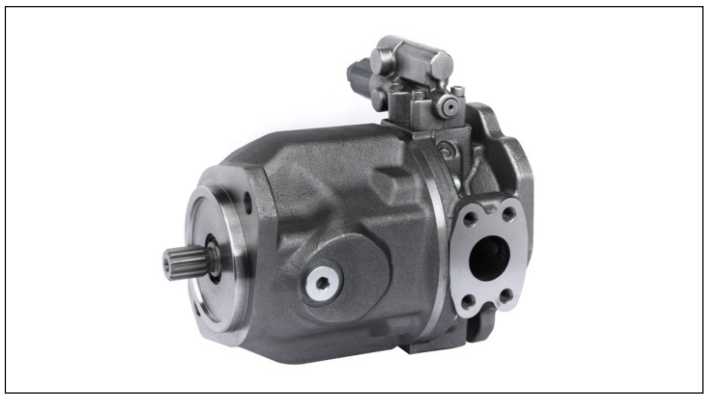
A10VSO Series
Axial Piston Variable Pump

Product show and brief introduction

Open Circuit

Size 28...140
Series 31
Nominal Perssure 28 MPa
Peak pressure 35 MPa



Features

— Variable pump witch axial piston rotary group in swashplate design for hydraulic open circuit.
— Flow is proportional to drive speed and displacement.
— The flow can be smoothly changed by adjustment.
— 2 drain ports.
— Excullent suction characteristics.
— Low noise level
— Long service life
— Good power to weight ratio.
— Versation controller range.
— Short control times.
— The through drive is suitable for adding gear pumps and axial pistion pumps up to the same size,i.e.,100% through drive.

Model Code

A10VS	O	71	DR	/31	R	-P	P	A	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
A10VS: Swashplate design, variable, nominal pressure 28 MPa, Maximum pressure 35MPa.	O: Pump, open circuits	18	DR: Pressure controller	31	(Viewed on drive shaft)	P: NBR nitrl~ caoutchouc to DIN ISO 1629 (shalft seal in FKM)	See below	A: ISO 2-hole	12: SAE flange ports according to ISO 6162 working ports, fastening thread metric, lateral top botton	See below
		28	DRG: Pressure control, remote controlled		R: clockwise			C: SAE 2-hole	62: SAE flange ports according to ISO 6162 working ports, fastening thread UNC, lateral top botton	
		45	DFR: Pressure /flow control							
		71	DFR1: Pressure /flow control, without orifice in X-line		L: counter-clockwise	V: FKM fluor~ caoutchouc to DIN ISO 1629				
		100						B: ISO 4-hole D: SAE 4-hole		
		140	DFLR: pressure, flow and power controller							

Shaft end

Size		18	28	45	71	100	140
Parallel with key DIN6885	P	✓	✓	✓	✓	✓	✓
Parallel with key SAE	K	✓	✓	✓	✓	✓	✓
Splined shaft SAE	S	3/4"	7/8"	1"	1 1/4"	1 1/2"	1 3/4"
Splined shaft SAE (higher through-shaft drive torque)	R	/	7/8"	1"	1 1/4"	/	/
Splined shaft SAE (limited suitability for through drive)	U	5/8"	/	7/8"	/	1 1/4"	/

Through drives

Installation of flange	Hub for shaft diameter	Acceptable		18	28	45	71	100	140
Withiout through drive			N00	✓	✓	✓	✓	✓	✓
ISO 80,2-hole	splined shaft 3/4"19-4(SAE A-B)	A10VSO18(shaft S or R)	KB2	/	✓	✓	✓	✓	✓
ISO 80,2-hole	with key shaft Φ18	A10VSO18(shaft P)	K51	/	✓	✓	✓	✓	✓
ISO 100,2-hole	splined shaft 7/8"22-4(SAE B)	A10VSO28(shaft S or R)	KB3	/	✓	✓	✓	✓	✓
ISO 100,2-hole	with key shaft Φ22	A10VSO28(shaft P)	K25	/	✓	✓	✓	✓	✓
ISO 100,2-hole	splined shaft 1"25-4(SAE B-B)	A10VSO45(shaft S or R)	KB4	/	/	✓	✓	✓	✓
ISO 100,2-hole	with key shaft Φ25	A10VSO45(shaft P)	K26	/	/	✓	✓	✓	✓
ISO 125,2-hole	splined shaft 1 1/4"32-4(SAE C)	A10VSO71(shaft S or R)	KB5	/	/	/	✓	✓	✓
ISO 125,2-hole	with key shaft Φ32	A10VSO71(shaft P)	K27	/	/	/	✓	✓	✓
ISO 125,2-hole	splined shaft 1 1/2"38-4(SAE C-C)	A10VSO100(shaft S)	KB6	/	/	/	/	✓	✓
ISO 180,4-hole	splined shaft 1 3/4"44-4(SAE D)	A10VSO140(shaft S)	KB7	/	/	/	/	/	✓
SAE 82,2-hole	splined shaft 5/8"16-4(SAE A)		K01	/	✓	✓	✓	✓	✓
SAE 82,2-hole	splined shaft 3/4"19-4(SAE A-B)	A10VSO18(shaft S)	K52	/	✓	✓	✓	✓	✓
SAE 101,2-hole	splined shaft 7/8"22-4(SAE B) radial seal	A10VSO28(shaft S)	K02	/	✓	✓	✓	✓	✓
SAE 101,2-hole	splined shaft 7/8"22-4(SAE B) axial seal	A10VSO28(shaft S)	K68	/	✓	✓	✓	✓	✓
SAE 101,2-hole	splined shaft 1"25-4(SAE B-B)	A10VSO45(shaft S)	K04	/	/	✓	✓	✓	✓
SAE 127,2-hole	splined shaft 1 1/4"32-4(SAE C)	A10VSO71(shaft S)	K07	/	/	/	✓	✓	/
SAE 127,2-hole	splined shaft 1 1/2"38-4(SAE C-C)	A10VSO100(shaft S)	K24	/	/	/	/	✓	✓
SAE 180,4-hole	splined shaft 1 3/4"44-4(SAE D)	A10VSO140(shaft S)	K17	/	/	/	/	/	✓

✓= available / = not available

1.If a second brueninghaus pump is to be fitted at factory then the two model codes must be linked with a + sign.
Model code 1st pump + Model code 2nd pump.
Ordering example:A10VSO100DR/31R-PPA12KB5 + A10VSO71DFR/31R-PSA12N00

2. If a gear or radial piston pump is to be fitted at factory please consult us.

Technical Data

Hydraulic fluid

The A10VSO 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:

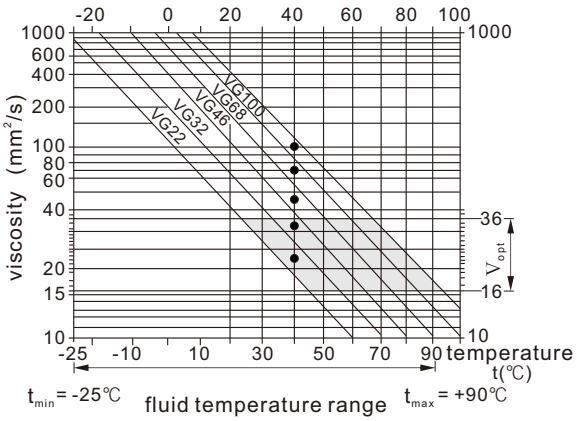
V_{min}=10 mm^2/s
short term at a max.permissible case temp. of 90℃.

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 ($¦_{opt}$) (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 ($¦_{opt}$;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.

High-speed-version

The size 140 is available in an optional high speed version.This version allows higher drive speeds at max. displacement (higher output flow) without affecting outside dimensions,see table on page 80.

Mechanical displacement limiter

Mechanical displacement limiter is possible on the nonthrough-drive model, N00 series but not for the model with through-drive.

$V_{g\,max}$: for sizes 28 to 140
setting range $V_{g\,max}$ to 50% $V_{g\,max}$ stepless

$V_{g\,min}$: for sizes 100 and 140
setting range $V_{g\,min}$ to 50% $V_{g\,min}$ stepless

Technical Data

Operating pressure range-inlet

Absolute pressure at port S

$P_{abs\ min}$ _____ 0.08 MPa
$P_{abs\ max}$ _____ 3 MPa

Operating pressure range-outlet

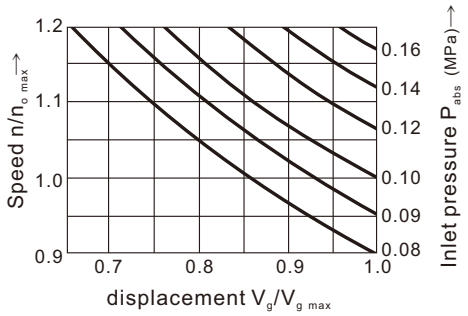
Pressure at port B
Nominal pressurre P_N _____ 28 MPa
Peak pressure P_{max} _____ 35 MPa

(Pressure data to DIN 24312)
Applications with intermittent operating pressures up to 31.5 MPa at 10% duty are permissible.
Limitation of pump output pressure spikes is possible with relief valve blocks mounted directly on flange connection.

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.

Determination of inlet pressure P_{abs} at suction port S or reduction of displacement for increasing speed.



Direction of through flow

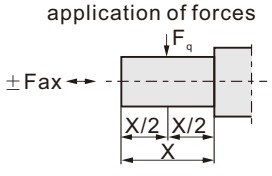
S to B

Table of values (theoretical values,without taking into accout $_{mh}$ and $_{v}$:values rounded off)

Size				18	28	45	71	100	140
Displacement		$V_{g\ max}$	mL/r	18	28	45	71	100	140
Max.speed[1]	at $V_{g\ max}$	$n_{o\ max}$	rpm	3300	3000	2600	2200	2000	1800
Max.permitted speed (limit speed) with increased input pressure P_{abs} bzw.$V_g < V_{g\ max}$		$n_{o\ max}$	rpm	3900	3600	3100	2600	2400	2100
Max.flow	at $n_{o\ max}$	$q_{vo\ max}$	L/min	59	84	117	156	200	252
	at n_E=1500 min^{-1}		L/min	27	42	68	107	150	210
Max.power (△P.= 28 MPa)	at $n_{o\ max}$	$P_{o\ max}$	kW	28	39	55	73	93	118
	at n_E=1500 min^{-1}		kW	13	20	32	50	70	98
Max.torque (△P.= 28 MPa)	at $V_{q\ max}$	T_{max}	Nm	80	125	200	316	445	623
Torque (△P.= 10 MPa)	at $V_{q\ max}$	T	Nm	30	45	72	113	159	223
Moment of inertia about drive axis		J	kgm^2	0.00093	0.0017	0.0033	0.0083	0.0167	0.0242
Case volume			L	0.4	0.7	1.0	1.6	2.2	3.0
Weight (without fluid)		m	kg	11	15	12	33	45	60
Permissible loading of drive shaft: max.axial force		$F_{ax\ max}$	N	350	1000	1500	2400	4000	4800
Max.permissible radial force[2]		$F_{q\ max}$	N	700	1200	1500	1900	2300	2800

1) These values are valid for an absolute pressure of 0.1 MPa at the suction port S.By reducing the displacement or increasing the input pressure the speed can be increased as shown in the diagram.
2) Please consult us for higher radial forces.

application of forces



Determination of displacement

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

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

Power $P = \frac{T \times n}{9549} = \frac{2\pi \times T \times n}{60000} = \frac{q_v \times \triangle P}{600 \times \eta_t}$ (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 ($\eta_t = \eta_v \times \eta_{mh}$)

Installation Notes

Optional installation position.The pump housing must be filled with fluid during commissioning and remain full when operating. In order to attain the lowest noise level, all connections(suction, pressure,case drain ports) must be linked by flexble couplings to tank.
Avoid placing a check valve in the case drain line.
This may, however, be permissible in individual cases, after consultation with us.

1. Vertical installation (shaft end upwards)

The following installation conditions must be taken into account:

1.1.Arrangement in the reservoir

Before installation fill pump housing,keeping it in a horizontal position.
a) If the minmum fluid level is equal to or above the pump mounting face close port "L"plugged, leave ports "L_1" and "S" open; L_1 piped and recommendation S piped (see Fig.1).
b) If the minmum fluid level is below the pump mounting face pipe port "L_1" and "S" according to Fig.2.
Close port "L" with respect taking into consideration conditions in 1.2.1.

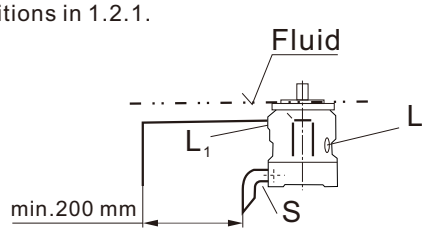


Fig.1

1.2. Arrangement outside the reservoir

Before installation fill the pump housing, keeping it in a horizontal position.For mounting above resrvoir see Fig.2.

Limiting condition:

1.2.1. Minimum pump inlet pressure $P_{abs\ min}$ = 0.08 MPa under both static and dynamic conditions.
Note: Avoid mounting above reservoir 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 bigger than h_{max} = 800 mm (immerdion depth $h_{t\ min}$ = 200mm).

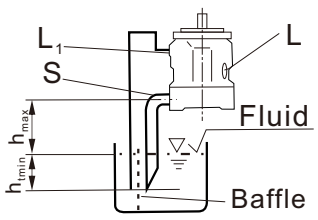


Fig.2

Overall pressure loss $\triangle P_{tot} = \triangle P_1 + \triangle P_2 + \triangle P_3 \leq (1-P_{abs\ min}) = 0.02MPa$

$\triangle P_1$: Pressure loss in pipe due to accelerating column of fluid

$$\triangle P_1 = \frac{\rho \times l \times dv}{dt} \times 10^{-6} (MPa)$$

$\triangle P_2$: Pressure loss due to static head

$\triangle P_2 = h \times \rho \times g \times 10^{-6} (MPa)$

$\triangle P3$:Line losses (elbows etc.)

ρ= density(kg/m^3)
l = pipe lenght(m)
dv/dt = rate of change in fluid velocity(m/s^2)
h = height(m)
g = gravity=9.81m/s^2

2. Horizontal installation

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

2.1.Arrangement in the reservoir

a) If the minimum fluid level is above the top of the pump, port "L_1" closed,"L" and "S" should remain open, L piped and recommendation S piped (see Fig.3)
b) If the minimum fluid level is equal to or below the top of the pump, pipe ports "L" and possibly "S" as Fig.4.; close port "L_1".
The conditions acconrding to tiem 1.2.1.

