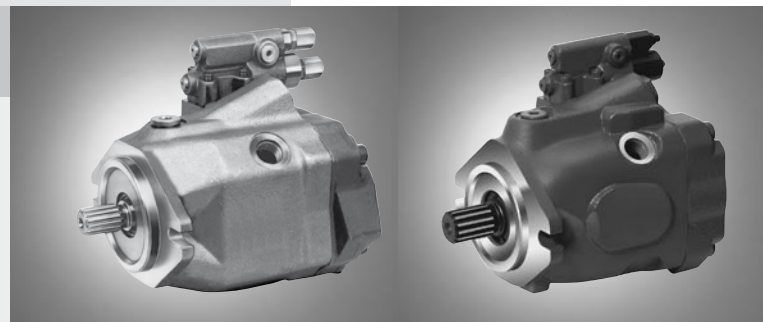


Axial Piston Variable Pump A10VNO

RE 92735/03.12 1/20
Replaces: 10.07
RE 92707/11.10

Data sheet

Series 52/53
Sizes 28 to 85
Nominal pressure 210 bar
Maximum pressure 250 bar
Open circuit



Series 52

Series 53

Contents

Ordering code for standard program	2
Technical data	3
DRS – Pressure and flow control	6
DRG – Pressure control, remotely operated	7
ED – Electro-hydraulic pressure control	8
Dimensions, size 28 to 85	9
Connector for solenoids	17
Installation instructions	18
General instructions	20

Features

- Variable pump in axial piston swashplate design for hydrostatic drives in an open circuit
- The flow is proportional to the drive speed and the displacement.
- The flow can be steplessly varied by adjusting the swashplate angle.
- Stable storage for long service life
- Favorable power-to-weight ratio - compact dimensions
- Low noise
- Permissible permanent operating pressure: 210 bar
- Axial and radial load capacity of drive shaft
- Pressure and flow control
- Electro-hydraulic pressure control
- Short response times

Ordering code for standard program

A10VN	O			/			-	V		C		N00	
01	02	03	04		05	06		07	08	09	10	11	12

Axial piston unit

											28	45	63	85	
01	Swashplate design, variable, nominal pressure 210 bar, maximum pressure 250 bar										●	●	●	●	A10VN

Operating mode

02	Pump, open circuit											O
----	--------------------	--	--	--	--	--	--	--	--	--	--	----------

Size (NG)

03	Geometric displacement, see table of values on page 5										28	45	63	85
----	---	--	--	--	--	--	--	--	--	--	-----------	-----------	-----------	-----------

Control device

	Pressure control										28	45	63	85	
04	with flow control, hydraulic X-T closed										●	●	●	●	DRS
	with pressure cut-off														
	remotely operated, hydraulic										●	●	●	●	DRG
	electrical negative characteristic U = 12 V DC										●	●	-	-	ED71
	U = 24 V DC										●	●	-	-	ED72

Series

											28	45	63	85	
05	Series 5, index 2										-	●	●	-	52
	Series 5, index 3										●	-	-	●	53

Direction of rotation

06	Viewed on drive shaft														R
											cw				L
										ccw				L	

Seals

07	FKM (fluor-caoutchouc)											V
----	------------------------	--	--	--	--	--	--	--	--	--	--	----------

Drive shaft

											28	45	63	85	
08	Splined shaft standard shaft										●	●	●	●	S
	ANSI B92.1a similar to shaft "S" however for higher input torque										●	●	●	●	R

Mounting flange

09	ISO 3019-1 (SAE) 2-hole										C
----	-------------------------	--	--	--	--	--	--	--	--	--	----------

Service line ports

											28	45	63	85	
10	SAE flange port at rear, metric fixing thread (not for through drive)										●	●	●	●	11
	SAE flange ports on opposite side, metric fastening thread (through drive facility on request)										●	●	●	●	12

Through drive

11	Without through drive											N00
----	-----------------------	--	--	--	--	--	--	--	--	--	--	------------

Connector for solenoids

											28	45	63	85	
12	Without (only with hydraulic control)										●	●	●	●	0
	DEUTSCH - molded connector, 2-pin - without suppressor diode										●	●	-	-	P

● = Available

○ = On request

- = Not available

Technical data

Hydraulic fluid

Prior to project design, please see our data sheets RE 90220 (mineral oil) and RE 90221 (environmentally acceptable hydraulic fluids) for detailed information regarding the choice of hydraulic fluid and application conditions.

If environmentally acceptable hydraulic fluids are being used, the limitations regarding technical data and other seals must be observed. Please contact us. When ordering, indicate the hydraulic fluid that is to be used.

Operating viscosity range

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

$$v_{\text{opt}} = \text{opt. operating viscosity } 16 \dots 36 \text{ mm}^2/\text{s}$$

referred to reservoir temperature (open circuit).

Limits of viscosity range

For critical operating conditions the following values apply:

$$v_{\text{min}} = 10 \text{ mm}^2/\text{s}$$

short-term ($t \leq 1 \text{ min}$)
at max. case drain temperature
of $115 \text{ }^\circ\text{C}$.

Please also ensure that the max. case drain temperature of $115 \text{ }^\circ\text{C}$ is not exceeded in localized areas (for instance, in the bearing area). The fluid temperature in the bearing area is approx. 5 K higher than the average case drain temperature.

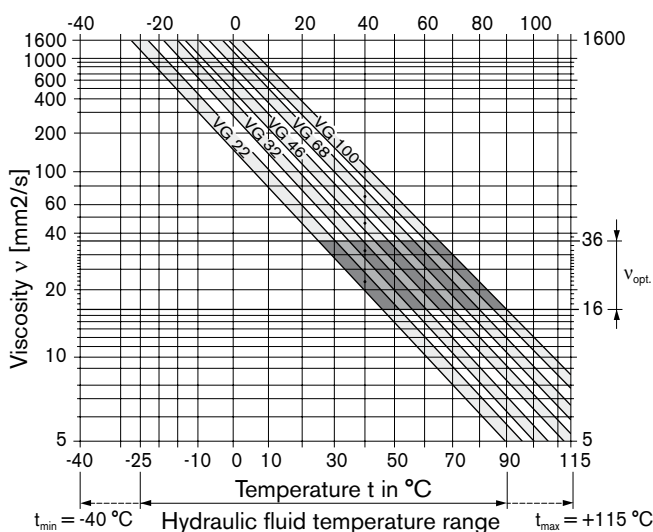
$$v_{\text{max}} = 1600 \text{ mm}^2/\text{s}$$

for short periods ($t \leq 1 \text{ min}$)
on cold start
($p \leq 30 \text{ bar}$, $n \leq 1000 \text{ rpm}$, $t_{\text{min}} -25 \text{ }^\circ\text{C}$)

Depending on the installation situation, special measures are necessary at temperatures between $-40 \text{ }^\circ\text{C}$ and $-25 \text{ }^\circ\text{C}$. Please contact us.

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

Selection diagram



Details regarding the choice of hydraulic fluid

In order to select the correct hydraulic fluid, it is necessary to know the operating temperature in the reservoir (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 (v_{opt} ; see shaded section of the selection diagram). We recommended that the higher viscosity class be selected in each case.

Example: at an ambient temperature of $X \text{ }^\circ\text{C}$ the operating temperature is $60 \text{ }^\circ\text{C}$. In the optimum operating viscosity range (v_{opt} ; shaded area) this corresponds to viscosity grades VG 46 resp. VG 68; VG 68 should be selected.

Important: The case drain temperature is influenced by pressure and input speed and is always higher than the reservoir temperature. At no point of the component may the temperature be higher than $115 \text{ }^\circ\text{C}$, however. The temperature difference specified on the left is to be taken into account when determining the viscosity in the bearing.

If the above conditions cannot be maintained due to extreme operating parameters, please contact us.

Filtration of the hydraulic fluid

Finer filtration improves the cleanliness level of the hydraulic fluid, which increases the service life of the axial piston unit.

To ensure the functional reliability of the axial piston unit, a gravimetric analysis of the hydraulic fluid is necessary to determine the amount of solid contaminant and to determine the cleanliness level according to ISO 4406. A cleanliness level of at least 20/18/15 is to be maintained.

At very high hydraulic fluid temperatures ($90 \text{ }^\circ\text{C}$ to maximum $115 \text{ }^\circ\text{C}$), a cleanliness level of at least 19/17/14 according to ISO 4406 is necessary.

If the above classes cannot be achieved, please contact us.

Technical data

Operating pressure range

Pressure at service line port B

Nominal pressure p_{nom} _____ 210 bar absolute

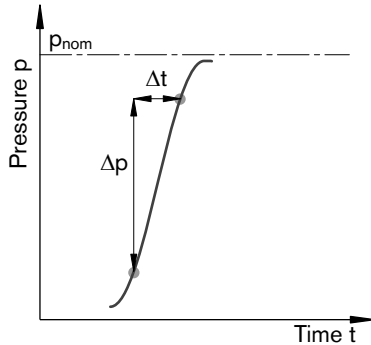
Maximum pressure p_{max} _____ 250 bar absolute

Single operating period _____ 2.5 ms

Total operating period _____ 300 h

Minimum pressure (high-pressure side) _____ 10 bar absolute

Rate of pressure change $R_{A\ max}$ _____ 16,000 bar/s



Pressure at suction port S (inlet)

Minimum pressure $p_{S\ min}$ _____ 0.8 bar absolute

Maximum pressure $p_{S\ max}$ _____ 5 bar absolute

Case drain pressure

Maximum permissible case drain pressure
(at port L, L₁):

Maximum 0.5 bar higher than the inlet pressure at port S, however not higher than 2 bar absolute.

