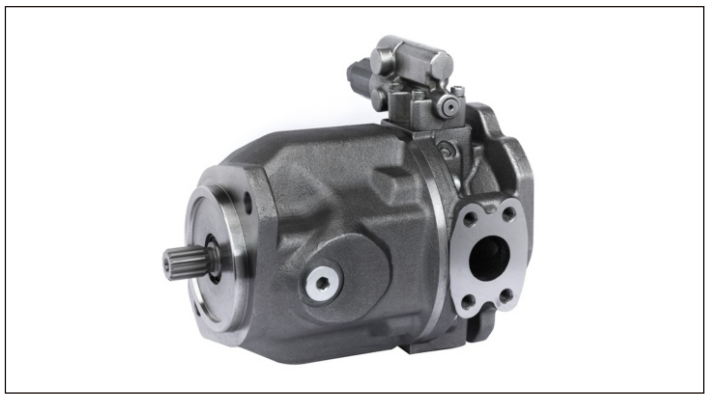
A10VO Series 53
Axial Piston Variable Pump

Product show and brief introduction

Open Circuit

Size 63
Series 53
Nominal Perssure 25 MPa
Peak pressure 31.5 MPa



Features

- Variable pump with axial piston rotary group in swashplate design for hydraulic drives in open circuit
- Flow is proportional to drive speed and displacement
- The flow can be infinitely varied by adjusting the swashplate angle
- Stable bearing for long service life
- High permissible drive speed
- Favorable power-tor-weight ratio-compact dimensions
- Low nosie
- Excellent suction characteristics
- Electro-hydraulic pressure control
- Power control
- Electro-proportional swivel angle control
- Short control response times

Model Code

A10V	O	63	DR	/53	R	-V	S	C	12	N00
Axial piston unit	Operating mode	Size (mL/r)	Control device	Series	Direction of rotation	Sealing material	Drive shaft	Mounting flange	Working port	Through drive
A10V: Swashplate design, variable	O: Pump, open circuits	63	DR: Pressure controller DRG: Pressure control, remote controlled DFR: Pressure /flow control DFR1: Pressure /flow control, without orifice in X-line LA*DS.: pressure, flow and power controller	53	(Viewed on drive shaft) R: clockwise L: counter-clockwise	V: FKM (fluor~ caoutchouc)	See below	C: SAE 2-hole	12: SAE flange ports , fastening thread metric, laterally opposite	N00: without through drive

Shaft end

Size			63
Splined shaft	standard shaft	S	✓
	similar to shaft S however for higher torque	R	✓
	reduced diameter,limited suitability for through drive	U	✓
	similar to shaft U, however for higher torque, only conditionally suitable for mounting with through dirve	W	✓

Technical Data

Hydraulic fluid

The A10VO variable displacement pump is suitable for use with mineral oil.

Operating viscosity range

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

V_{opt}=operating viscosity 16...36 mm^2/s

Referred to the reservoir temperature(open circuit).

Viscosity limits

The limiting values for viscosity are as follows:

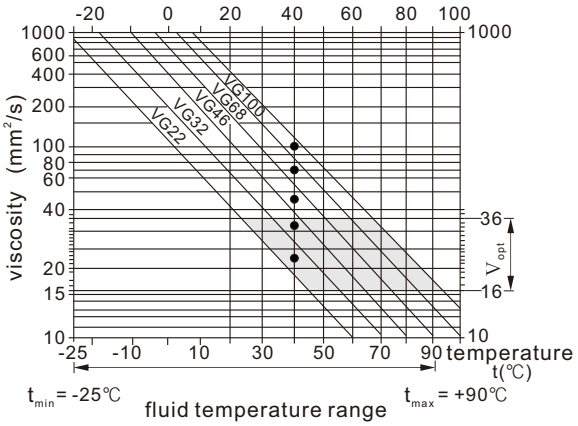
V_{min}=10 mm^2/s
short term at a max.permissible case temp. of 90℃.