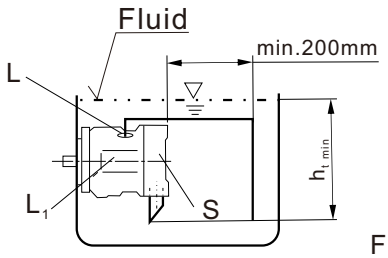


Fig.3

2.2. Installation outside the reservoir

Fill the pump housing before commissionsing.
Pipe ports "s" and the higher port "L" or "L_1".
a) When mounting above the reservoir, see fig.4.
Conditions according to 1.2.1.

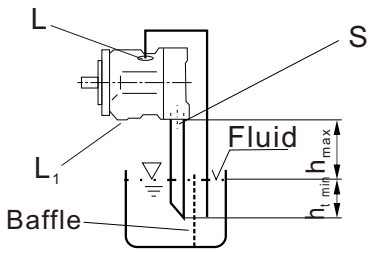


Fig.4

b) Mounting below the reservoir
Pipe ports "L_1" and "S" according to Fig.5, close port "L".

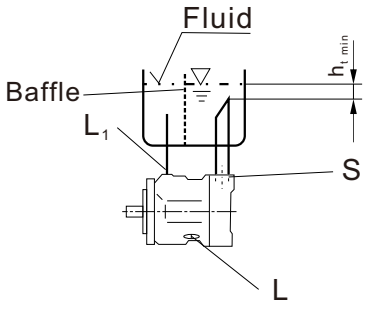
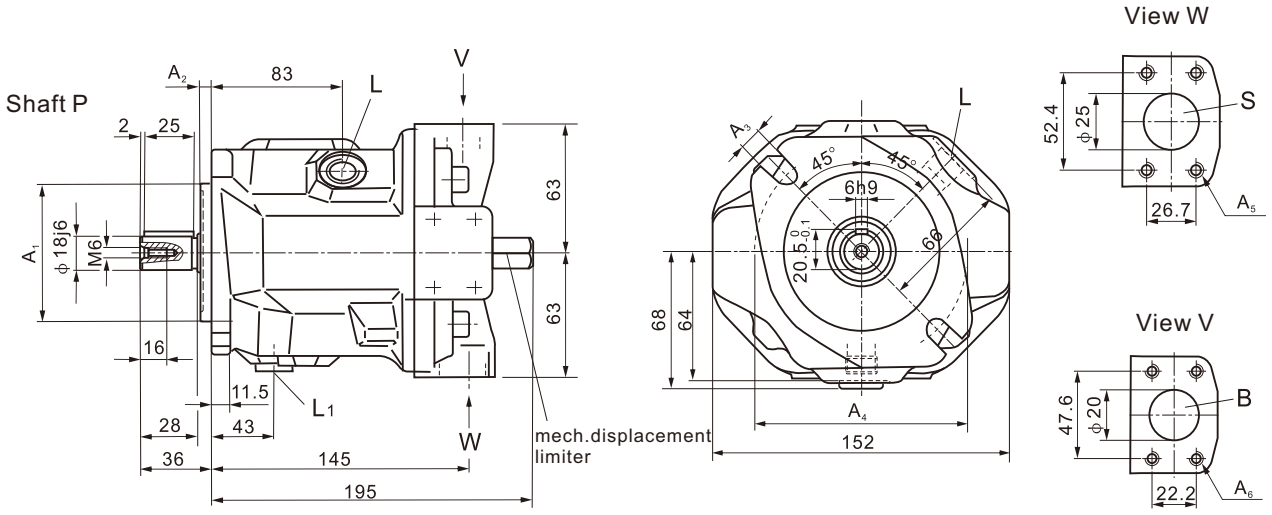
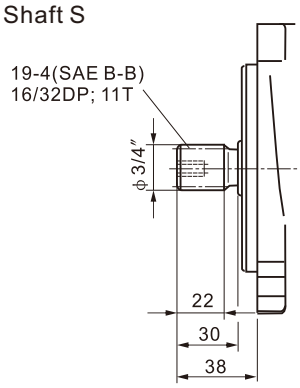


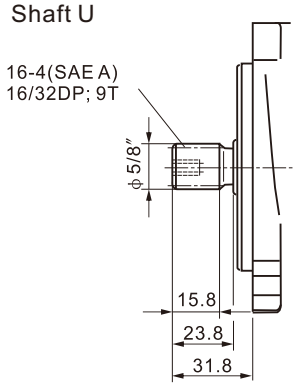
Fig.5

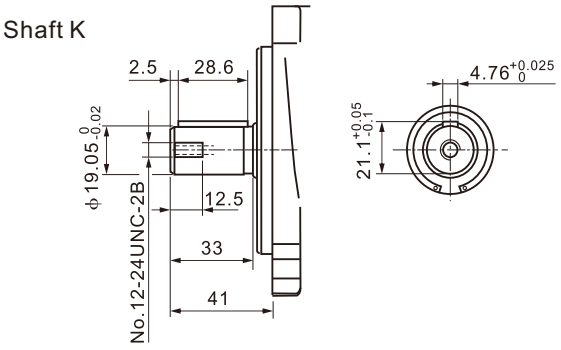
Installation Notes

A10VSO18※※-※N00(without control valves)







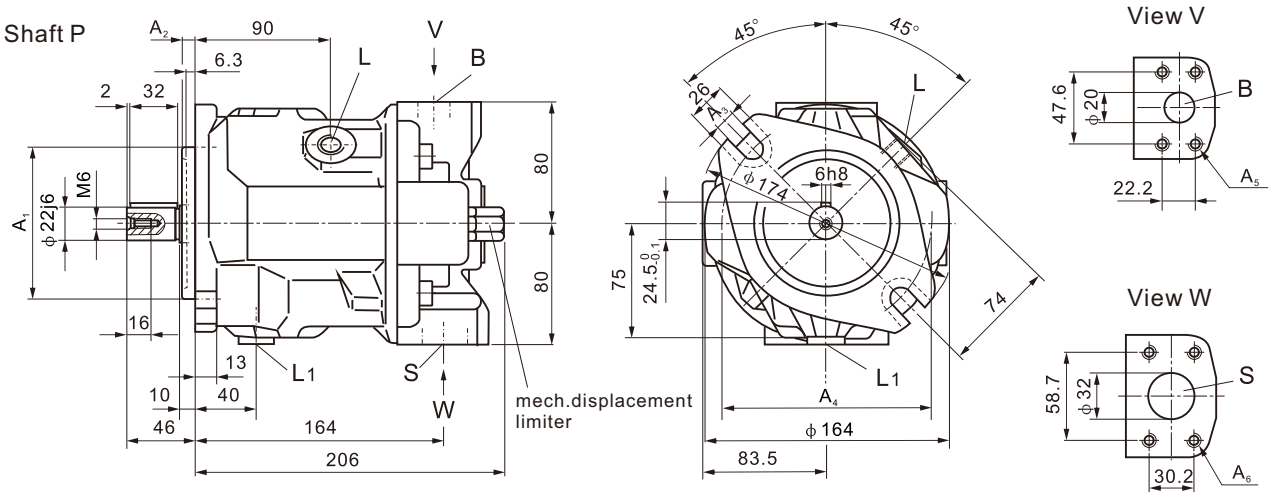


B	Pressure port	SAE 3/4" (Standard pressure range)
S	Suction port	SAE 1" (Standard pressure range)
L/L$_1$	Case drain ports	(L$_1$ plugged at factory)

Size	A_1	A_2	A_3	A_4	A_5	A_6	Drain ports L/L$_1$
18_{ISO}	ϕ80h8	7	11	ϕ109	4-M10,17 deep	4-M10,17 deep	M16×1.5
18_{SAE}	ϕ82.55h8	6.3	11	ϕ106.4	4-3/8-16UNC-2B, 20 deep	4-3/8-16UNF-2B	9/16-18UNF-2B

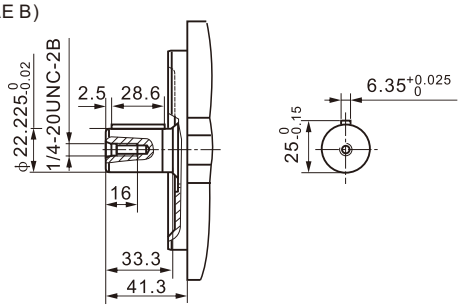
Installation Dimensions

A10VSO28※※-※N00(without control valves)



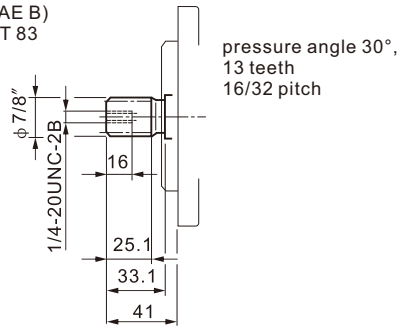
Shaft K

Shaft 22-1;(SAE B)
ISO3019-1



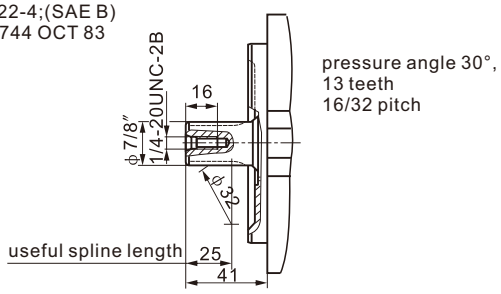
Shaft S

Shaft 22-4;(SAE B)
SAE J744 OCT 83



Shaft R

Shaft 22-4;(SAE B)
SAE J744 OCT 83



B	Pressure port	SAE 3/4" (Standard pressure range)
S	Suction port	SAE 11/4" (Standard pressure range)
L/L_1	Case drain ports	(L_1 plugged at factory)

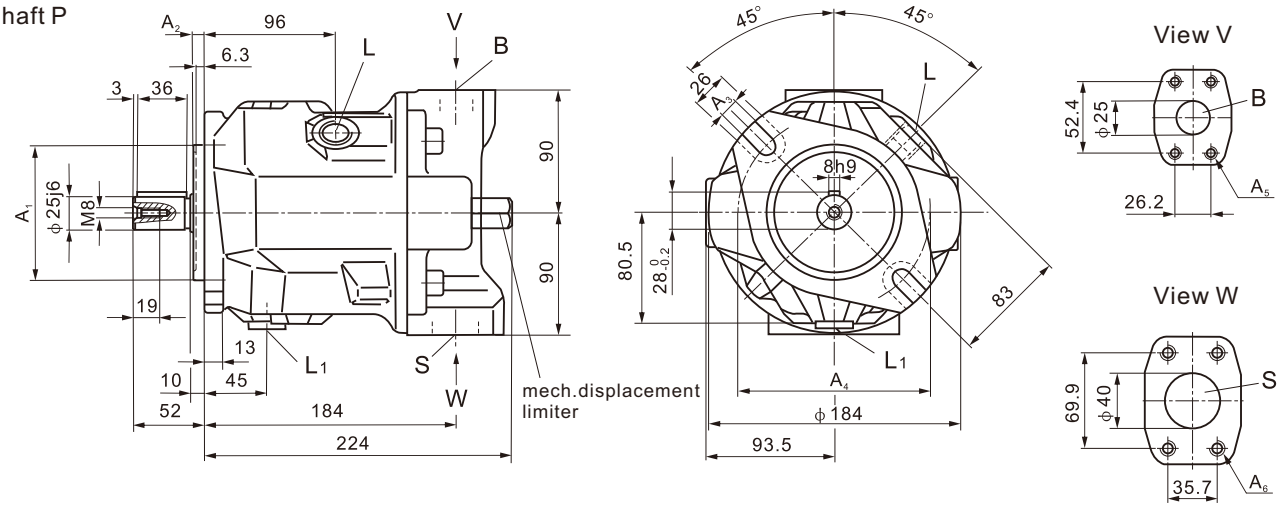
4-M10深17

Size	A_1	A_2	A_3	A_4	A_5	A_6	Drain ports L/L_1
28_{ISO}	ϕ100h8	9	14	ϕ140	4-M10,17 deep	4-M10,17 deep	M18×1.5
28_{SAE}	ϕ101.6h8	9.5	ϕ14	ϕ146	4-3/8-16UNC-2B, 18 deep	4-7/16-14UNC-2B, 24 deep	3/4-16UNF-2B

Installation Dimensions

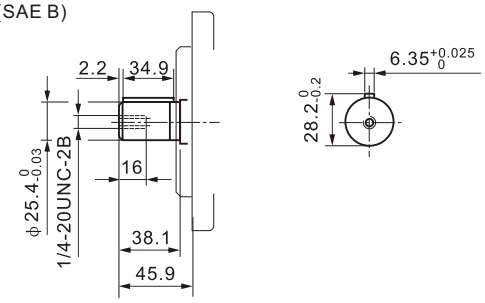
A10VSO45※※-※N00(without control valves)

Shaft P



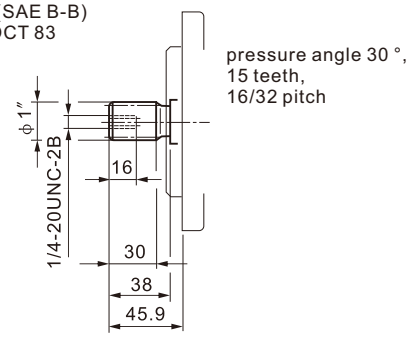
Shaft K

Shaft 25-1;(SAE B)
ISO3019-1



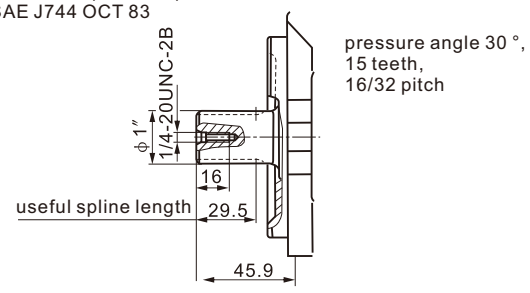
Shaft S

Shaft 25-4;(SAE B-B)
SAE J744 OCT 83



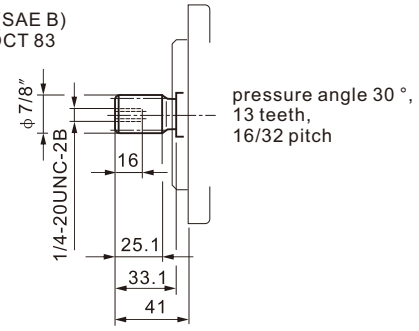
Shaft R

Shaft 25-4;(SAE B-B)
SAE J744 OCT 83



Shaft U

Shaft 22-4;(SAE B)
SAE J744 OCT 83



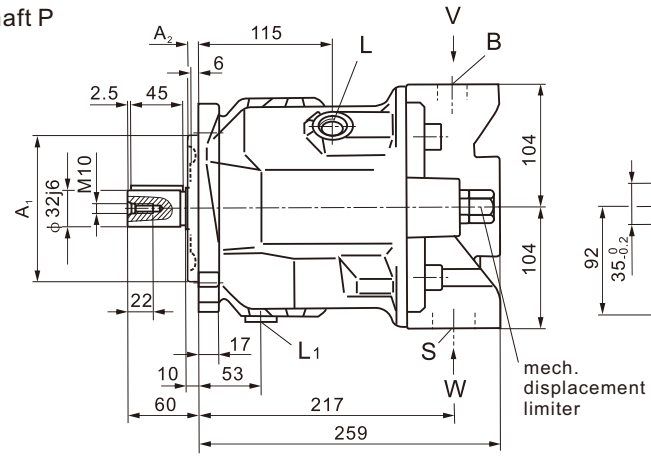
B	Pressure port	SAE 1"	(Standard pressure range)
S	Suction port	SAE 11/2"	(Standard pressure range)
L/L_1	Case drain ports		(L_1 plugged factory)

