

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
Traped 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	SAE flange rear,		-	-	-	●	-	-	91
Suction port S	fixing thread UNC								
Pressure port B	SAE flange on opposite side		-	-	-	●	-	-	92
Suction port S	fixing thread UNC								
Pressure port B	SAE flange rear,		-	●	●	-	●	●	61
Suction port S	fixing thread UNC								
Pressure port B	SAE flange on opposite side		●	●	●	-	●	●	62
Suction port S	fixing thread UNC								

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

$$v_{\text{opt}} = \text{opt. operating viscosity } 80 \dots 170 \text{ SUS } (16 \dots 36 \text{ mm}^2/\text{s})$$

referred to tank temperature (open loop circuit).

Limits of viscosity range

The following limits are valid for extreme operating conditions:

$$v_{\text{min}} = 60 \text{ SUS } (10 \text{ mm}^2/\text{s})$$

short term ($t \leq 1 \text{ min}$)
at a max. permissible oil temperature
of $t_{\text{max}} = 239^\circ\text{F}$ (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.

$$v_{\text{max}} = 7500 \text{ SUS } (1600 \text{ mm}^2/\text{s})$$

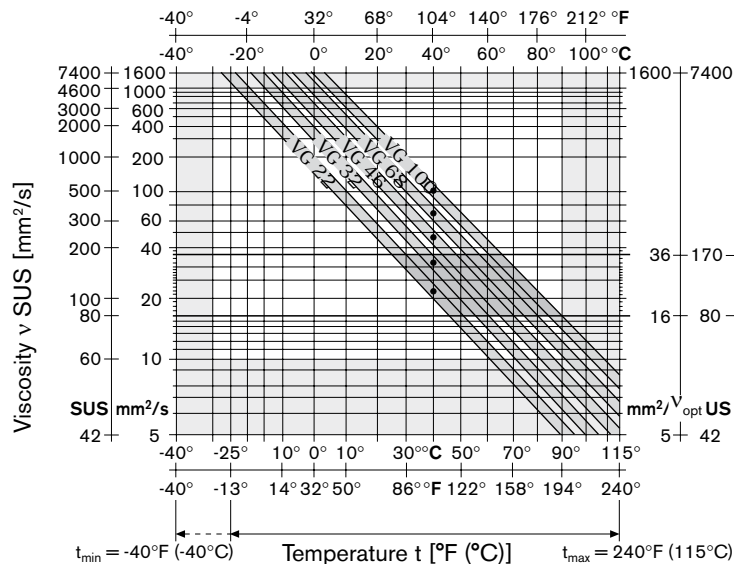
short term ($t \leq 1 \text{ min}$)
on cold start
($t_{\text{min}} = p \leq 436 \text{ psi}/30 \text{ bar}$, $n \leq 1000 \text{ rpm}$, $-40^\circ\text{F}/40^\circ\text{C}$).

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 ($+90^\circ\text{C}$) and 239°F (115°C) use FKM-seals (code designation V).

Selection diagram



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 (v_{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 $X^\circ\text{F}$ ($^\circ\text{C}$) the operating temperature in the tank is 140°F (60°C). In the optimum viscosity range v_{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 4406¹⁾ 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 4406¹⁾.

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

¹⁾ draft issue 1999

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.

$p_{L \text{ abs max}}$ _____ 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 ($1.2 \cdot n_o$) refers to the standard drive speed n_o .

e.g. size 100: $n_{max} = 1.2 \cdot 2000 \text{ rpm} = 2400 \text{ rpm}$

WRONG: $1.2 \cdot 2400 \text{ rpm} = 2880 \text{ rpm}$

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.