V_{max}=1000 mm^2/s
short term on cold start

Temperature range (see selection diagram)

t_{min}=-25℃
t_{max}=90℃

Selection diagram



Notes on the selection of the hydraulic fluid

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

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

Example:At an ambient temperature of x˚ the operating temperature is 60˚.Within the operating viscosity range (ν_{opt};shaded area), this corresponds to viscosity ranges VG46 or VG68;VG68 should be selected.

Important:The leakage oil (case drain oil) temperature is influenced by pressure and pump speed and is always higher than the tank temperature. However, at on point in the circuit may the temperature exceed 90˚.

If it is not possible to comply with the above conditions because of extreme operating parameters or high ambient temperatures please consult us.

Filtration

The finer the filtration the better the cleanliness of the pressure fluid and the longer the life of the axial piston unit. To ensure the functioning of the axial piston unit a minimum cleanliness level of:

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

if above mentioned grades cannot be maintained please consult supplier.

Technical Data

Operating pressure range-inlet

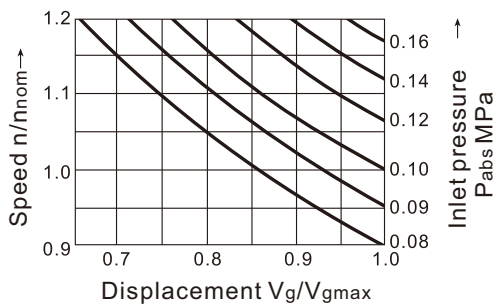
Absolute pressure at port S

$P_{abs\ min}$ _____ 0.08 MPa
$P_{abs\ max}$ _____ 0.5 MPa

Operating pressure range-outlet

Pressure at port B
Nominal pressurre P_N _____ 25 MPa
Peak pressure P_{max} _____ 31.5 MPa

Permissible speed by increasing inlet pressure P_{abs} at suction opening S or at $V_g \le V_{g\ max}$



Technical Data

Case drain pressure

Maximum permissible pressure of leakage fluid (at port L,L_1);
Maximum 0.05 MPa higher than the inlet pressure at port S,
but no higher than 0.2 MPa absolute.

Direction of through flow

S to B

Table of values

在$n_{O\ max}$时
在n_E = 1500rpm时

Size				63
Displacement		$V_{g\ max}$	mL/r	63
Max.speed[1]	at $V_{g\ max}$	n_{nom}	rpm	2600
	at $V_g < V_{g\ max}$	$n_{max\ adm.}$	rpm	3140
Flow	at n_{nom} and V_{gmax}	q_v	L/min	163
	at n_E=1500rpm	q_{vE}	L/min	95
Power (at △P=25 MPa)	at n_{nom} and V_{gmax}	P	kW	68
	at n_E=1500rpm	P_E	kW	39
Torque	at $V_{g\ max}$ and △P=25MPa	T	Nm	250
	at $V_{g\ max}$ and △P=10MPa	T	Nm	100
Case volume		V	L	0.8
Weight (without fluid)		m.	kg	22

1)The values are applicable
- at an abs.pressure P_{abs}=1 bar at the suction port S
- for the optimum viscosity range from v_{opt}=36 to 16 cst
- with hydraulic fluid on the basis of mineral oils

Determination of displacement

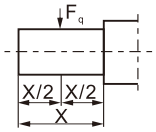
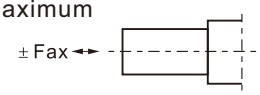
Flow $q_v = \frac{V_g \times n \times \eta_v}{1000}$ (L/min)

Torque $T = \frac{1.59 \times V_g \times \Delta P}{1000 \times \eta_{mh}} = \frac{V_g \times \Delta P}{20 \times \pi \times \eta_{mh}}$ (Nm)

Power $P = \frac{T \times n}{9549} = \frac{2\pi \times T \times n}{60000} = \frac{q_V \times \Delta P}{600 \times \eta_t}$ (kW)

