Variable Axial Piston Pump A10V(S)O

RA 92 701/10.07 **1**/36
Replaces: 05.04

open circuit

Size 18 ... 140
Series 31
Nominal pressure 4000 psi (280 bar)
Peak pressure 5100 psi (350 bar)

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Features

- Axial piston pump A10VO, variable, in swashplate design for hydrostatic transmissions in open loop circuit
- Flow is proportional to drive speed and displacement. By adjusting the swashplate angle it is possible to infinitely vary the flow
- Mounting flange acc. to SAE J744
- Flanged ports acc. to SAE J518
- 2 case drain ports
- Good suction characteristics
- Permissible working pressure 4000 psi (280 bar)
- Low noise level
- Long service life
- Axial and radial loading of drive shaft possible
- High power-weight ratio
- Wide range of controls
- Short response times
- Through drive option for multi-circuit system

Ordering code standard range

Version	**18, 28**	**45...140**	
High-Speed-Version	-	●	**H**

Axial piston unit	**18**	**28...140**	
Swashplate design variable	-	●	**A10V**
	●	-	**AA10VS**

Mode of operation	
Pump open circuit	**O**

Size		**18**	**28**	**45**	**71**	**100**	**140**
Displacement $V_{g\,max}$	in^3/rev	1.10	1.71	2.75	4.33	6.10	8.54
	cm^3/rev	18	28	45	71	100	140

Control devices			**18**	**28**	**45**	**71**	**100**	**140**	
Two point, direct control	DG		❍	●	●	●	●	●	**DG**
Pressure control	DR		●	●	●	●	●	●	**DR**
	DR	G	●	●	●	●	●	●	**DRG**
remote control									
Pressure and flow control	DFR		●	●	●	●	●	●	**DFR**
	DFR	1	●	●	●	●	●	●	**DFR1**
orifice in X-channel closed									
Pressure, flow and torque control			-	●	●	●	●	●	**DFLR**
Electro-hydr. pressure control, see RA 92707			●	●	●	●	●	●	**ED**
Pressure and flow control with electrically adjustable differential pressure see RE 92709 (in preparation)			❍	●	●	●	●	❍	**EF**

Series	
	31

Direction of rotation		
Viewed on drive shaft	clockwise	**R**
	counter clockwise	**L**

Seals	
NBR nitril-caoutchouc, shaft seal FKM	**P**
FKM fluoro-caoutchouc	**V**

Shaft end acc. to SAE J744	**18**	**28**	**45**	**71**	**100**	**140**	
Splined, reduced dia. (not for through drive) [in]	5/8	-	7/8	-	1 1/4	-	**U**
Splined, regular dia. (with undercut) [in]	3/4	7/8	1	1 1/4	1 1/2	1 3/4	**S**
Splined (with runout, higher input torque) [in]	-	7/8	1	1 1/4	–	–	**R**
Splined (with runout, reduced dia.) [in]	–	–	7/8	–	1 1/4	–	**W**
Parallel with key	●	●	●	●	●	●	**K**
Trapered with woodruff key	-	●	-	●	-	-	**C**

● = available ❍ = in preparation – = not available = preferred program

	A10V(S)	O			/	31		–					

Version

Axial piston unit

Mode of operation

Size

Control devices

Series

Direction of rotation

Seals

Shaft end

Mounting flange acc. to SAE J744	18	28	45	71	100	140	
2-hole	●	●	●	●	●	-	**C**
4-hole	–	–	–	–	–	●	**D**

Port for service lines		18	28	45	71	100	140	
Pressure port B Suction port S	SAE flange rear, fixing thread UNC	-	-	-	●	-	-	**91**
Pressure port B Suction port S	SAE flange on opposite side fixing thread UNC	-	-	-	●	-	-	**92**
Pressure port B Suction port S	SAE flange rear, fixing thread UNC	-	●	●	-	●	●	**61**
Pressure port B Suction port S	SAE flange on opposite side fixing thread UNC	●	●	●	-	●	●	**62**

Port plate 91 and 61 without through drive only

Through drive			18	28	45	71	100	140	
Without through drive			●	●	●	●	●	●	**N00**
With through drive (port plate 62 org[2]) Mounting flange[1])	Shaft/coupling[2])	Sealing							
82-2 (A)	16-4 (A)	axial	●	●	●	●	●	●	**K01**
82-2 (A)	19-4 (A-B)	axial	●	●	●	●	●	●	**K52**
101-2 (B)	22-4 (B)	axial	–	●	●	●	●	●	**K68**
101-2 (B)	25-4 (B-B)	axial	–	–	●	●	●	●	**K04**
127-2 (C)	32-4 (C)	axial	–	–	–	●	●	●	**K07**
127-2 (C)	38-4 (C-C)	axial	–	–	–	–	●	●	**K24**
152-4 (D)	44-4 (D)	axial	–	–	–	–	–	●	**K17**

[1]) Flange acc. to SAE J744

[2]) Coupling for splined shaft acc. to SAE J744 OCT83

For mounting options on through drive see page 29.

Technical data

Fluid

Prior to project design, please see our data sheets RA 90220 (mineral oil) and RA 90221 (ecologically acceptable fluids) for detailed information on fluids and application conditions. When using ecologically acceptable fluids attention must be paid to possible limitations of the technical data. If necessary please contact us.

Operating viscosity range

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

ν_{opt} = opt. operating viscosity 80...170 SUS (16...36 mm²/s)

referred to tank temperature (open loop circuit).

Limits of viscosity range

The following limits are valid for extreme operating conditions:

ν_{min} = 60 SUS (10 mm²/s)
short term (t ≤1 min)
at a max. permissible oil temperature
of t_{max} = 239 °F (115 °C).

Please note, that the max. fluid temperature of 239 °F (115 °C) is also not exceeded in certain areas (for instance bearing area). The temperature in the bearing area is approx. 7 °F (5 K) higher than average leakage fluid temperature.

ν_{max} = 7500 SUS (1600 mm²/s)
short term (t ≤1 min)
on cold start
(t_{min} = p ≤436 psi/30 bar, n ≤1000 rpm, -40 °F/40 °C.

At temperatures between -13 °F (-25 °C) and -40 °F (-40 °C) special measures may be required for certain installation positions. Please contact us for further information.

For detailed information on operation at very low temperatures see RA 90300-03-B.

When operating at temperatures between 195 °F (+90 °C) and 239 °F (115 °C) use FKM-seals (code designation V).

Notes on the selection of hydraulic fluid

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

The hydraulic fluid should be selected so that within the operating temperature range, the viscosity is within the optimum range ($\nu_{opt.}$); see shaded section of the selection diagram. We recommend that the higher viscosity grade is selected in each case.

Example: at an ambient temperature of X °F (°C) the operating temperature in the tank is 140 °F (60 °C). In the optimum viscosity range ν_{opt} (shaded area), this corresponds to viscosity grades VG 46 or VG 68, VG 68 should be selected.

Important: The leakage oil temperature is influenced by pressure and speed and is typically higher than the tank temperature. However max. temperature at any point in the system may not exceed 239 °F (115 °C).

At high temperatures please use FKM seals.

If the above mentioned conditions cannot be kept due to extreme operating parameters or high ambient temperatures, please consult us.

Filtration of fluid

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

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

20/18/15 acc. to ISO 4406[1)] is necessary.

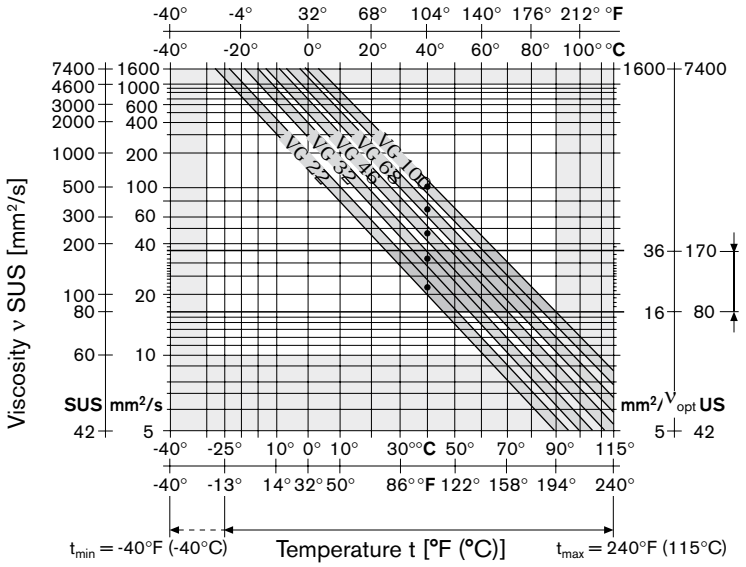
At very high fluid temperatures (195 °F (90 °C) up to max. 239 °F (115 °C)) the minimum cleanliness has to be at least

19/17/14 acc. to ISO 4406[1)].

If the above cleanliness classes cannot be met please consult us.

[1)] draft issue 1999

Selection diagram



Technical data (valid for mineral oil; for **ecologically acceptable fluids see RA 90221**)

Operating pressure range

Inlet

Absolute pressure at port S

$p_{abs\ min}$ ——— 12 psi (0,8 bar)

$p_{abs\ max}$ ——— 435 psi (30 bar)

Outlet

Pressure at port B

Nominal pressure p_N ——— 4000 psi (280 bar)

Peak pressure p_{max} ——— 5100 psi (350 bar)

(Pressure data to DIN 24312)

Case drain pressure

Maximum pressure of leakage fluid (at ports L, L_1):

maximum 7 psi (0,5 bar) higher than inlet pressure at port S.

$p_{L\ abs\ max}$ ——— 29 psi (2 bar)

Direction of flow

S to **B**.

High speed version

The sizes 45, 71, 100 and 140 are available in a High-Speed-version.

Without any changes in dimensions, these optimized units are suitable for higher input speeds, see table on page 6.

Important: The drive speed increase (1.2 • n_0) refers to the standard drive speed n_0.

e.g. size 100: n_{max} = 1.2 • 2000 rpm = 2400 rpm

WRONG: 1.2 • 2400 rpm = 2880 rpm

Mechanical displacement limiter

On size 18 a mechanical max. displacement limiter is standard on the non-through drive model N00, but not possible for the model with through drive.

$V_{g\ max}$: for sizes 18
Setting range from 50 % to $V_{g\ max}$ stepless

Determination of inlet pressure p_{abs} at inlet port S, or reduction in displacement for increasing speed.

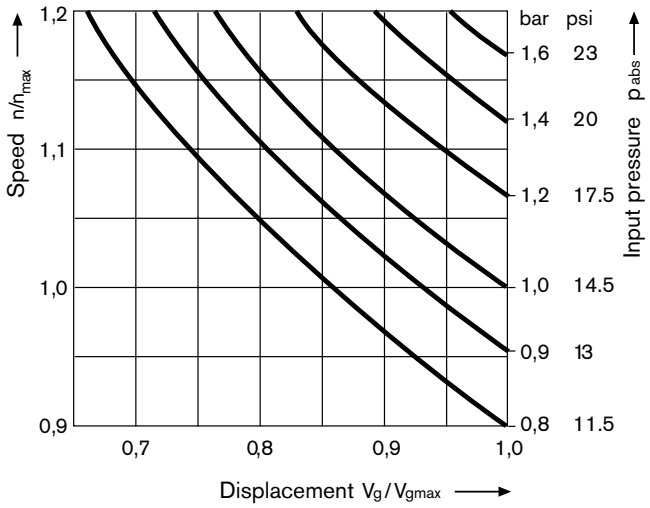


Table of values (theoretical values, without considering η_{mh} and η_v: values rounded)

Size			**18**	**28**	**45**	**71**	**100**	**140**				
High-Speed-Version									**45**	**71**	**100**	**140**
Displacement	$V_{g\,max}$	in³	1.10	1.71	2.75	4.33	6.10	8.54	2.75	4.33	6.10	8.54
		(cm³)	(18)	(28)	(45)	(71)	(100)	(140)	(45)	(71)	(100)	(140)
Speed [1], max.												
at $V_{g\,max}$	$n_{o\,max}$	rpm	3300	3000	2600	2200	2000	1800	3000	2550	2300	2050
at $V_g < V_{g\,max}$	$n_{o\,max\,perm.}$	rpm	3900	3600	3100	2600	2400	2100	3300	2800	2500	2200
Flow, max.												
at $n_{o\,max}$	$q_{vo\,max}$	gpm	15.6	22.2	30.9	41.2	52.8	66.6	35.7	47.8	60.7	75.8
		(L/min)	(59.4)	(84)	(117)	(156)	(200)	(252)	(135)	(181)	(230)	(287)
at $n_E = 1800$ rpm	q_{vE}	gpm	8.5	13.2	21.4	33.8	47.5	66.6	21.4	33.8	47.5	66.6
		(L/min)	(32.4)	(50)	(81)	(128)	(180)	(252)	(81)	(128)	(180)	(252)
Power ($\Delta p = 4000$ psi (280 bar) and $V_{g\,max}$)												
at $n_{o\,max}$	$P_{o\,max}$	HP	37	52	74	98	125	157	84	113	143	180
		(kW)	(27.7)	(39)	(55)	(73)	(93)	(117)	(63)	(84)	(107)	(134)
at $n_E = 1800$ rpm	$P_{E\,max}$	HP	20	31	51	80	113	158	51	80	113	158
		(kW)	(15)	(23)	(38)	(60)	(84)	(118)	(38)	(60)	(84)	(118)
Torque at $V_{g\,max}$												
$\Delta p = 4000$ psi	T_{max}	lb-ft	58.9	91	146	230	324	453	146	230	324	453
(280 bar)		(Nm)	(80.1)	(125)	(200)	(316)	(445)	(623)	(200)	(316)	(445)	(623)
$\Delta p = 1450$ psi	T	lb-ft	21	33	53	83	117	164	53	83	117	164
(100 bar)		(Nm)	(28.6)	(45)	(72)	(113)	(159)	(223)	(72)	(113)	(159)	(223)
Moment of inertia	J	lb-ft²	0.022	0.040	0.078	0.197	0.396	0.574	0.078	0.197	0.396	0.574
about drive axis		(kgm²)	(0.00093)	(0.0017)	(0.0033)	(0.0083)	(0.0167)	(0.0242)	(0.0033)	(0.0083)	(0.0167)	(0.0242)
Max. angular acceleration		rad/s	6800	5500	4000	2900	2400	2000	4000	2900	2400	2000
Torsional stiffness - shaft "S"		lb-ft/rad	8149	16403	27562	52835	89039	124610	27562	52835	89039	124610
		(Nm/rad)	(11087)	(22317)	(37499)	(71884)	(121142)	(169537)	(37499)	(71884)	(121142)	(169537)
shaft "U"		lb-ft/rad	5946		22107		66953		22107		66953	
		(Nm/rad)	(8090)		(30077)		(91093)		(30077)		(91093)	
shaft "R"		lb-ft/rad		19375	30153	56261			30153	56261		
		(Nm/rad)		(26360)	(41025)	(76545)			(41025)	(76545)		
shaft "W"		lb-ft/rad			25330		74858		25330		74858	
		(Nm/rad)			(34463)		(101847)		(34463)		(101847)	
shaft "K"		lb-ft/rad	9805	19712	32270	60352	99448	144680	32270	60352	99448	144680
		(Nm/rad)	(13340)	(26819)	(43905)	(82112)	(135303)	(196844)	(43905)	(82112)	(135303)	(196844)
Filling capacity		gall.	0.1	0.18	0.26	0.42	0.58	0.79	0.26	0.42	0.58	0.79
		(L)	(0.4)	(0.7)	(1.0)	(1.6)	(2.2)	(3.0)	(1.0)	(1.6)	(2.2)	(3.0)
Weight (without fluid)	m	lbs	26	33	46	73	99	132	46	73	99	132
		(kg)	12	15	21	33	45	60	21	33	45	60

[1] Values shown are valid for an absolute pressure of 14.5 psi (1 bar) at inlet port S. At reduced displacement or increased inlet pressure the speed may be increased according to the diagram.

[2] For higher radial loads, please consult us.

Determination of size

Flow $q_v = \frac{V_g \cdot n \cdot \eta_v}{231}$ [gpm] $\left(q_v = \frac{V_g \cdot n \cdot \eta_v}{1000} \right.$ [L/min] $\left.\right)$

Torque $T = \frac{V_g \cdot \Delta p}{24 \cdot \pi \cdot \eta_{mh}}$ [lb-ft] $\left(T = \frac{V_g \cdot \Delta p}{20 \cdot \pi \cdot \eta_{mh}} \right.$ [Nm] $\left.\right)$

Power $P = \frac{q_v \cdot \Delta p}{1714 \cdot \eta_t}$ [HP] $\left(P = \frac{q_v \cdot \Delta p}{600 \cdot \eta_t} \right.$ [kW] $\left.\right)$

V_g = Geometrical displacement per revolution in in³ (cm³)

Δp = Pressure differential in psi (bar)

n = Speed in rpm (min^{-1})

η_v = Volumetric efficiency

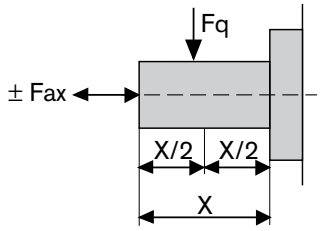
η_{mh} = Mechanical-hydraulic efficiency

η_t = Total efficiency

Permitted loading of drive shaft:

Size			**18**	**28**	**45**	**71**	**100**	**140**
Axial force, max.	$F_{ax\ max}$	lbf	157	225	340	540	900	1080
		(N)	(700)	(1000)	(1500)	(2400)	(4000)	(4800)
Radial force, max. [2)]	$F_{q\ max}$	lbf	80	270	340	427	517	630
		(N)	(350)	(1200)	(1500)	(1900)	(2300)	(2800)

Application of forces



Noise Level

Characteristics for pump

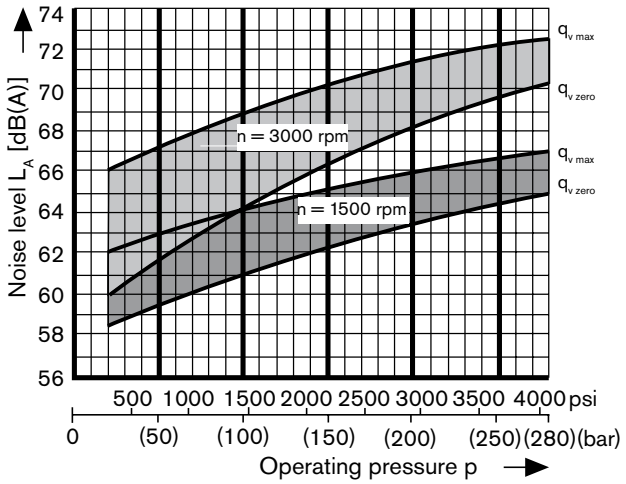
Measured in an anechoic chamber

Distance microphone-pump = 3.3 ft (1 m)