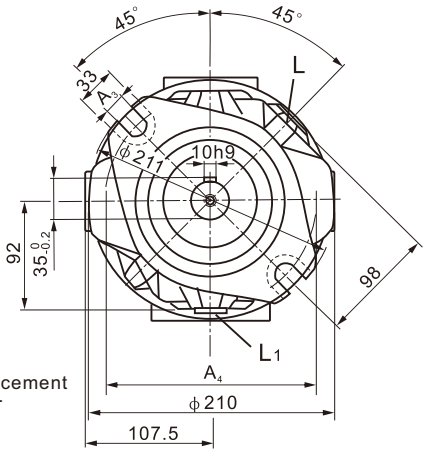
Size	A_1	A_2	A_3	A_4	A_5	A_6	Drain ports L/L_1
45_{ISO}	φ100h8	9	14	φ140	4-M10,17 deep	4-M12,20 deep	M22×1.5
45_{SAE}	φ101.6h8	9.5	φ14	φ146	4-3/8-16UNC-2B, 18 deep	4-1/2-13UNC-2B, 22 deep	7/8-14UNF-2B

Installation Dimensions

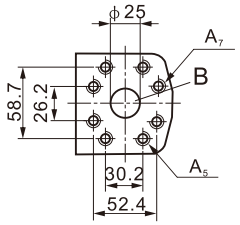
A10VSO71※※-※N00(without control valves)
12/62 type

Shaft P

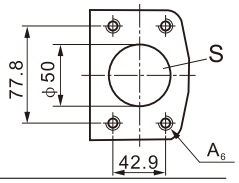




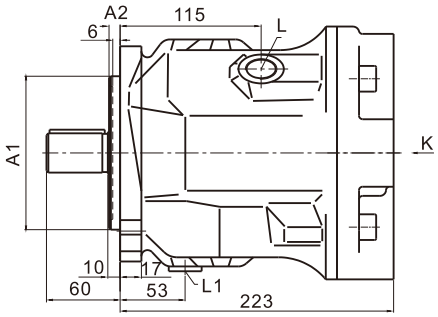
View V



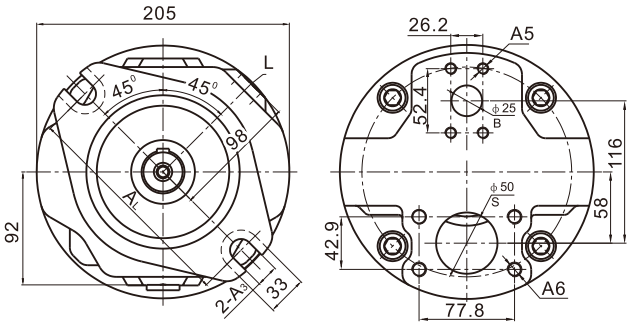
View W



11/61 type

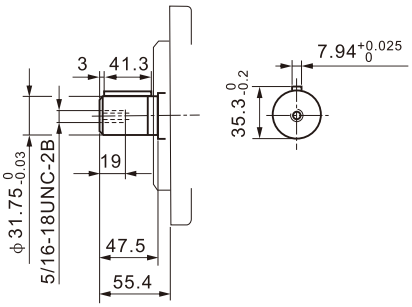


View K



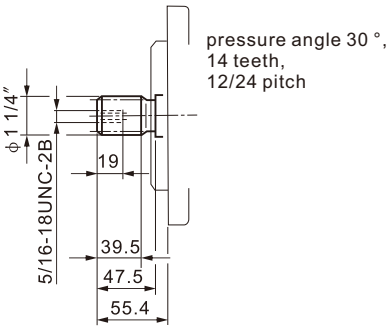
Shaft K

Shaft 32-1;(SAE C)
ISO3019-1



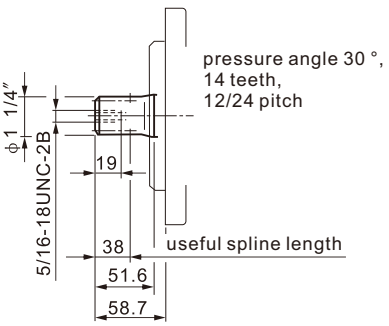
Shaft S

Shaft 32-4;(SAE C)
SAE J744 OCT 83



Shaft R

Shaft 32-4;(SAE C)
SAE J744 OCT 83



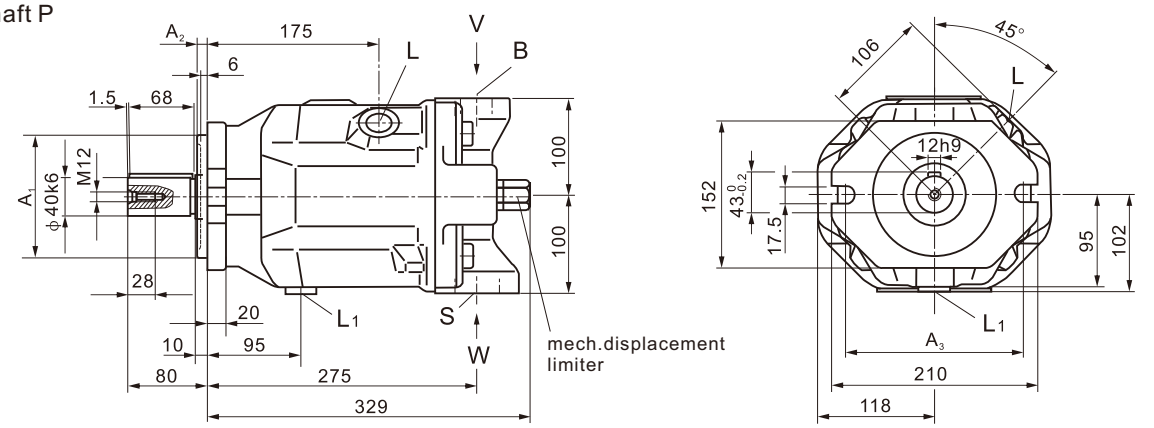
B	Pressure port	SAE 1˝ (Standard pressure range)
S	Suction port	SAE 2˝ (Standard pressure range)
L/L1	Case drain ports	(L1 plugged at factory)

Size	A1	A2	A3	A4	A5 (A7)	A6	Drain ports L/L1
71ISO	φ125h8	9	18	φ180	8-M10,17 deep	4-M12,20 deep	M22×1.5
71SAE	φ127h8	12.7	φ18	φ181	4-3/8-16UNC,18 deep 4-7/16-14UNC,24 deep	4-1/2-13UNC-2B, 22 deep	7/8-14UNF-2B

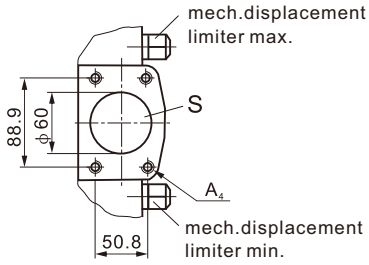
Installation Dimensions

A10VSO100※※-※N00(without control valves)

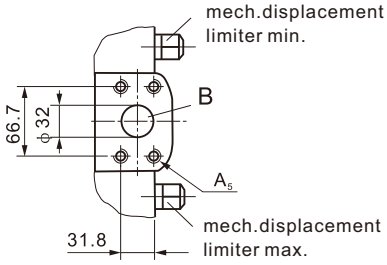
Shaft P



View W

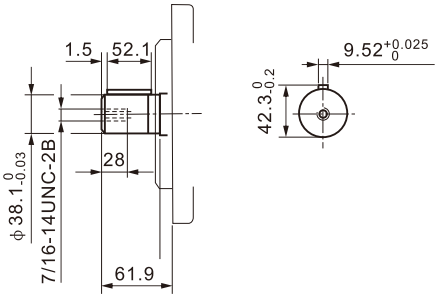


View V



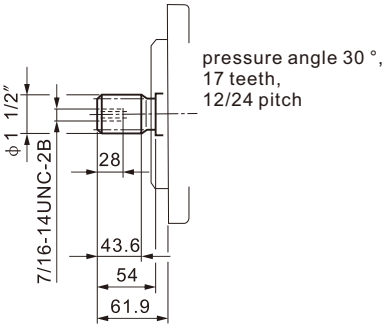
Shaft K

Shaft 38-1;(SAE C-C)
ISO3019-1



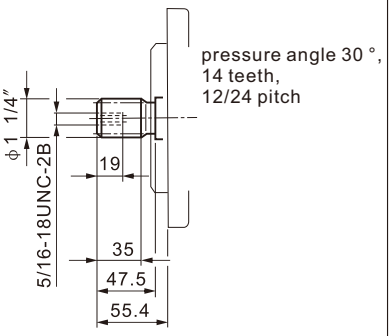
Shaft S

Shaft 38-4;(SAE C-C)
SAE J744 OCT 83



Shaft U

Shaft 32-4;(SAE C)
SAE J744 OCT 83



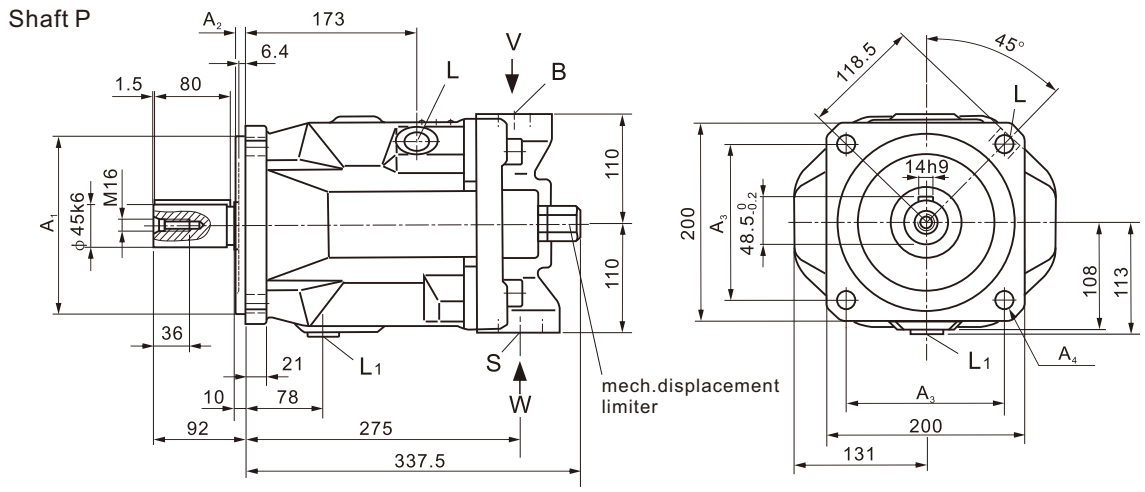
B	Pressure port	SAE 1 1/4" (High pressure range)
S	Suction port	SAE 2 1/2" (Standard pressure range)
L/L_1	Case drain ports	(L_1 plugged at factory)

Size	A_1	A_2	A_3	A_4	A_5	Drain ports L/L_1
100_{ISO}	φ125h8	9	180	4-M12,17 deep	4-M14,19 deep	M27×2
100_{SAE}	φ127h8	12.7	181	4-1/2-13UNC-2B, 27 deep	4-1/2-13UNC-2B, 29 deep	1 1/16-12UN-2B

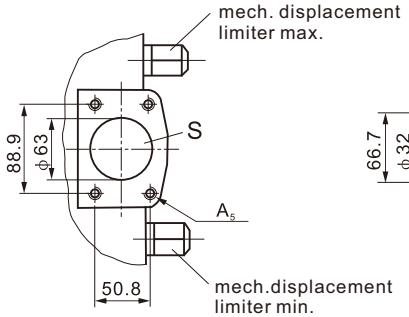
Installation Dimensions

A10VSO140※※-※N00(without control valves)

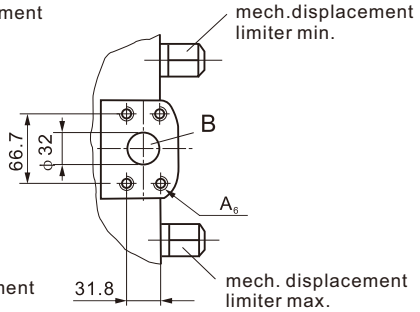
Shaft P



View W

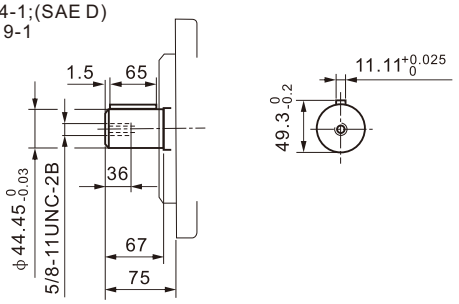


View V



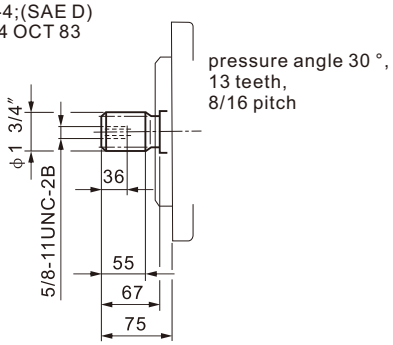
Shaft K

Shaft 44-1;(SAE D)
ISO3019-1



Shaft S

Shaft 44-4;(SAE D)
SAE J744 OCT 83



B	Pressure port	SAE 1 1/4" (High pressure range)
S	Suction port	SAE 2 1/2" (Standard pressure range)
L/L_1	Case drain port	(L_1 plugged at factory)

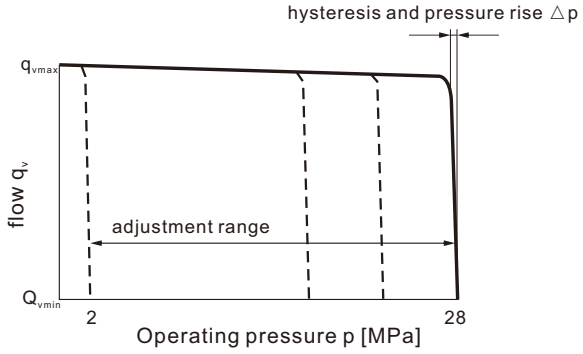
Size	A_1	A_2	A_3	A_4	A_5	A_6	Drain ports L/L_1
140_{ISO}	φ180h8	9	158.4	4-φ18	4-M12,17 deep	4-M14,19 deep	M27×2
140_{SAE}	φ152.4h8	12.7	161.6	4-φ20	4-1/2-13UNC-2B, 27 deep	4-1/2-13UNC-2B, 19 deep	1 1/16-12UN-2B

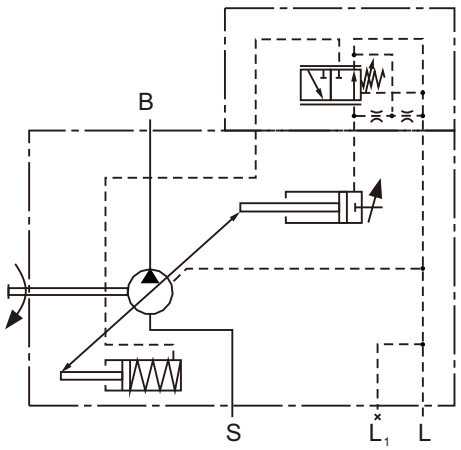
DR Pressure Contorl

The pressure controller serves to maintain a constant pressure in a hydraulic system within the control range of the pump.The pump therefore supplies only the amount of hydraulic fluid required by the system.Pressure may be steplessly set at the contorl valves.