V_g =displacement (mL/r) per revolution
△P = pressure differential (MPa)
n = speed (rpm)
η_v = volumetric efficiency
η_{mh} = mechanical-hydraulic efficiency
η_t = overall efficiency ($\eta_t = \eta_v \times \eta_{mh}$)

Permissible radial and axial forces on the drive shaft

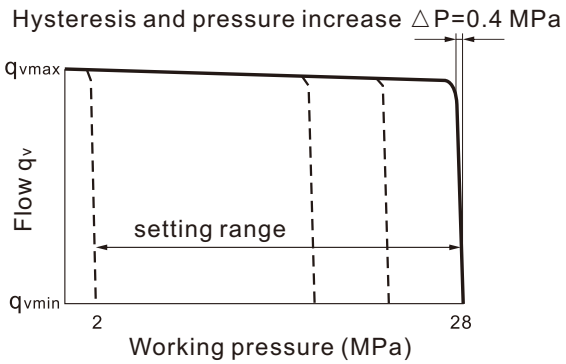
Size				63
Radial force maximum at X/2		$\pm F_{q\ max}$	N	1700
Axial force maximum		$\pm F_{ax\ max}$	N	2000

DR- Pressure controller

The pressure controller limits the maximum pressure at the pump outlet within the control range of the variable pump. The variable pump only supplies as much hydraulic fluid as is required by the consumers.If the working pressure exceeds the pressure command value at the pressure valve,the pump will regulate to a smaller displacement to reduce the control diffenrential.

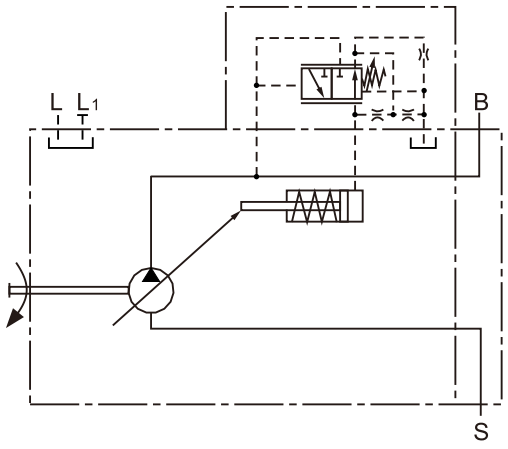
- Basic position in depressurized state: $V_{g\,max}$
- Setting range for pressure control 35 to 250 bar
- Standard is 250 bar

Characteristic curve DR



Characteristic curve valid for n_1 =1500rpm and ϑ_{fluid}=50 ℃

Circuit diagram DR



Controller data

Pressure increase △P. 8bar
Hysteresis and repeat accuracy △P max.3 bar
Pilot fluid consumption maximum approx.3L/min

DRG- Pressure controller,remotely controlled

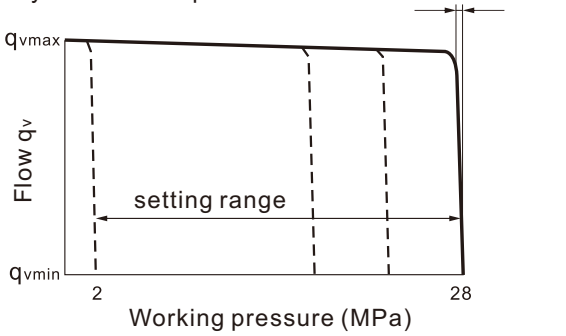
For the remote controlled pressure controller,the LS pressure limitation is performed using a separately arranged pressure relief valve.Thereforre,any pressure control value under the pressure set on the pressure controller can be regulated.Pressure controller DR see page 5.
A pressure relief valve is externally piped to port X for remote control.This relief valve is not included in the scope of delivery of the DRG control.
When there is differential pressure P. at the controlb valve and with the standard setting on the remote controlled pressure cut-off of 20 bar,the amount of control fluid at the port is X approx.1.5 L/min.If another setting is required (range from 10 to 22 bar) please state in plain text.
As a separate pressure relief valve (1) we recommend:
- a direct operated,hydraulic or electric proportional one, suitable for the control fluid mentioned above.