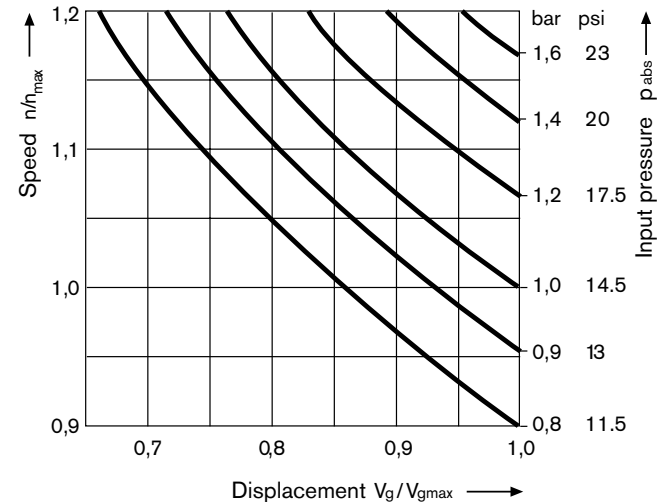


Table of values (theoretical values, without considering η_{mh} and η_v : values rounded)

Size			18	28	45	71	100	140				
High-Speed-Version									45	71	100	140
Displacement	$V_{g\ max}$	in ³ (cm ³)	1.10 (18)	1.71 (28)	2.75 (45)	4.33 (71)	6.10 (100)	8.54 (140)	2.75 (45)	4.33 (71)	6.10 (100)	8.54 (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 (L/min)	15.6 (59.4)	22.2 (84)	30.9 (117)	41.2 (156)	52.8 (200)	66.6 (252)	35.7 (135)	47.8 (181)	60.7 (230)	75.8 (287)
at $n_E = 1800$ rpm	q_{vE}	gpm (L/min)	8.5 (32.4)	13.2 (50)	21.4 (81)	33.8 (128)	47.5 (180)	66.6 (252)	21.4 (81)	33.8 (128)	47.5 (180)	66.6 (252)
Power ($\Delta p = 4000$ psi (280 bar) and $V_{g\ max}$)												
at $n_{o\ max}$	$P_{o\ max}$	HP (kW)	37 (27.7)	52 (39)	74 (55)	98 (73)	125 (93)	157 (117)	84 (63)	113 (84)	143 (107)	180 (134)
at $n_E = 1800$ rpm	$P_{E\ max}$	HP (kW)	20 (15)	31 (23)	51 (38)	80 (60)	113 (84)	158 (118)	51 (38)	80 (60)	113 (84)	158 (118)
Torque at $V_{g\ max}$												
$\Delta p = 4000$ psi (280 bar)	T_{max}	lb-ft (Nm)	58.9 (80.1)	91 (125)	146 (200)	230 (316)	324 (445)	453 (623)	146 (200)	230 (316)	324 (445)	453 (623)
$\Delta p = 1450$ psi (100 bar)	T	lb-ft (Nm)	21 (28.6)	33 (45)	53 (72)	83 (113)	117 (159)	164 (223)	53 (72)	83 (113)	117 (159)	164 (223)
Moment of inertia about drive axis	J	lb-ft ² (kgm ²)	0.022 (0.00093)	0.040 (0.0017)	0.078 (0.0033)	0.197 (0.0083)	0.396 (0.0167)	0.574 (0.0242)	0.078 (0.0033)	0.197 (0.0083)	0.396 (0.0167)	0.574 (0.0242)
Max. angular acceleration		rad/s	6800	5500	4000	2900	2400	2000	4000	2900	2400	2000
Torsional stiffness - shaft "S"		lb-ft/rad (Nm/rad)	8149 (11087)	16403 (22317)	27562 (37499)	52835 (71884)	89039 (121142)	124610 (169537)	27562 (37499)	52835 (71884)	89039 (121142)	124610 (169537)
	shaft "U"	lb-ft/rad (Nm/rad)	5946 (8090)		22107 (30077)		66953 (91093)		22107 (30077)		66953 (91093)	
	shaft "R"	lb-ft/rad (Nm/rad)		19375 (26360)	30153 (41025)	56261 (76545)			30153 (41025)	56261 (76545)		
	shaft "W"	lb-ft/rad (Nm/rad)			25330 (34463)		74858 (101847)		25330 (34463)		74858 (101847)	
	shaft "K"	lb-ft/rad (Nm/rad)	9805 (13340)	19712 (26819)	32270 (43905)	60352 (82112)	99448 (135303)	144680 (196844)	32270 (43905)	60352 (82112)	99448 (135303)	144680 (196844)
Filling capacity		gall. (L)	0.1 (0.4)	0.18 (0.7)	0.26 (1.0)	0.42 (1.6)	0.58 (2.2)	0.79 (3.0)	0.26 (1.0)	0.42 (1.6)	0.58 (2.2)	0.79 (3.0)
Weight (without fluid)	m	lbs (kg)	26 (12)	33 (15)	46 (21)	73 (33)	99 (45)	132 (60)	46 (21)	73 (33)	99 (45)	132 (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