Static operating curve

(at n_1=1500 rpm;t_{oil}=50℃)





Ports

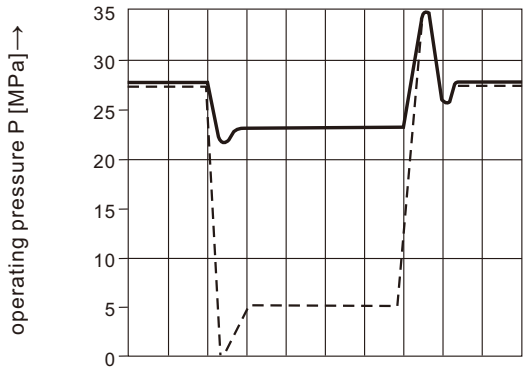
B	Pressure port
S	Suction port
LŁL_1	Case drain ports (L_1 pluggedŁ

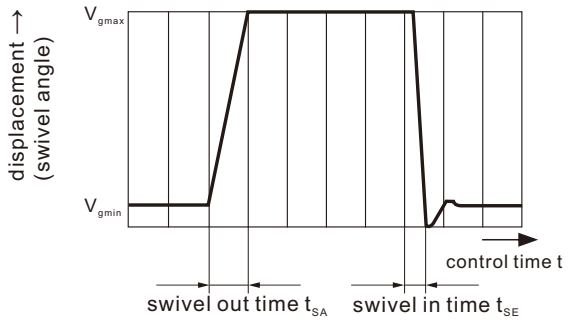
Dynanmic operating curves

The operating curves are mean values measured under test conditions with the unit mounted inside the tank.

Conditions: n = 1500 rpm
t_{oil} = 50℃
Main relief set at 35 MPa

Load steps were obtained by suddenly opening and closing the pressure line with a pressure relief valve as load valve 1 m from the output flange of the pump.





Contorller Data

Hysteresis and repetitive accuracy △P_____max. 0.3 MPa

Max.pressure rise

Size		18	28	45	71	100	140
△P	MPa	0.4	0.4	0.6	0.8	1.0	1.2

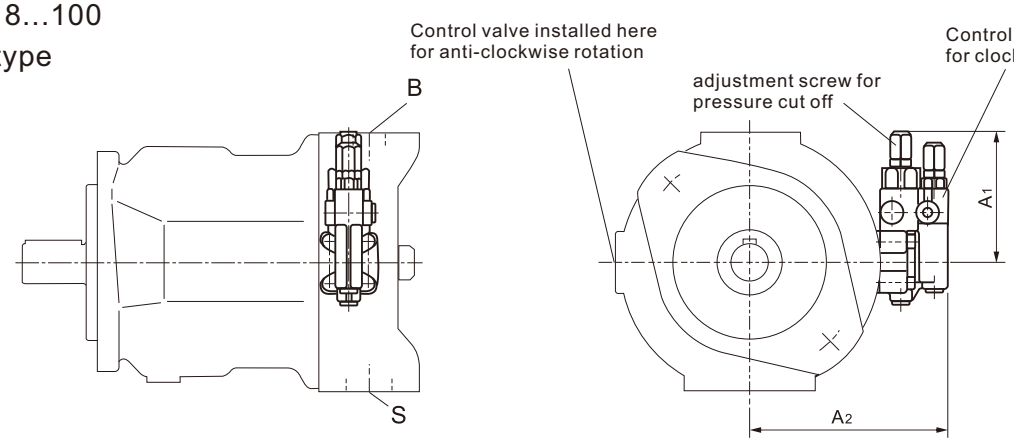
Polit oil requirement _____ Max.approx 3 L/min

Control Times

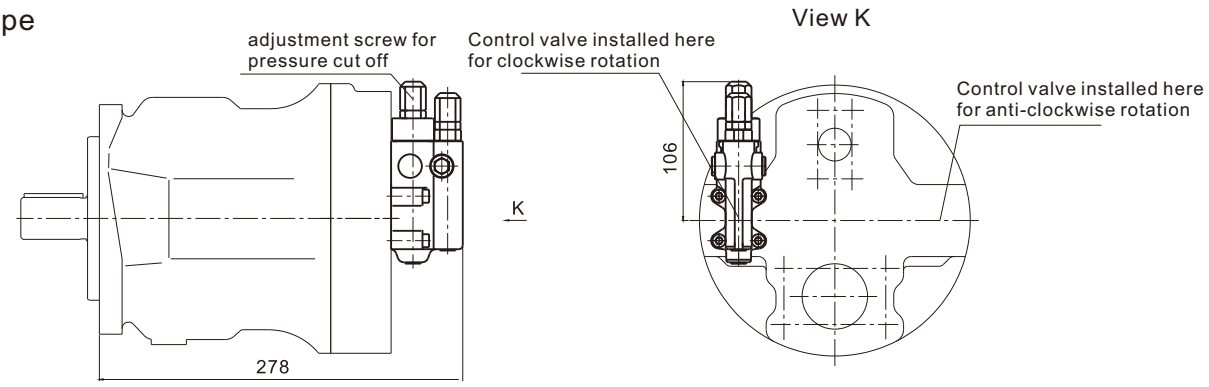
Size	t_{SA} (ms) again 5 MPa	t_{SA} (ms) again 22 MPa	t_{SA} (ms) again 28 MPa
18	50	20	20
28	60	30	20
45	80	40	20
71	100	50	25
100	125	90	30
140	130	110	30

Installation Dimensions

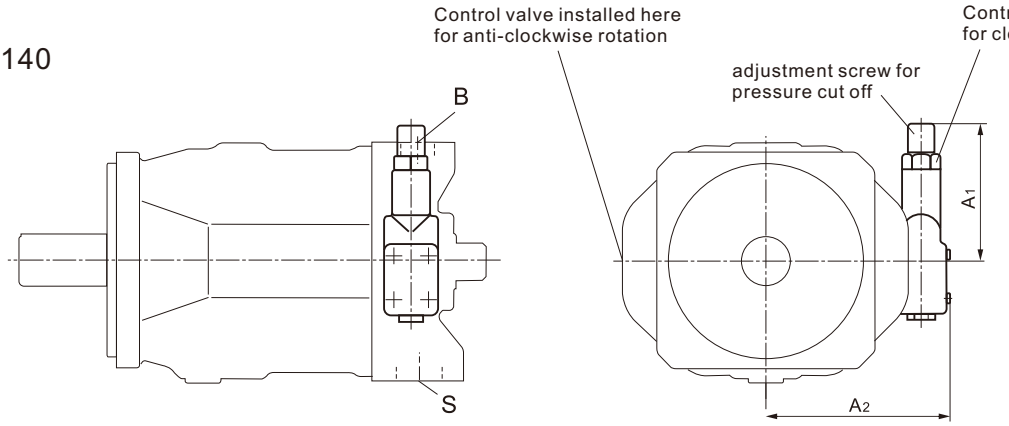
Sizes 18...100
12/62 type



Sizes 71
11/61 type



Sizes 140



Size	A_1	A_2
18	104.5	125.5
28	106	136
45	106	146
71	106	160
100	106	165
140	127	169

DRG Pressure Controller, Remote Control

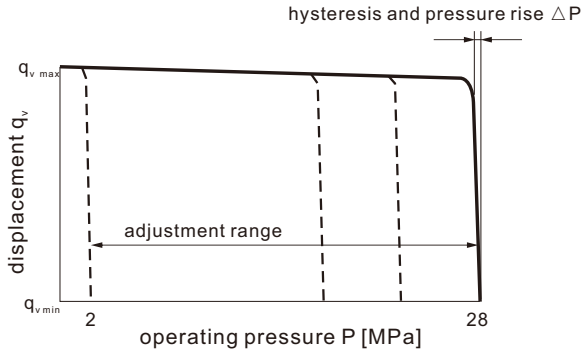
Function and equipment as for DR.

A pressure refief valve can be connected to port X for remote control applications;this is not included in the items supplied with the DRG control.

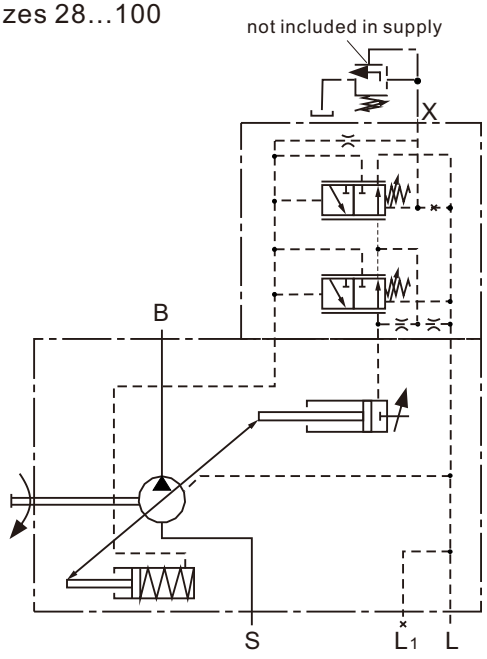
The standard pressure differential setting at the control valve is 2 MPa. A pilot oil flow of approw. 1.5 L/min is then used. If an other setting (range1-2.2 Mpa) is required please indicate in clear text.

Static Operating Curve

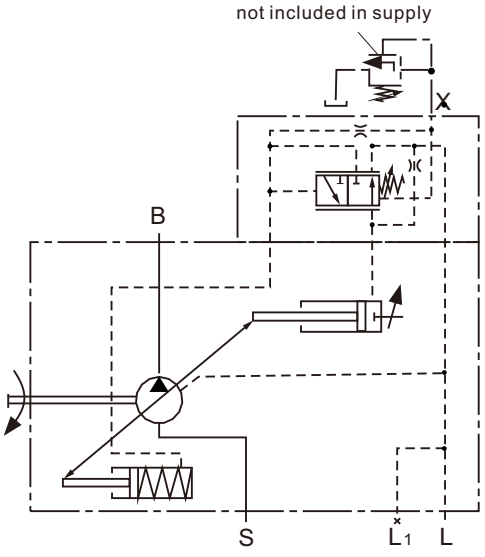
(at n_1=1500 rpm; t_{oil}=50℃)



Sizes 28...100



Size 140



Contorller Data

Hysteresis △P _____ max. 0.3 MPa

Max. pressure rise

Size		18	28	45	71	100	140
△P	MPa	0.4	0.4	0.6	0.8	1.0	1.2

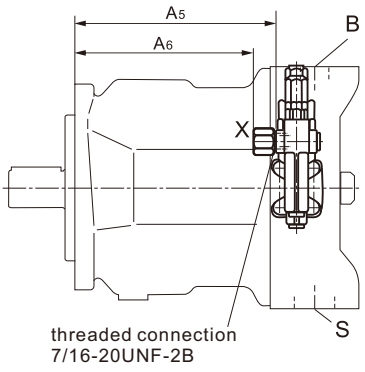
Pilot oil requirement _____ approx. 4.5 L/min

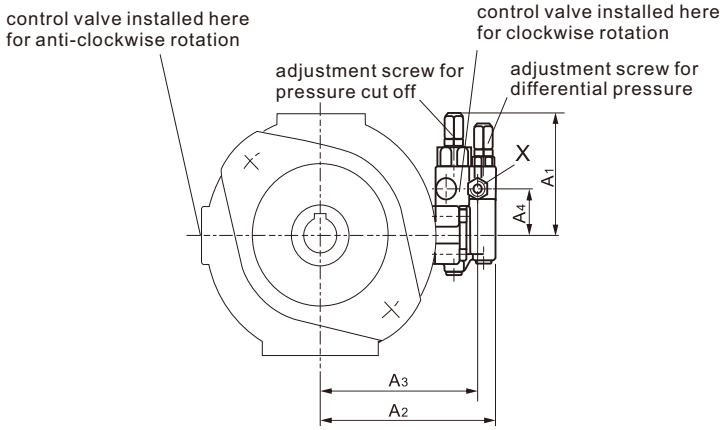
Ports

B	Pressure port
S	Suction port
L/L_1	Case drain ports(L_1 pluggedŁ
X	Pilot pressure port