The maximum line length should not exceed 2 m.
- Basic position in depressurized state:Vg max
- Setting range for pressure control 35 to 250 bar (3) Standard is 250 bar
- Setting range for differential pressure 10 to 22 bar(2) Standard is 20 bar.

Unloading on port X to the reservoir results in a zero stroke pressure ("standby") pressure which lies about 1 to 2 bar higher than the differential pressure △P,however, other system influences are not taken into account.

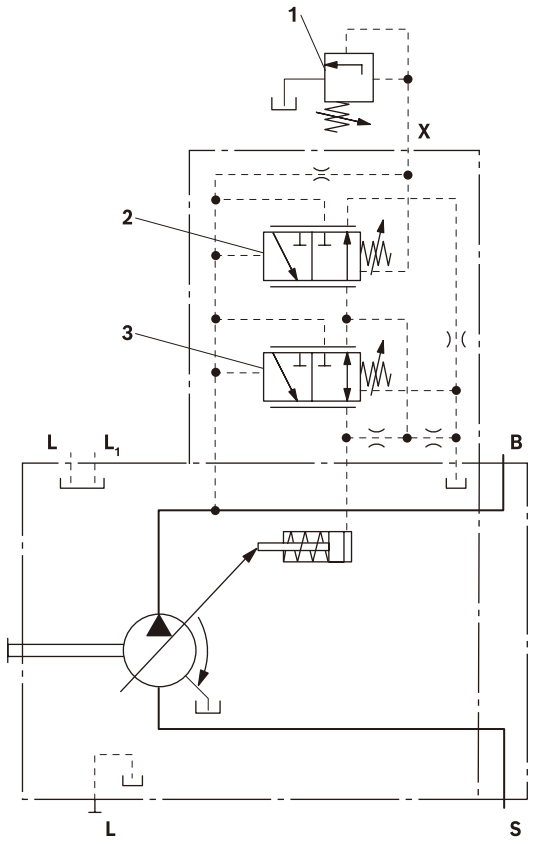
Characteristic curve DR

Hysteresis and pressure increase △P=0.4 MPa



Characteristic curve valid for n_1 =1500rpm and ϑ_{fluid}=50 ℃

Circuit diagram DRG



1 The separate pressure relief valve and the line are not included in the scope of delivery
2 Remote controlled pressure cut-off (G)
3 Pressure controller (DR)

Controller data

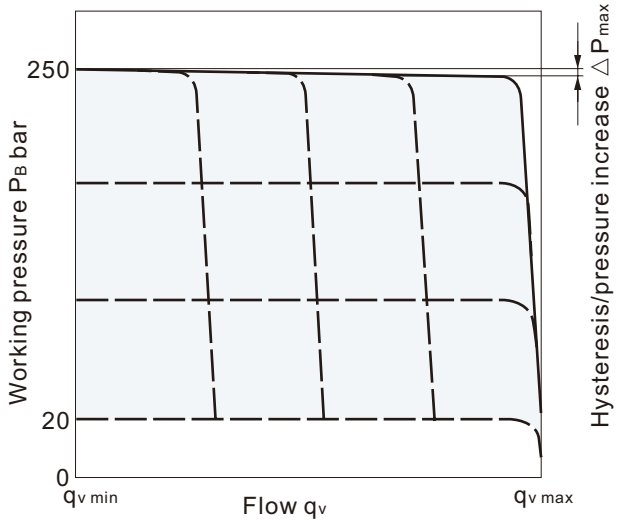
Size		63
Pressure increase △P	bar	8
Hysteresis and repeat accuracy △P	bar	max. 3
Pilot fluid consumption	L/min	max. approx. 4.5