$p_{L\ max\ abs}$ _____ 2 bar

Definition

Nominal pressure p_{nom}

The nominal pressure corresponds to the maximum design pressure.

Maximum pressure p_{max}

The maximum pressure corresponds to the maximum operating pressure within the single operating period. The sum of the single operating periods must not exceed the total operating period.

Minimum pressure (high-pressure side)

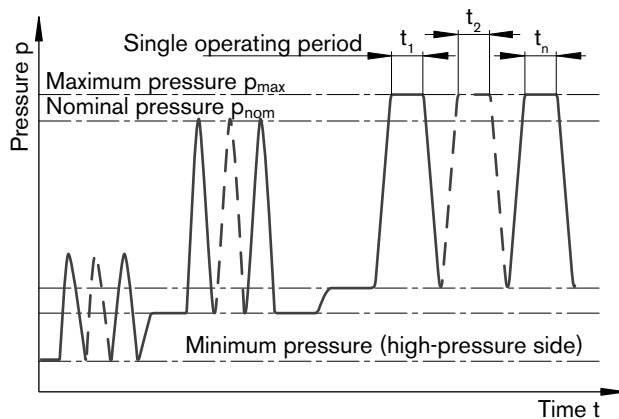
Minimum pressure in the high-pressure side (port B) that is required in order to prevent damage to the axial piston unit.

Minimum pressure (inlet)

Minimum pressure at suction port S (inlet) that is required to prevent damage to the axial piston unit. The minimum pressure depends on the speed and displacement of the axial piston unit.

Rate of pressure change R_A

Maximum permissible rate of pressure rise and reduction during a pressure change over the entire pressure range.



Total operating period = $t_1 + t_2 + \dots + t_n$

Technical data

Table of values (theoretical values, without efficiency and tolerances; values rounded)

Size	NG		28	45	63	85
Displacement geometric, per revolution	$V_{g \max}$	cm ³	28	45	63	85
Speed ¹⁾						
maximum at $V_{g \max}$	n_{nom}	rpm	3200	2900	2700	2700
Flow						
at n_{nom} and $V_{g \max}$	$q_{v \max}$	l/min	90	131	170	230
Power at $\Delta p = 210$ bar						
at n_{nom} , $V_{g \max}$	P_{\max}	kW	31	46	59	80
Torque						
at $V_{g \max}$ and $\Delta p = 210$ bar	T_{\max}	Nm	94	150	210	284
Rotary stiffness, drive shaft	S	c	11000	22300	37500	65500
	R	c	14800	26500	40500	69400
Moment of inertia for rotary group	J_{GR}	kgm ²	0.00093	0.0017	0.0033	0.0056
Maximum angular acceleration ²⁾	α	rad/s ²	6800	4900	3500	2500
Case volume	V	L	0.25	0.3	0.5	0.8
Mass approx. (without through drive)	m	kg	11.5	14	18	22

1) The values apply

- for an absolute pressure $p_{\text{abs}} = 1$ bar at suction port S
- within the optimum viscosity range from $v_{\text{opt}} = 16$ to 36 mm²/s
- for mineral-oil based hydraulic fluids.

2) The data are valid for values between the minimum required and maximum permissible speed.

Valid for external excitation (e. g. engine 2 to 8 times rotary frequency; cardan shaft twice the rotary frequency).

The limit value applies for a single pump only.

The load capacity of the connection parts must be considered.

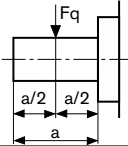
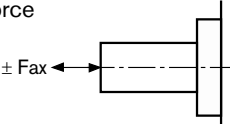
Note

Operation above the maximum values or below the minimum values may result in a loss of function, a reduced service life or in the destruction of the axial piston unit. We recommend testing the loads by means of experiment or calculation / simulation and comparison with the permissible values.

Determining the operating characteristics

Flow	$q_v = \frac{V_g \cdot n \cdot \eta_v}{1000}$	[l/min]	V_g	= Displacement per revolution in cm ³
			Δp	= Pressure differential in bar
Torque	$T = \frac{V_g \cdot \Delta p}{20 \cdot p \cdot \eta_{mh}}$	[Nm]	n	= Speed in rpm
			η_v	= Volumetric efficiency
Power	$P = \frac{2\pi \cdot T \cdot n}{60000} = \frac{q_v \cdot \Delta p}{600 \cdot \eta_t}$	[kW]	η_{mh}	= Mechanical-hydraulic efficiency
			η_t	= Total efficiency ($\eta_t = \eta_v \cdot \eta_{mh}$)

Permissible radial and axial forces of the drive shaft

Size	NG		28	45	63	85	
Radial force maximum at a/2		$F_{q \max}$	N	350	650	1000	1350
Maximum axial force		$F_{ax \max}$	N	700	650	1000	1350

DRS – Pressure and flow control

In addition to the pressure control function (see page 7), the pump flow may be varied by means of a differential pressure over an adjustable orifice (e.g. directional valve) installed in the service line to the actuator. The pump flow is equal to the actual required flow by the actuator, regardless of changing pressure levels.

The pressure control overrides the flow control function.

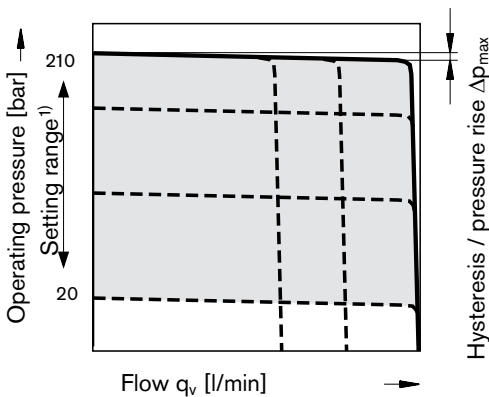
Note

The DRS valve version has no connection between X and the reservoir. Unloading the LS-pilot line must be possible in the valve system.

Because of the flushing function sufficient unloading of the X-line must also be provided.

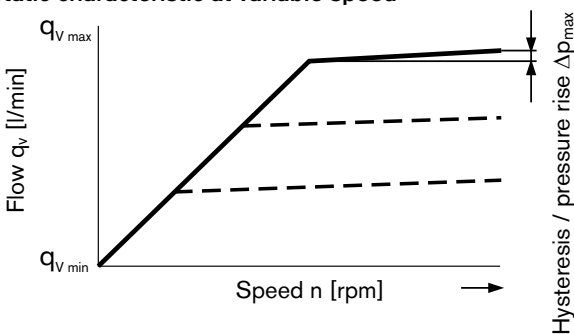
Static characteristic

Flow control at $n_1 = 1500 \text{ rpm}$; $t_{fluid} = 50 \text{ }^\circ\text{C}$



- 1) In order to prevent damage to the pump and the system, this setting range is the permissible setting range and must not be exceeded. The range of possible settings at the valve are greater.

Static characteristic at variable speed

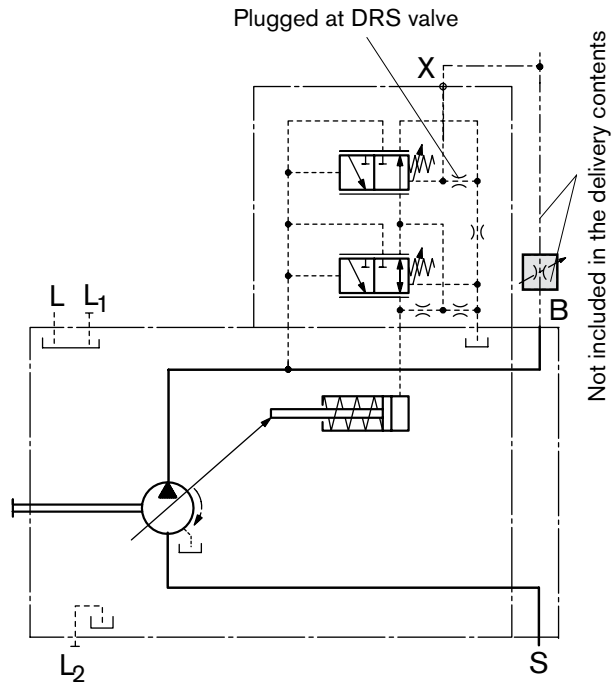


Possible connections at port B

(not included in the delivery contents)

- LS mobile control blocks
- Mobile control blocks M4 - 12 (RE 64276)
- Mobile control blocks M4 - 15 (RE 64283)
- LUDV mobile control blocks
- Mobile control blocks M6 - 15 (RE 64284)
- Mobile control blocks M7 - 22 (RE 64295)

Schematic



	Port for
B	Service line
S	Suction line
L, L_{1,2}	Case drain fluid (L _{1,2} plugged)
X	Pilot pressure

Differential pressure Δp

Standard setting: 14 to 22 bar.
 If another setting is required, please state in clear text.
 Relieving the load on port X to the reservoir results in a zero stroke ("standby") pressure which lies about 1 to 2 bar higher than the differential pressure (Δp). System influences are not taken into account.