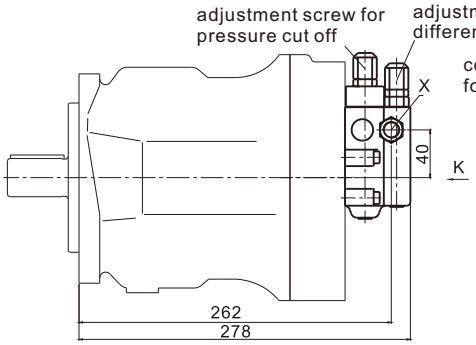
Installation Dimensions

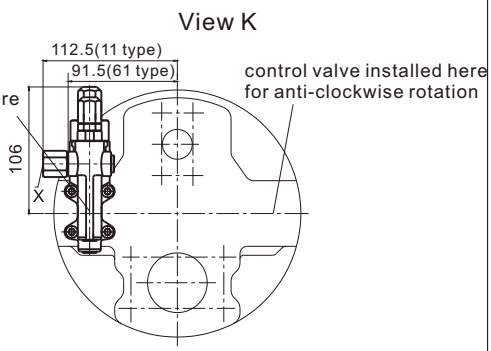
Sizes 18...100
12/62 type



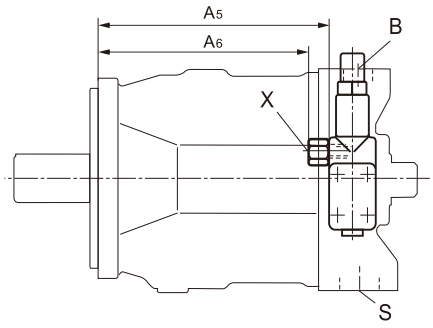


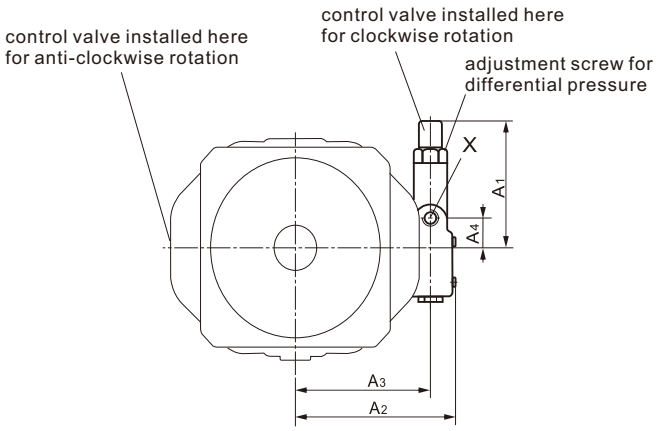
Sizes 71
11/61 type





Sizes 140





Size	A1	A2	A3	A4	A5	A6	Port X	
18ISO	104.5	125.5	109	40	-	109	M14×1.5;12 deep	with adaptor
18SAE	104.5	125.5	109	40	130	-	7/16-20UNF-2B;11.5 deep	without adaptor
28ISO	106	136	119	40	-	119	M14×1.5;12 deep	with adaptor
28SAE	106	136	119	40	138	-	7/16-20UNF-2B;11.5 deep	without adaptor
45ISO	106	146	129	40	-	134	M14×1.5;12 deep	with adaptor
45SAE	106	146	129	40	153	-	7/16-20UNF-2B;11.5 deep	without adaptor
71ISO	106	160	143	40	-	162	M14×1.5;12 deep	with adaptor
71SAE	106	160	143	40	181	-	7/16-20UNF-2B;11.5 deep	without adaptor
100ISO	106	165	148	40	-	229	M14×1.5;12 deep	with adaptor
100SAE	106	165	148	40	248	-	7/16-20UNF-2B;11.5 deep	without adaptor
140ISO	127	169	143	27	244	-	M14×1.5;12 deep	without adaptor
140SAE	127	169	143	27	-	222	9/16-18UNF-2B;13 deep	with adaptor

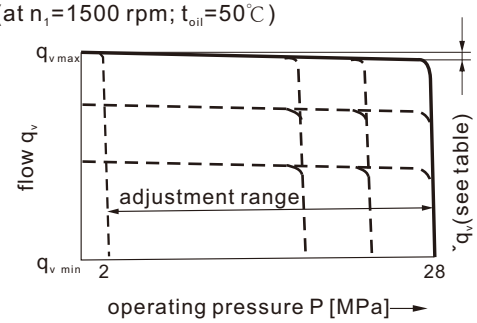
DFR/DFR1 Pressure / Flow Control

In addition to the pressure control function, the pump flow may be varied by means of a differential pressure over an orifice or valvespool, installed in the service line. The pump flow is equal to the actual required flow by the actuator.

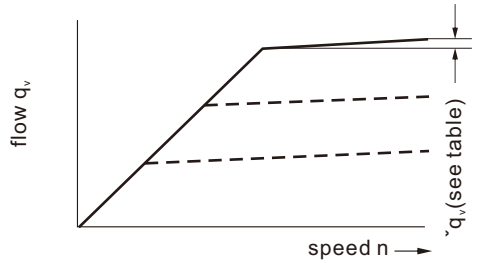
The DFR1-valve has no connection between X and the tank. For function of pressure control see page 13.

Static operating curve

(at n_1=1500 rpm; t_{oil}=50℃)

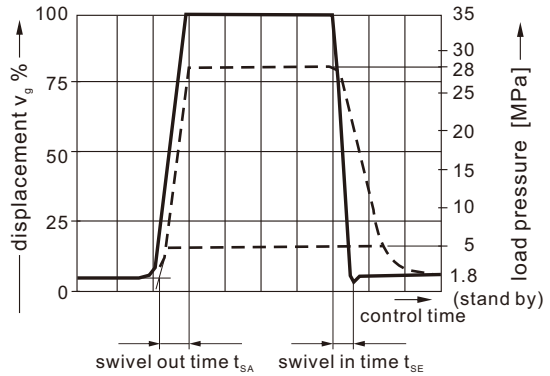


Static operating curve at variable speed

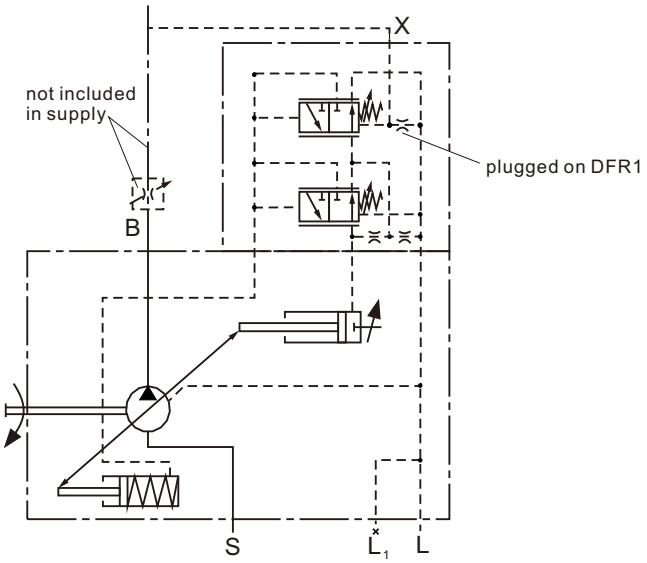


Dynamic flow control operating curve

The operating curves are average values measured under test conditions with the unit mounted inside the tank.



Size	t_{SA} (ms) stand by-28 MPa	t_{SE} (ms) 28 MPa-stand by	t_{SE} (ms) 5 MPa-stand by
18	40	15	40
28	40	20	40
45	50	25	50
71	60	30	60
100	120	60	120
140	130	60	130



Ports

B	Pressure port
S	Suction port
L/L_1	Case drain ports(L_1 plugged)
X	Pilot pressure port

Differential Pressure △P

Adjustable between 1 and 2.2 MPa (higher valves on request).
Standard setting: 1.4 MPa . If a different setting is required please indicate in clear text.
When port X is unloaded to tank a "zerostroke pressure" of P=1.8±0.2 MPa (stand by) results (dependent on △P).

Controller Data

Data pressure controller see page 13.
Max. Flow variation (hysteresis and increase) measured at drive speed n=1500 rpm

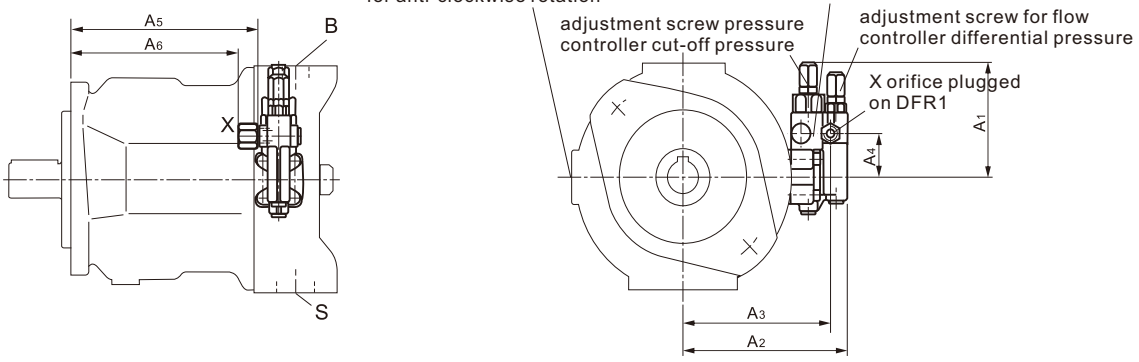
Size		18	28	45	71	100	140
$\triangle q_{vmax}$	L/min	0.5	1.0	1.8	2.8	4.0	6.0

DFR pilot oil consumption ___ max.approx. 3...4.5 L/min

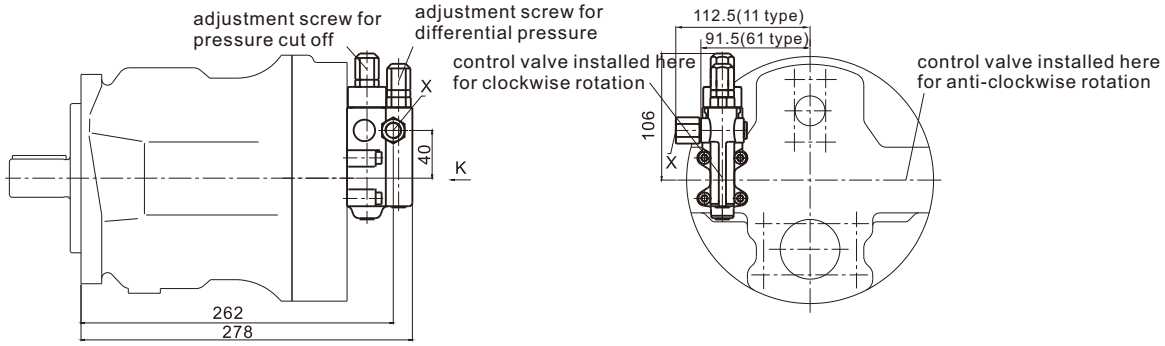
DFR1 pilot oil consumption _____ max.approx. 3 L/min

Installation Dimensions

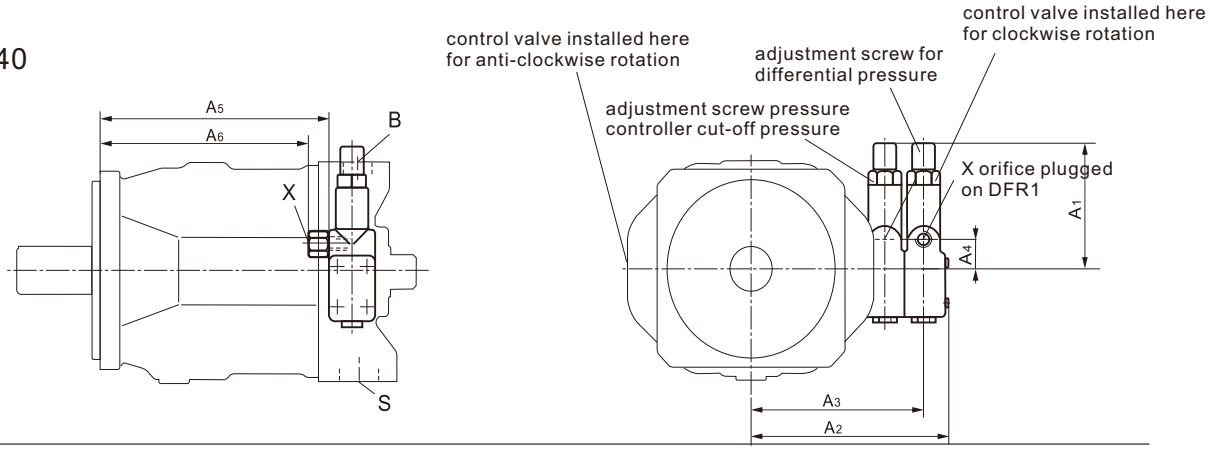
Sizes 18...100
12/62 type



Sizes 71
11/61 type



Sizes 140

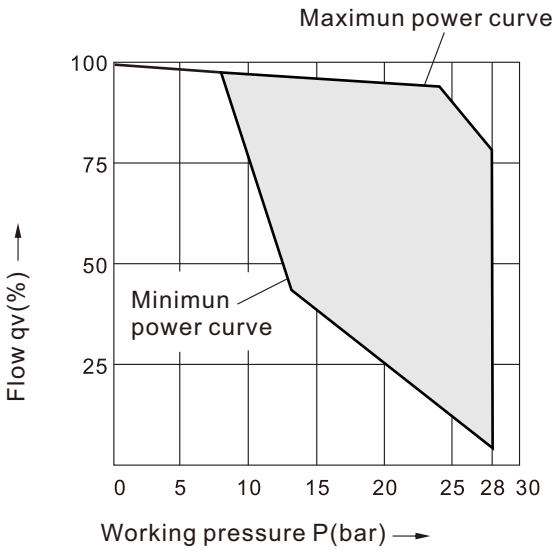


Size	A1	A2	A3	A4	A5	A6	Port X	
18ISO	104.5	125.5	109	40	-	109	M14×1.5;12 deep	with adaptor
18SAE	104.5	125.5	109	40	130	-	7/16-20UNF-2B;11.5 deep	without adaptor
28ISO	106	136	119	40	-	119	M14×1.5;12 deep	with adaptor
28SAE	106	136	119	40	138	-	7/16-20UNF-2B;11.5 deep	without adaptor
45ISO	106	146	129	40	-	134	M14×1.5;12 deep	with adaptor
45SAE	106	146	129	40	153	-	7/16-20UNF-2B;11.5 deep	without adaptor
71ISO	106	160	143	40	-	162	M14×1.5;12 deep	with adaptor
71SAE	106	160	143	40	181	-	7/16-20UNF-2B;11.5 deep	without adaptor
100ISO	106	165	148	40	-	229	M14×1.5;12 deep	with adaptor
100SAE	106	165	148	40	248	-	7/16-20UNF-2B;11.5 deep	without adaptor
140ISO	127	169	143	27	244	-	M14×1.5;12 deep	without adaptor
140SAE	127	169	143	27	-	222	9/16-18UNF-2B;13 deep	with adaptor

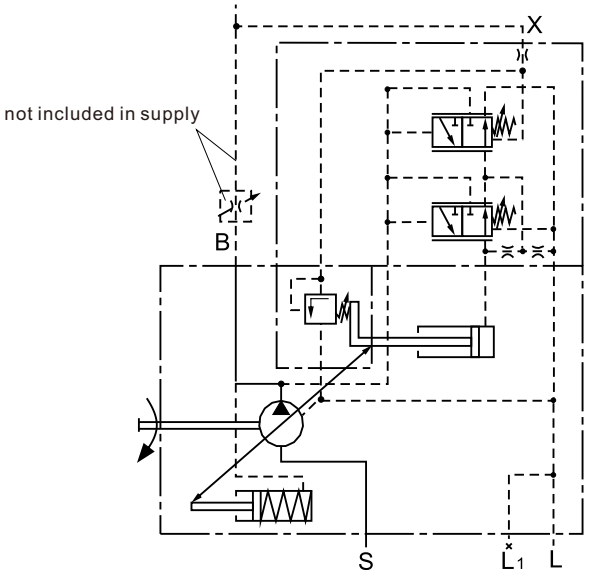
DFLR Pressure ,flow and power Control

Pressure controller equipped as DR(G),see page 13 and 15.
Flow controller equipped like DFR,DFR1,see page 17.
In order to achieve a constant drive torque with varying working pressure,the swivel angle and with it the output flow from the axial piston pump is varied so that the product of folw and pressure remains constant.
Flow control is possible below the power control cureve.