DFR/DFR1- Pressure flow controller

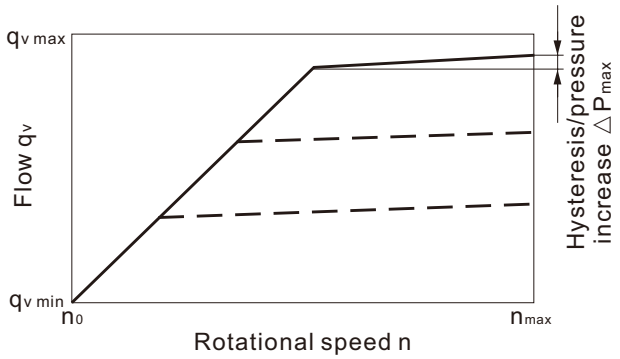
In addition to the pressure controller function (see page 5), an adjustable orifice(e.g.directional valve) is used to adjust the differential pressure upstream and downstream of the orifice.This is used to control the pump flow.The pump flow is equal to the actual hydraulic fluid quantity required by the consumer.With all controller combinations, the Vg reduction has priority.

- Basic position in depressurized state:Vg max
- Setting range for pressure for 250 bar
- DR pressure controller data see page 5

Characteristic curve DFR/DFR1

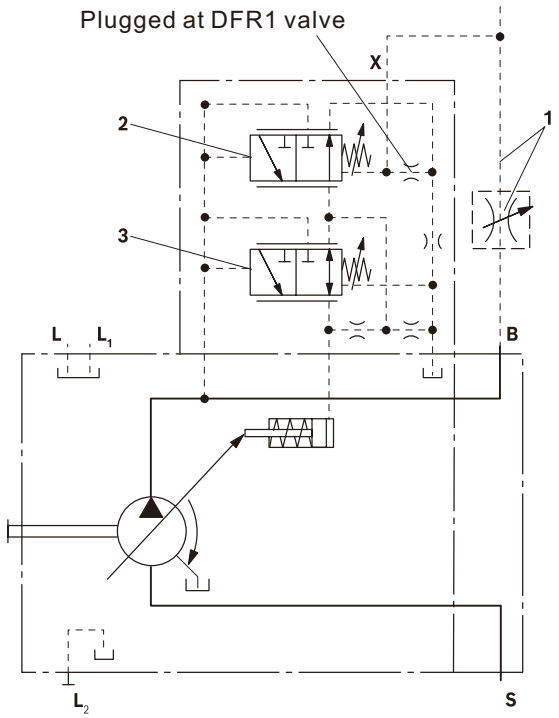


Characteristic curve at variable rotational speed



Characteristic curve valid for n_1 =1500rpm and ϑ_{fluid}=50 ℃

Circuit diagram DFR



1 The metering orifice(control block) and the line are not included in the scope of delivery
2 Flow controller (FR)
3 Pressure controller (DR)

Differential pressure △P:

- Standard setting:14 bar
  If another setting is required,please state in clear text.
- Setting range:14 to 22 bar

Unloading on port X to the reservoir sesults in a zero stroke pressureC ("standby") pressure which lies about 1 to 2 bar higher than the differential pressure △P,however, other system influences are not taken into account.

Controller data

- DR pressure controller data see page 5
- Maximum flow deviation measured at drive speed n=1500rpm

Size		63
Flow deviation △qv max	L/min	2.5
Hysteresis; repeat accuracy △P	bar	max. 3
Pilot fluid consumption	L/min	max. approx.(3- 4.5)(DFR) max. approx.(3)(DFR1)

LA...-Pressure,flow and power controller

In order to achieve a constant drive torque with varying operating pressures,the swivel angle and with it the volume flow from the axial piston pump is varied so that the product of flow and pressure remains constant.
Flow control is possible below the power control curve.