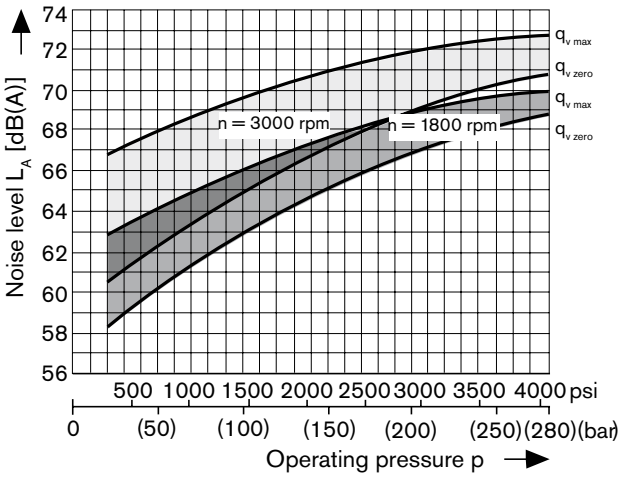
Max. measurement error ± 2 dB (A)

Fluid: hydraulic oil ISO VG 46 DIN 51519, t = 122 °F (50° C)

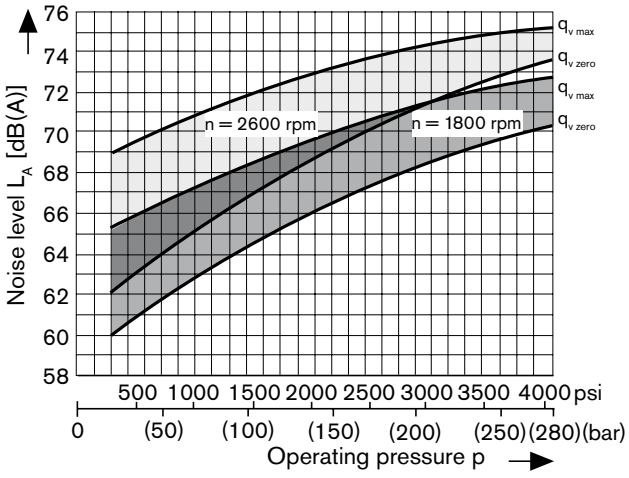
Size 18



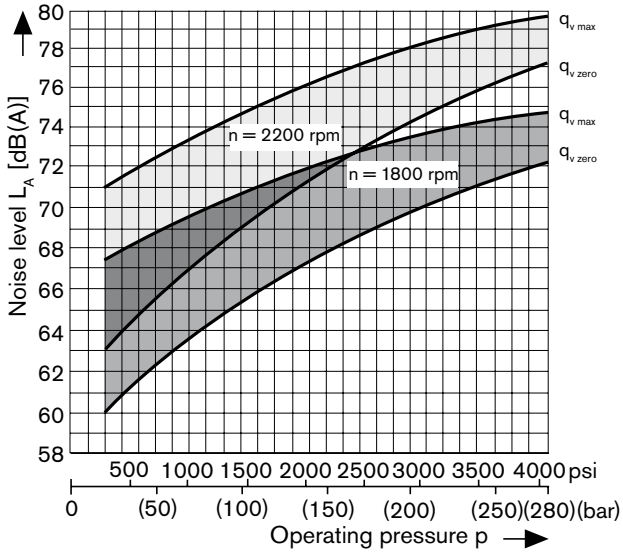
Size 28



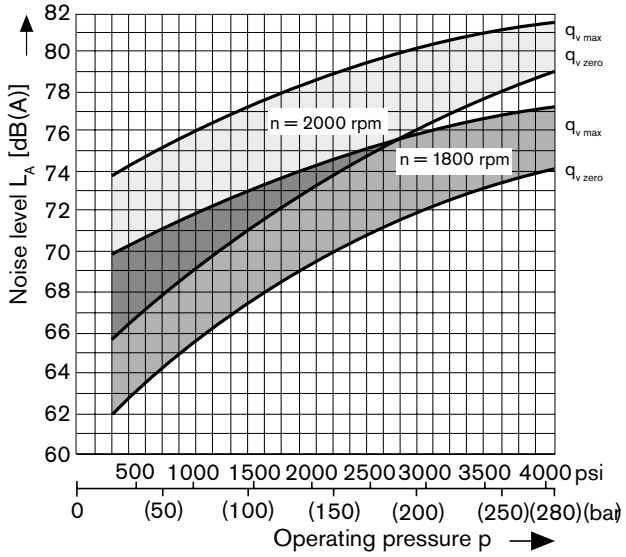
Size 45



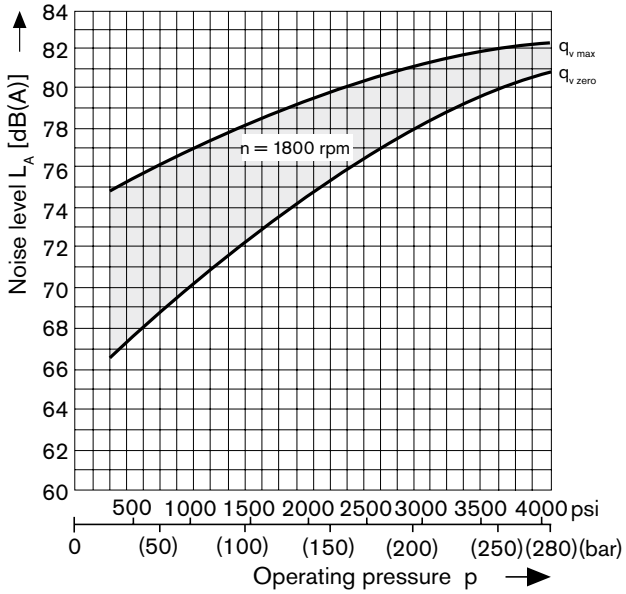
Size 71



Size 100



Size 140



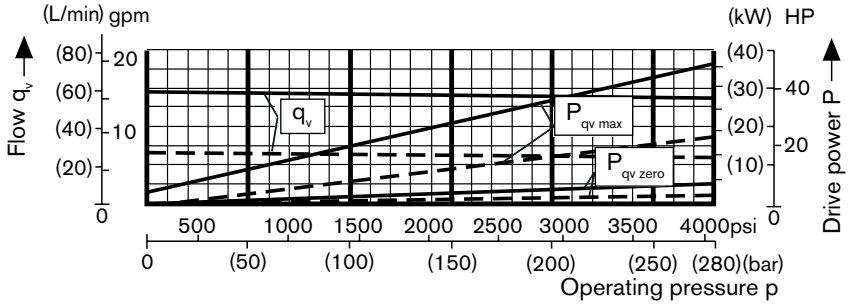
Drive power and flow

Fluid: hydraulic oil ISO VG 46 DIN 51519, t = 122 °F (50° C)

Size 18

– – – – n = 1500 rpm

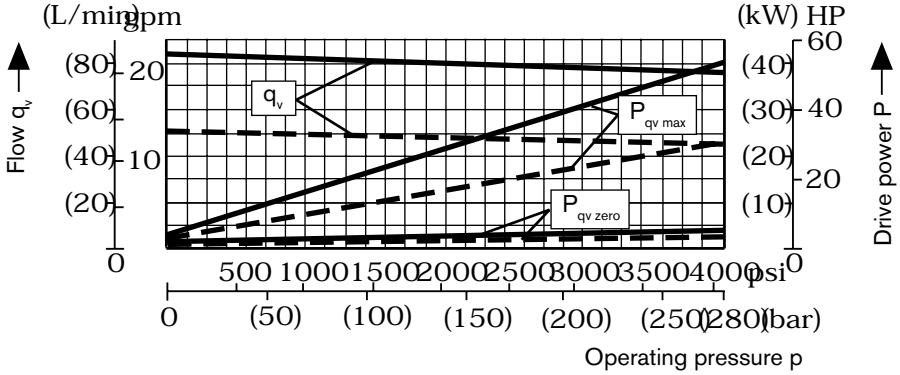
——— n = 3300 rpm



Size 28

– – – – n = 1800 rpm

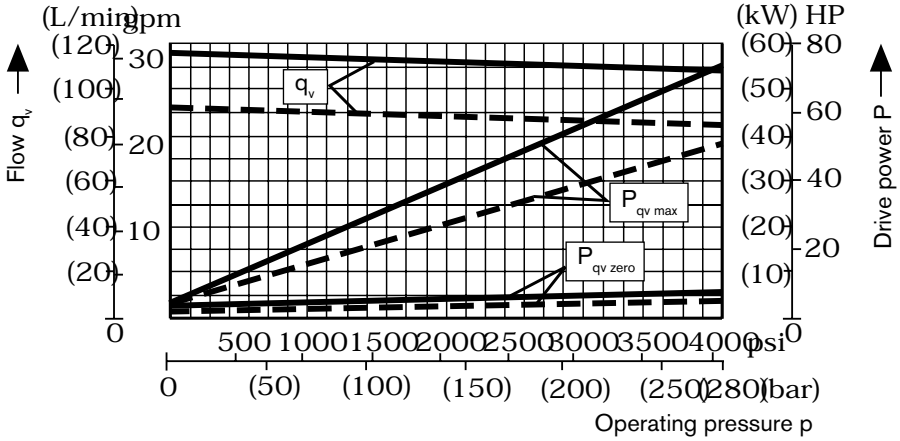
——— n = 3000 rpm



Size 45

– – – – n = 1800 rpm

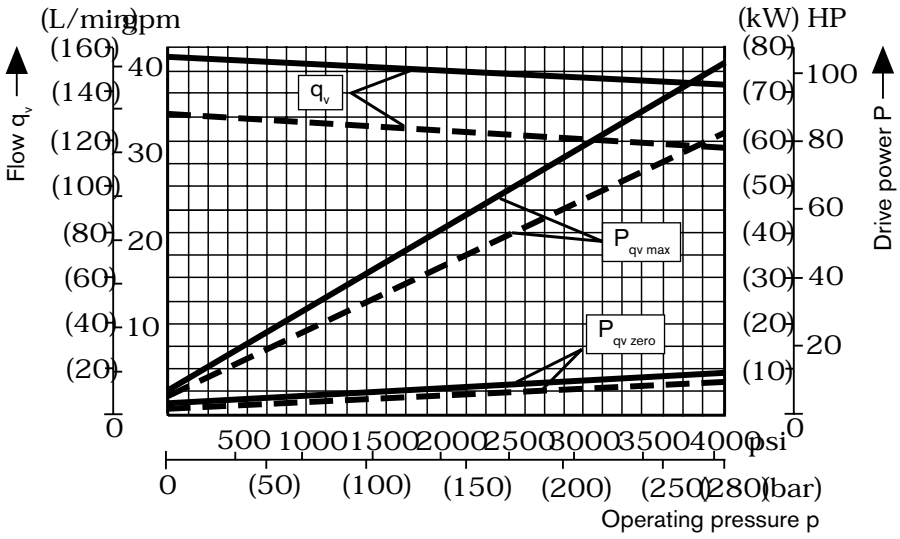
——— n = 2600 rpm



Size 71

– – – – n = 1800 rpm

——— n = 2200 rpm



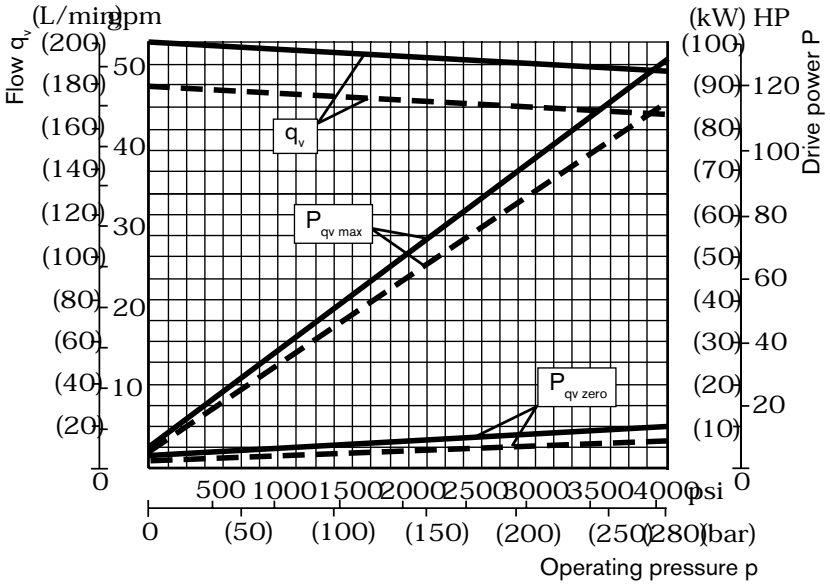
Drive power and flow

Fluid: hydraulic oil ISO VG 46 DIN 51519, t = 122 °F (50° C)

Size 100

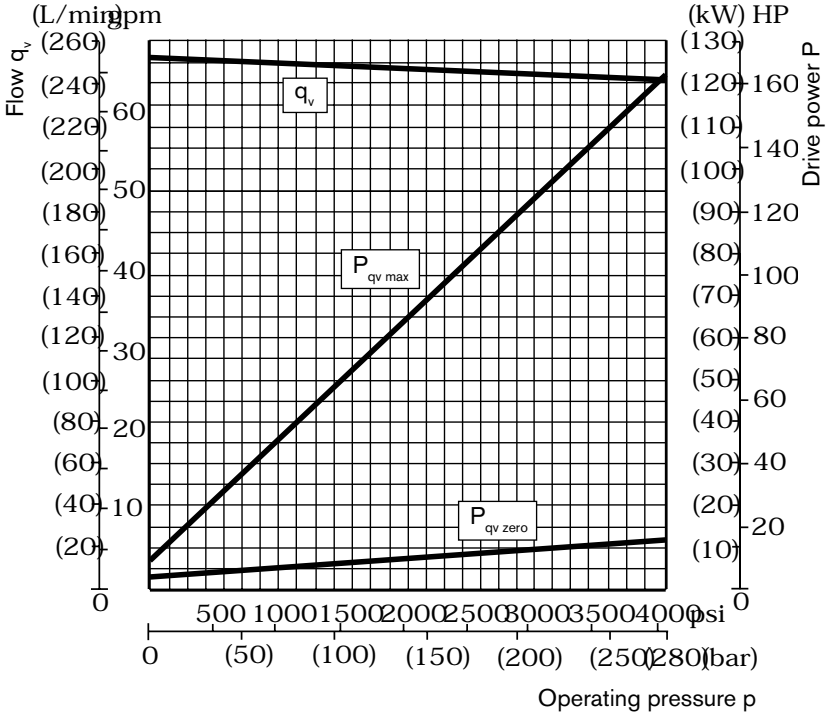
– – – – n = 1800 rpm

——— n = 2000 rpm



Size 140

——— n = 1800 rpm



Overall efficiency

$$\eta_t = \frac{q_v \bullet p}{P_{qv\ max} \bullet 1714} \left(\frac{q_v \bullet p}{P_{qv\ max} \bullet 600} \right)$$

Volumetric efficiency

$$\eta_v = \frac{q_v}{q_{v\ theor.}}$$

DG - two point, direct control

The pump can be set to a minimum swivel angle by connecting an external switching pressure to port X.

This will supply the control piston directly with control oil; a minimum pressure of p_{st} ≤725 psi (50 bar) is required.

The pump can only be switched between $V_{g\,max}$ or $V_{g\,min}$.

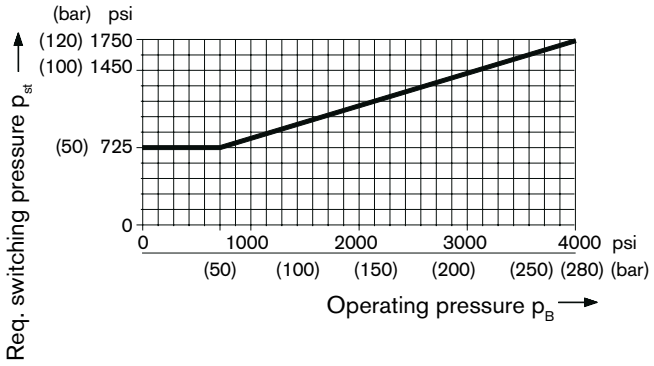
Please note, that the required switching pressure at port X is directly dependent on the actual operating pressure p_B in port B. (See switching pressure diagram)

Control pressure p_{st} in X = 0 psi (bar) ≙ $V_{g\,max}$

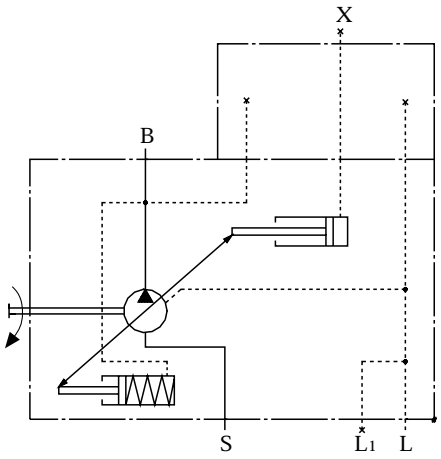
Control pressure p_{st} in X ≤725 psi (50 bar) ≙ $V_{g\,min}$

The max. permissible switching pressure p_{st} is 4000 psi (280 bar).

Switching pressure diagram



Circuit drawing



Ports

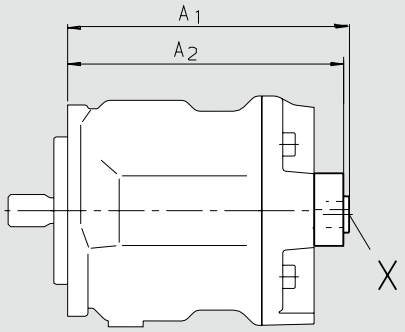
B	Pressure port
S	Inlet port
L, L_1	Case drain ports (L_1 plugged)
X	Pilot pressure port (plugged)

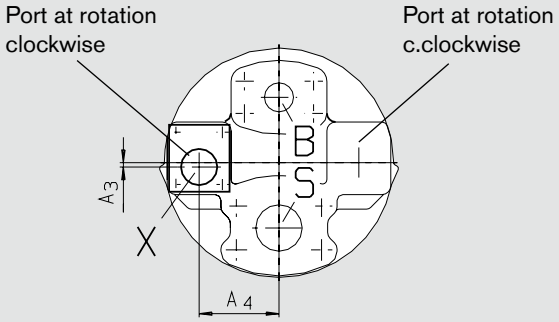
Unit dimensions DG

Before finalizing your design please request a certified installation drawing.
Dimensions in inches (mm).