Characteristic curve



When ordering please state the power characteristics to be set at the factory in plain text,e.g.20KW at 1500rpm.



Ports

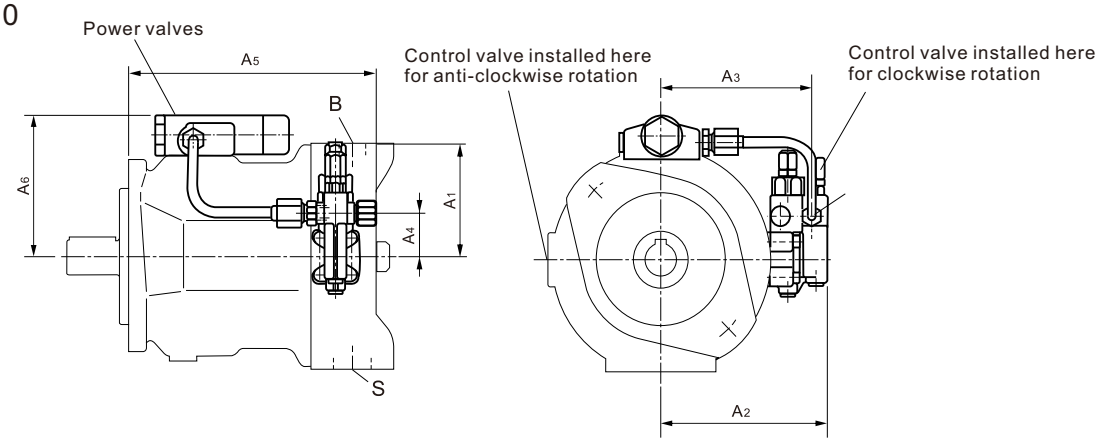
B	Pressure port
S	Suction port
L/L1	Case drain ports(L1 plugged)
X	Pilot pressure port

Controller data

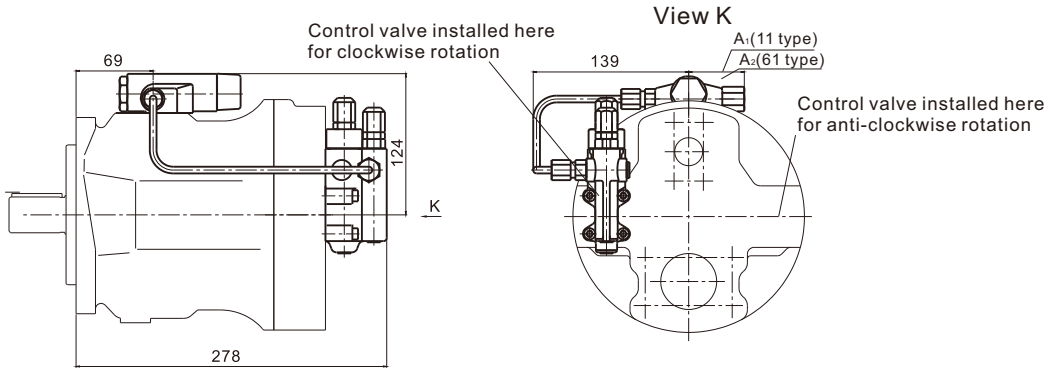
For technical data of pressure controller,see page 13
For technical date of flow controller,see page 15
Controls the starting point _____ 8MPa rise
Pilot fluid consumption:maximum approx.5.5L/min

Installation Dimensions

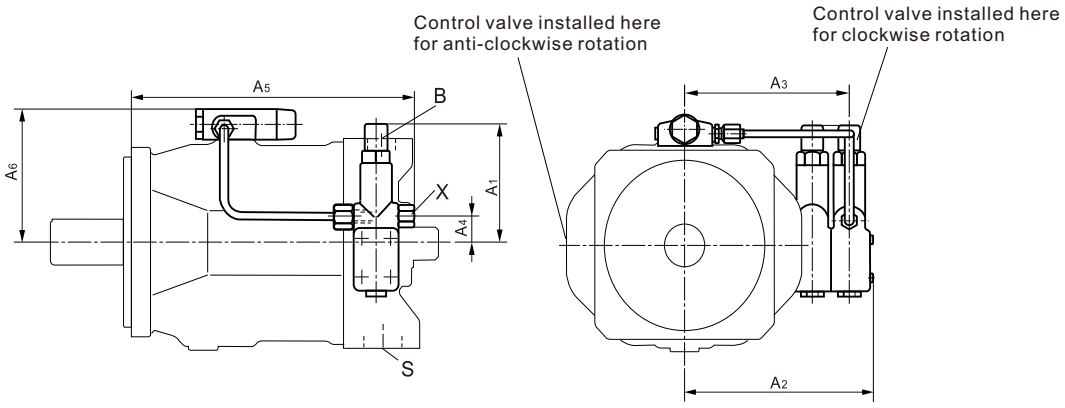
Sizes 18...100
12/62 type



Sizes 71
11/61 type



Sizes 140



Size	A1	A2	A3	A4	A5	A6	Port X
28ISO	106	136	119	40	197	107	M14×1.5;12 deep
28SAE	106	136	119	40	194	107	7/16-20UNF-2B;11.5 deep
45ISO	106	146	129	40	212	112	M14×1.5;12 deep
45SAE	106	146	129	40	209	112	7/16-20UNF-2B;11.5 deep
71ISO	106	160	143	40	240	124	M14×1.5;12 deep
71SAE	106	160	143	40	237	124	7/16-20UNF-2B;11.5 deep
100ISO	106	165	148	40	307	129	M14×1.5;12 deep
100SAE	106	165	148	40	304	129	7/16-20UNF-2B;11.5 deep
140ISO	127	209	183	26	314	140	M14×1.5;12 deep
140SAE	127	209	183	26	314	140	9/16-18UNF-2B;13 deep

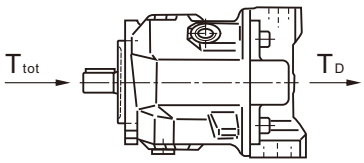
Through Drive

The A10VSO pump can be supplied with through drive in accordance with the type code on page 3.
The through drive version is designated by the code numbers (KB3-KB6).
If on other pumps are fitted by the manufacturer,the simple type designation is sufficient.
in this case, the delivery package comprises:
Hub fixing screws,seal and,if necessary, an adaptor flange.

Combination Pump

By building on further pumps it is possible to obtain independent circuits:
1. If the combination pump consists of 2 A10VSO and if these are to be supplied assembled then the two order codes should be linked by means of a "+"sign.
Ordering example:
A10VSO 71 DR/31 L -PPA12KB3+
A10VSO 28 DR/31 L -PSA12N00
2. If a gear or radial piston pump is to be built on at the factory, please consult us.

Maximum permissible input and through drive torque



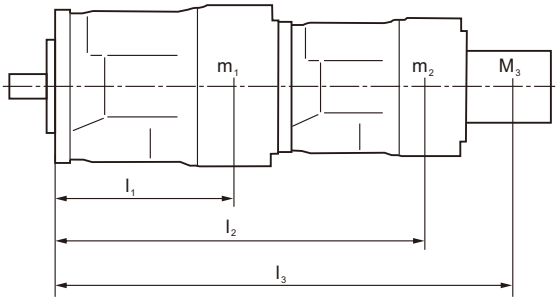
The split in torque between pump 1 and 2 is optional.
The max. permissible input torque T_{tot} as well as the max. permissible through drive torque T_D may not be exceeded.

Size			28	45	71	100	140
Max. permissible input torque at pump 1 with shaft "P"							
	T_{tot}	Nm	137	200	439	857	1206
Max. permissible through-drive torque	T_D	Nm	137	200	439	778	1206
	$T_{D\ keyed\ shaft}$	Nm	112	179	283	398	557

Size			28	45	71	100	140
Max. permissible input torque at pump 1 with shaft "S"							
	T_{tot}	Nm	137	319	626	1104	1620
Max. permissible through-drive torque	T_D	Nm	160	319	492	778	1266
	$T_{D\ keyed\ shaft}$	Nm	112	179	283	398	557

Size			28	45	71	100	140
Max. Permissible input torque at pump 1 with shaft "R"							
	T_{tot}	Nm	225	400	644	-	-
Max. permissible through-drive torque	T_D	Nm	176	365	548	-	-
	$T_{D\ keyed\ shaft}$	Nm	112	179	283	-	-

Permissible moment of inertia



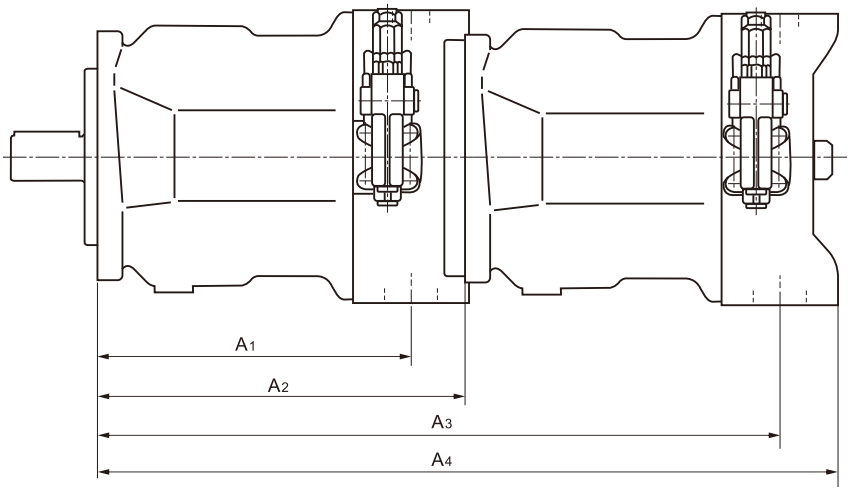
m_1, m_2, m_3[kg] Pump mass
l_1, l_2, l_3[mm] distance to center of gravity
$T_m = (m_1 \cdot l_1 + m_2 \cdot l_2 + m_3 \cdot l_3) \cdot \frac{1}{102}$ [Nm]

Size			28	45	71	100	140
Permissible moment of inertia	T_m	Nm	880	1370	2160	3000	4500
Permissible moment of inertia at dynamic mass acceleration 10g≙98.1 m/s²	T_m	Nm	88	137	216	300	450
Mass	m_1	kg	15	21	33	45	60
To center of gravity	l_1	mm	110	130	150	160	160

T_{tot} = Max. permissible input torque at pump 1
T_D = Max. permissible through-drive torque at through-drive to splined shaft
$T_{D\ keyed\ shaft}$ = Max. permissible through-drive torque at through-drive to keyed shaft

Installation Dimensions

A10VSO+A10VSO

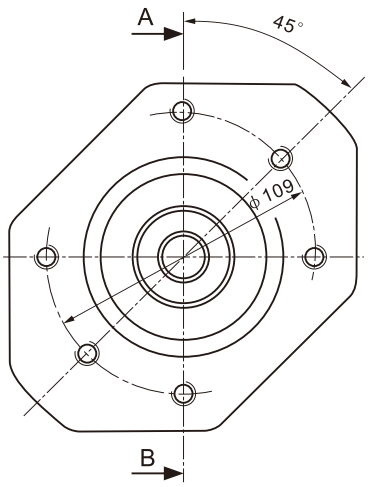


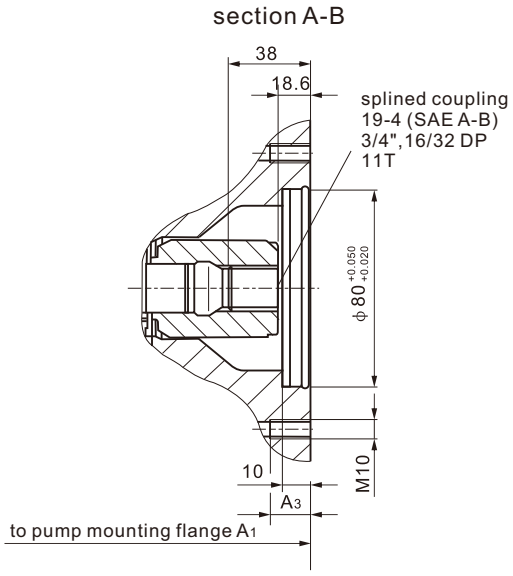
main p. / built-on p.	A10VSO18				A10VSO28				A10VSO45				A10VSO71				A10VSO100				A10VSO140			
	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4
A10VSO18	164	204	349	399	164	204	349	399	184	229	374	424	217	267	412	462	275	338	483	533	275	350	495	545
A10VSO28	-	-	-	-	164	204	368.5	410	184	229	393.5	435	217	267	431.5	431.5	275	338	502.5	544	275	350	514	556
A10VSO45	-	-	-	-	-	-	-	-	184	229	413	453	217	267	451	491	275	338	522	562	275	350	534	574
A10VSO71	-	-	-	-	-	-	-	-	-	-	-	-	217	267	484	524	275	338	555	595	275	350	567	609
A10VSO100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	275	338	613	664	275	350	625	679
A10VSO140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	275	350	625	688

Installation Dimensions, Through Drives

Flange ISO 80,2-hole for built-on A10VSO 18 (splined shaft S or R)

Order code KB2

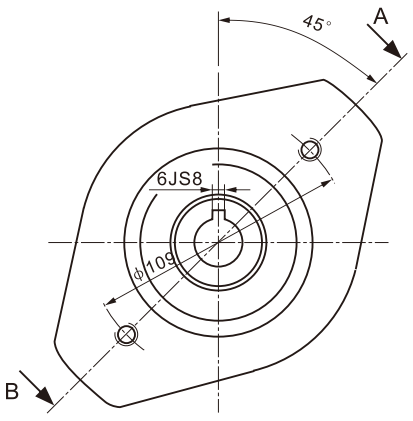


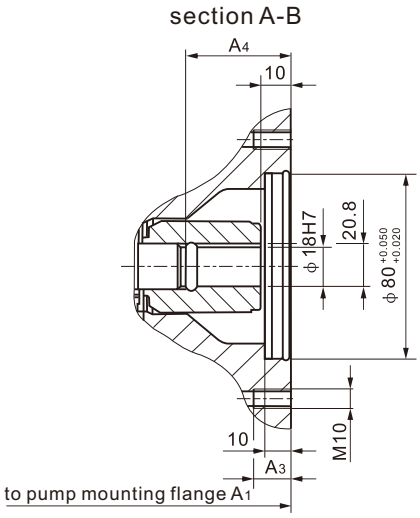


Size main pump	A_1	A_2
28	204	16
45	229	16
71	267	20

Flange ISO 80,2-hole for built-on A10VSO 18 (splined shaft P.)