Control data

Data for pressure control DR, see page 6.
 Maximum flow deviation measured at drive speed $n = 1500 \text{ rpm}$.

NG	28	45	63	85
$\Delta q_{v \text{ max}}$ l/min	0.9	1.0	1.8	2.5

Control fluid consumption
 DRS (DFR1) _____ maximum approx. 3 l/min

DRG – Pressure control, remotely operated

The DR pressure control function is performed by the DRG control valve.

The pressure control limits the maximum pressure at the pump output within the pump control range. The variable pump only supplies as much hydraulic fluid as is required by the consumers. If the operating pressure exceeds the target pressure set at the pressure valve, the pump will regulate towards a smaller displacement. The pressure can be set steplessly at the control valve.

A pressure relief valve can be externally piped to port X for remote setting of pressure below the setting of the DR control valve spool. This relief valve is not included in the delivery contents of the DRG control.

The differential pressure at the DRG control valve is set as standard to 20 bar. This results in a pilot oil flow to the relief valve of approx. 1.5 l/min at port X. If another setting is required (range from 10-22 bar) please state in clear text.

As a separate pressure relief valve we can recommend:

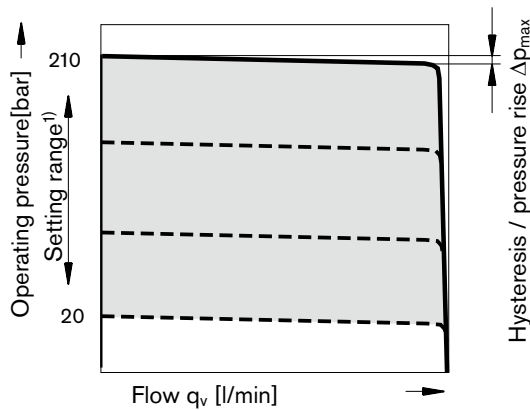
DBDH 6 (hydraulic) to RE 25402 or

DBETR-SO 381 with orifice \varnothing 0.8 mm in P (electric) to RE 29166.

The max. length of piping should not exceed 2 m.

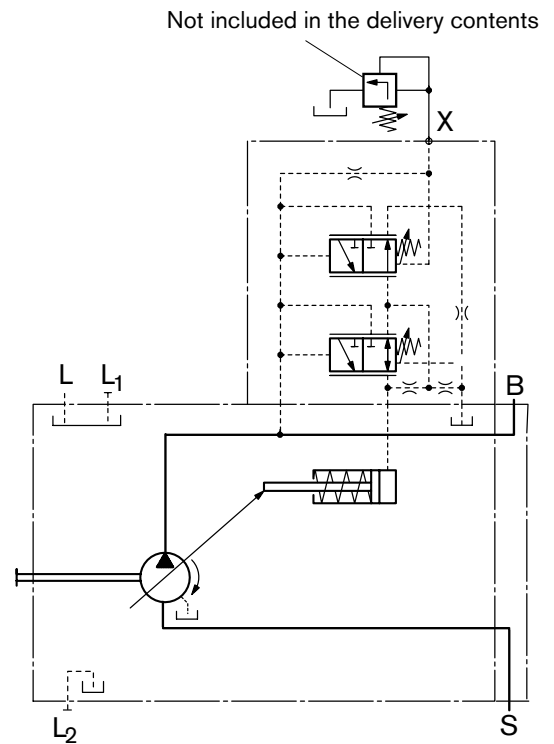
Static characteristic

(at $n_1 = 1500$ rpm; $t_{fluid} = 50$ °C)



- In order to prevent damage to the pump and the system, this setting range is the permissible setting range and must not be exceeded. The range of possible settings at the valve are greater.

Schematic



	Port for
B	Service line
S	Suction line
L, L _{1,2}	Case drain fluid (L _{1,2} plugged)
X	Pilot pressure

Control data

Hysteresis and repeatability Δp _____ maximum 3 bar

Pressure rise, maximum

NG	28	45	63	85
Δp bar	6	6	6	8

Control fluid consumption _____ maximum approx. 4.5 l/min

ED – Electro-hydraulic pressure control

The ED valve is set to a certain pressure by a specified, variable solenoid current.

If there is a change at the consumer (load pressure), the position of the control piston changes.

This causes an increase or decrease in the pump swivel angle (flow) in order to maintain the electrically set pressure level.

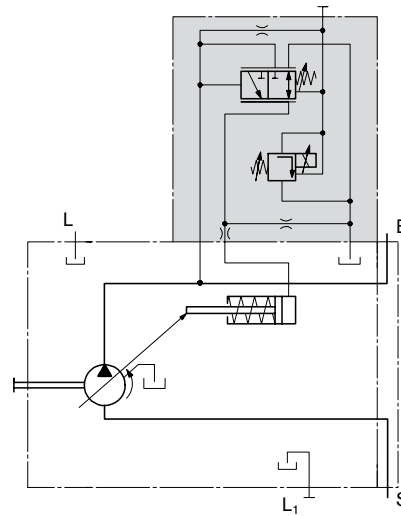
The pump thus only delivers as much hydraulic fluid as the consumers can take. The desired pressure level can be set steplessly by varying the solenoid current.

When the solenoid current signal drops toward zero, the maximum output pressure is limited to p_{max} by an adjustable hydraulic pressure cut-off (secure failsafe function in case of a loss of power e.g. for use as fan drives).

The response time characteristic of the ED-control was optimized for the use as a fan drive system.

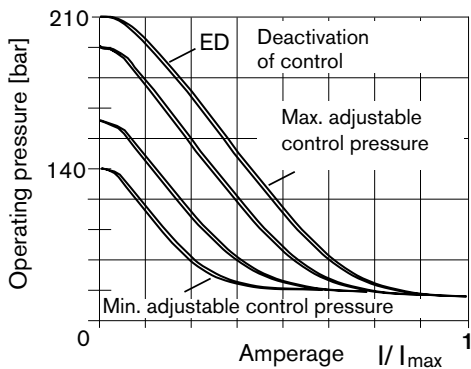
When ordering, state the type of application in clear text.

Circuit diagram ED..



Static current-pressure characteristic ED

(measured at pump in zero stroke – negative characteristic)



Hysteresis static current-pressure characteristic < 3 bar

	Port for
B	Service line
S	Suction line
L, L1	Case drain (L1 plugged)

Technical data, solenoid

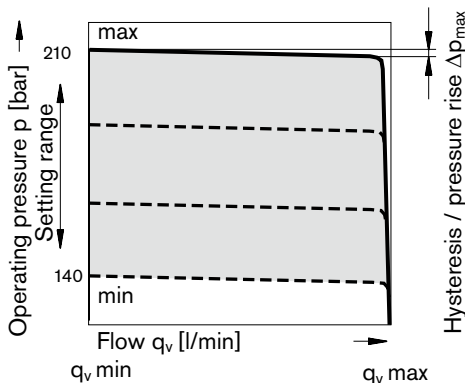
	ED71	ED72
Voltage	12 V (±20 %)	24 V (±20 %)
Control current		
Control begin at $q_{v \min}$	100 mA	50 mA
End of control at $q_{v \max}$	1200 mA	600 mA
Limiting current	1,54 A	0,77 A
Nominal resistance (at 20 °C)	5,5 Ω	22,7 Ω
Dither frequency	100 to 200 Hz	100 to 200 Hz
Duty cycle	100 %	100 %
Type of protection see connector design page 17		

Operating temperature range at valve -20 °C to +115 °C

210 bar is the standard nominal pressure, higher pressures for fan application on request.

Static flow-pressure characteristic

(at $n = 1500 \text{ rpm}$; $t_{fluid} = 50 \text{ °C}$)



Control data

Standby standard setting 20 bar, other values on request.