Controller data

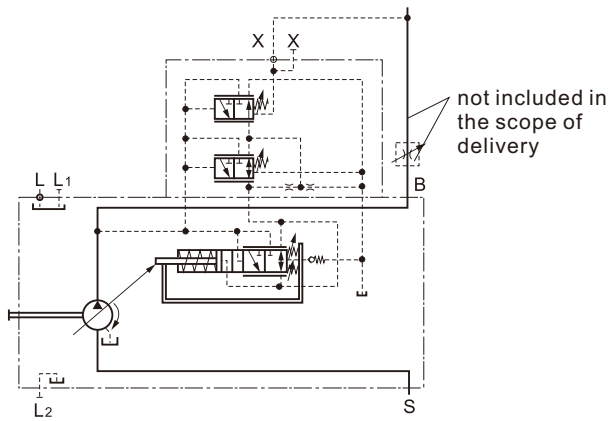
Pressure controller DR see page 5.

Pressure and flow controller DFR see page 7.

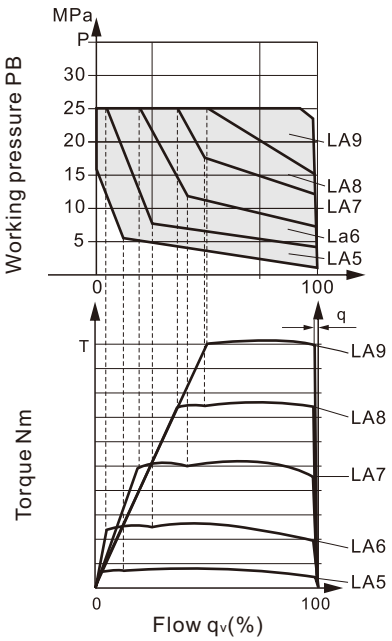
Pilot fluid consumption max.approx.3L/min.

Beginning of conftrol(MPa)	Torque(Nm)	order code
1.0~3.5	15~43	LA5
3.6~7.0	43.1~83	LA6
7.1~10.5	83.1~119	LA7
10.6~14.0	119.1~157	LA8
14.1~23.0	157.1~265	LA9

