pipe ports "L", "L_1" and possibly "S" (as fig. 4).
The conditions correspond to item 5.I.2.1.

fig. 4



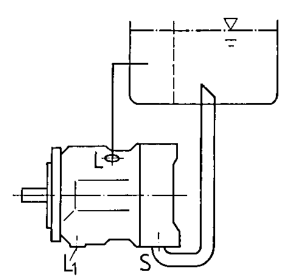
5.II.2 Installation outside a tank

Fill the pump housing before commissioning.

a) When mounting above the tank, see fig. 4. Conditions correspond to 5.I.2.1.

b) Mounting below the tank. Pipe ports "L" and "S" according to fig. 5.

fig. 5



6. Pressure regulation

The pressure is set with the pressure setting screw.

6.1 Remove the cap nut with 17 mm external hexagon.
6.2 Undo the lock nut with 17 mm external hexagon.
6.3 Set the pressure range by turning the setting screw with hexagon socket head 4 mm.
6.4 Lock the setting screw with lock nut, external hexagon 17 mm.
Turning the setting screw clockwise increases the pressure .
Turning the setting screw counter-clockwise reduces the pressure.
1 turn of the setting screw corresponds to 50 bar pressure range 20 to 250 bar.
6.5 Screw on the cap nut with external hexagon 17 mm and tighten to a torque M_a = 21 Nm.

7. Flow regulation

The flow is set at the flow setting screw.

7.1 Remove the cap nut with 13 mm external hexagon.
7.2 Undo the lock nut with 13 mm external hexagon.
7.3 Set the flow range by turning the setting screw with 3 mm hexagon socket.
7.4 Lock the setting screw with the lock nut, 13 mm external hexagon.
Turning the setting screw clockwise increases the flow.
Turning the setting screw counter-clockwise decreases the flow.
7.5 Screw on the cap nut with 13 mm external hexagon and tighten to a torque of M_a = 8.5 Nm.

8. Horse power regulation

The control inset point is adjusted at the setting screw 1.

8.1 Undo the lock nut.
8.2 Set the control inset point by turning the setting screw 1.
8.3 Lock the setting screw with the lock nut.
Turning the setting screw clockwise increases the power.
Turning the setting screw counter-clockwise reduces the power.
The control cut-off point is adjusted at the adjusting screw 2.
8.4 Undo the lock nut with 13 mm external hexagon.
8.5 Set the control cut-off point by turning the setting screw with 4 mm hexagon socket.
8.6 Lock the setting screw with the lock nut, 13 mm external hexagon.
Turning the setting screw clockwise increases the power.
Turning the setting screw counter-clockwise decreases the power.

9. Electrical flow regulation

The electrical flow regulator must be set in accordance with SK-A 24739.00.

10. Hydraulic fluid

Operating viscosity range

For optimum efficiency and service life, we recommend that the operating viscosity (at operating temperature) be selected in the range.

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

as referred to tank temperature (open circuits).

Viscosity limits

For critical operating conditions the following values apply:

ν_{min} = 10 mm²/s
for short periods with a max. permissible leakage oil temperature of 90° C

ν_{max}= 1000 mm²/s
for short periods when starting from cold

for detailed information on the selection of hydraulic fluids and application conditions, please see our data sheet RE 90220 prior to project design.
Important: The leakage oil temperature is influenced by pressure and speed and is always higher than the tank temperature. At no point in the system, however, may the temperature be higher than 90° C.
If the above conditions cannot be maintained because of extreme operating parameters or high ambient temperature, please consult us.

11. Filtration of hydraulic fluid

In order to guarantee reliable function, the operating fluid should be maintained to at least cleanliness grade 9 to NAS 1638 or 6 to SAE, ASTM, AIA.
This may be achieved, for example, with the filter elements type ... D 020 BH or ... D 020 BN from Hydac.
A filtration quotient of $\beta_{20} \geq 100$ is then obtained (see data sheets RE 90300-B and RE 90301-B).

12. Filter inspection

1. Daily after commissioning.
2. If free of contamination, weekly.
3. After approx. 100 operating hours, monthly.

13. Oil change

1. After 500 operating hours.
2. After 2000 operating hours.
3. Every 2000 operating hours or once a year.

Depending on the degree of contamination and on the thermal loading of the fluid, shorter intervals may be necessary. When changing the oil, account must also be taken of winter or summer operation if the fluid used is not capable of bridging the two temperature ranges while maintaining the minimum permissible viscosity at operating temperature.
Common errors made in practice during an oil change:

- lack of cleanliness (dirt introduced into the system)
- failure to clean tank
- filling of tank without filter (NAS grade must not be exceeded)

14. Drive

It is essential that the direction of rotation marked on the pump housing is maintained. Changing the direction of rotation is not possible without conversion.

15. Oil tank

The capacity of the tank must be selected to suit the operating conditions. The oil temperature must not be allowed to rise too high therefore fit cooler if necessary. The suction and return lines should be arranged so as to allow free flow. All pipelines must enter the tank sufficiently far below the minimum permissible oil level (approx. 5 cm) so as to prevent foaming.
An air breather is necessary for volume compensation due to varying work cycles and temperature fluctuations and should take the form of an air filter fitted at the highest point on the tank, so as to prevent the sucking in of dirt particles into the tank (NAS grade must not be exceeded).

16. Pipelines and connections

All plugs on the pump should not be removed until immediately before connecting the pipelines. Observe cleanliness when assembling!
The use of seamless precision steel pipes to DIN 2391 is recommended.
The suction line must be sized to suit the connection and should be kept as short as possible. A larger size should be used for longer suction lines.
The pipe ends should be cut at an angle of 45° and should enter the tank at least 5 cm from the tank floor, so that any dirt on the tank floor is not sucked up.
The leakage oil line must be below the oil level in the tank.

17. Commissioning

Before first switching on, the housing of A10VO/A10VSO should be filled with the selected fluid via the case drain con-
nection.
Immediately check the direction of rotation of drive motor. Run the pump without load and allow to deliver without pressure for a few seconds to ensure adequate lubrication.

If the pump is not delivering without air bubbles after approx. 60 secs., the system must be rechecked.

Once the operating parameters have been achieved, check pipe connections for leakage and check temperature of operating fluid (see data sheet RE 90301-B).

18. General

All pumps supplied by us are tested for function and performance. Modifications to the pump of any kind are not permitted and will invalidate any claim under warranty.

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