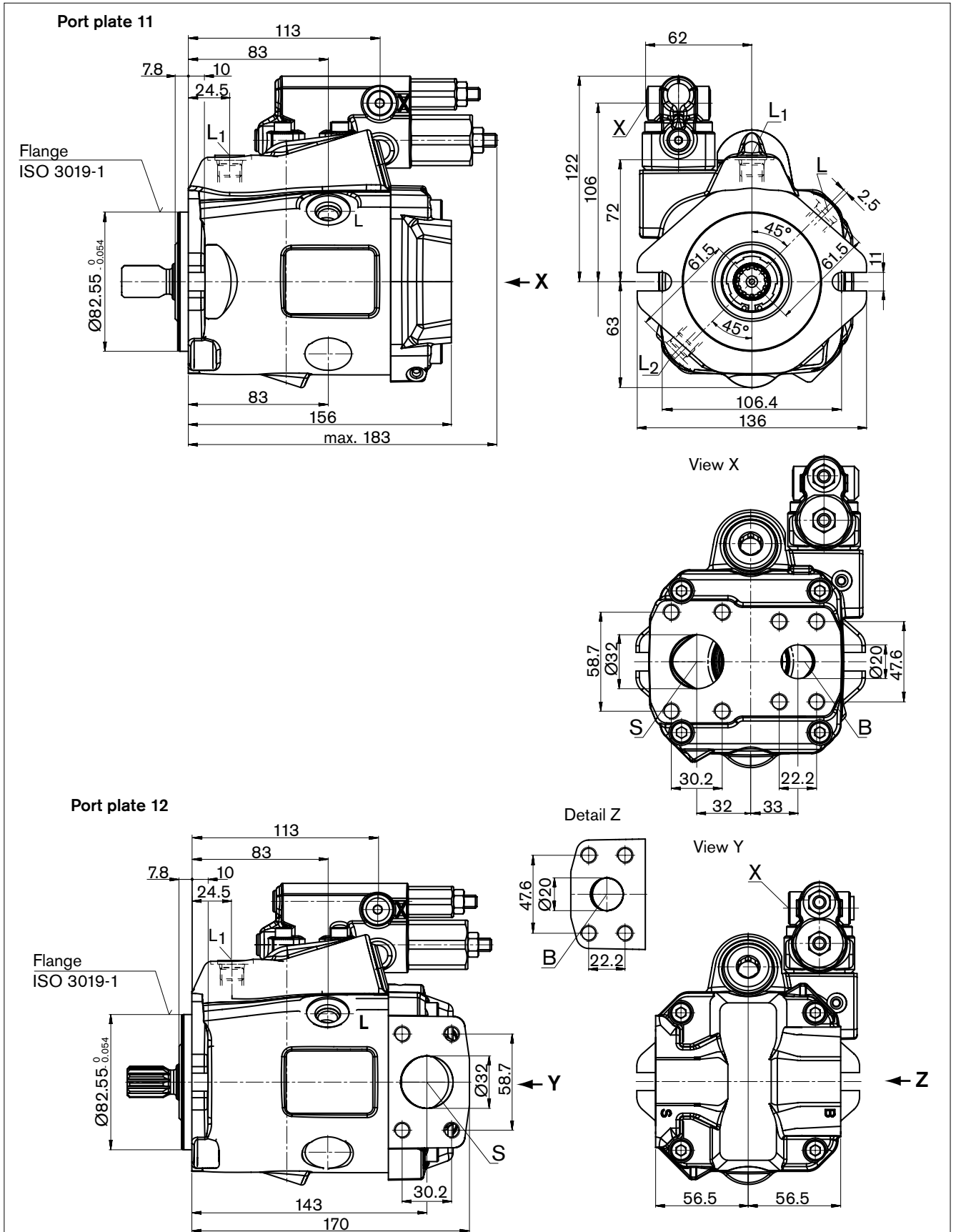
Hysteresis and pressure rise _____ $\Delta p < 4 \text{ bar}$.

Control flow consumption _____ 3 to 4.5 l/min.

Dimensions, size 28¹⁾

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

DRS – Pressure and flow control, hydraulic,
clockwise rotation



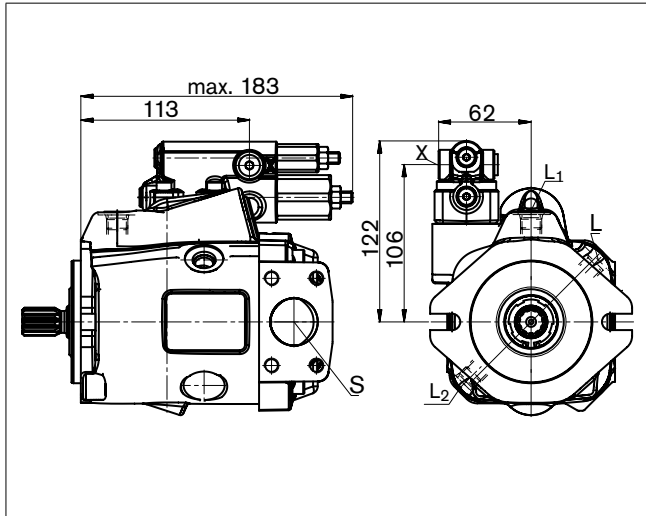
1) Dimensions of service line ports turned through 180° for counter-clockwise rotation

Dimensions size 28

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

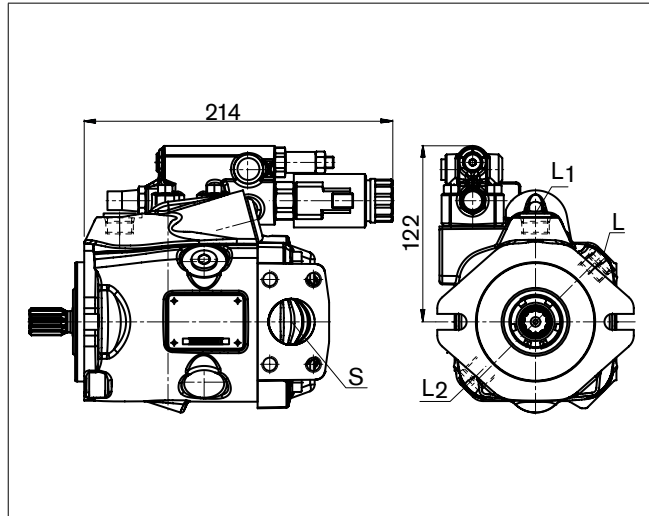
DRG

Pressure control, remotely operated

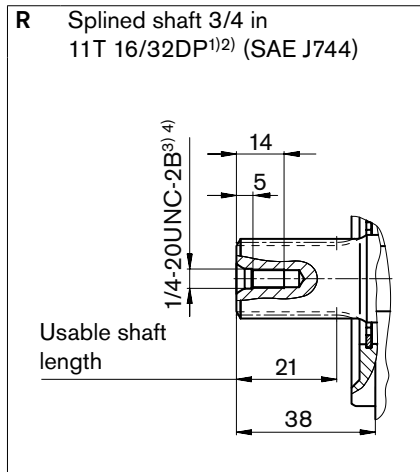
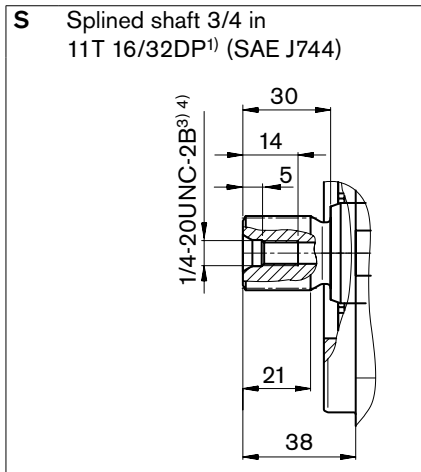


ED7.

Electro-hydraulic pressure control



Drive shaft



Ports

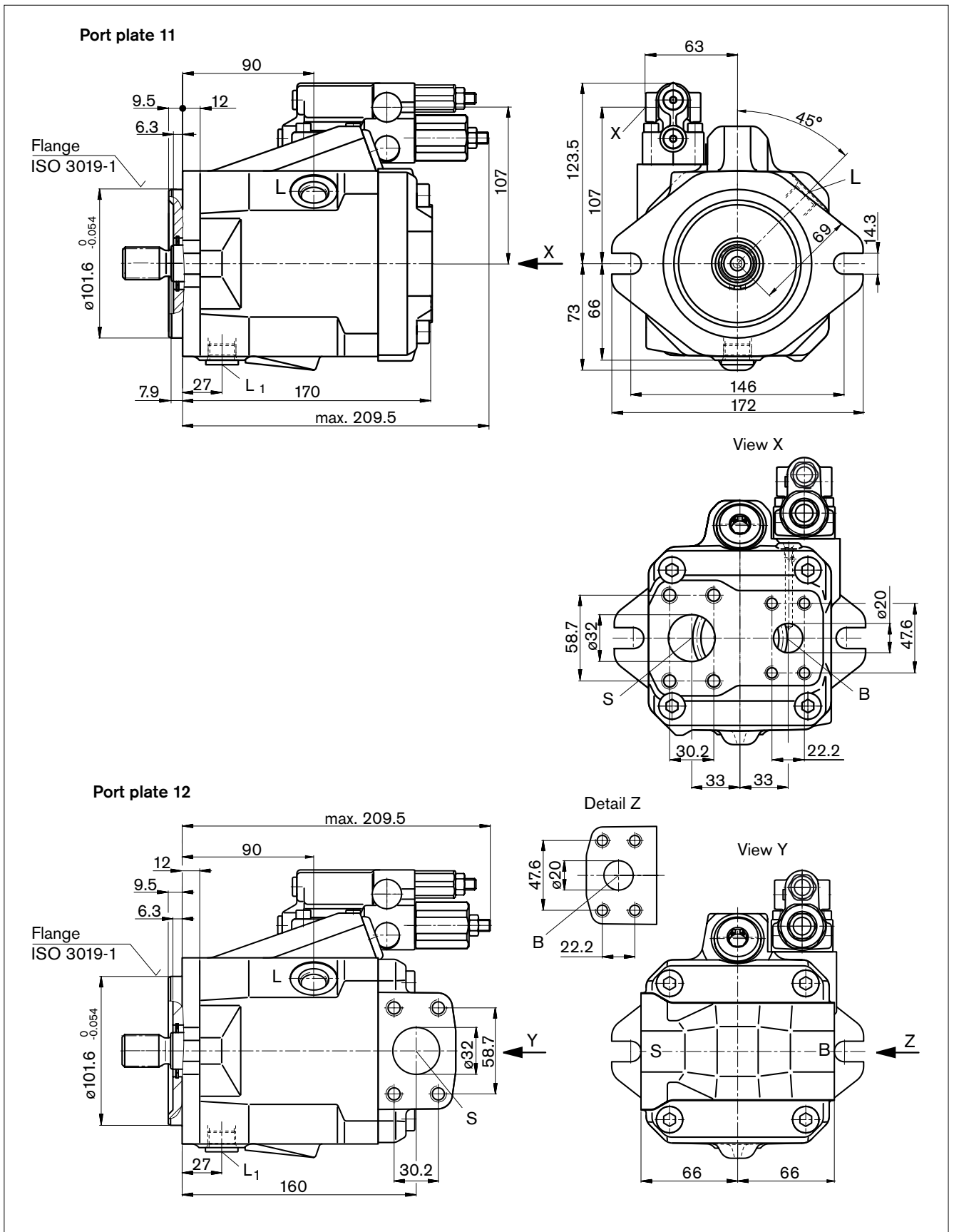
Designation	Port for	Standard	Size ⁴⁾	Maximum pressure [bar] ⁵⁾	State
B	Service line, fastening thread	SAE J518 ⁶⁾ DIN 13	3/4 in M10 x 1.5; 17 deep	250	O
S	Suction line, fastening thread	SAE J518 ⁶⁾ DIN 13	1 1/4 in M10 x 1.5; 17 deep	5	O
L	Case drain fluid	ISO 11926 ⁷⁾	3/4-16UNF-2B; 12 deep	2	O ⁸⁾
L ₁ , L ₂	Case drain fluid	ISO 11926 ⁷⁾	3/4-16UNF-2B; 12 deep	2	X ⁸⁾
X	Pilot pressure	ISO 11926 ⁷⁾	7/16-20UNF-2A; 11.5 deep	250	O