Circuit diagram

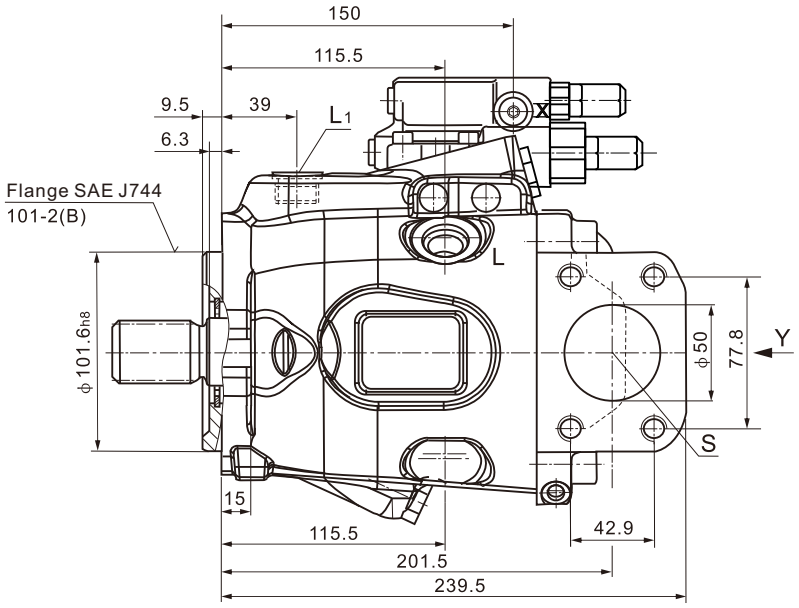


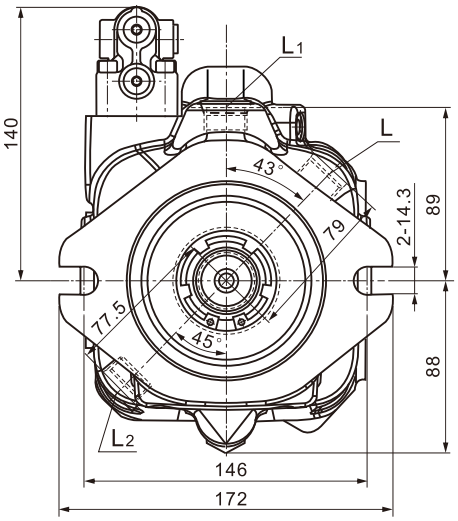
Characteristic curve



Installation Dimensions

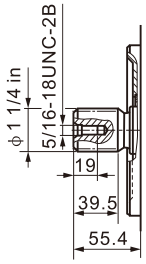
DR(DRG/DFR/DFR1) control



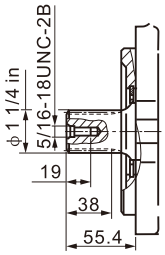


Drive shaft

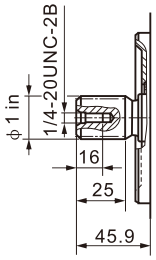
S splined shaft
1-1/4" 14T 12/24DP[1)]
SAE J744-32-4(C))



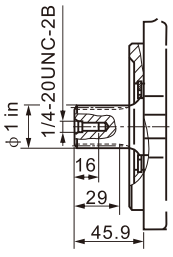
R splined shaft
1-1/4" 14T 12/24DP[1)]
SAE J744-32-4(C))



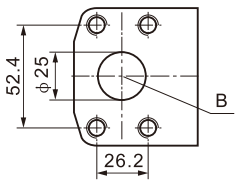
U splined shaft
1" 15T 16/32DP[1)]
SAE J744-25-4(B-B)



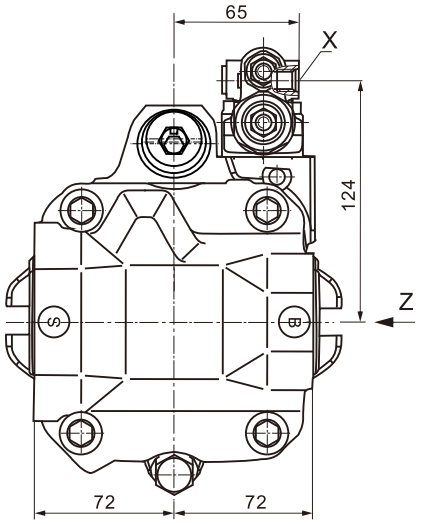
W splined shaft
1" 15T 16/32DP[1)]
SAE J744-25-4(B-B)



View Z



View Y(clockwise)



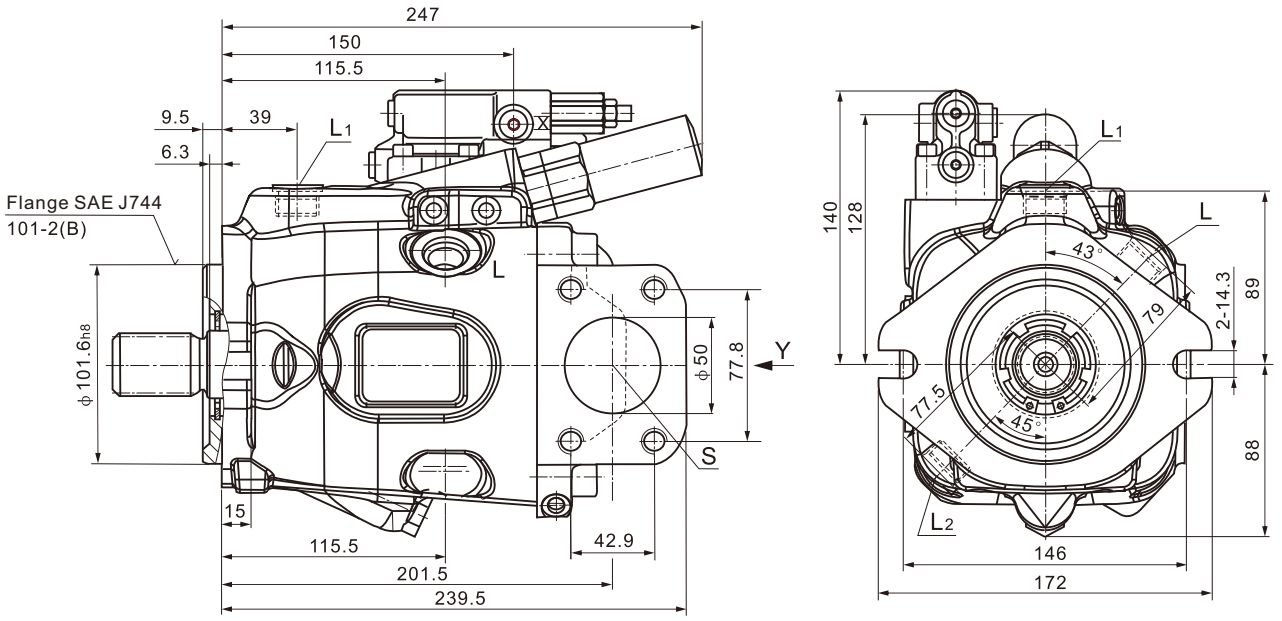
Dimensions of working ports turned through 180° for counter-clockwise rotation