Order code K51



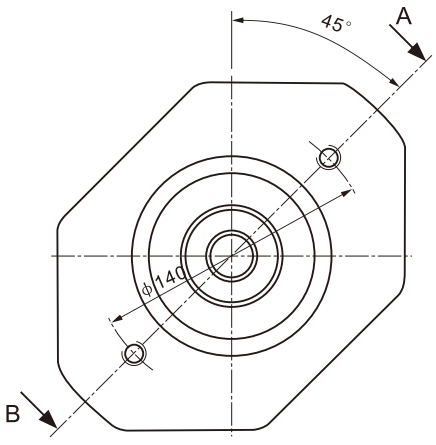


Size main pump	A_1	A_3	A_4
28	204	16	37
45	229	16	43
71	267	20	51
100	338	20	55
140	350	20	67

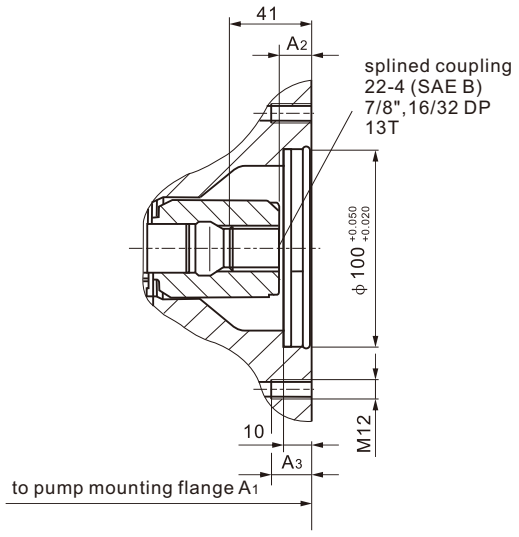
Installation Dimensions, Through Drives

Flange ISO 100,2-hole for built-on A10VSO 28 (splined shaft S or R)

Order code KB3



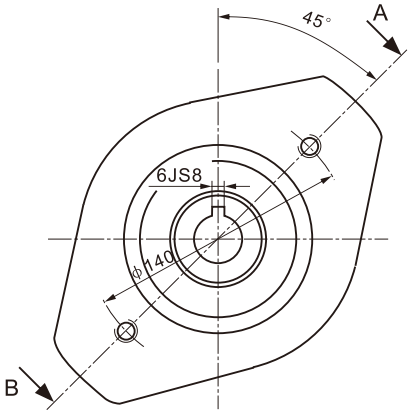
section A-B



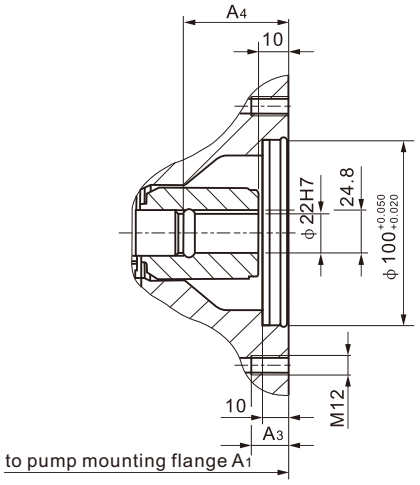
Size main pump	A_1	A_2	A_3
28	204	19.2	14
45	229	16.5	15
71	267	16.5	18
100	338	17.6	18
140	350	18.2	24

Flange ISO 100,2-hole for built-on A10VSO 28 (splined shaft P.)

Order code K25



section A-B

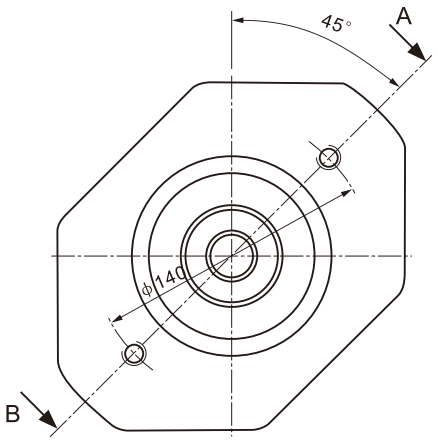


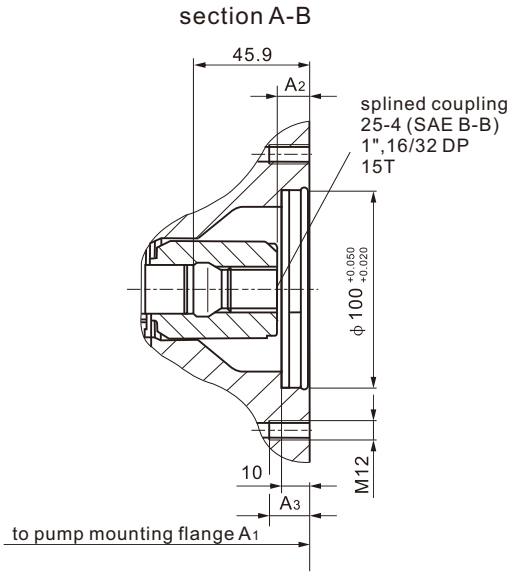
Size main pump	A_1	A_3	A_4
28	204	14	37
45	229	14	43
71	267	23	51
100	338	20	55
140	350	24	62

Installation Dimensions, Through Drives

Flange ISO 100,2-hole for built-on A10VSO 45 (splined shaft S or R)

Order code KB4

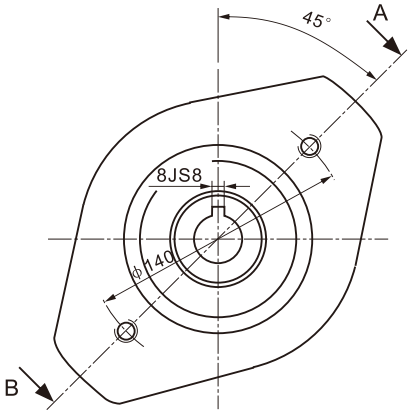


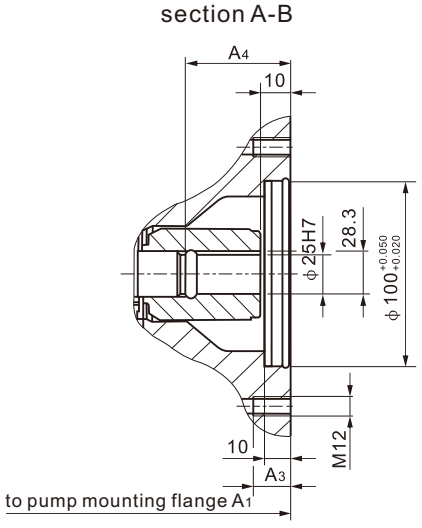


Size main pump	A_1	A_2	A_3
45	229	17.2	14
71	267	17.2	18
100	338	18.2	20
140	350	18.2	24

Flange ISO 100,2-hole for built-on A10VSO 45 (splined shaft P.)

Order code K26



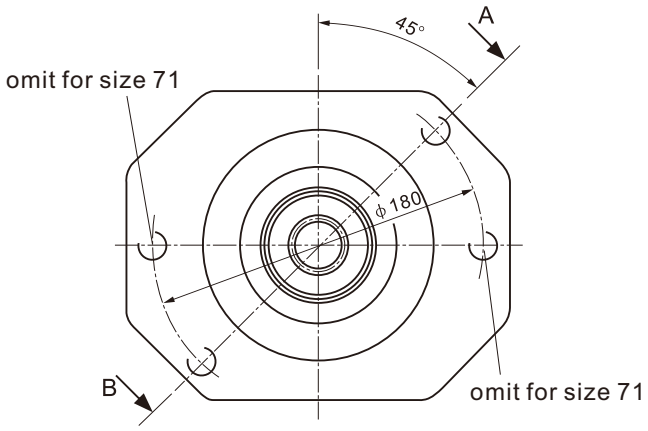


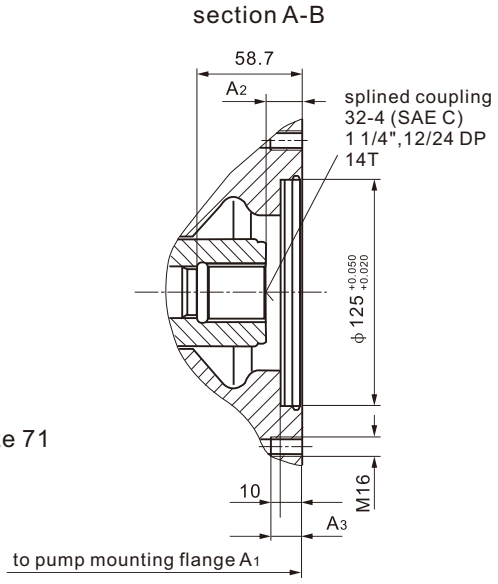
Size main pump	A_1	A_3	A_4
45	229	14	43
71	267	23	51
100	338	20	55
140	350	24	67

Installation Dimensions, Through Drives

Flange ISO 125,2-hole for built-on A10VSO 71 (splined shaft S or R)

Order code KB5

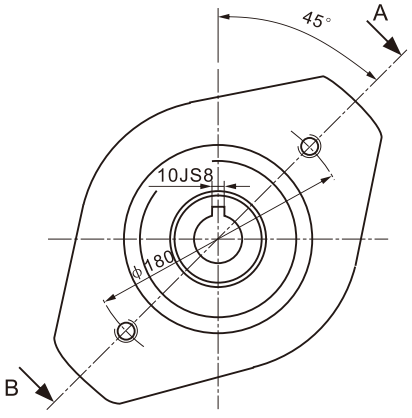


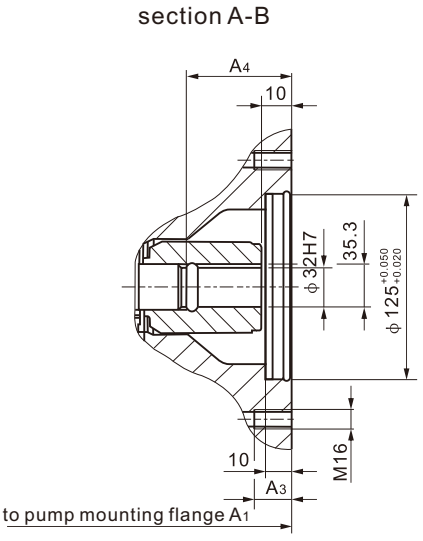


Size main pump	A_1	A_2	A_3
71	267	20	18.5
100	338	20	25
140	350	21	32

Flange ISO 125,2-hole for built-on A10VSO 71 (splined shaft P.)

Order code K27



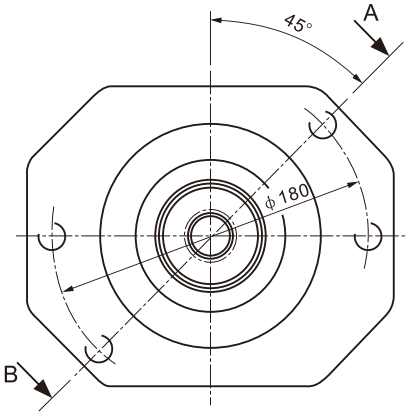


Size main pump	A_1	A_3	A_4
71	267	18	51
100	338	20	54
140	350	24	63

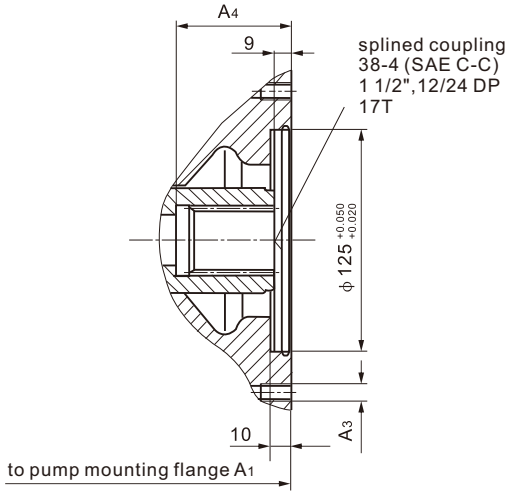
Installation Dimensions, Through Drives

Flange ISO 125,2-hole for built-on A10VSO100 (splined shaft S)

Order code KB6



section A-B

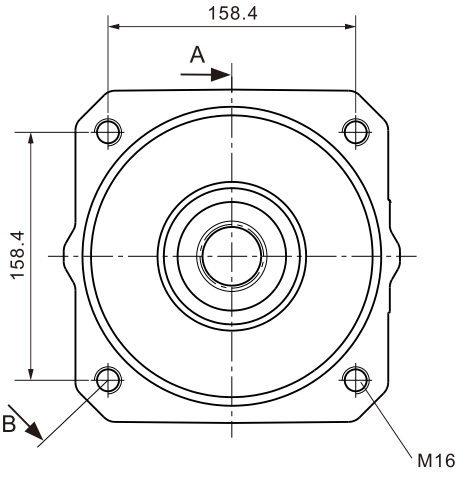


Size main pump	A_1	A_3	A_4
100	338	M16, 25deep	65
140	350	M16,32deep	77.3

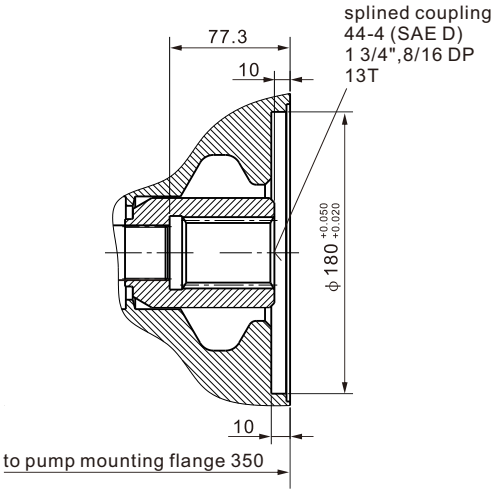
Flange ISO 180,4-hole for built-on A10VSO 140 (splined shaft S)