- 1) ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
- 2) Splines according to ANSI B92.1a, run out of spline is a deviation from standard
- 3) Thread according to ASME B1.1
- 4) Observe the general instructions on page 20 for the maximum tightening torques.
- 5) Momentary pressure spikes may occur depending on the application. Keep this in mind when selecting measuring devices and fittings.
- 6) Only dimensions compliant with SAE J518, metric fastening thread deviating from the standard.
- 7) The spot face can be deeper than as specified in the standard
- 8) Depending on the installation position, L, L₁ or L₂ must be connected (please refer to installation instructions on pages 18 and 19).
O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions, size 45¹⁾

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

DRS – Pressure and flow control, hydraulic,
clockwise rotation



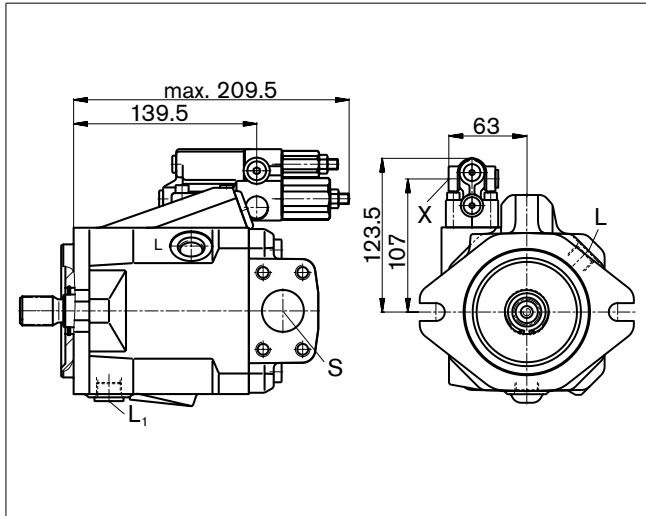
1) Dimensions of service line ports turned through 180° for counter-clockwise rotation

Dimensions size 45

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

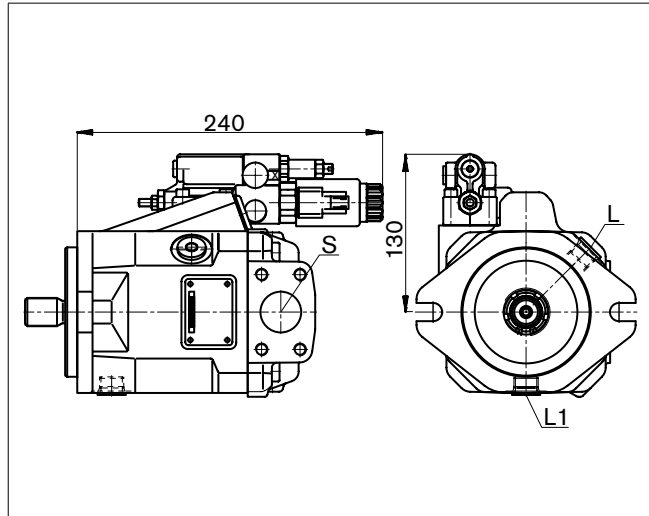
DRG

Pressure control, remotely operated

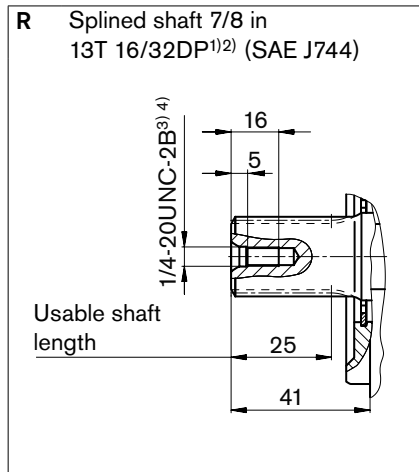
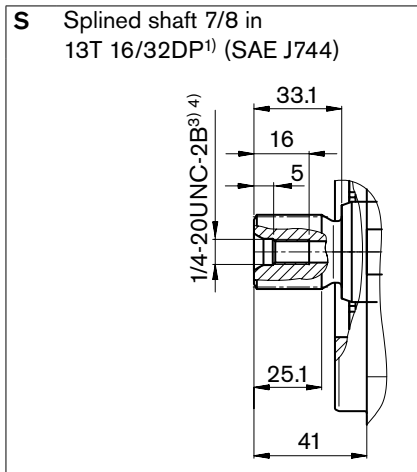


ED7.

Electro-hydraulic pressure control



Drive shaft



Ports

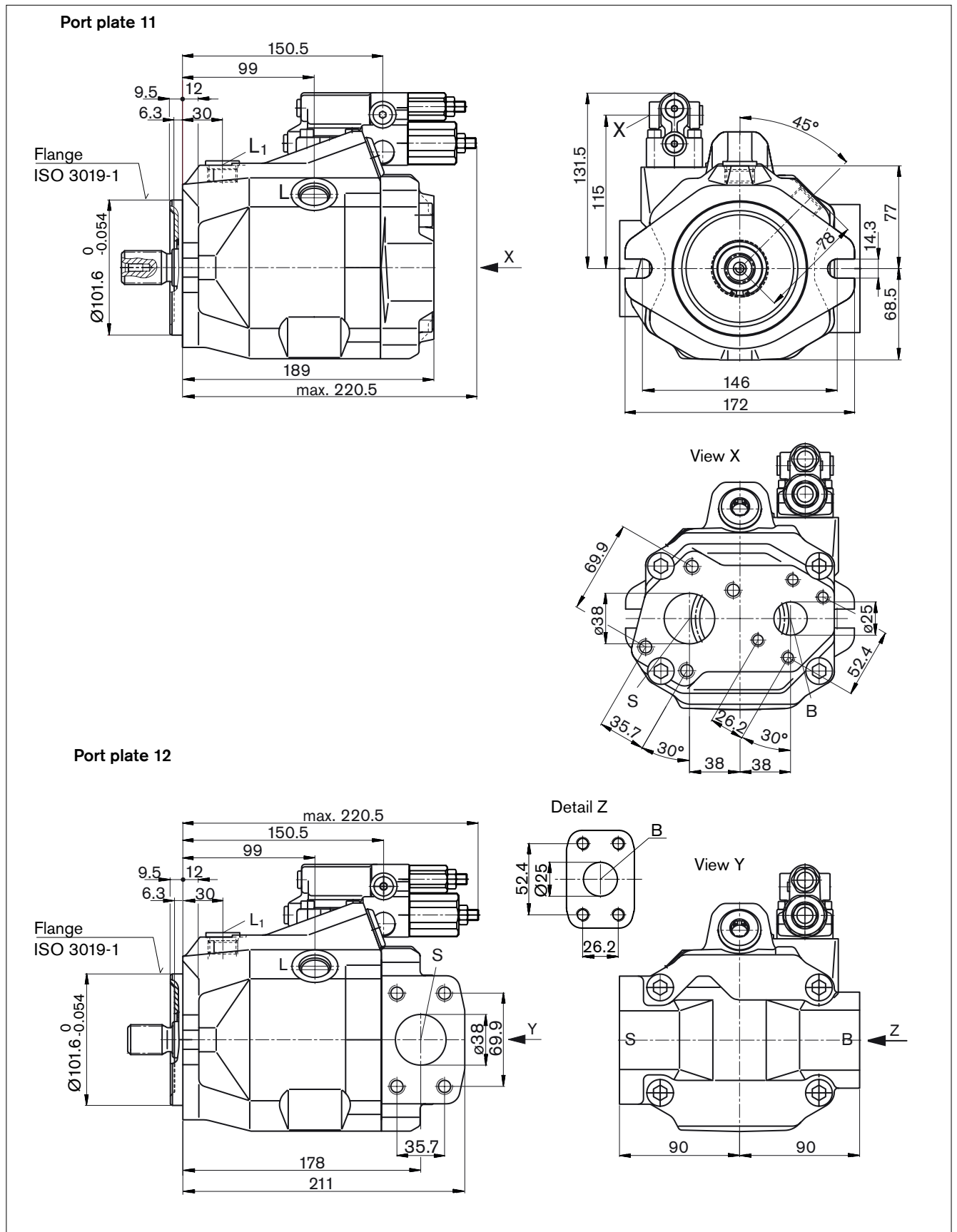
Designation	Port for	Standard	Size ⁴⁾	Maximum pressure [bar] ⁵⁾	State
B	Service line, fastening thread	SAE J518 ⁶⁾ DIN 13	3/4 in M10 x 1.5; 17 deep	250	O
S	Suction line, fastening thread	SAE J518 ⁶⁾ DIN 13	1 1/4 in M10 x 1.5; 17 deep	5	O
L	Case drain fluid	ISO 11926 ⁷⁾	3/4-16UNF-2B; 12 deep	2	O ⁸⁾
L ₁	Case drain fluid	ISO 11926 ⁷⁾	3/4-16UNF-2B; 12 deep	2	X ⁸⁾
X	Pilot pressure	ISO 11926 ⁷⁾	7/16-20UNF-2B; 11.5 deep	250	O