Ports

B	working port(standard pressure series) Fastening thread	SAE J518C	ϕ25 M10,17 deep 60N.m
S	Suction port(standard pressure series) Fastening thread	SAE J518C	ϕ25 M12,20 deep 130N.m
L/L1	Drain port	ISO 11926	7/8-14UNF-2B 240N · m
X	Pilot pressure	ISO 11926	7/16-20UNF-2B;11.5 deep 40N.m

Installation Dimensions

LA. . . . Control



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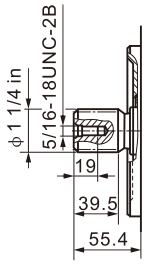
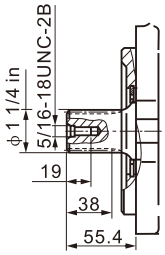
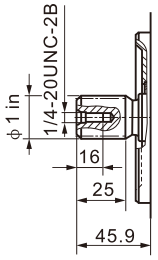
SAE J744-32-4(C))



R splined shaft
1-1/4" 14T 12/24DP[1)]
SAE J744-32-4(C))



U splined shaft
1" 15T 16/32DP[1)]
SAE J744-25-4(B-B)



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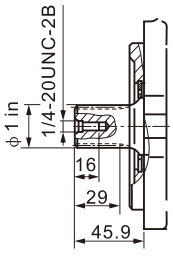
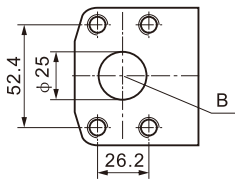
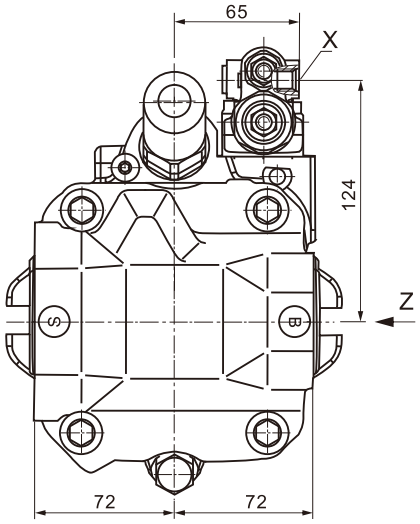
SAE J744-25-4(B-B)



View Z



View Y(clockwise)



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for counter-clockwise rotation

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L/L1	Drain port	ISO 11926	7/8-14UNF-2B 240N · m
X	Pilot pressure	ISO 11926	7/16-20UNF-2B;11.5 deep 40N.m

1) Involute spline according to ANSI B92.1a, 30° pressure angle,flat root,side fit,tolerance class 5