Order code KB7

Size main pump A10VSO140



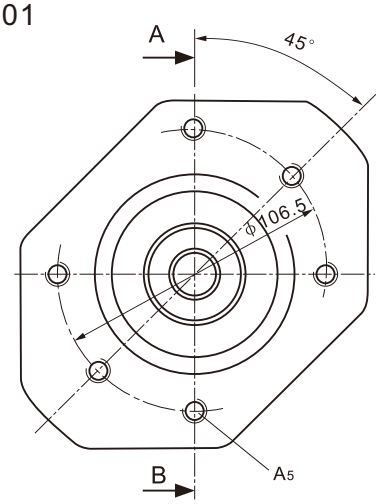
section A-B



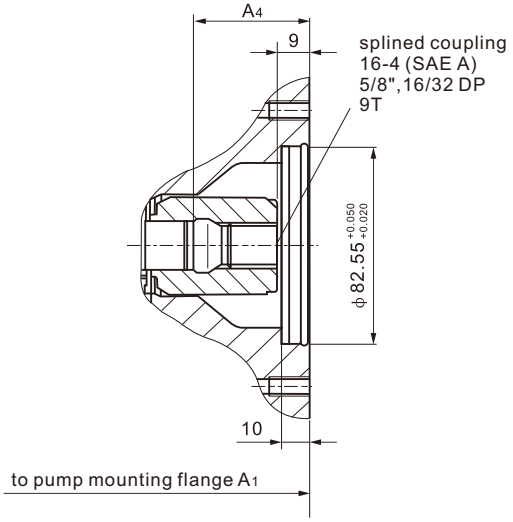
Installation Dimensions, Through Drives

Flange SAE 82,2-hole (SAE A)

Order code K01



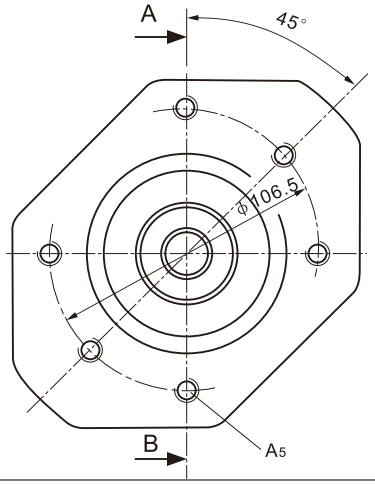
section A-B



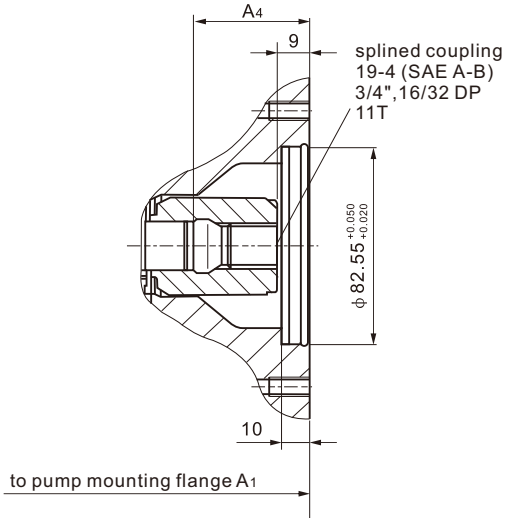
Size main pump	A_1	A_2	A_3
18	182	52.3	M10;16deep
28	204	47	M10;16deep
45	229	53	M10;16deep
71	267	61	M10;20deep
100	338	65	M10;20deep
140	350	77	M10;20deep

Flange SAE 82,2-hole for built-on A10VSO 18 (splined shaft S)

Order code K52



section A-B

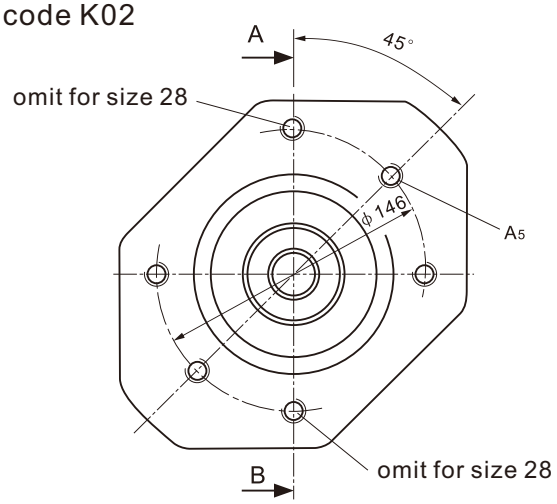


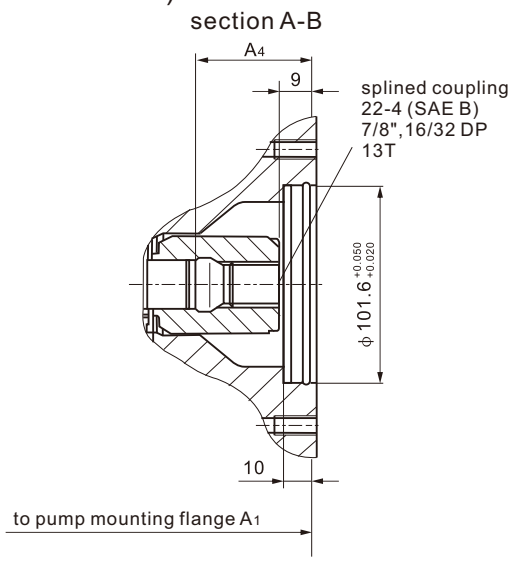
Size main pump	A_1	A_2	A_3
18	182	52.3	M10;16deep
28	204	47	M10;16deep
45	229	53	M10;16deep
71	267	61	M10;20deep
100	338	65	M10;20deep
140	350	77	M10;20deep

Installation Dimensions, Through Drives

Flange SAE 101,2-hole for built-on A10VSO 28 (splined shaft S)

Order code K02

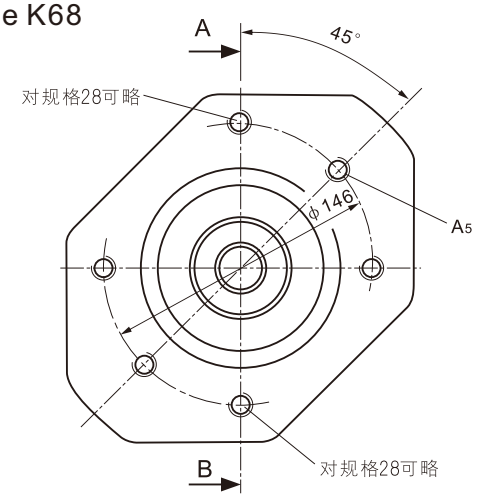


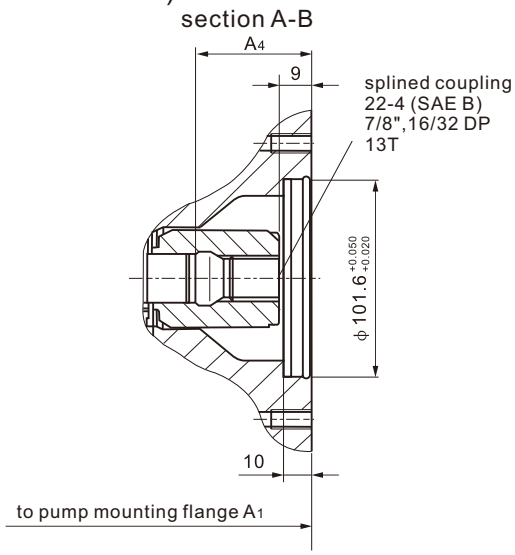


Size main pump	A_1	A_4	A_5
28	204	47	M12;15deep
45	229	53	M12;18deep
71	267	61	M12;20deep
100	338	65	M12;20deep
140	350	77	M12;20deep

Flange SAE 101,2-hole for built-on A10VSO 28 (splined shaft S)

Order code K68



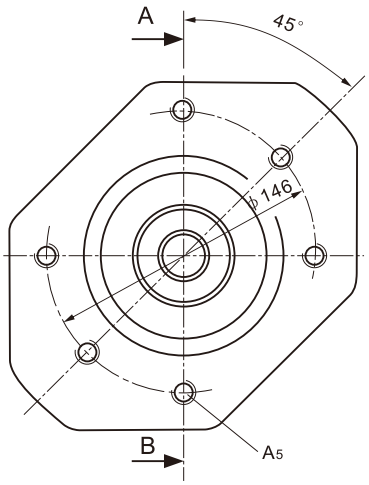


Size main pump	A_1	A_4	A_5
28	204	47	M12;15deep
45	229	53	M12;18deep
71	267	61	M12;20deep
100	338	65	M12;20deep
140	350	77	M12;20deep

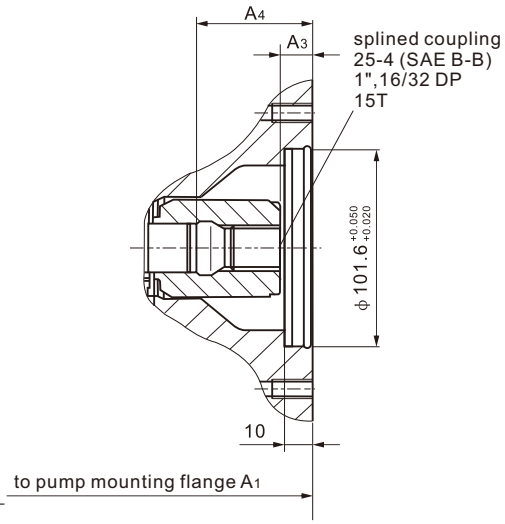
Installation Dimensions, Through Drives

Flange SAE 101,2-hole for built-on A10VSO 45 (splined shaft S)

Order code K04



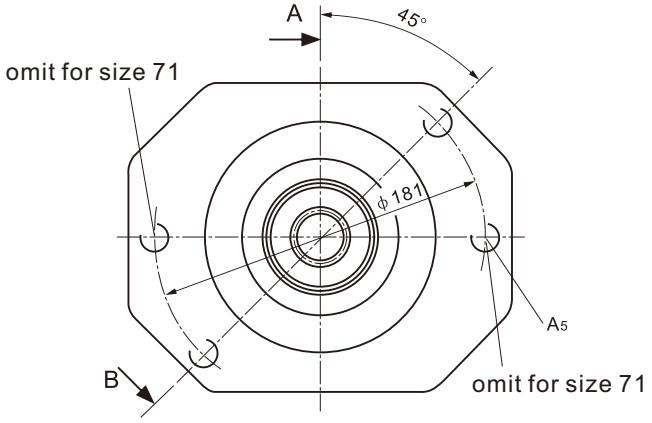
section A-B



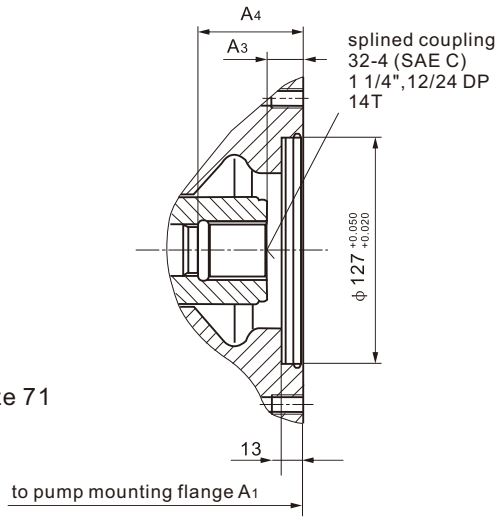
Size main pump	A_1	A_3	A_4	A_5
28	204	9	47	M12;15deep
45	229	9	53.4	M12;18deep
71	267	9	61.3	M12;20deep
100	338	10	65	M12;20deep
140	350	8	77.3	M12;20deep

Flange SAE 127,2-hole for built-on A10VSO 71 (splined shaft S)

Order code K07



section A-B

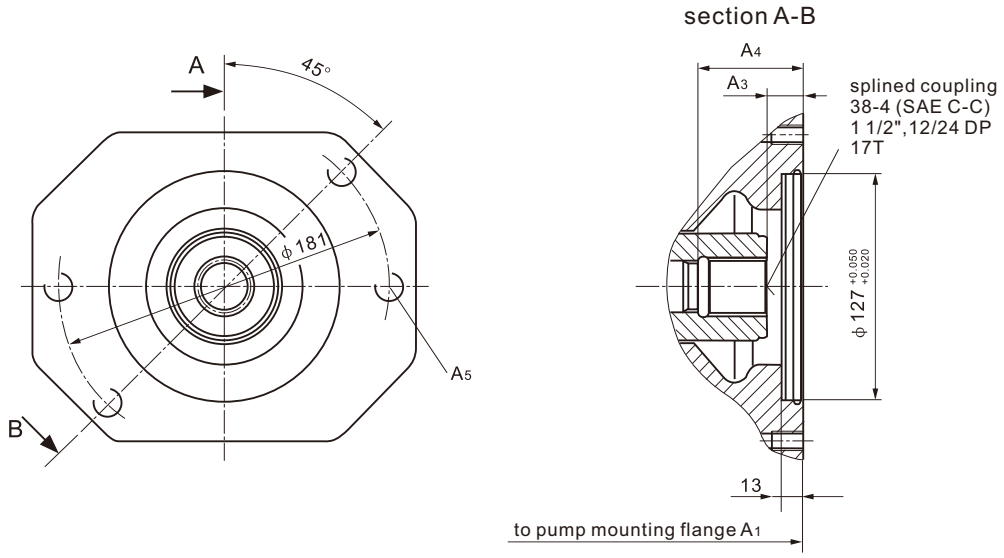


Size main pump	A_1	A_3	A_4	A_5
71	267	10	61.3	M16;18deep
100	338	9	65	M16;20deep

Installation Dimensions, Through Drives

Flange SAE 127,2-hole for built-on A10VSO 100(splined shaft S)

Order code K24



Size main pump	A_1	A_3	A_4	A_5
100	338	8	65	M16;20deep
140	350	9	77.3	M16;32deep

Flange SAE 152,4-hole for built-on A10VSO 140 (splined shaft S)

Order code K17

Size main pump A10VSO140