- 1) ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
 - 2) Spline according to ANSI B92.1a, run out of spline is a deviation from standard.
 - 3) Thread according to ASME B1.1
 - 4) Observe the general instructions on page 20 for the maximum tightening torques.
 - 5) Momentary pressure spikes may occur depending on the application. Keep this in mind when selecting measuring devices and fittings.
 - 6) Only dimensions compliant with SAE J518, metric fastening thread deviating from the standard.
 - 7) The spot face can be deeper than specified in the appropriate standard.
 - 8) Depending on the installation position, L or L₁ must be connected (see also installation instructions on pages 18, 19).
- O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions, size 63¹⁾

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

DRS – Pressure and flow control, hydraulic,
clockwise rotation



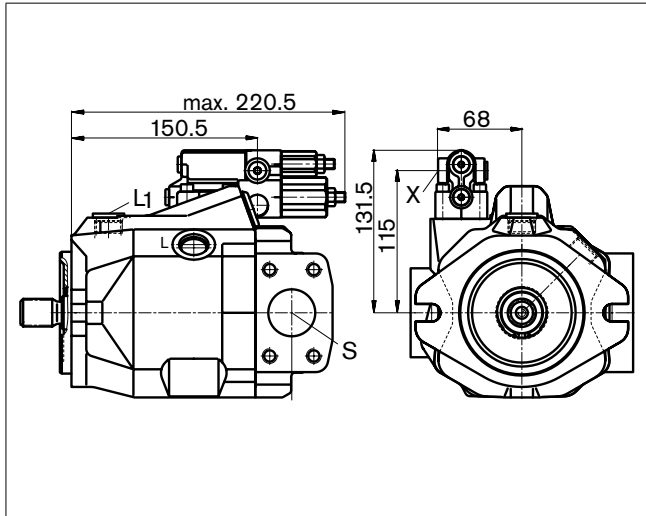
1) Dimensions of service line ports turned through 180° for counter-clockwise rotation

Dimensions size 63

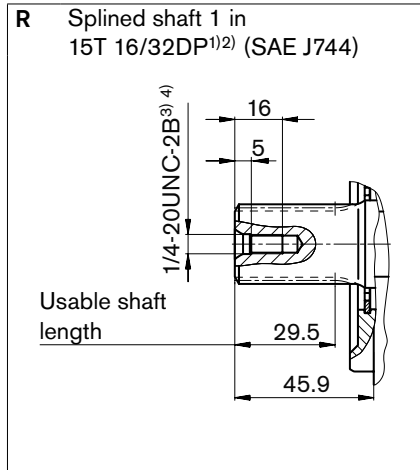
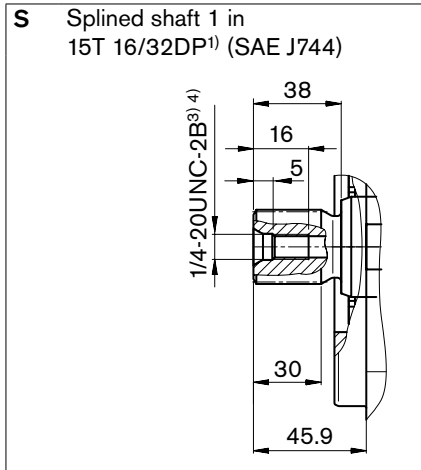
Before finalizing your design, request a binding installation drawing. Dimensions in mm.

DRG

Pressure control, remotely operated



Drive shaft



Ports

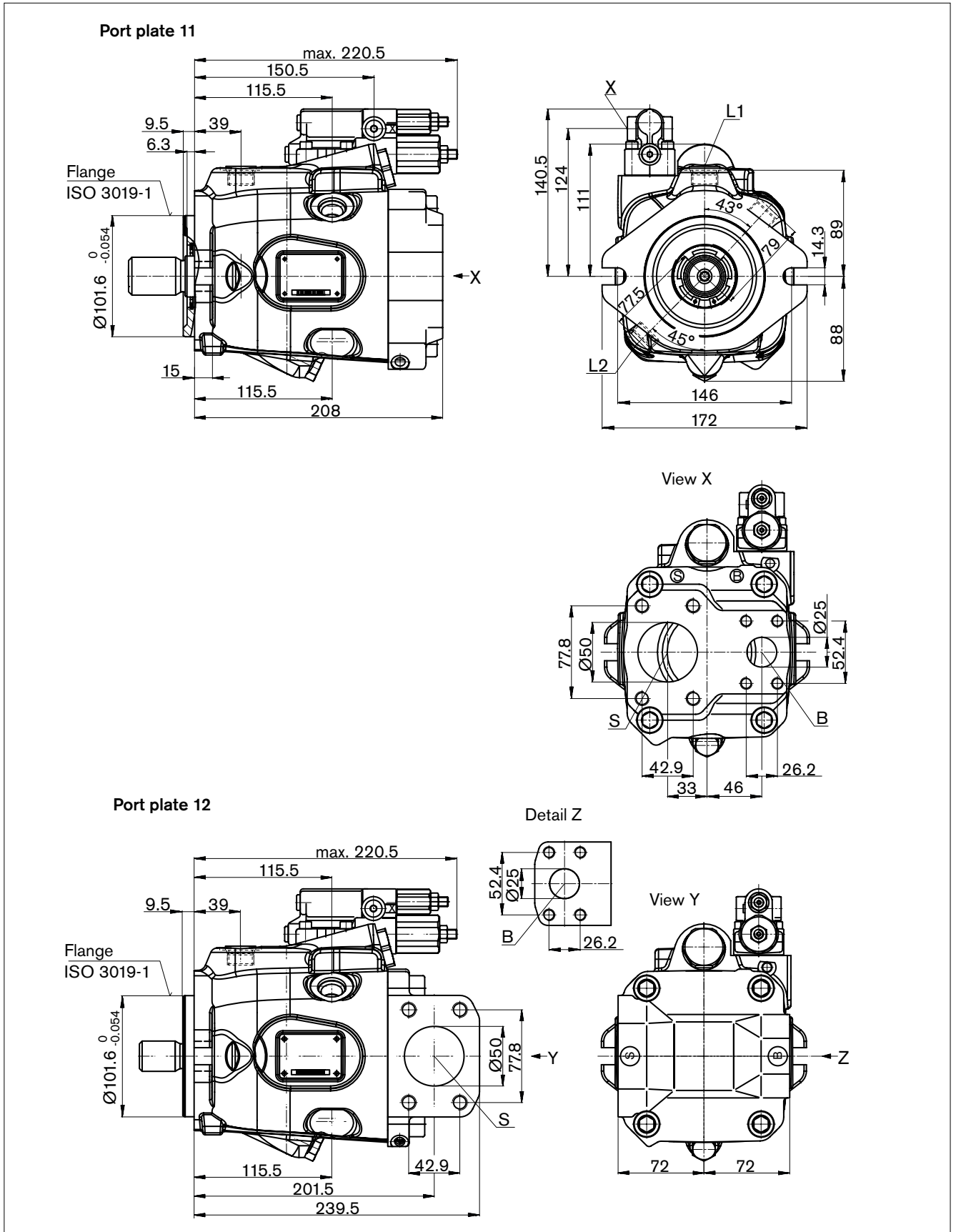
Designation	Port for	Standard	Size ⁴⁾	Maximum pressure [bar] ⁵⁾	State
B	Service line, fastening thread	SAE J518 ⁶⁾ DIN 13	1 in M10 x 1.5; 17 deep	250	O
S	Suction line, fastening thread	SAE J518 ⁶⁾ DIN 13	1 1/2 in M12 x 1.75; 20 deep	5	O
L	Case drain fluid	ISO 11926 ⁷⁾	7/8-14UNF-2B; 13 deep	2	O ⁸⁾
L ₁	Case drain fluid	ISO 11926 ⁷⁾	7/8-14UNF-2B; 13 deep	2	X ⁸⁾
X	Pilot pressure	ISO 11926 ⁷⁾	7/16-20UNF-2A; 11.5 deep	250	O