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

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

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

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

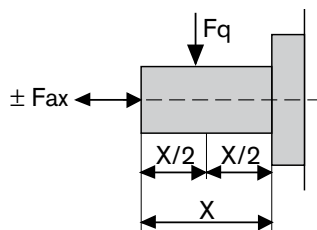
η_{mh} = Mechanical-hydraulic efficiency

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

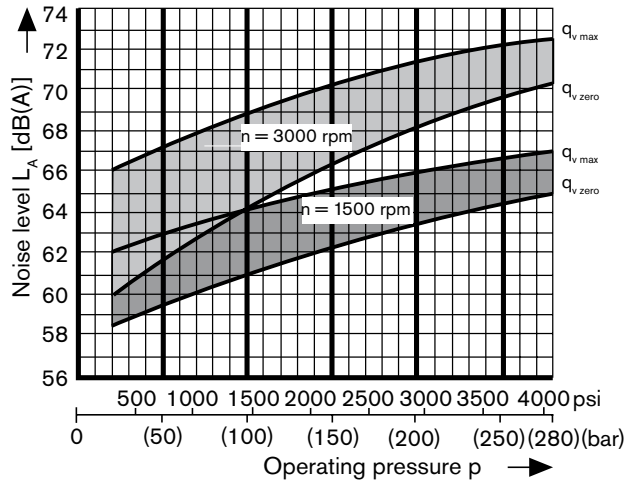
Measured in an anechoic chamber

Distance microphone-pump = 3.3 ft (1 m)

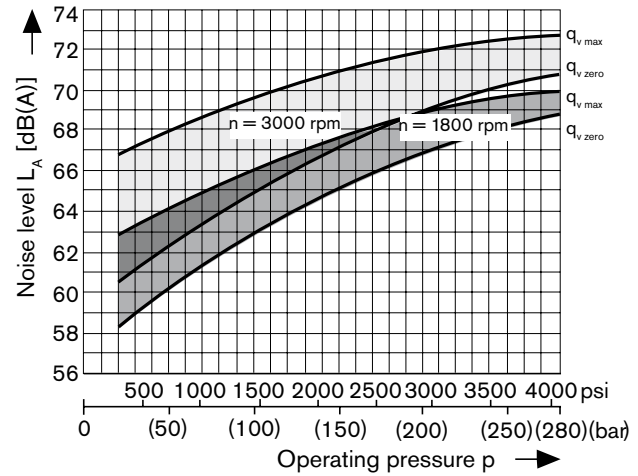
Max. measurement error ± 2 dB (A)

Fluid: hydraulic oil ISO VG 46 DIN 51519, $t = 122^\circ\text{F}$ (50°C)