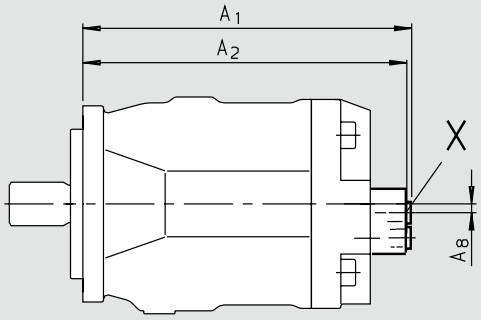
Version 61 N00 - Ports at rear

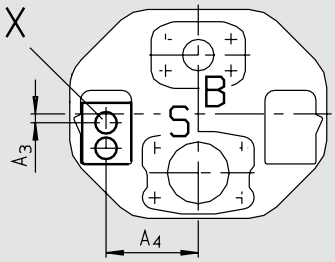
Size 28...100





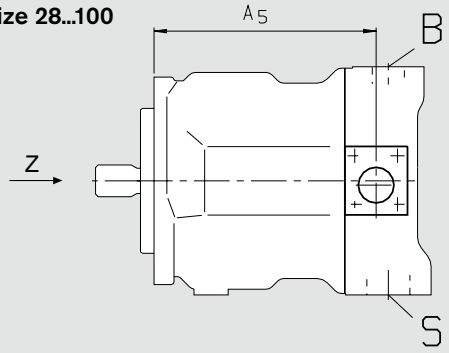
Size 140

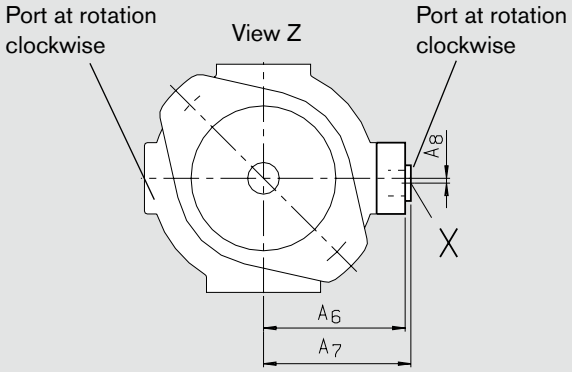




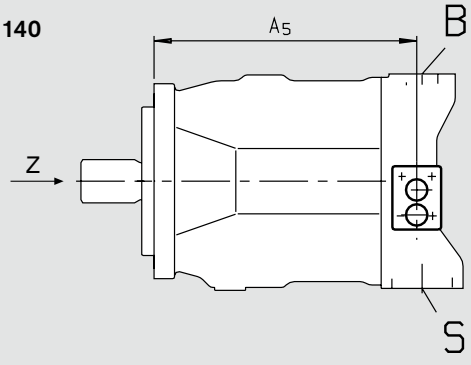
Version 62 N00 - Ports on side

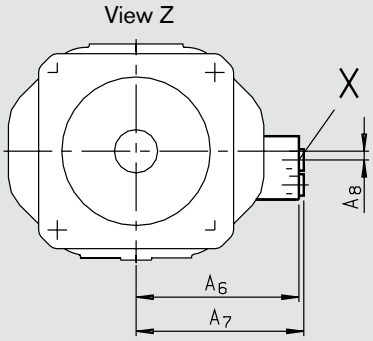
Size 28...100





Size 140





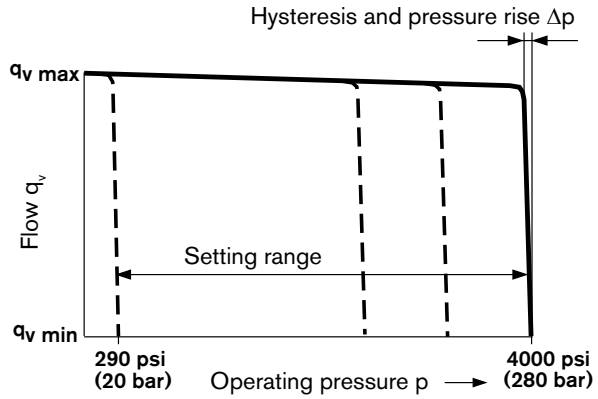
Size	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	X (closed)
28	7.62 (193.5)	7.48 (190)	0 (0)	2.16 (55)	6.22 (158)	3.94 (100)	4.07 (103.5)	0.12 (3)	R1/4in DIN 3852-1
45	8.37 (212.5)	8.23 (209)	0.12 (3)	2.50 (63.5)	6.81 (173)	4.33 (110)	4.47 (113.5)	0.12 (3)	R1/4in DIN 3852-1
71	9.70 (246.5)	9.55 (242.5)	0.12 (3)	2.89 (73.5)	7.91 (201)	4.86 (123.5)	5.02 (127.5)	0.12 (3)	R1/4in DIN 3852-1
100	12.26 (311.5)	12.11 (307.5)	0.12 (3)	3.19 (81)	10.55 (268)	5.06 (128.5)	5.22 (132.5)	0.12 (3)	R1/4in DIN 3852-1
140	13.31 (338)	13.15 (334)	0.12 (3)	3.70 (94)	10.55 (268)	5.92 (150.5)	6.10 (155)	0.12 (3)	M14x1,5 DIN 3852-1

DR - Pressure control

The pressure controller serves to maintain a constant pressure in a hydraulic system within the 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 pilot valve.

Static characteristic

(at n_1 = 1500 rpm; t_{oil} = 122 °F / 50 °C)

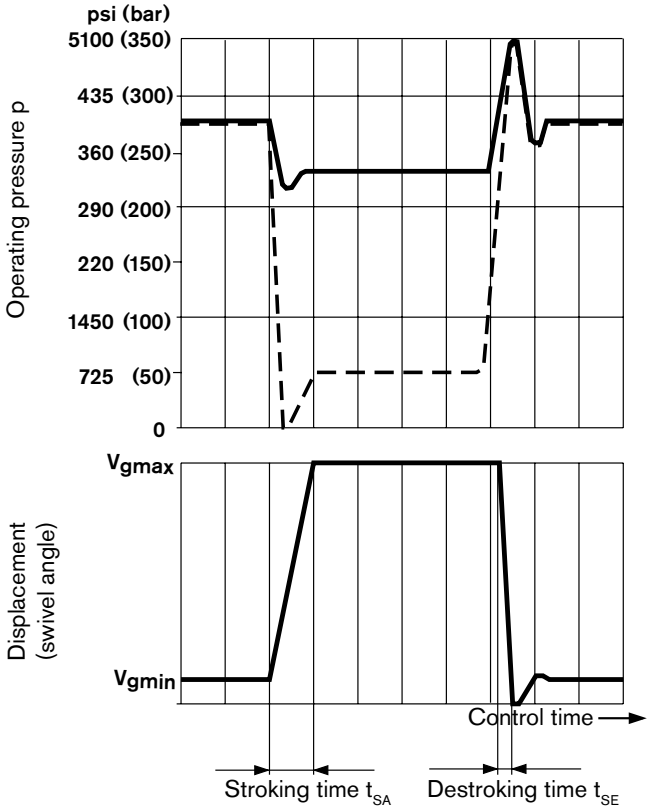


Dynamic characteristic

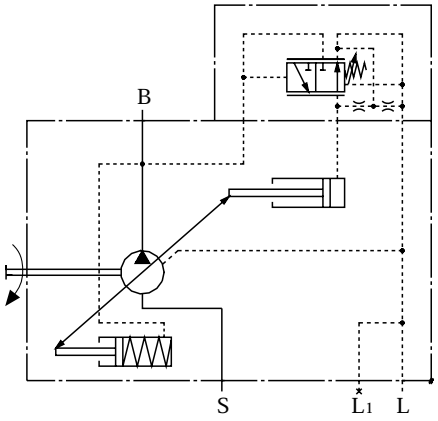
The opening curves are mean values measured under test conditions with the unit mounted inside the tank.

Conditions: n = 1500 rpm
t_{oil} = 122 °F (50 °C)
Main relief set at 5100 psi (350 bar)

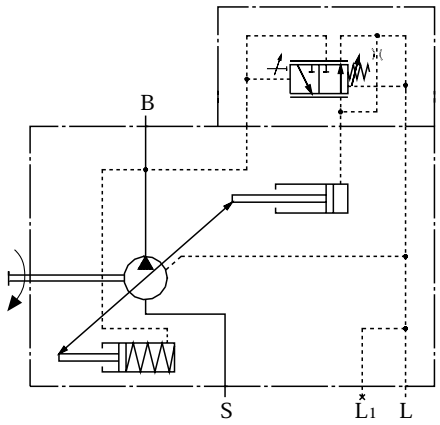
Stepped loading by suddenly opening or closing the pressure line using a pressure relief valve at 3.3 ft (1 m) downstream from the pump pressure outlet.



Circuit drawing
Size 18 ... 100



Size 140



Ports

B	Pressure port
S	Inlet port
L,L_1	Case drain port (L_1 plugged)

Controller data

Hysteresis and repetitive accuracy Δp ____ max. 45 psi (3 bar)

Pressure rise, max.

Size	18	28	45	71	100	140
Δp psi (bar)	60(4)	60(4)	90(6)	115(8)	145(10)	175(12)

Pilot oil consumption max. approx 0.8 gpm (3 L/min)

Flow loss at q_{vmax} see pages 10 and 11.

Control times

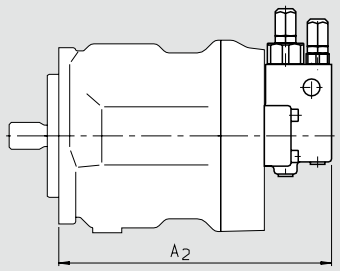
Size	t_{SA} [ms] against 725 psi (50 bar)	t_{SA} [ms] against 3200 psi (220 bar)	t_{SE} [ms] zero stroke 4000 psi (280 bar)
18	50	25	20
28	60	30	20
45	80	40	20
71	100	50	25
100	125	90	30
140	130	110	30

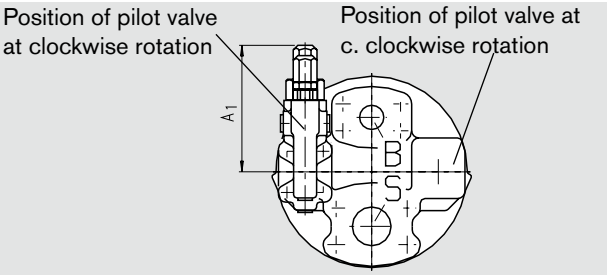
Unit dimensions DR

Before finalizing your design please request a certified installation drawing.
Dimensions in inches (mm).

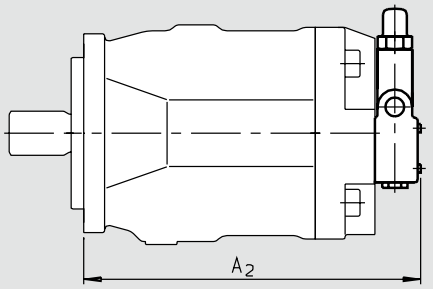
Version 61 N00 - Ports at rear

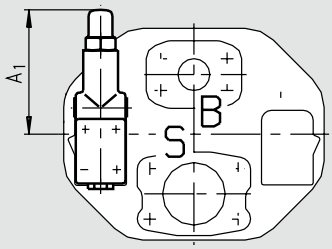
Size 28... 100





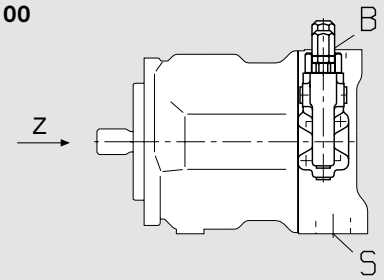
Size 140

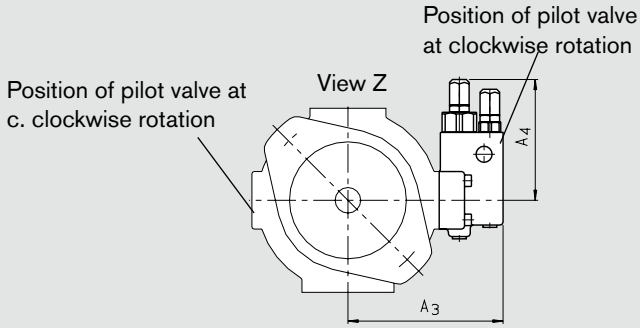




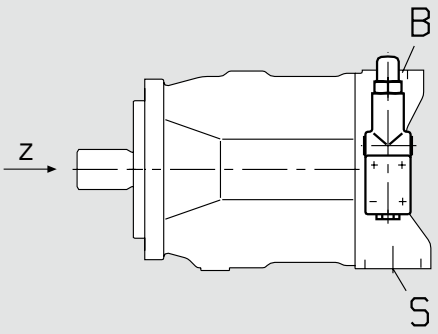
Version 62 N00 - Ports on side

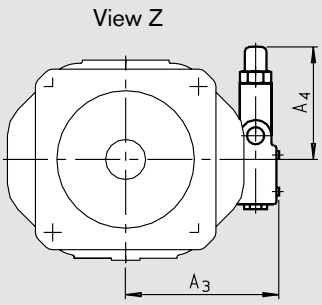
Size 18... 100





Size 140





NG	A_1	A_2	A_3	A_4
18	-	-	4.96 (126)	4.13 (105)
28	4.29 (109)	8.86 (225)	5.35 (136)	4.17 (106)
45	4.17 (106)	9.61 (244)	5.75 (146)	4.17 (106)
71	4.17 (106)	10.94 (278)	6.30 (160)	4.17 (106)
100	4.17 (106)	13.54 (344)	6.50 (165)	4.17 (106)
140	5.00 (127)	13.35 (339)	6.65 (169)	5.00 (127)

DRG - Pressure control, remote

Function and design as for DR.

A pressure relief valve may be externally piped to port X for remote control purposes. However it is not included in the scope of supply with the DRG control.

The differential presssure at the DRG control spool is set as standard to 290 psi (20 bar) and this results in a pilot flow of 0.4 gpm (1.5 L/min). If another setting is required, please state this in clear text.

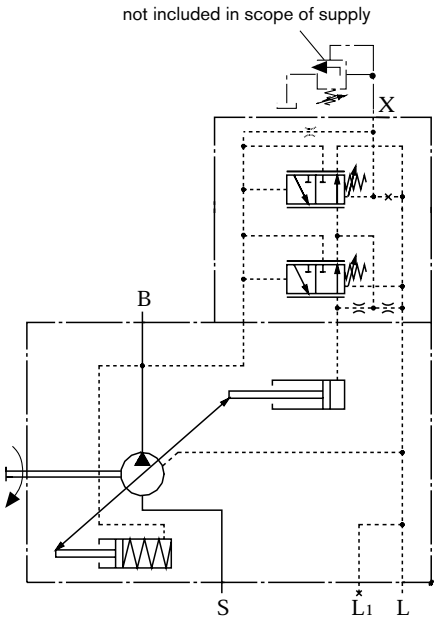
We recommend that one of the following is used as the seperate pressure relief valve.

DBDH 6 (hydraulic) to RA 25402 or

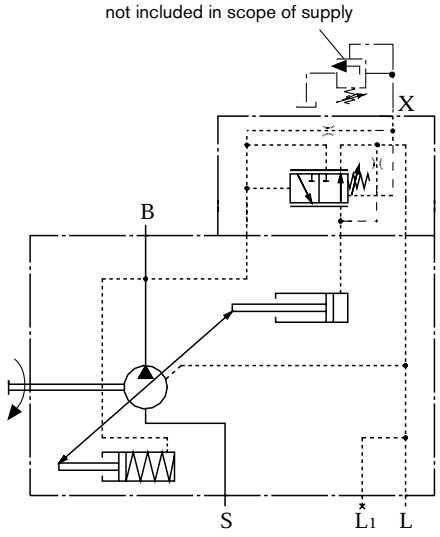
DBETR-SO 381 with orifice DIA 0.0315 in (0.8 mm) in P (electric) to RA 29166.

Max. length of piping should not exceed 6.5 ft (2 m).

Circuit drawing
Size 18 ... 100

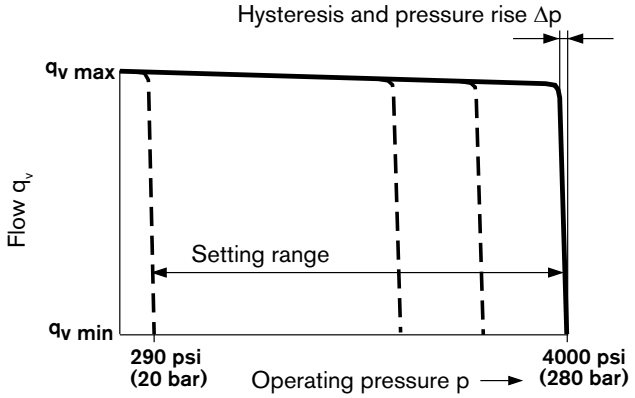


Size 140



Static characteristic

(at n_1 = 1500 rpm; t_{oil} = 122°F / 50°C)



Control data

Hysteresis Δp _____ max. 45 psi (3 bar)

Pressure rise, max.

Size	18	28	45	71	100	140
Δp psi (bar)	60(4)	60(4)	90(6)	115(8)	145(10)	175(12)

Pilot oil requirement _____ approx. 1.2 gpm (4.5 L/min)

Flow loss at q_{vmax} see pages 10 and 11.

Ports

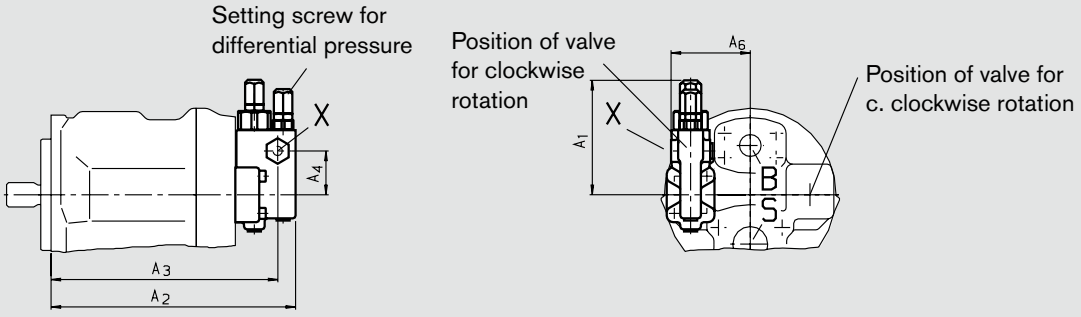
B	Pressure port
S	Inlet port
L,L_1	Case drain port (L_1 plugged)
X	Pilot pressure port

Unit dimensions DRG

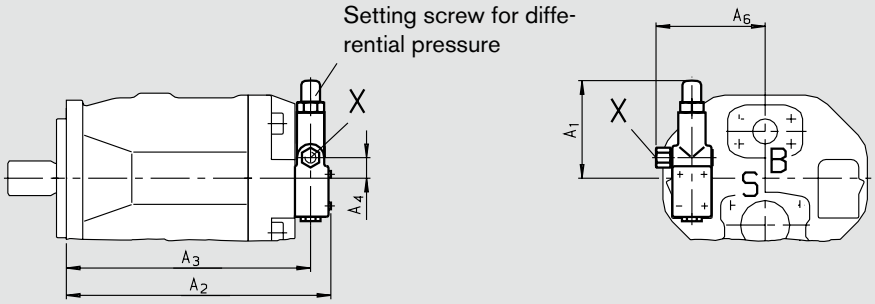
Before finalizing your design please request a certified installation drawing.
Dimensions in inches (mm).