- 1) ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
 - 2) Spline according to ANSI B92.1a, run out of spline is a deviation from standard.
 - 3) Thread according to ASME B1.1
 - 4) Observe the general instructions on page 20 for the maximum tightening torques.
 - 5) Momentary pressure spikes may occur depending on the application. Keep this in mind when selecting measuring devices and fittings.
 - 6) Only dimensions compliant with SAE J518, metric fastening thread deviating from the standard.
 - 7) The spot face can be deeper than specified in the appropriate standard.
 - 8) Depending on the installation position, L or L₁ must be connected (see also installation instructions on pages 18, 19).
- O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions, size 85¹⁾

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

DRS – Pressure and flow control, hydraulic,
clockwise rotation



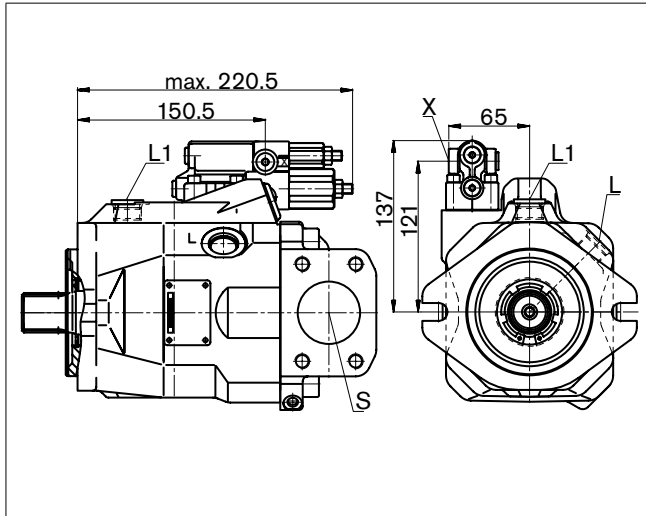
1) Dimensions of service line ports turned through 180° for counter-clockwise rotation

Dimensions size 85

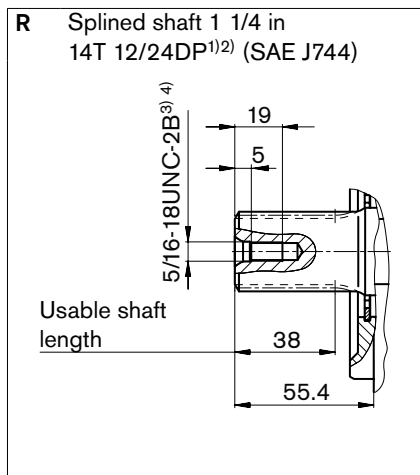
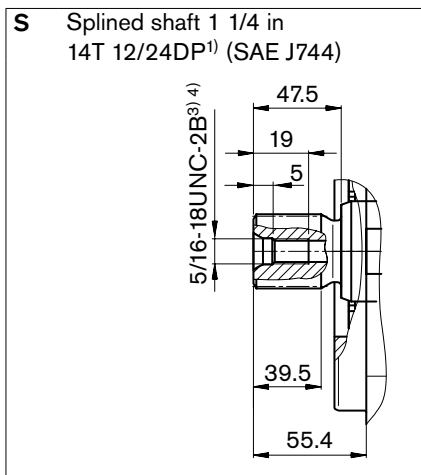
Before finalizing your design, request a binding installation drawing. Dimensions in mm.

DRG

Pressure control, remotely operated



Drive shaft



Ports

Designation	Port for	Standard	Size ⁴⁾	Maximum pressure [bar] ⁵⁾	State
B	Service line, fastening thread	SAE J518 ⁶⁾ DIN 13	1 in M10 x 1.5; 17 deep	250	O
S	Suction line, fastening thread	SAE J518 ⁶⁾ DIN 13	2 in M12 x 1.75; 20 deep	5	O
L	Case drain fluid	ISO 11926 ⁷⁾	7/8-14UNF-2B; 13 deep	2	O ⁸⁾
L ₁ , L ₂	Case drain fluid	ISO 11926 ⁷⁾	7/8-14UNF-2B; 13 deep	2	X ⁸⁾
X	Pilot pressure	ISO 11926 ⁷⁾	7/16-20UNF-2A; 11.5 deep	250	O

- 1) ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
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 - 7) The spot face can be deeper than specified in the appropriate standard.
 - 8) Depending on the installation position, L, L₁ or L₂ must be connected (please refer to installation instructions on pages 18 and 19).
- O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Connector for solenoids

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

DEUTSCH DT04-2P-EP04, 2-pin

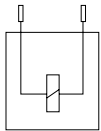
Molded, without bidirectional suppressor diode _____ P

There is the following type of protection with mounted mating connector:

IP67 _____ DIN/EN 60529
and IP69K _____ DIN 40050-9

Circuit symbol

Without bidirectional suppressor diode



Mating connector

DEUTSCH DT06-2S-EP04

Bosch Rexroth Mat. No. R902601804

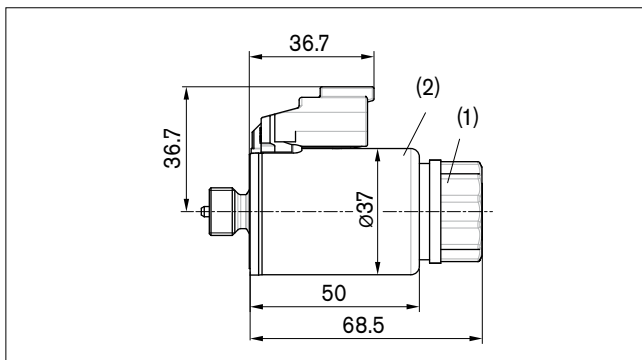
Consisting of: _____ DT designation

– 1 housing _____ DT06-2S-EP04

– 1 wedge _____ W2S

– 2 sockets _____ 0462-201-16141

The mating connector is not included in the delivery contents. This can be supplied by Bosch Rexroth on request.



Changing connector orientation

If necessary, you can change the connector orientation by turning the solenoid housing.

To do this, proceed as follows:

1. Loosen the mounting nut (1) of the solenoid. To do this, turn the mounting nut (1) one turn counter-clockwise.
2. Turn the solenoid body (2) to the desired position.
3. Retighten the mounting nut of the solenoid. Tightening torque: 5+1 Nm (size WAF 26, 12kt DIN 3124).

On delivery, the connector orientation may differ from that shown in the brochure or drawing.

Electronic controls

Control	Electronics function	Electronics		Further information
Electric pressure control	Controlled power outlet	RA	analog	RE 95230
		RC2-2/21 ¹⁾	digital	RE 95201

1) Power outlets for 2 valves, can be actuated separately

2) only 24V nominal voltage

Installation instructions

General

During commissioning and operation, the axial piston unit must be filled with hydraulic fluid and air bled. This must also be observed following a relatively long standstill as the axial piston unit may drain back to the reservoir via the hydraulic lines.

Especially with the installation position "drive shaft upwards" or "drive shaft downward", attention must be paid to a complete filling and air bleeding since there is a risk, for example, of dry running.

The case drain fluid in the motor housing must be directed to the reservoir via the highest case drain port (L, L₁, L₂).

For combinations of multiple units, make sure that the respective case pressure in each unit is not exceeded. In the event of pressure differences at the drain ports of the units, the shared drain line must be changed so that the minimum permissible case pressure of all connected units is not exceeded in any situation. If this is not possible, separate drain lines must be laid if necessary.

To achieve favorable noise values, decouple all connecting lines using elastic elements and avoid above-reservoir installation.

In all operating conditions, the suction line and case drain line must flow into the reservoir below the minimum fluid level. The permissible suction height h_s results from the overall loss of pressure; it must not, however, be higher than $h_{s\ max} = 800\ mm$. The minimum suction pressure at port S must also not fall below 0.8 bar absolute during operation or upon a cold start.