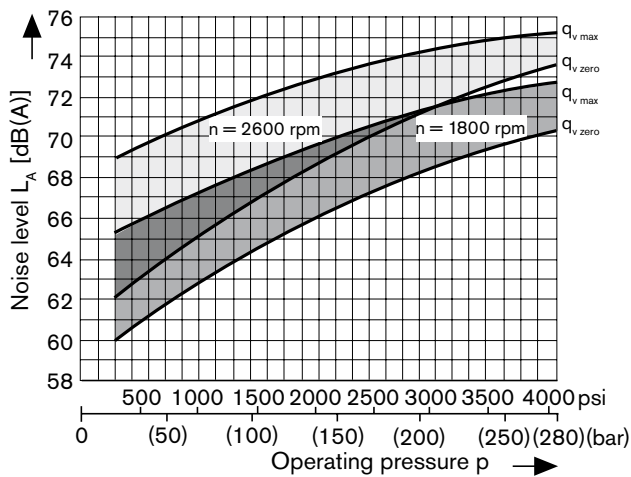
Size 18



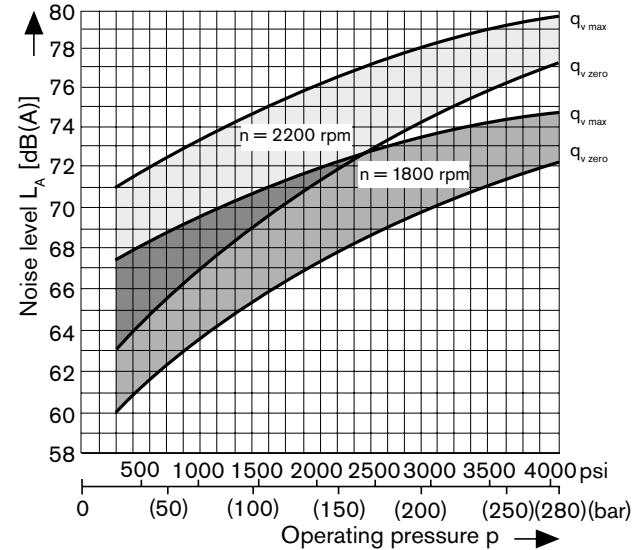
Size 28



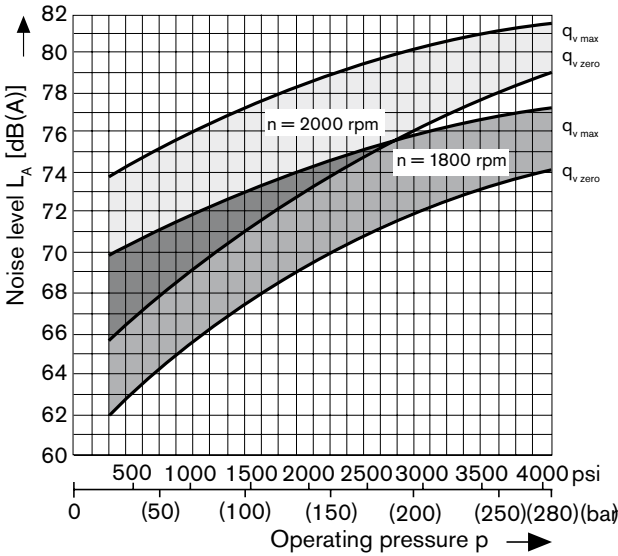
Size 45



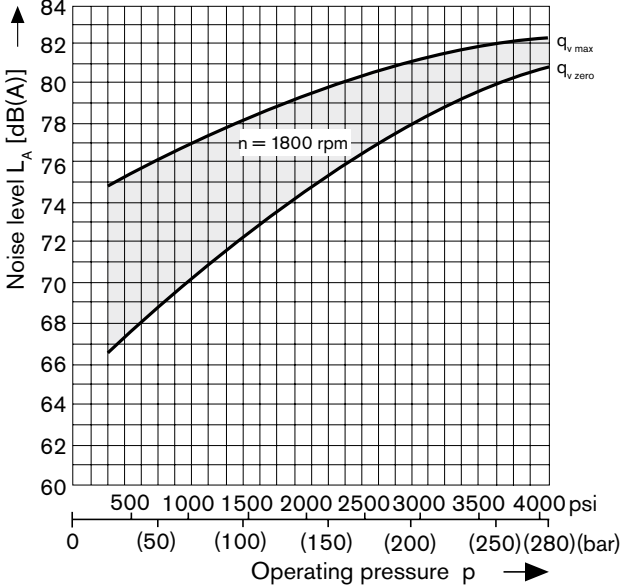
Size 71



Size 100



Size 140

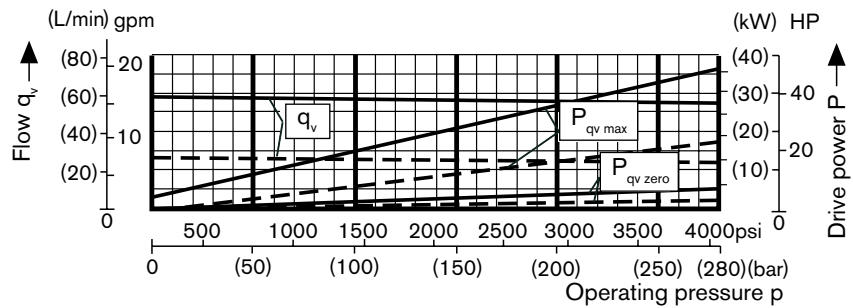


Drive power and flow

Fluid: hydraulic oil ISO VG 46 DIN 51519, $t = 122^\circ\text{F}$ (50°C)