Version 61 N00 - Ports at rear

Size 28... 100

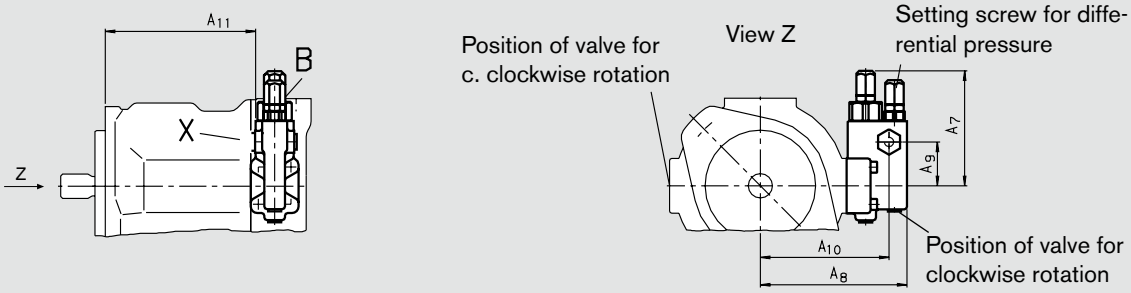


Size 140

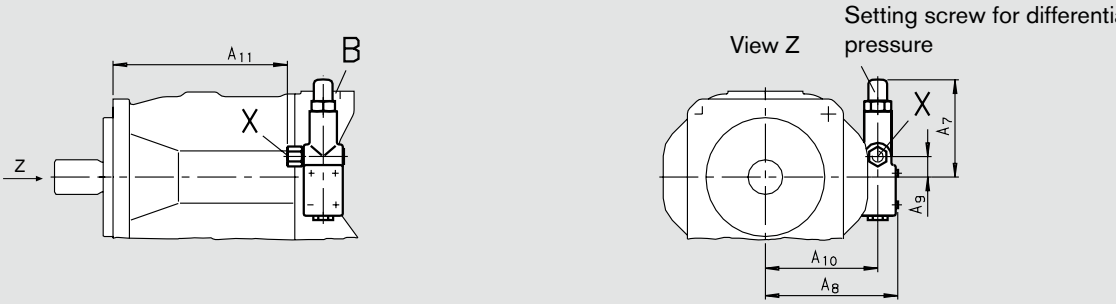


Version 62 N00 - Ports on side

Size 18... 100



Size 140



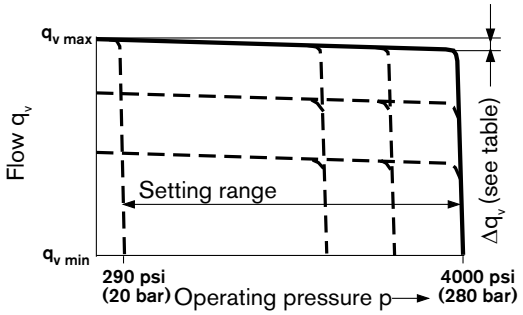
Size	A_1	A_2	A_3	A_4	A_6	A_7	A_8	A_9	A_{10}	A_{11}	Port X
18	-	-	-	-	-	4.13(105)	4.96(126)	1.57(40)	4.29(109)	5.12(130)	7/16-20 UNF-2B; 0.39(10)deep
28	4.29(109)	8.86(225)	8.23(209)	1.69(43)	2.87(73)	4.17(106)	5.35(136)	1.57(40)	4.69(119)	5.51(140)	7/16-20 UNF-2B; 0.39(10)deep
45	4.17(106)	9.61(244)	8.98(228)	1.57(40)	3.21(81.5)	4.17(106)	5.75(146)	1.57(40)	5.08(129)	6.10(155)	7/16-20 UNF-2B; 0.39(10)deep
71	4.17(106)	10.94(278)	10.31(262)	1.57(40)	3.60(91.5)	4.17(106)	6.30(160)	1.57(40)	5.62(143)	7.20(183)	7/16-20 UNF-2B; 0.39(10)deep
100	4.17(106)	13.54(344)	12.87(327)	1.57(40)	3.90(99)	4.17(106)	6.50(165)	1.57(40)	5.83(148)	9.84(250)	7/16-20 UNF-2B; 0.39(10)deep
140	5.00(127)	13.35(339)	12.32(313)	1.06(27)	5.51(140)	5.00(127)	6.65(169)	1.06(27)	5.63(143)	8.74(222)	9/16-18 UNF-2B; 0.51(13)deep

DFR / DFR1 - Pressure flow control

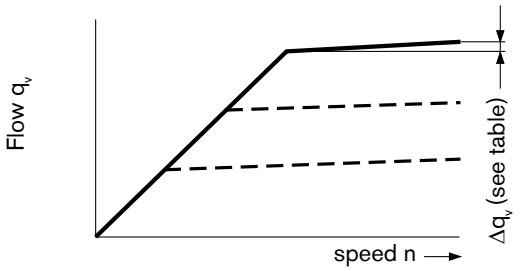
In addition to the pressure control function, the pump flow to the actuator may be varied by means of a differential pressure (e.g. over an orifice or directional control valve). The pump supplies only the amount of fluid as required by the actuator.
In the DFR1-valve version the orifice between the X port and tank is plugged.
For function and content of pressure control see pages 14/15.

Static characteristic

(at n_1 = 1500 rpm; t_{oil} = 122 °F / 50 °C)

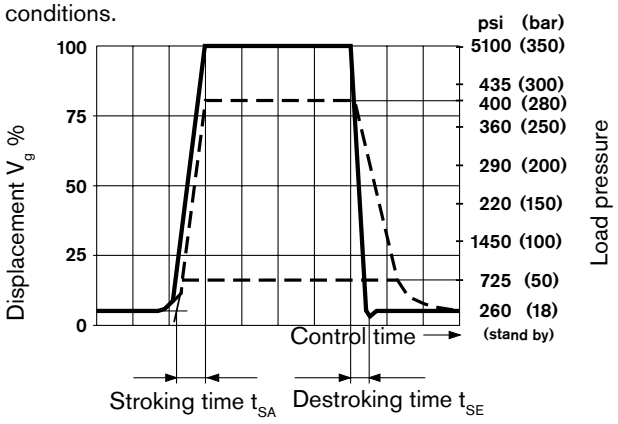


Static characteristic at variable speed



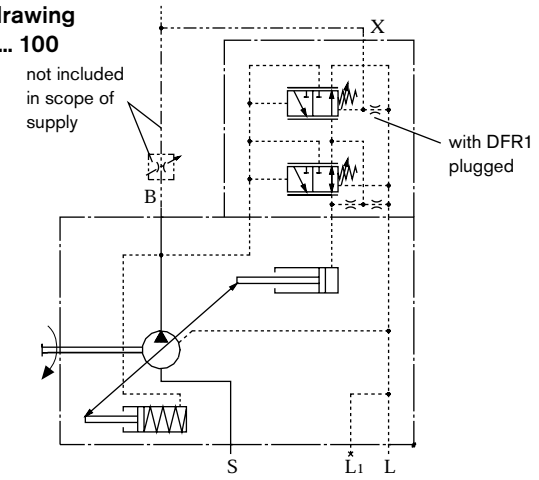
Dynamic characteristic operating curve

The curves shown are measured average values under test conditions.

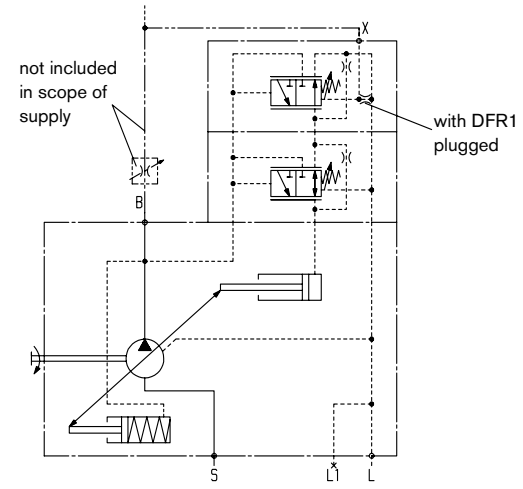


Size	t_{SA} [ms] 4000 psi (280 bar)-stand by	t_{SE} [ms] 4000 psi (280 bar)-stand by	t_{SE} [ms] 725 psi (50 bar)-stand by
18	40	15	40
28	40	20	40
45	50	25	50
71	60	30	60
100	120	60	120
140	130	60	130

Circuit drawing
Size 18 ... 100



Size 140



Ports

B	Pressure port
S	Inlet port
L,L_1	Case drain port (L_1 plugged)
X	Pilot pressure port

X-port execution	Size 18-100	Size 140
	without adapter	with adapter

Differential pressure Δp:

Standard setting: 200 psi (14 bar). If a different setting is required please state in clear text.

When port X is loaded to tank (and outlet B is closed), a zero stroke pressure (standby) of p = 260 ± 30 psi (18 ± 2 bar) results. (depends on Δp)

Control data

For technical data of pressure control see page 20.
Max. flow deviation (hysteresis and rise) measured at drive speed n = 1500 rpm.

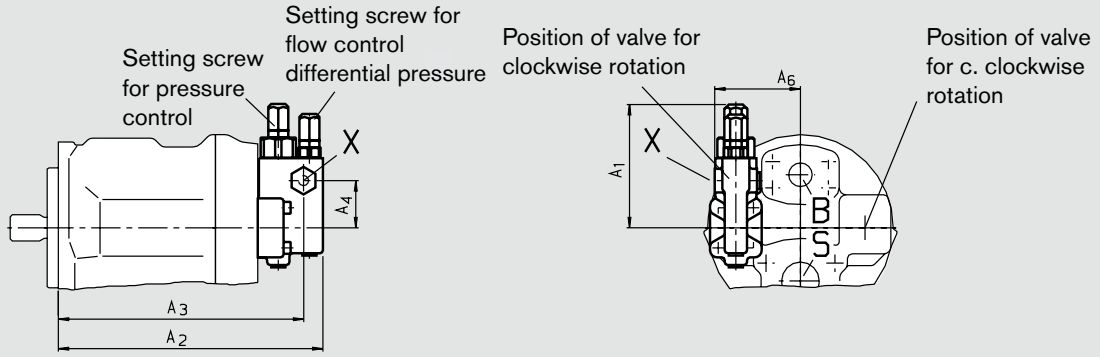
Size		18	28	45	71	100	140
Δqv_{max}	gpm	0.24	0.26	0.48	0.74	1.06	1.60
	(L/min)	(0.9)	(1.0)	(1.8)	(2.8)	(4.0)	(6.0)

Unit dimensions DFR/DFR1

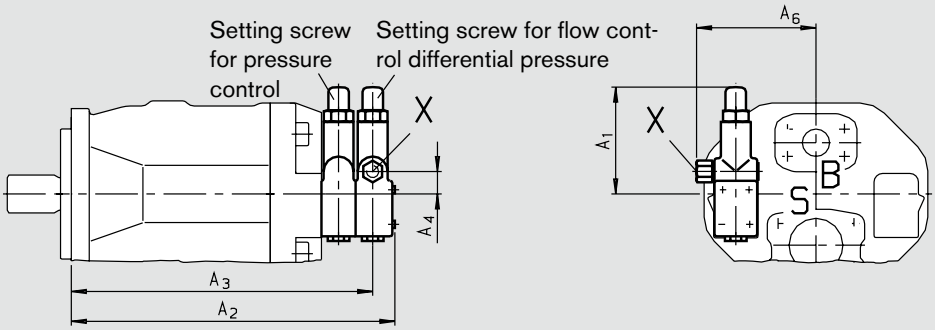
Before finalizing your design please request a certified installation drawing.
Dimensions in inches (mm).

Version 61 N00 - Ports at rear

Size 28...100

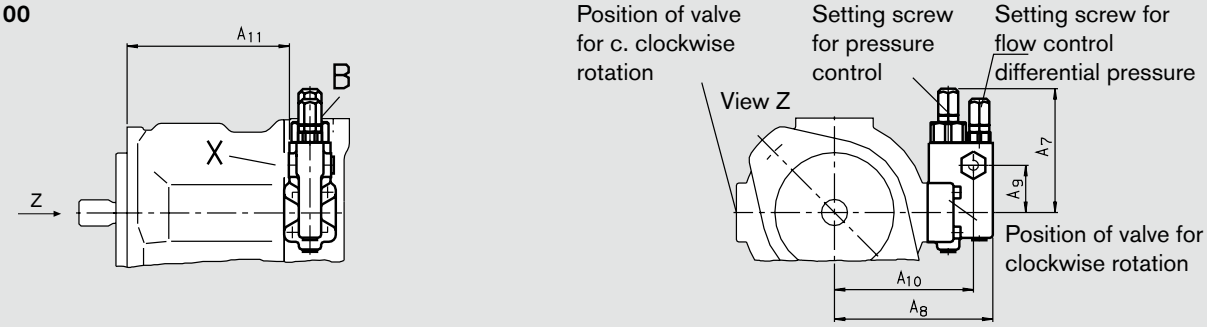


Size 140

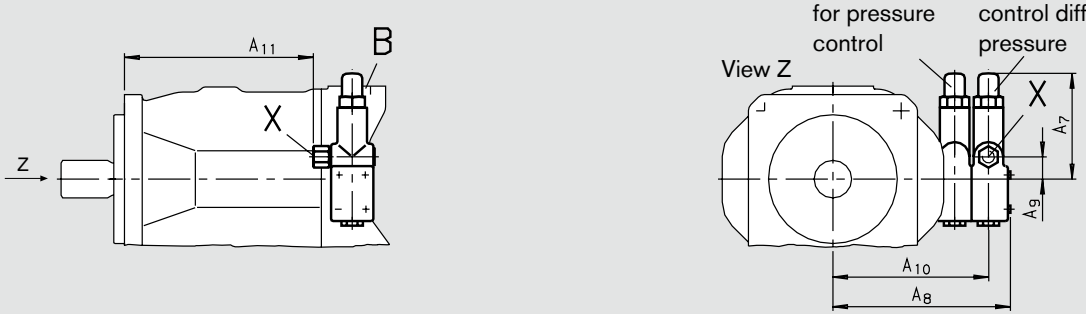


Version 62 N00 - Ports on side

Size 18...100



Size 140



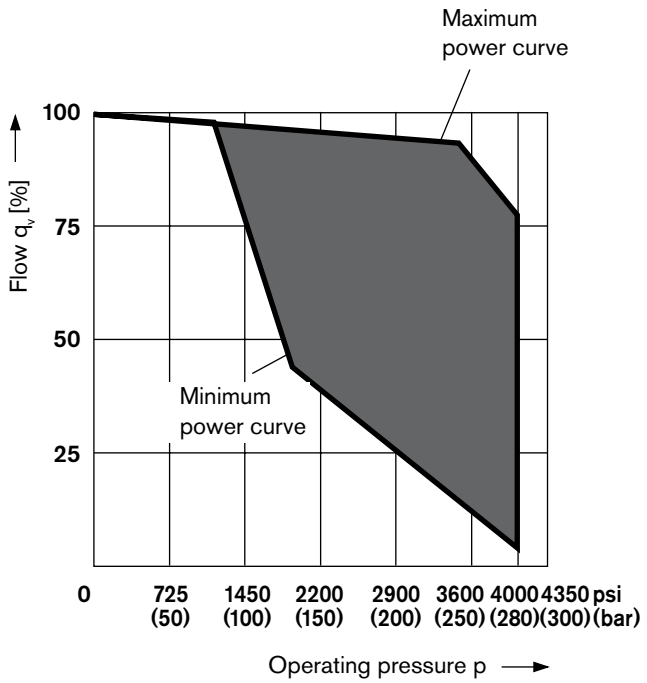
Size	A_1	A_2	A_3	A_4	A_6	A_7	A_8	A_9	A_{10}	A_{11}	Port X
18	-	-	-	-	-	4.13(105)	4.96(126)	1.57(40)	4.29(109)	5.12(130)	7/16-20 UNF-2B; 0.39(10)deep
28	4.29(109)	8.86(225)	8.23(209)	1.69(43)	2.87(73)	4.17(106)	5.35(136)	1.57(40)	4.69(119)	5.51(140)	7/16-20 UNF-2B; 0.39(10)deep
45	4.17(106)	9.61(244)	8.98(228)	1.57(40)	3.21(81.5)	4.17(106)	5.75(146)	1.57(40)	5.08(129)	6.10(155)	7/16-20 UNF-2B; 0.39(10)deep
71	4.17(106)	10.94(278)	10.31(262)	1.57(40)	3.60(91.5)	4.17(106)	6.30(160)	1.57(40)	5.62(143)	7.20(183)	7/16-20 UNF-2B; 0.39(10)deep
100	4.17(106)	13.54(344)	12.87(327)	1.57(40)	3.90(99)	4.17(106)	6.50(165)	1.57(40)	5.83(148)	9.84(250)	7/16-20 UNF-2B; 0.39(10)deep
140	5.00(127)	14.92(379)	13.90(353)	1.06(27)	5.51(140)	5.00(127)	8.23(209)	1.06(27)	7.20(183)	8.74(222)	9/16-18 UNF-2B; 0.51(13)deep

DFLR - Pressure / flow / power control

In order to achieve a constant drive torque with a varying operating pressure, the swivel angle and with it the output flow from the axial piston unit is varied so that the product of flow and pressure remains constant.

Flow control is possible below the limit of the power curve.

Static characteristic



The power characteristic is set at the factory, please state your requirements in clear text e.g. 40 HP (30 kW) at 1800 rpm.

Control data

For technical data constant pressure control see page 16.

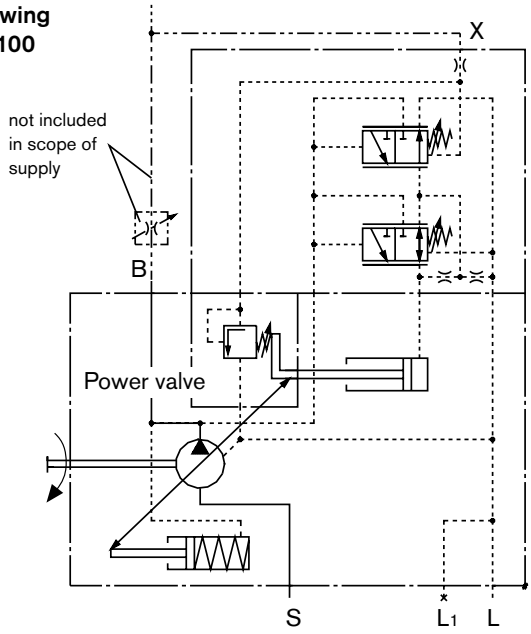
For technical data flow control see page 18.

Start of control _____ from 1160 psi (80 bar)

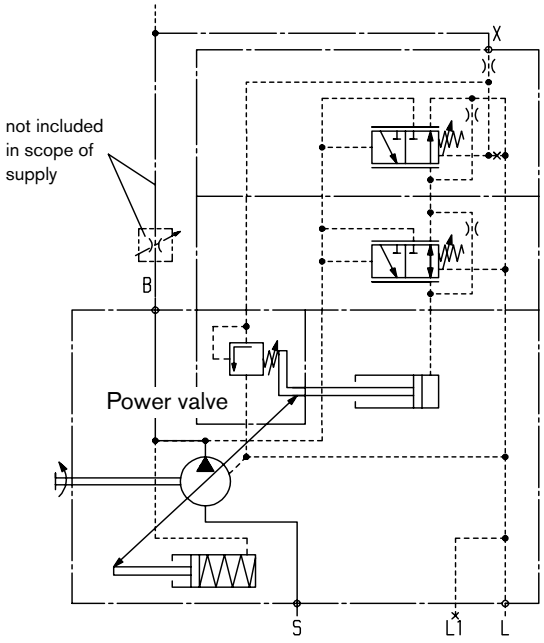
Pilot oil consumption _____ max. approx. 1.45 gpm (5.5 L/min)

Flow loss at q_{vmax} see pages 10 and 11.