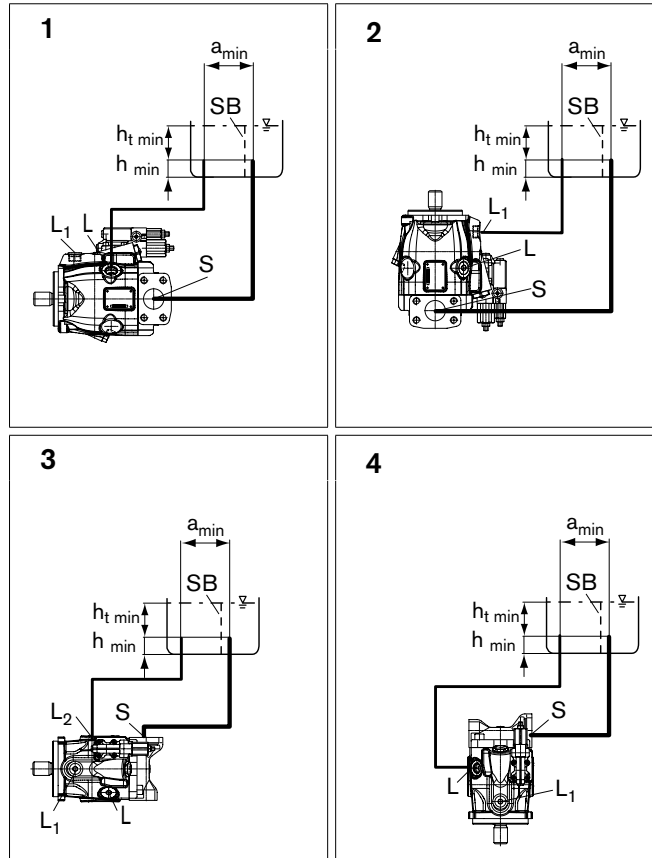
Installation position

See the following examples 1 to 12. Further installation positions are available upon request.

Recommended installation positions: 1 and 3.

Below-reservoir installation (standard)

Below-reservoir installation means that the axial piston unit is installed outside of the reservoir below the minimum fluid level.



Installation position	Air bleed	Filling
1	L	S + L
2	L ₁	S + L ₁
3 ¹⁾	L ₂	S + L ₂
4	L	S + L

Key, see page 19.

1) Only series 53

Installation instructions

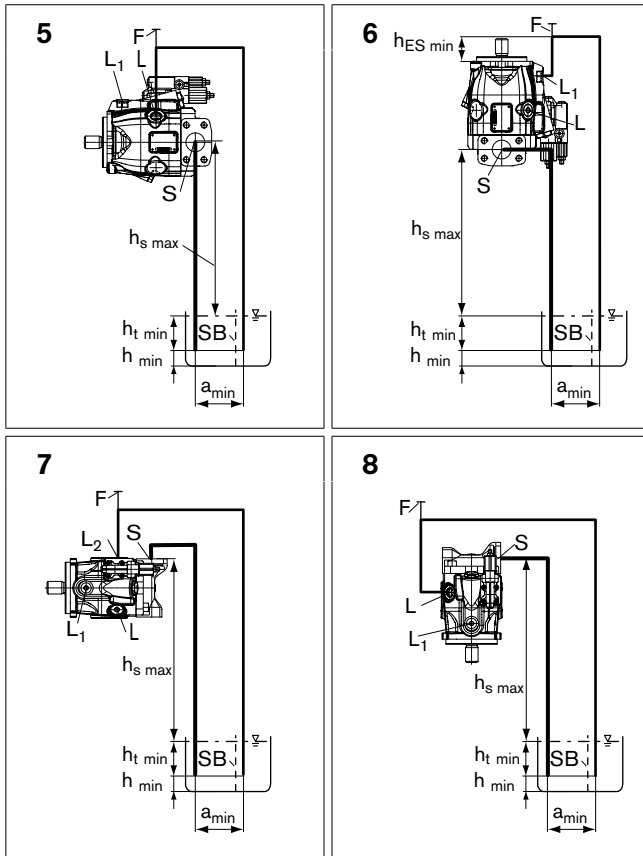
Above-reservoir installation

Above-reservoir installation means that the axial piston unit is installed above the minimum fluid level of the reservoir.

To prevent the axial piston unit from draining, a height difference $h_{ES\ min}$ of at least 25 mm is required in installation position 6

Observe the maximum permissible suction height $h_{S\ max} = 800\ mm$.

A check valve in the case drain line is only permissible in individual cases. Consult us for approval.



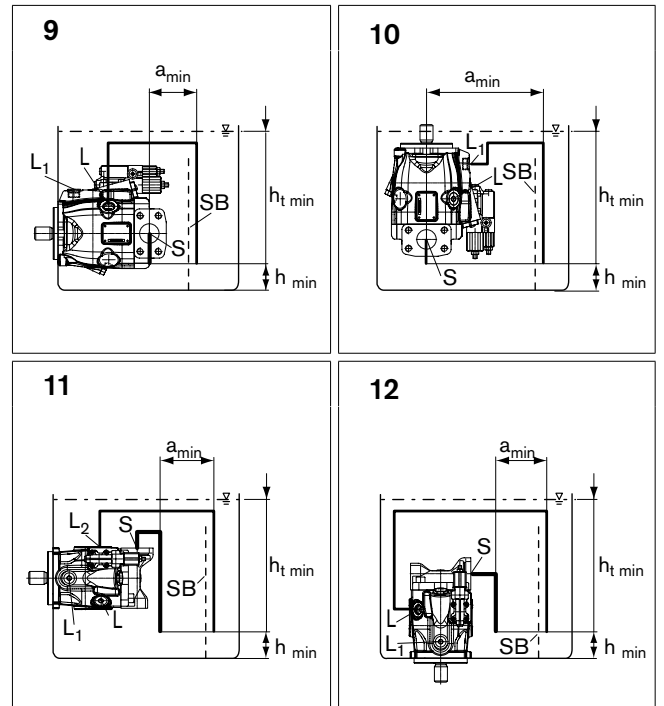
Installation position	Air bleed	Filling
5	F	L, L ₁ (F)
6	F	L ₁ (F)
7 ¹⁾	F	S + L ₂ (F)
8	F	S + L (F)

1) Only series 53

Inside-reservoir installation

Inside-reservoir installation means the pump is installed within the minimum reservoir fluid level.

Axial piston units with electrical components (e.g. electric control, sensors) may not be installed in a reservoir below the fluid level.



Installation position	Air bleed	Filling
9	L ₁	L, L ₁
10	L ₁	L, L ₁
11 ¹⁾	L ₂	S
12	L	S + L

- S** Suction port
- F** Filling / air bleed
- L, L₁** Case drain port
- SB** Baffle (baffle plate)
- $h_{t\ min}$** Minimum required immersion depth (200 mm)
- h_{min}** Minimum required spacing to reservoir bottom (100 mm)
- $h_{ES\ min}$** Minimum required height needed to protect the axial piston unit from draining (25 mm).
- $h_{S\ max}$** Maximum permissible suction height (800 mm)
- a_{min}** When designing the reservoir, ensure adequate distance between the suction line and the case drain line. This prevents the heated, return flow from being drawn directly back into the suction line.

General instructions

- The A10VNO pump is designed to be used in open circuit.
- The project planning, installation and commissioning of the axial piston unit requires the involvement of qualified personnel.
- Before using the axial piston unit, please read the corresponding instruction manual completely and thoroughly. If necessary, these can be requested from Bosch Rexroth.
- During and shortly after operation, there is a risk of burns on the axial piston unit and especially on the solenoids. Take appropriate safety measures (e. g. by wearing protective clothing).
- Depending on the operating conditions of the axial piston unit (operating pressure, fluid temperature), the characteristic may shift.
- Service line ports:
 - The ports and fastening threads are designed for the specified maximum pressure. The machine or system manufacturer must ensure that the connecting elements and lines correspond to the specified operating conditions (pressure, flow, hydraulic fluid, temperature) with the necessary safety factors.
 - The service line ports and function ports can only be used to accommodate hydraulic lines.
- Pressure cut-off and pressure control do not provide security against pressure overload. A separate pressure relief valve is to be provided in the hydraulic system.
- The data and notes contained herein must be adhered to.
- The product is not approved as a component for the safety concept of a general machine according to ISO 13849.
- The following tightening torques apply:
 - Fittings:
 - Observe the manufacturer's instruction regarding the tightening torques of the used fittings.
 - Mounting bolts:
 - For mounting bolts with metric ISO thread according to DIN 13 or thread according to ASME B1.1, we recommend checking the tightening torque individually according to VDI 2230.
 - Female threads in axial piston unit:
 - The maximum permissible tightening torques $M_{G \max}$ are maximum values for the female threads and must not be exceeded. For values, see the following table.
 - Threaded plugs:
 - For the metal threaded plugs supplied with the axial piston unit, the required tightening torques of the threaded plugs M_V apply. For values, see the following table.

Ports		Maximum permissible tightening torque for female threads $M_{G \max}$	Required tightening torque for threaded plugs M_V	Size of hexagon socket of threaded plugs
Standard	Size of thread			
ISO 11926	7/16-20UNF-2B	40 Nm	18 Nm	3/16 in
	3/4-16UNF-2B	160 Nm	70 Nm	5/16 in
	7/8-14UNF-2B	240 Nm	110 Nm	3/8 in