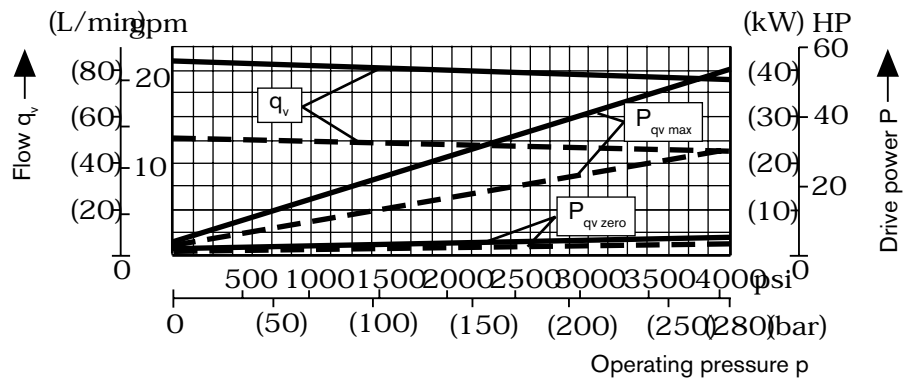
Size 18

- $n = 1500$ rpm
— $n = 3300$ rpm



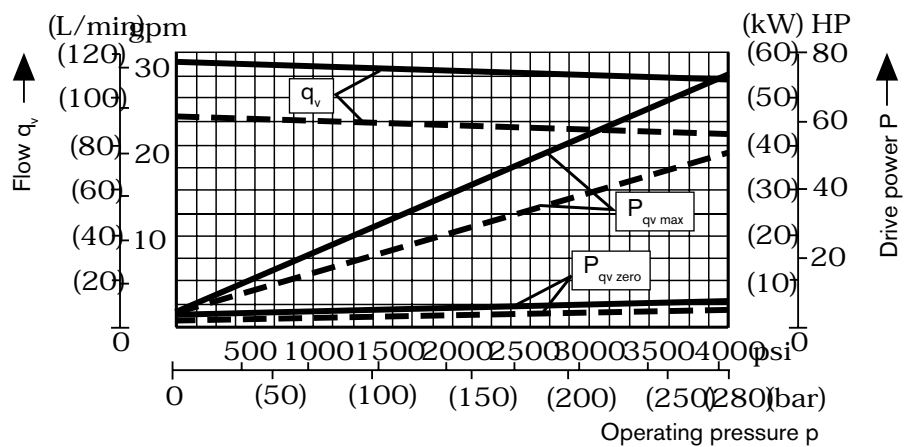
Size 28

- $n = 1800$ rpm
— $n = 3000$ rpm



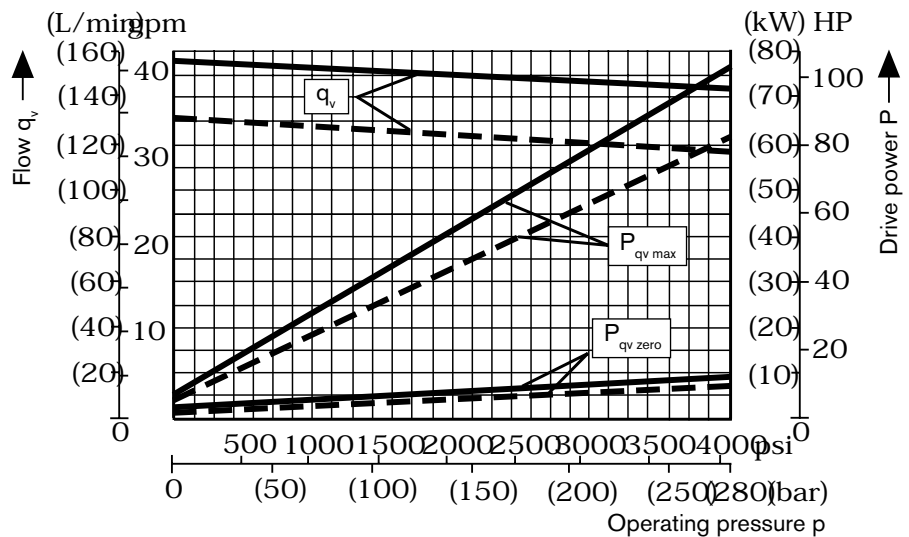
Size 45

- $n = 1800$ rpm