Circuit drawing
Size 28 ... 100



Size 140



Ports

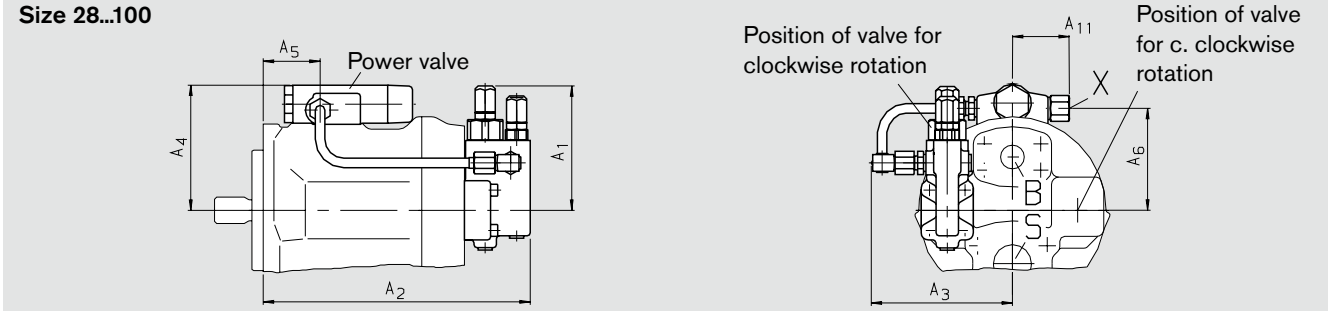
B	Pressure port
S	Inlet port
L,L_1	Case drain port (L_1 plugged)
X	Pilot pressure port

Unit dimensions DFLR

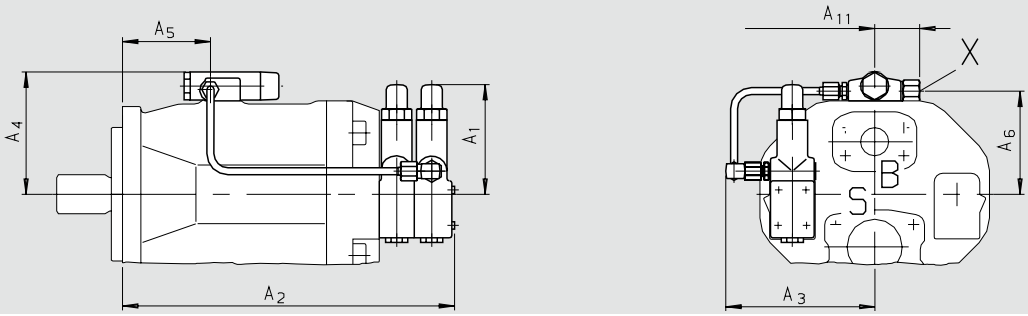
Before finalizing your design please request a certified installation drawing.
Dimensions in inches (mm).

Version 61 N00 - Ports at rear

Size 28...100

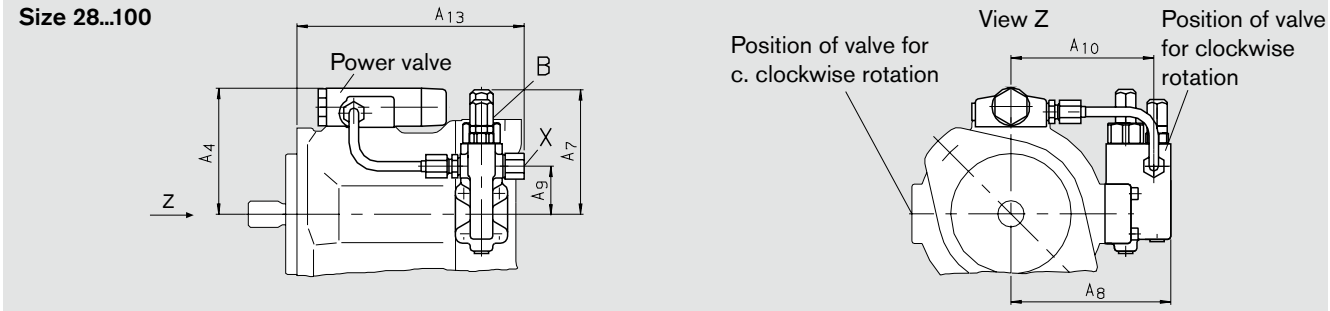


Size 140

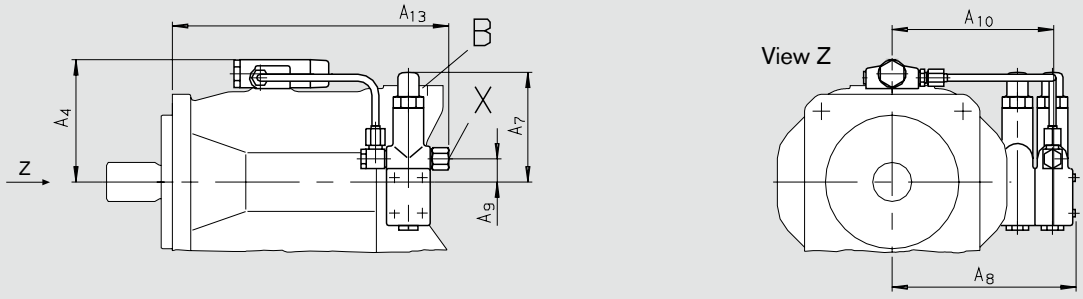


Version 62 N00 - Ports on side

Size 28...100



Size 140



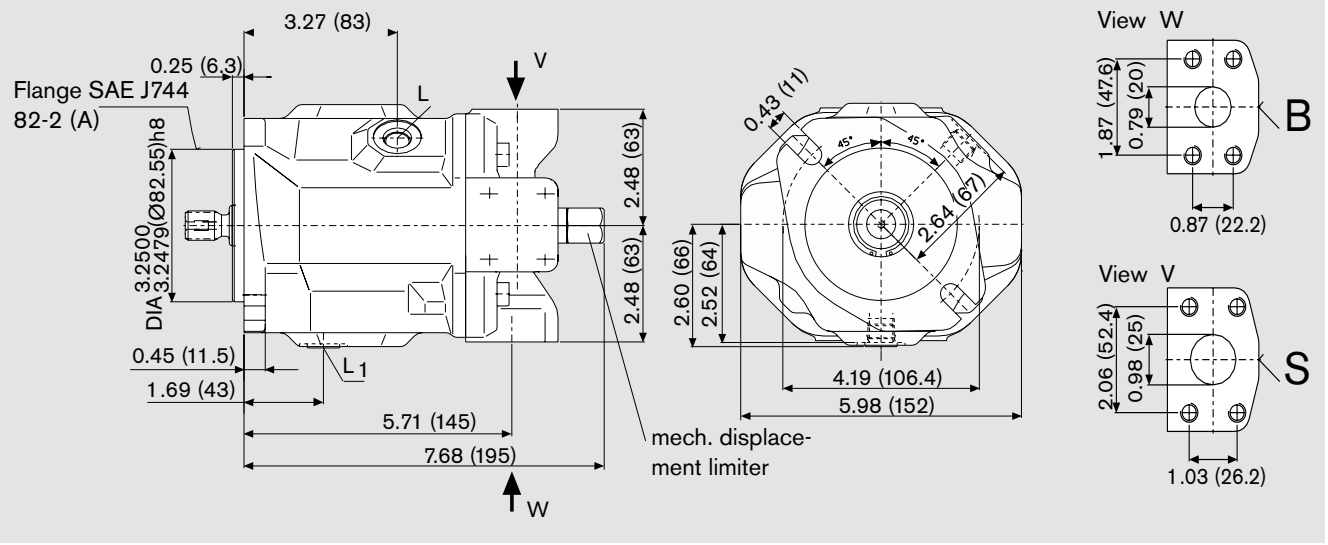
Size	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	A_9	A_{10}	A_{11}	A_{13}	Port X
28	4.29	8.86	4.72	4.21	1.89	3.39	4.17	5.35	1.57	4.68	1.89	7.64	7/16-20 UNF-2B;
	(109)	(225)	(120)	(107)	(48)	(86)	(106)	(136)	(40)	(119)	(48)	(194)	0.39(10)deep
45	4.17	9.61	5.08	4.41	2.13	3.60	4.17	5.75	1.57	5.08	1.89	8.23	7/16-20 UNF-2B;
	(106)	(244)	(129)	(112)	(54)	(91.5)	(106)	(146)	(40)	(129)	(48)	(209)	0.39(10)deep
71	4.17	10.94	5.47	4.88	2.72	4.07	4.17	6.30	1.57	5.63	1.89	9.33	7/16-20 UNF-2B;
	(106)	(278)	(139)	(124)	(69)	(103.5)	(106)	(160)	(40)	(143)	(48)	(237)	0.39(10)deep
100	4.17	13.54	5.71	5.08	4.37	4.27	4.17	6.50	1.57	5.83	1.89	11.97	7/16-20 UNF-2B;
	(106)	(344)	(145)	(129)	(111)	(108.5)	(106)	(165)	(40)	(148)	(48)	(305)	0.39(10)deep
140	5.00	14.92	5.83	5.51	3.90	4.86	5.00	8.23	1.06	7.20	1.89	12.36	7/16-20 UNF-2B; 0.39(10)d.(Mod. **61**)
140	(127)	(379)	(148)	(140)	(99)	(123.5)	(127)	(209)	(27)	(183)	(48)	(314)	9/16-18 UNF-2B; 0.51(13)d.(Mod. **62**)

Unit dimensions, Size 18

Before finalizing your design please request a certified installation drawing.
Dimensions in inches (mm).

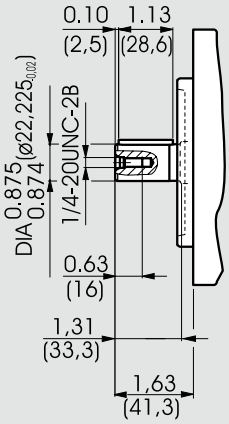
Version 62 N00

Ports on side, no through drive (without control valves)

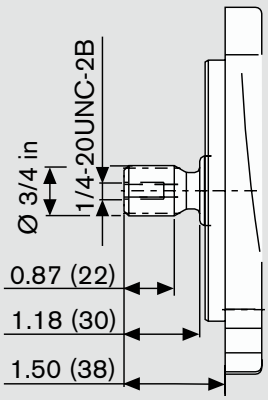


Shaft ends (acc. to SAE J744 OCT83)

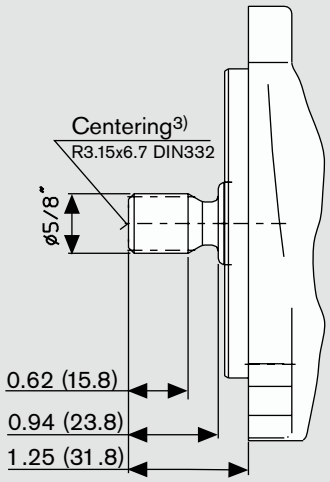
K Parallel with key
ISO 3019-1 19-1



S Splined shaft 3/4 in 11T 16/32 DP[1)]
SAE J744 - 19-4 (A-B)



U Splined shaft 5/8 in 9T 16/32 DP[1)]
SAE J744 - 16-4 (A)



Ports

				Tightening torques, max.[1)]
B	Pressure port (standard pressure range)	SAE J518	3/4 in	
	Fixing thread	ISO 68	3/8-16 UNC-2B; 0.79 (20) deep	29 lb-ft (40 Nm)
S	Inlet port (standard pressure range)	SAE J518	1 in	
	Fixing thread	ISO 68	3/8-16 UNC-2B; 0.79 (20) deep	29 lb-ft (40 Nm)
L/L_1	Case drain port (L_1 plugged)	ISO 11926	9/16-18 UNF-2B	59 lb-ft (80 Nm)

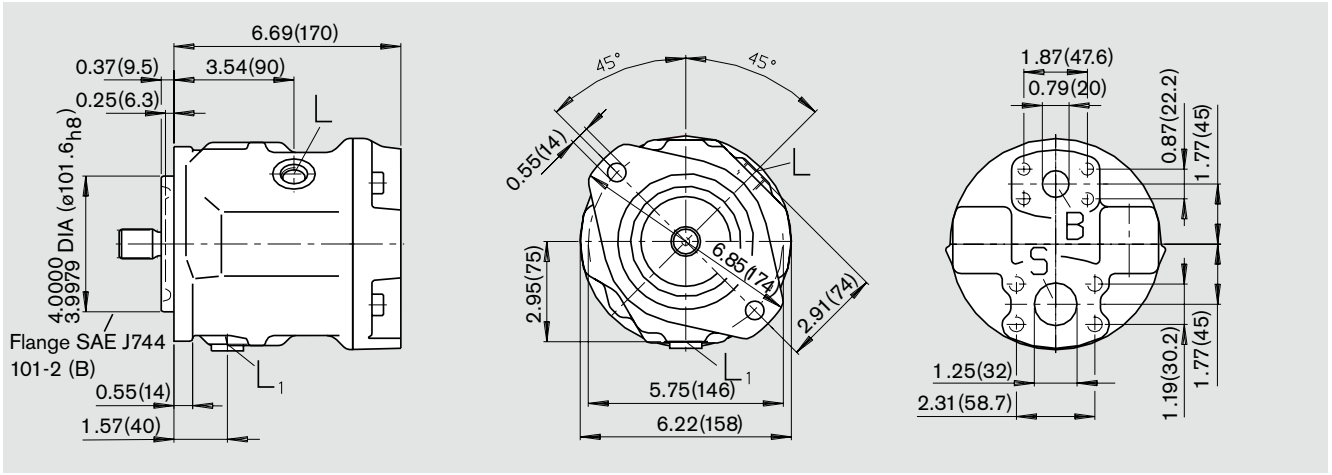
[1)] ANSI B92.1a-1976, pressure angle 30°, flat base, flank centering, fit class 5
[2)] See safety information
[3)] Axial locking of the coupling e.g. via clamping coupling or radial mounted binding screw

Unit dimensions, Size 28

Before finalizing your design please request a certified installation drawing.
Dimensions in inches (mm).

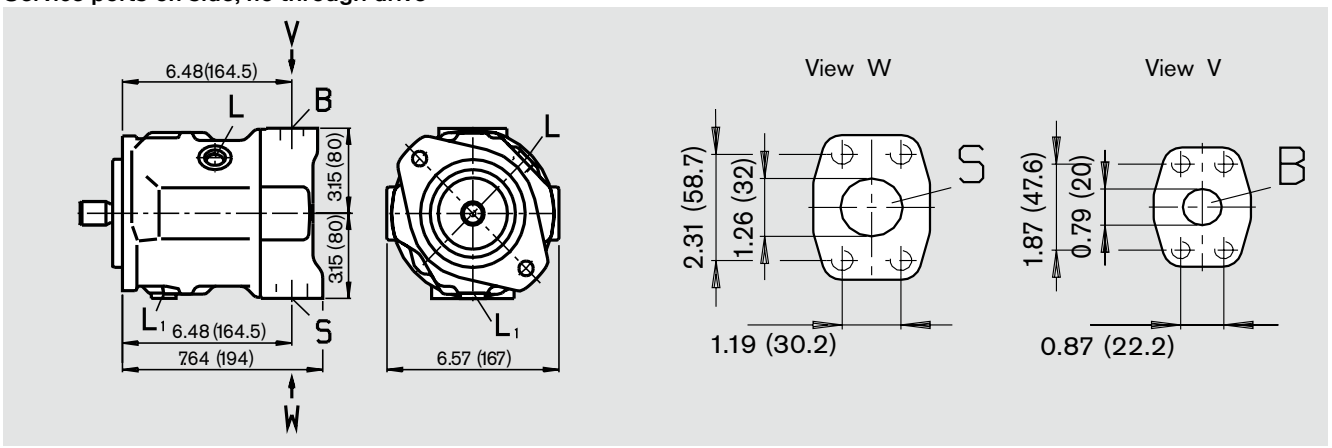
Version 61 N00

Service ports at rear, no through drive (without control valves)



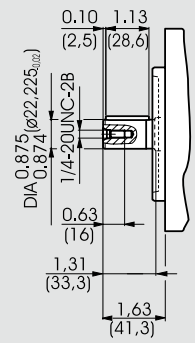
Version 62 N00

Service ports on side, no through drive

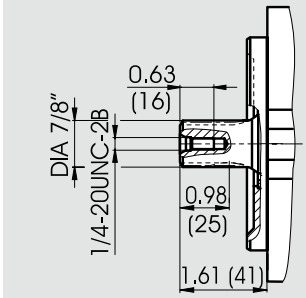


Shaft ends (acc. to SAE J744 OCT83)

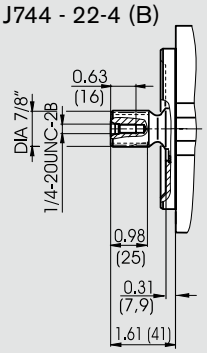
K Parallel with key
ISO 3019-1 22-1



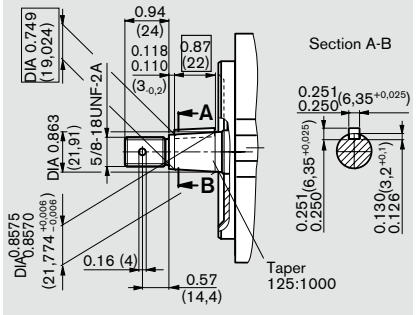
R Splined shaft 7/8 in 13T
16/32 DP[1)]
SAE J744 - 22-4 (B)



S Splined shaft 7/8 in 13T
16/32 DP[1)]
SAE J744 - 22-4 (B)



C Tapered shaft
ISO 3019-1 22-1



Ports

				Tightening torques, max.[1)]
B	Pressure port (standard pressure range)	SAE J518	3/4 in	
	Fixing thread	ISO 68	3/8-16 UNC-2B; 0.71 (18) deep	29 lb-ft (40 Nm)
S	Inlet port (standard pressure range)	SAE J518	1 1/4 in	
	Fixing thread	ISO 68	7/16-14 UNC-2B; 0.94 (24) deep	48 lb-ft (65 Nm)
L/L_1	Case drain port (L_1 plugged)	ISO 11926	3/4-16 UNF-2B	118 lb-ft (160 Nm)

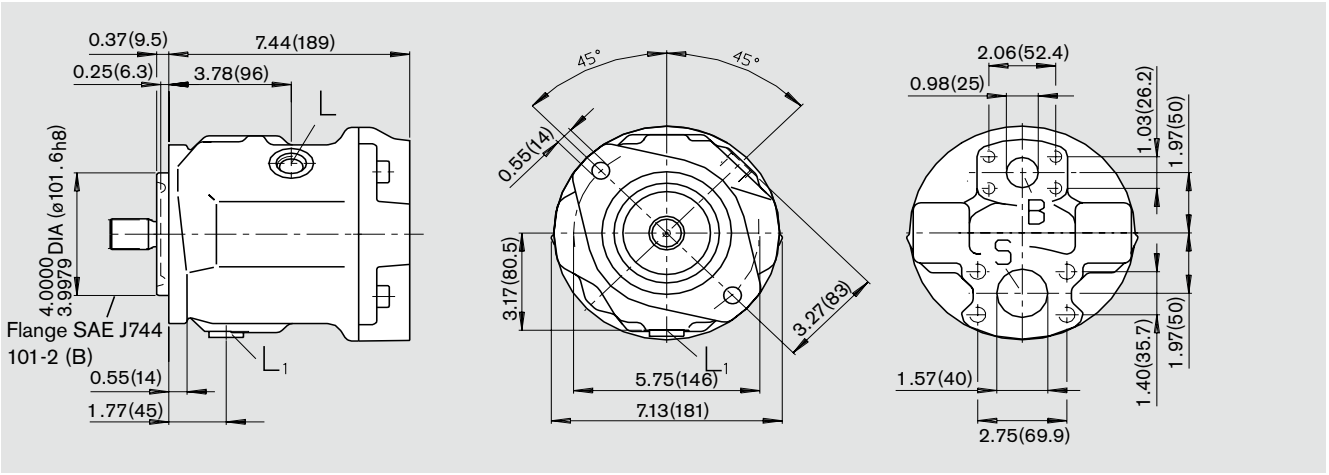
[1)] ANSI B92.1a-1976, pressure angle 30°, flat base, flank centering, fit class 5
[2)] See safety information

Unit dimensions, Size 45

Before finalizing your design please request a certified installation drawing.
Dimensions in inches (mm).

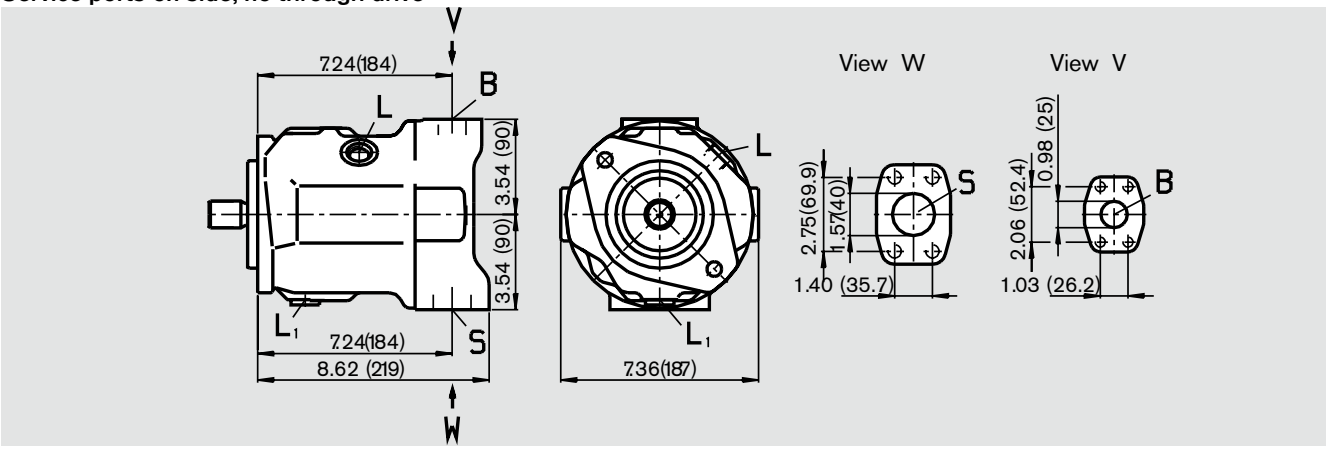
Version 61 N00

Service ports at rear, no through drive (without control valves)



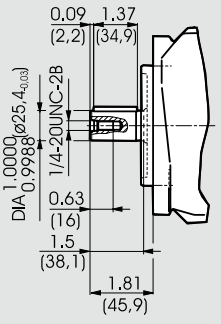
Version 62 N00

Service ports on side, no through drive

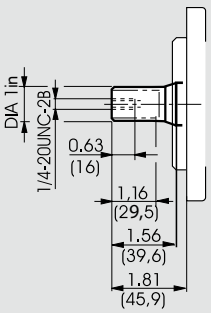


Shaft ends (acc. to SAE J744 OCT83)

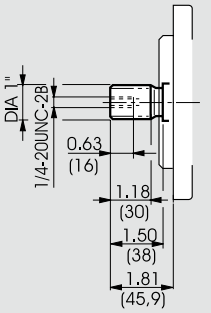
K Parallel with key
ISO 3019-1 25-1



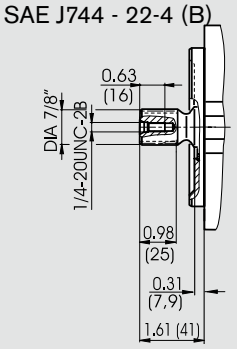
R Splined shaft 1 in
15T 16/32 DP[1)]
SAE J744 - 25-4 (B-B)



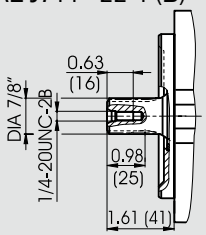
S Splined shaft 1 in
15T 16/32 DP[1)]
SAE J744 - 25-4 (B-B)



U Splined shaft 7/8 in
13T 16/32 DP[1)]
SAE J744 - 22-4 (B)



W Splined shaft 7/8 in
13T 16/32 DP[1)]
SAE J744 - 22-4 (B)



Ports

				Tightening torques, max.[1)]
B	Pressure port (standard pressure range)	SAE J518	1 in	
	Fixing thread	ISO 68	3/8-16 UNC-2B; 0.71 (18) deep	29 lb-ft (40 Nm)
S	Inlet port (standard pressure range)	SAE J518	1 1/2 in	
	Fixing thread	ISO 68	1/2-13 UNC-2B; 0.87 (22) deep	66 lb-ft (90 Nm)
L/L_1	Case drain port (L_1 plugged)	ISO 11926	7/8-14 UNF-2B	177 lb-ft (240 Nm)

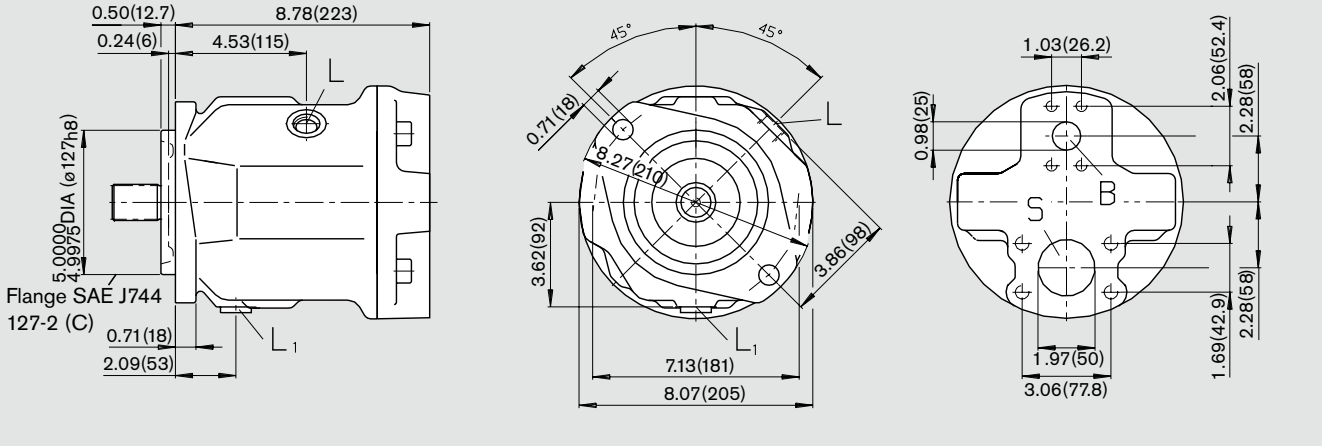
[1)] ANSI B92.1a-1976, pressure angle 30°, flat base, flank centering, fit class 5
[2)] See safety information

Unit dimensions, Size 71

Before finalizing your design please request a certified installation drawing.
Dimensions in inches (mm).

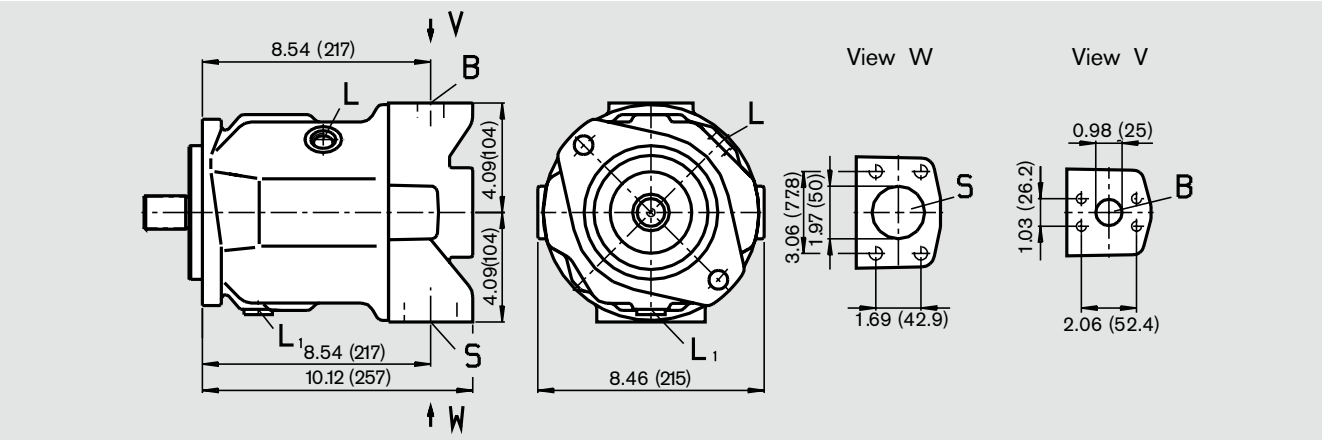
Version 91 N00

Service ports at rear, no through drive (without control valves)



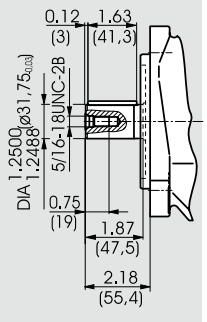
Version 92 N00

Service ports on side, no through drive

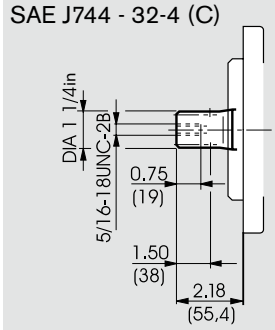


Shaft ends (acc. to SAE J744 OCT83)

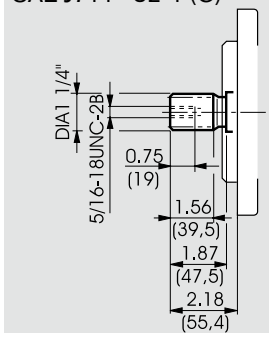
K Parallel with key
ISO 3019-1 32-1



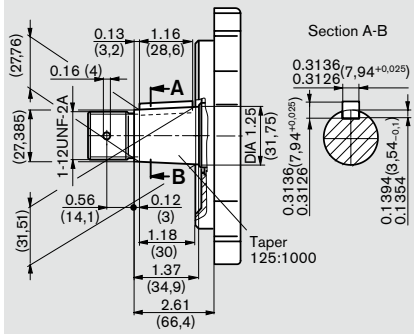
R Splined shaft 1 1/4 in 14T
12/24 DP[1)]
SAE J744 - 32-4 (C)



S Splined shaft 1 1/4 in 14T
16/32 DP[1)]
SAE J744 - 32-4 (C)



C Tapered shaft
ISO 3019-1 32-3



Ports

				Tightening torques, max.[1)]
B	Pressure port (standard pressure range)	SAE J518	1 in	
	Fixing thread	ISO 68	3/8-16 UNC-2B; 0.71 (18) deep	29 lb-ft (40 Nm)
S	Inlet port (standard pressure range)	SAE J518	2 in	
	Fixing thread	ISO 68	1/2-13 UNC-2B; 0.87 (22) deep	66 lb-ft (90 Nm)
L/L_1	Case drain port (L_1 plugged)	ISO 11926	7/8-14 UNF-2B	177 lb-ft (240 Nm)

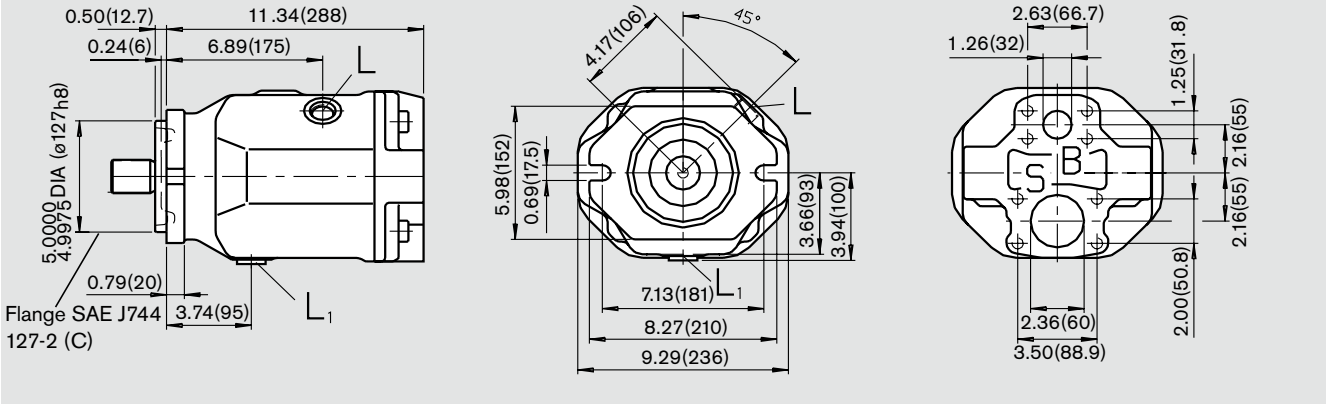
[1)] ANSI B92.1a-1976, pressure angle 30°, flat base, flank centering, fit class 5
[2)] See safety information

Unit dimensions, Size 100

Before finalizing your design please request a certified installation drawing.
Dimensions in inches (mm).

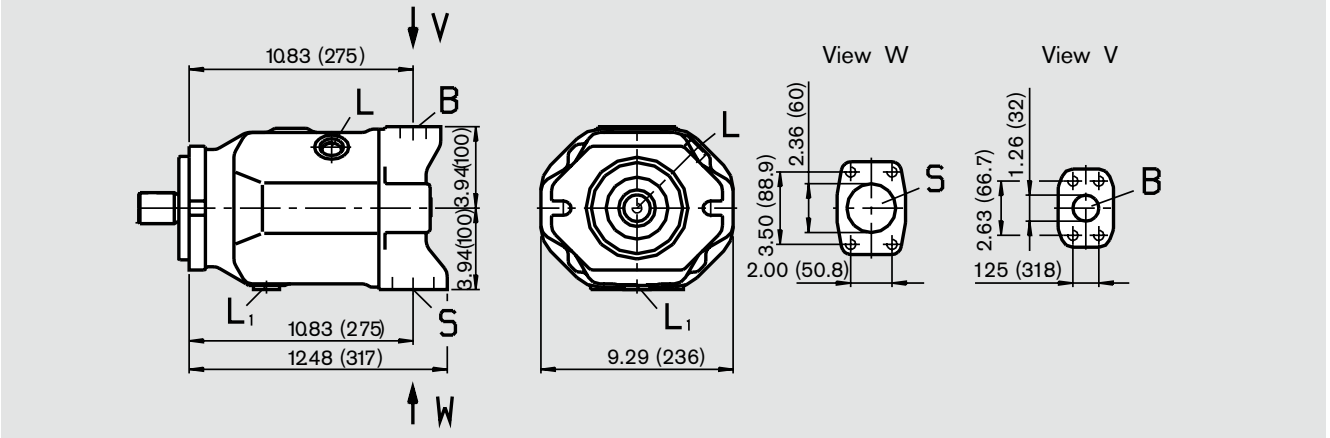
Version 61 N00

Service ports at rear, no through drive (without control valves)



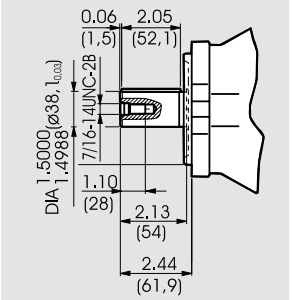
Version 62 N00

Service ports on side, no through drive

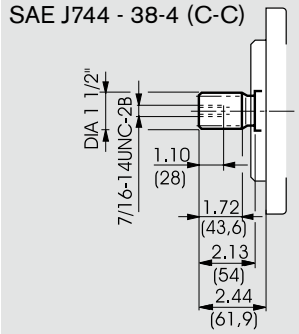


Shaft ends (acc. to SAE J744 OCT83)

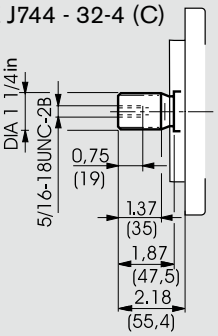
K Parallel with key
ISO 3019-1 38-1



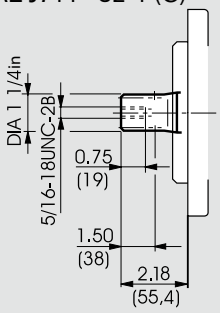
S Splined shaft 1 1/2 in 17T
12/24 DP[1)]
SAE J744 - 38-4 (C-C)



U Splined shaft 1 1/4 in 14T
12/24 DP[1)]
SAE J744 - 32-4 (C)



W Splined shaft 1 1/4 in
14T 12/24 DP[1)]
SAE J744 - 32-4 (C)



Ports

				Tightening torques, max.[1)]
B	Pressure port (high pressure range)	SAE J518	1 1/4 in	
	Fixing thread	ISO 68	1/2-13 UNC-2B; 0.75 (19) deep	66 lb-ft (90 Nm)
S	Inlet port (standard pressure range)	SAE J518	2 1/2 in	
	Fixing thread	ISO 68	1/2-13 UNC-2B; 1.06 (27) deep	66 lb-ft (90 Nm)
L/L_1	Case drain port (L_1 plugged)	ISO 11926	1 1/16-12 UN-2B	265 lb-ft (360 Nm)

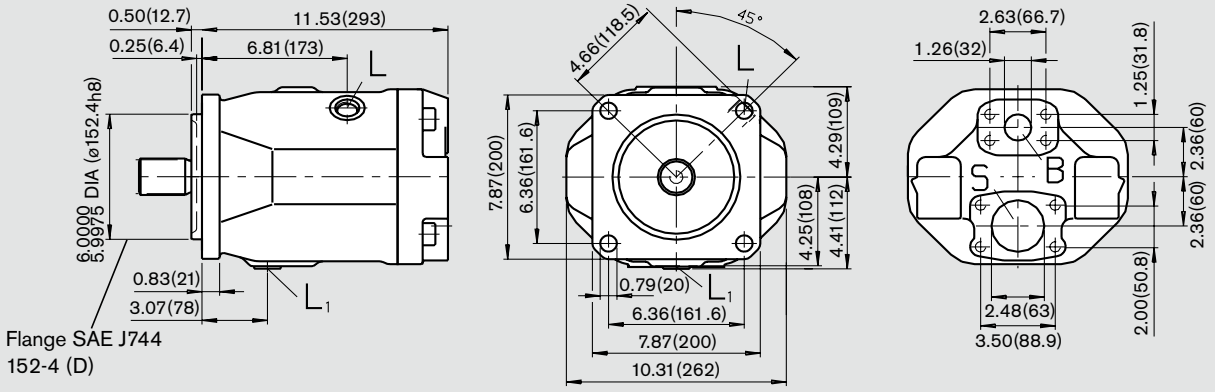
[1)] ANSI B92.1a-1976, pressure angle 30°, flat base, flank centering, fit class 5
[2)] See safety information

Unit dimensions, Size 140

Before finalizing your design please request a certified installation drawing.
Dimensions in inches (mm).

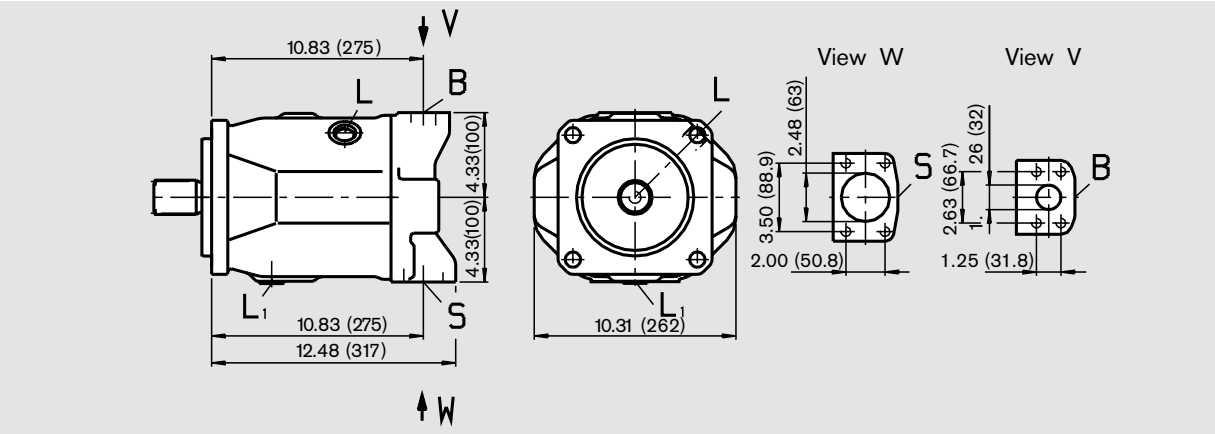
Version 61 N00

Service ports at rear, no through drive (without control valves)



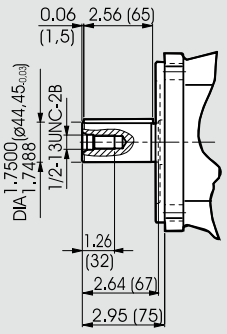
Version 62 N00

Service ports on side, no through drive

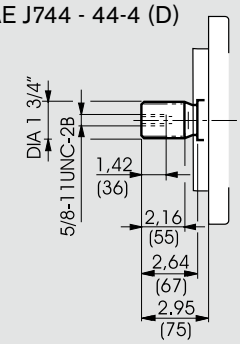


Shaft ends (acc. to SAE J744 OCT83)

K Parallel with key
ISO 3019-1 44-1



S Splined shaft 1 3/4 in 13T
8/16 DP[1)]
SAE J744 - 44-4 (D)



Ports

				Tightening torques, max.[1)]
B	Pressure port (high pressure range)	SAE J518	1 1/4 in	
	Fixing thread	ISO 68	1/2-13 UNC-2B; 0.94 (24) deep	66 lb-ft (90 Nm)
S	Inlet port (standard pressure range)	SAE J518	2 1/2 in	
	Fixing thread	ISO 68	1/2-13 UNC-2B; 0.94 (24) deep	66 lb-ft (90 Nm)
L/L_1	Case drain port (L_1 plugged)	ISO 11926	1 1/16-12 UN-2B	265 lb-ft (360 Nm)

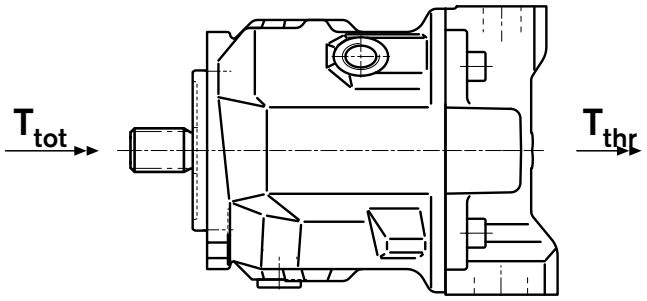
[1)] ANSI B92.1a-1976, pressure angle 30°, flat base, flank centering, fit class 5
[2)] See safety information

Through drives

Axial piston units A10V(S)O can be supplied with a through drive as shown in the ordering code on page 3. The type of through drive is determined by codes (K01–K24). If the combination pump is not mounted in the factory, the simple type code is sufficient.

Included in this case are: Shaft coupler, seals, and if necessary an adapter flange.

Maximum permissible input and through drive torques

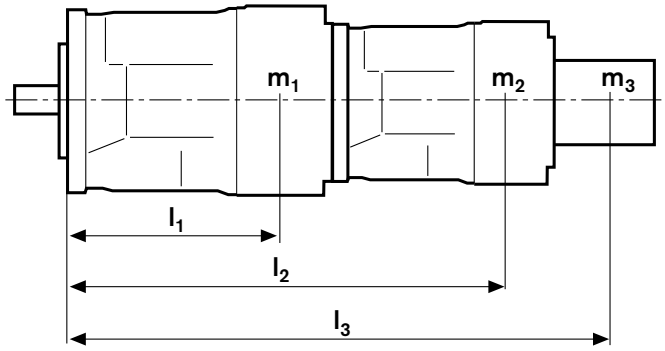


The drive torques for pump 1 and pump 2 can be split up as required. However the max. permissible input torque T_{tot} as well as the max. permissible through drive torque T_{thr} may not be exceeded.

Size				18	28	45	71	100	140
Max. perm. input torque T_{tot}									
	With shaft K	T_{tot}	lb-ft (Nm)	77 (104)	107 (145)	156 (212)	319 (433)	553 (750)	875 (1186)
	With shaft S	T_{tot}	lb-ft (Nm)	92 (124)	146 (198)	235 (319)	462 (626)	814 (1104)	1195 (1620)
	With shaft R	T_{tot}	lb-ft (Nm)	111 (150)	166 (225)	295 (400)	475 (644)	- (-)	- (-)
Max. perm. through drive torque T_{thr}									
	With shaft K	T_{thr}	lb-ft (Nm)	77 (104)	107 (145)	156 (212)	319 (433)	553 (750)	875 (1186)
	With shaft S	T_{thr}	lb-ft (Nm)	80 (108)	118 (160)	235 (319)	363 (492)	574 (778)	934 (1266)
	With shaft R	T_{thr}	lb-ft (Nm)	89 (120)	130 (176)	269 (365)	404 (548)	- (-)	- (-)

T_{tot} = Max. permissible input torque pump1
T_{thr} = Max. permissible through drive torque

Permissible overhang moment



m_1, m_2, m_3 Weight of pump in lbs (kg)

l_1, l_2, l_3 Distance to center of gravity in in (mm)

$T_m = (m_1 \bullet l_1 + m_2 \bullet l_2 + m_3 \bullet l_3) \bullet \frac{1}{12}$ in (lb-ft)

$\ldots \bullet \frac{1}{102}$ in (Nm)

Size				18	28	45	71	100	140
Perm. overhang moment		M_{mper}	lb-ft (Nm)	369 (500)	649 (880)	1010 (1370)	1593 (2160)	2213 (3000)	3319 (4500)
	at dyn. acceleration 10g 98.1 m/sec^2	M_{mper}	lb-ft (Nm)	37 (50)	65 (88)	101 (137)	159 (216)	221 (300)	332 (450)
Weight		m	lbs (kg)	26 (12)	33 (15)	46 (21)	73 (33)	99 (45)	132 (60)
Distance to center of gravity		l_1	in (mm)	3.54 (90)	4.33 (110)	5.11 (130)	5.91 (150)	6.30 (160)	6.30 (160)

Overview of through drive mounting options

Before finalizing your design please request a certified installation drawing.
Dimensions in inches (mm).

Through drive - (A)A10V(S)O			Mounting option - 2. pump			Through dr.
Flange (SAE J744)	Coupler for shaft ANSI B.92.1a-1976	Code	(A)A10V(S)O.../31... Size (shaft)	A10V(S)O.../52... Size (shaft)	Gear pump	available on size
82-2 (A)	5/8 in (A)	**K01**	18 (U)	10 (U)	Size F	18 – 140
	3/4 in (A-B)	**K52**	18 (S and R)	10 (S)		18 – 140
101-2 (B)	7/8 in (B)	**K68**	28 (S and R) 45 (U and W) [1]	28 (S and R) 45 (U and W) [1]	Size N and G	28 – 140
	1 in (B-B)	**K04**	45 (S and R)	45 (S and R) 60 (U and W) [2]		45 – 100
127-2 (C)	1 1/4 in (C)	**K07**	71 (S and R) 100 (U) [3]	85 (U and W) [3]		71 – 140
	1 1/2 in (C-C)	**K24**	100 (S)	85 (S)		100 – 140
152-4 (D)	1 3/4 in (D)	**K17**	140 (S)			140

[1]) Not with K68-through drive on main pump size 28
[2]) Not with K04-through drive on main pump size 45
[3]) Not with K07-through drive on main pump size 71

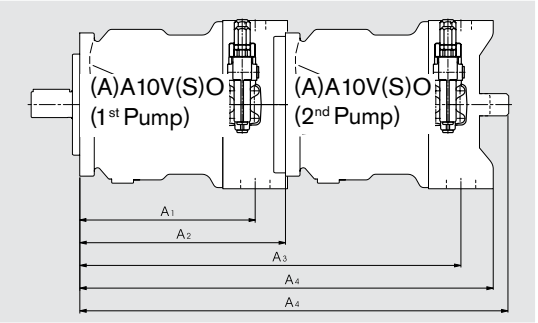
Unit dimensions combination pumps

A10V(S)O (2. Pump)	AA10VSO 18				A10VO 28				A10V(S)O (1.Pump) A10VO 45				A10VO 71				A10VO 100				A10VO 140			
	A_1	A_2	A_3	A_4	A_1	A_2	A_3	A_4	A_1	A_2	A_3	A_4	A_1	A_2	A_3	A_4	A_1	A_2	A_3	A_4	A_1	A_2	A_3	A_4
A10VSO 18	5.71	7.17	12.87	14.84	6.50	8.03	13.74	15.71	7.24	9.02	14.72	16.69	8.54	10.51	16.22	18.19	10.83	13.31	19.02	20.98	10.83	13.78	19.49	21.46
	(145)	(182)	(327)	(377)	(165)	(204)	(349)	(399)	(184)	(229)	(374)	(424)	(217)	(267)	(412)	(462)	(275)	(338)	(483)	(533)	(275)	(350)	(495)	(545)
A10VO 28	–	–	–	–	6.50	8.03	14.53	15.67	7.24	9.02	15.51	16.65	8.54	10.51	17.01	18.15	10.83	13.31	19.80	20.94	10.83	13.78	20.28	21.42
					(165)	(204)	(369)	(398)	(184)	(229)	(394)	(423)	(217)	(267)	(432)	(461)	(275)	(338)	(503)	(532)	(275)	(350)	(515)	(544)
A10VO 45	–	–	–	–	–	–	–	–	7.24	9.02	16.30	17.64	8.54	10.51	17.76	19.36	10.83	13.31	20.55	21.93	10.83	13.78	21.02	22.40
									(184)	(229)	(413)	(448)	(217)	(267)	(451)	(486)	(275)	(338)	(522)	(557)	(275)	(350)	(534)	(569)
A10VO 71	–	–	–	–	–	–	–	–	–	–	–	–	8.54	10.51	19.06	20.63	10.83	13.31	21.85	23.43	10.83	13.78	22.32	23.90
													(217)	(267)	(484)	(524)	(275)	(338)	(555)	(595)	(275)	(350)	(567)	(607)
A10VO 100	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	10.83	13.31	24.13	25.79	10.83	13.78	24.61	26.26
																	(275)	(338)	(613)	(655)	(275)	(350)	(625)	(667)
A10VO 140	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	10.83	13.78	24.61	26.26
																					(275)	(350)	(625)	(667)

1. If a **second Rexroth pump must be factory mounted** the two individual model codes must be combined with a "+". Model code pump 1+ model code pump 2.

   Ordering example :
   A10VO100DR/31R-PSC12K07 + A10VO71DR/31R-PSC12N00

2. If a **gear pump or a radial piston pump is to be factory mounted** as a second pump please consult the factory.

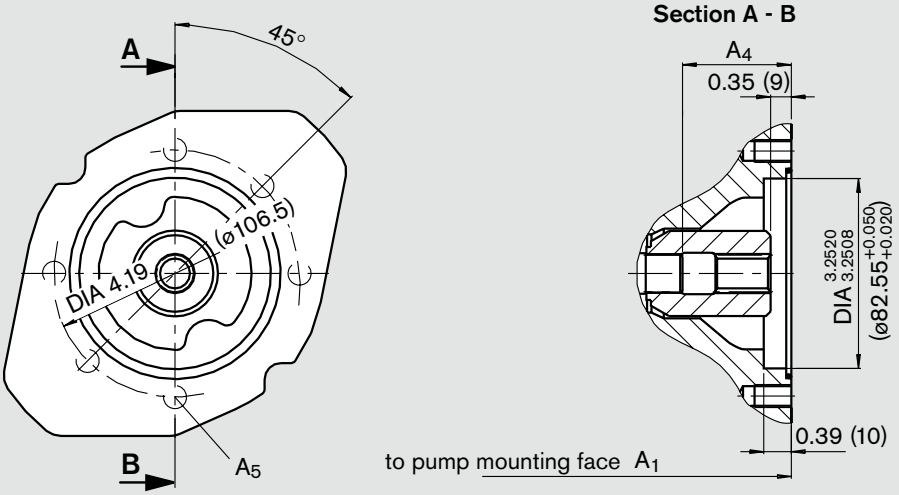


Dimensions of through drives

Before finalizing your design please request a certified installation drawing.
Dimensions in inches (mm).

K01 Flange SAE J744 - 82-2 (A)

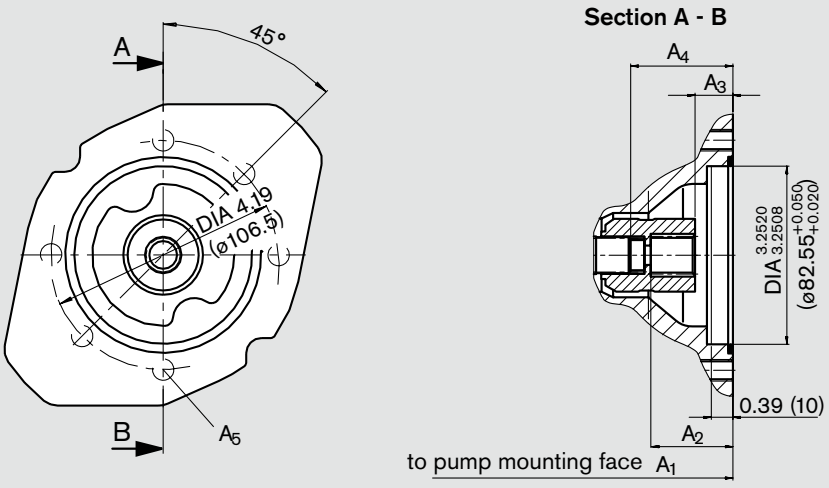
Hub for splined shaft to ANSI B.92.1a-1976 5/8 in 9T 16/32 DP[1] (SAE J744-16-4(A))



Size main pump	A_1	A_4	A_5
18	7.17 (182)	1.65 (42)	M10; 0.57 (14.5) deep
28	8.03 (204)	1.85 (47)	M10; 0.63 (16) deep
45	9.02 (229)	2.09 (53)	M10; 0.63 (16) deep
71	10.51 (267)	2.40 (61)	M10; 0.79 (20) deep
100	13.31 (338)	2.56 (65)	M10; 0.79 (20) deep
140	13.78 (350)	3.03 (77)	M10; 0.63 (17) deep

K52 Flange SAE J744 - 82-2 (A)

Hub for splined shaft to ANSI B.92.1a-1976 3/4 in 11T 16/32 DP[1)] (SAE J744 - 19-4 (A-B))



Size main pump	A_1	A_2	A_3	A_4	A_5
18	7.17 (182)	1.57 (40)	0.74 (18.8)	1.69 (43)	M10; 0.57 (14.5) deep
28	8.03 (204)	1.53 (39)	0.74 (18.8)	1.85 (47)	M10; 0.63 (16) deep
45	9.02 (229)	1.59 (40.5)	0.75 (18.9)	2.09 (53)	M10; 0.63 (16) deep
71	10.51 (267)	1.57 (40)	0.84 (21.3)	2.40 (61)	M10; 0.79 (20) deep
100	13.31 (338)	1.57 (40)	0.75 (19)	2.56 (65)	M10; 0.79 (20) deep
140	13.78 (350)	1.61 (41)	0.75 (18.9)	3.03 (77)	M10; 0.67 (17) deep

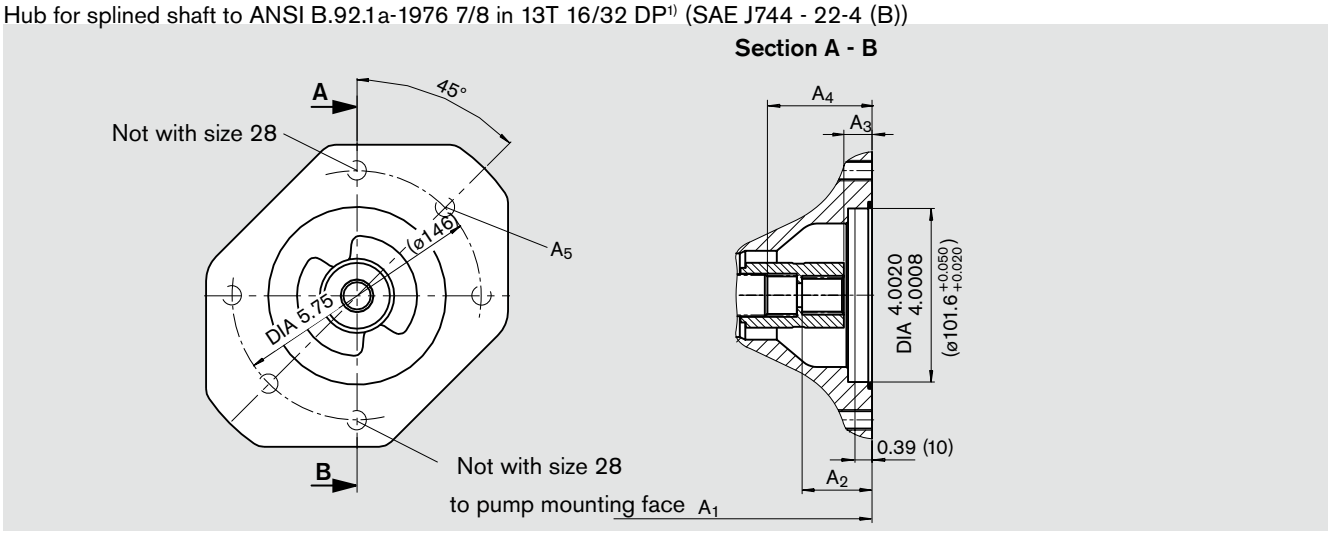
[1)]pressure angle 30°, flat root side fit, tolerance class 5

Dimension of through drives

Before finalizing your design please request a certified installation drawing.
Dimensions in inches (mm).

K68 Flange SAE J744 - 101-2 (B)

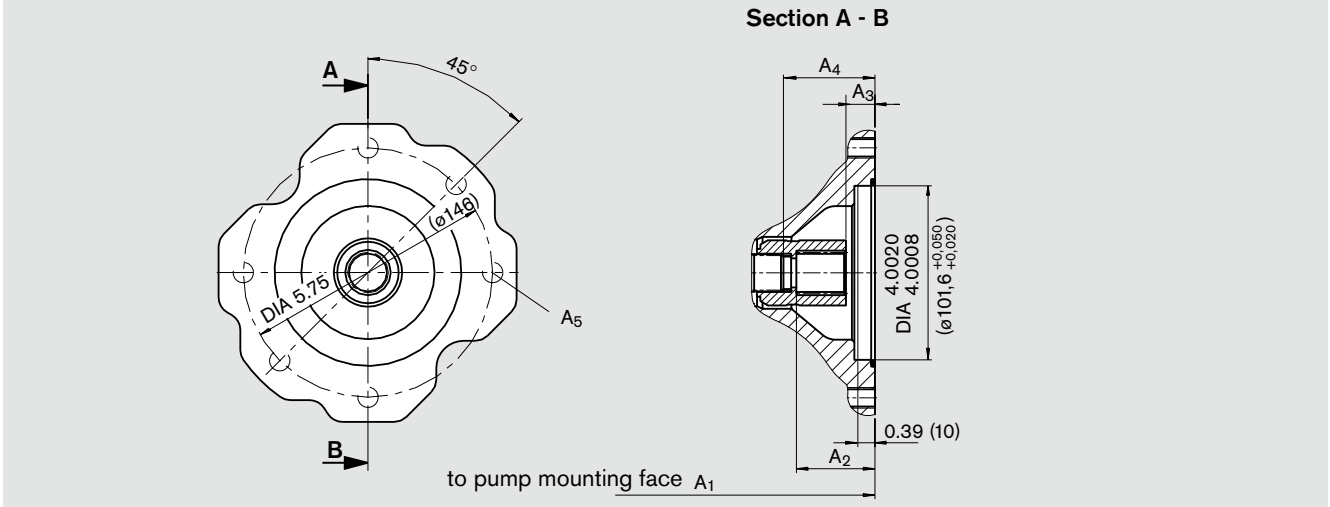
Hub for splined shaft to ANSI B.92.1a-1976 7/8 in 13T 16/32 DP[1] (SAE J744 - 22-4 (B))



Size main pump	A_1	A_2	A_3	A_4	A_5
28	8.03 (204)	1.69 (43)	0.70 (17.8)	1.85 (47)	M12; 0.71 (18) deep
45	9.02 (229)	1.65 (42)	0.70 (17.9)	2.09 (53)	M12; 0.71 (18) deep
71	10.51 (267)	1.69 (43)	0.80 (20.3)	2.40 (61)	M12; 0.79 (20) deep
100	13.31 (338)	1.61 (41)	0.71 (18)	2.56 (65)	M12; 0.79 (20) deep
140	13.78 (350)	1.73 (44)	0.70 (17.9)	3.03 (77)	M12; 0.79 (20) deep

K04 Flange SAE J744 - 101-2 (B)

Hub for splined shaft to ANSI B.92.1a-1976 1 in 15T 16/32 DP[1] (SAE J744 - 25-4 (B-B))



Size main pump	A_1	A_2	A_3	A_4	A_5
45	9.02 (229)	1.87 (47.5)	0.73 (18.4)	2.09 (53)	M12; 0.71 (18) deep
71	10.51 (267)	1.87 (47.5)	0.82 (20.8)	2.40 (61)	M12; 0.79 (20) deep
100	13.31 (338)	1.87 (47.5)	0.72 (18.2)	2.56 (65)	M12; 0.79 (20) deep
140	13.78 (350)	1.87 (47.5)	0.73 (18.4)	3.03 (77)	M12; 0.79 (20) deep

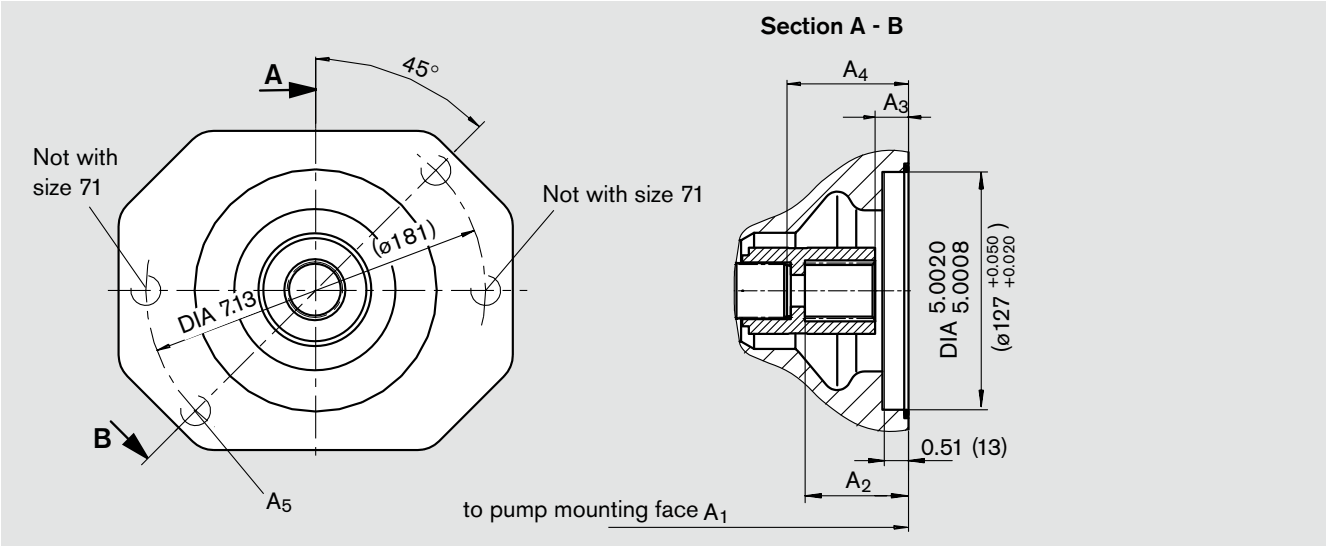
[1] pressure angle 30°, flat root side fit, tolerance class 5

Dimensions through drives

Before finalizing your design please request a certified installation drawing.
Dimensions in inches (mm).

K07 Flange SAE J744 - 127-2 (C)

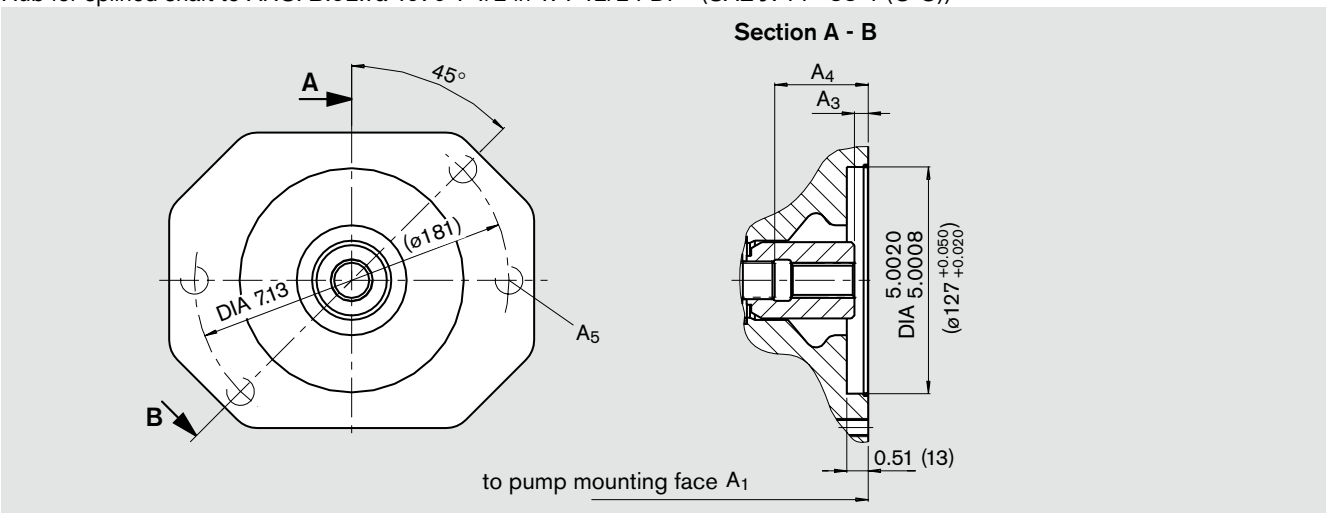
Hub for splined shaft to ANSI B.92.1a-1976 1 1/4 in 14T 12/24 DP[1] (SAE J744 - 32-4 (C))



Size main pump	A_1	A_2	A_3	A_4	A_5
71	10.51 (267)	2.18 (55.5)	0.87 (22)	2.40 (61)	M16; 0.71 (18) deep
100	13.31 (338)	2.24 (57)	0.77 (19.5)	2.56 (65)	M16; 0.95 (24) deep
140	13.78 (350)	2.36 (60)	0.77 (19.4)	3.03 (77)	M16; 0.95 (24) deep

K24 Flange SAE J744 - 127-2 (C)

Hub for splined shaft to ANSI B.92.1a-1976 1 1/2 in 17T 12/24 DP[1] (SAE J744 - 38-4 (C-C))



Size main pump	A_1	A_3	A_4	A_5
100	13.31 (338)	0.31 (8)	2.56 (65)	M16; 0.95 (24) deep
140	13.78 (350)	0.35 (9)	3.03 (77)	M16; 1.34 (34) deep

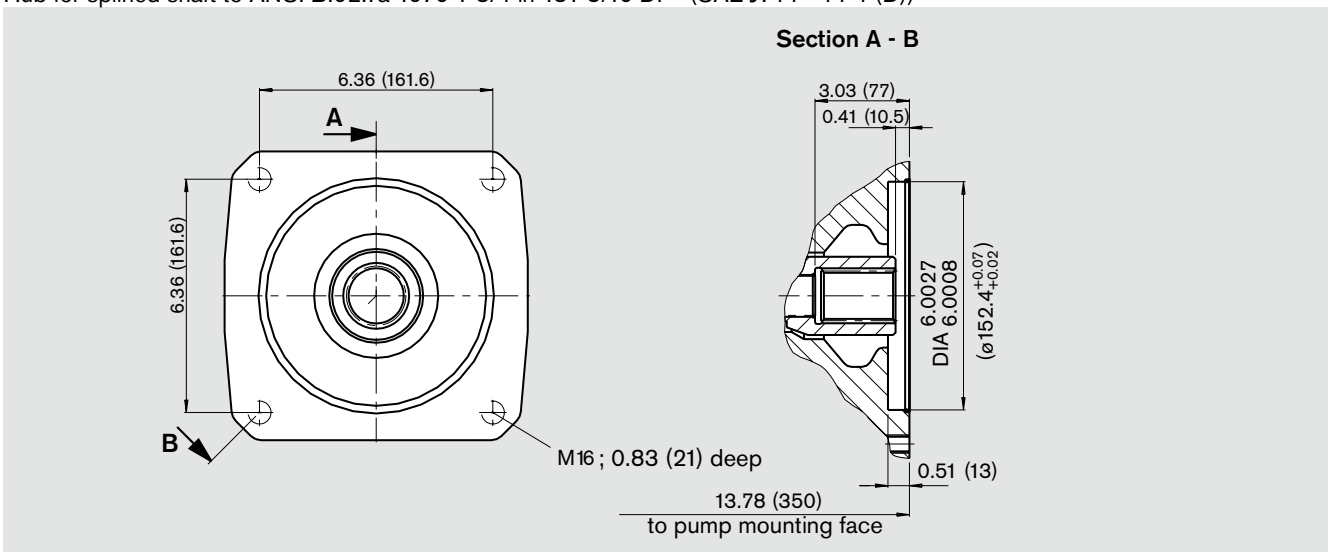
[1] pressure angle 30°, flat root side fit, tolerance class 5

Dimensions through drives

Before finalizing your design please request a certified installation drawing.
Dimensions in inches (mm).

K17 Flange SAE J744 - 152-4 (D)

Hub for splined shaft to ANSI B.92.1a-1976 1 3/4 in 13T 8/16 DP[1] (SAE J744 - 44-4 (D))



[1] pressure angle 30°, flat root side fit, tolerance class 5

Installation notes

Optional installation position. The pump housing must be filled with fluid during commissioning and operation.

In order to attain the lowest noise level, all connections (suction, pressure, pilot, case drain) must be linked by flexible members to tank.

Avoid placing a check valve in the case drain line. In some cases it may be permissible however. Please consult us.

The largest standard pipe connection must be installed in the uppermost (top) leakage port..

1. Vertical installation (shaft end upwards)

Following installation conditions must be taken into account:

1.1 Arrangement inside the reservoir

Before installation fill pump housing, keeping it in a horizontal position.

a) If the min. fluid level is equal to or above the pump mounting surface:

Close port "L", "L_1" and "S" open; L_1 piped and also S with suction pipe (see fig. 1).

b) If the min. fluid level is below the pump mounting surface: pipe port "L" and "S" acc. to fig. 2. Conditions acc. to item 1.2.1, close port "L".

Note: In order to avoid damages at the pump, all attached parts (e.g. protective caps, covers, etc.) must be removed before installation.

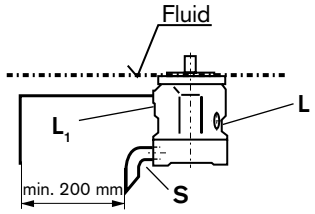


Fig. 1

1.2 Arrangement outside the reservoir

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

Limiting condition:

1.2.1 Min. pump inlet pressure $p_{abs\ min}$ = 11.6 psi (0.8 bar) under static and dynamic loading.

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

The permissible suction height "h" is a result of the overall pressure loss, but may not be greater than h_{max} = 31.5 in/800 mm) (Immersion depth $h_{t\ min}$ = 7.8 in/200 mm).

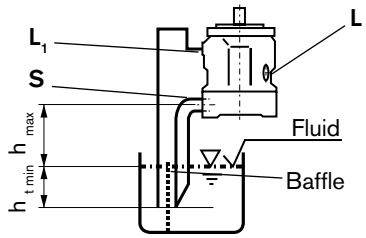


Fig. 2

Overall pressure loss

$\Delta p_{Ges} = \Delta p_1 + \Delta p_2 + \Delta p_3 \leq (1 - p_{abs\ min})$ = 3 psi (0.2 bar)

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

$$\Delta p_1 = \frac{\rho \bullet l \bullet dv}{dt} \bullet 10^{-5}\ [bar]$$

ρ = density [kg/m³]
l = pipe lenth [m]
dv/dt = rate of change in fluid velocity [m/s²]

Δp_2: Pressure loss due to static head

$\Delta p_2 = h \bullet \rho \bullet g \bullet 10^{-5}$ [bar]

h = height [m]
ρ = density [kg/m³]
g = gravity. = 9,81 m/s²

Δp_3: line losses (elbows etc.)

2. Horizontal installation

The pump must be installed in such a manner, that either "L" or "L_1" is at the top.

2.1 Arrangement inside the reservoir

a) If the min. fluid level is above the top of the pump:

Close "L_1" , "L" and "S" open, mount suction pipe to port S, and pipe "L" at least 8 in (200 mm) away from suction pipe (see fig. 3).

b) If the min. fluid level is equal to or below the top of the pump:

Pipe port "L" and "S" acc. to fig. 4 , port "L_1" closed. Conditions correspond with item 1.2.1.

Note: In order to avoid demages at the pump, all attached parts (e.g. protective caps) must be removed.

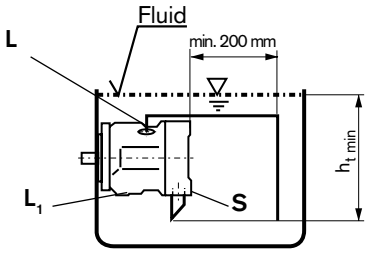


Fig. 3

2.2 Arrangement outside the reservoir

Fill pump housing before commissioning.

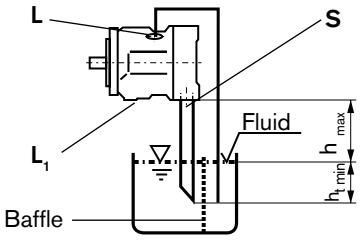


Fig. 4

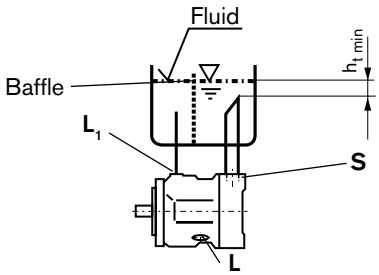


Fig. 5

Safety information

- Pump A10V(S)O was designed for operation in open loop circuits.
- Systems design, installation and commissioning require trained technicians or tradesmen.
- All hydraulic ports can only be used for the fastening of hydraulic service lines.
- Tightening torques:
  The tightening torques mentioned in this data sheet are maximum values and must not be exceeded (max. values for thread).
  Manufacturer's information concerning the maximum permitted tightening torques of the various fittings are to be observed!
  For ISO 68 mounting bolts, we recommend that tightening torques be checked on a case by case basis in accordance with VDI 2230, published 2003.
- During and shortly after operation of a pump the housing and especially a solenoid can be extremely hot, avoid being burned!

Bosch Rexroth Corporation
Mobile Hydraulics
Axial & Radial Piston Units
8 Southchase Court
Fountain Inn, SC 29644-9018, USA
Telephone (864) 967-2777
Facsimile (864) 967-8900
www.boschrexroth-us.com