— $n = 2600$ rpm



Size 71

- $n = 1800$ rpm
— $n = 2200$ rpm

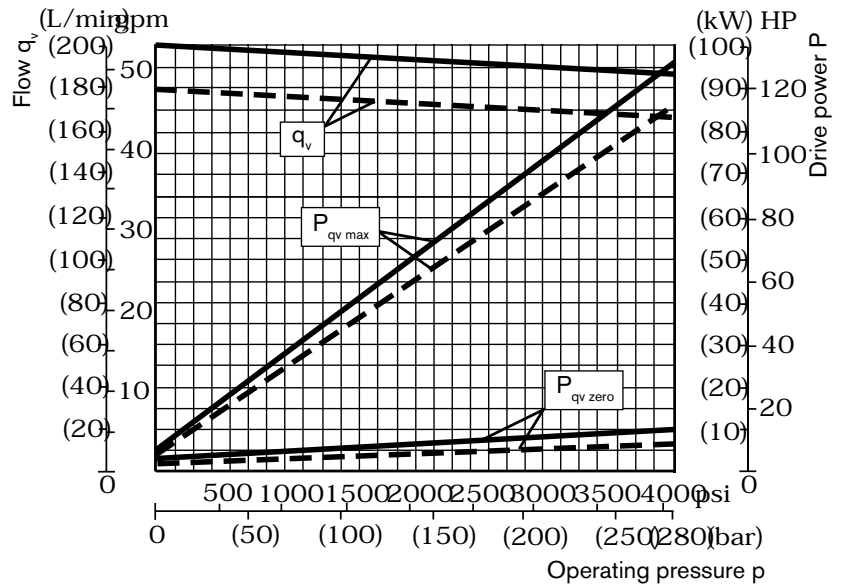


Drive power and flow

Fluid: hydraulic oil ISO VG 46 DIN 51519, $t = 122\text{ }^{\circ}\text{F}$ ($50\text{ }^{\circ}\text{C}$)

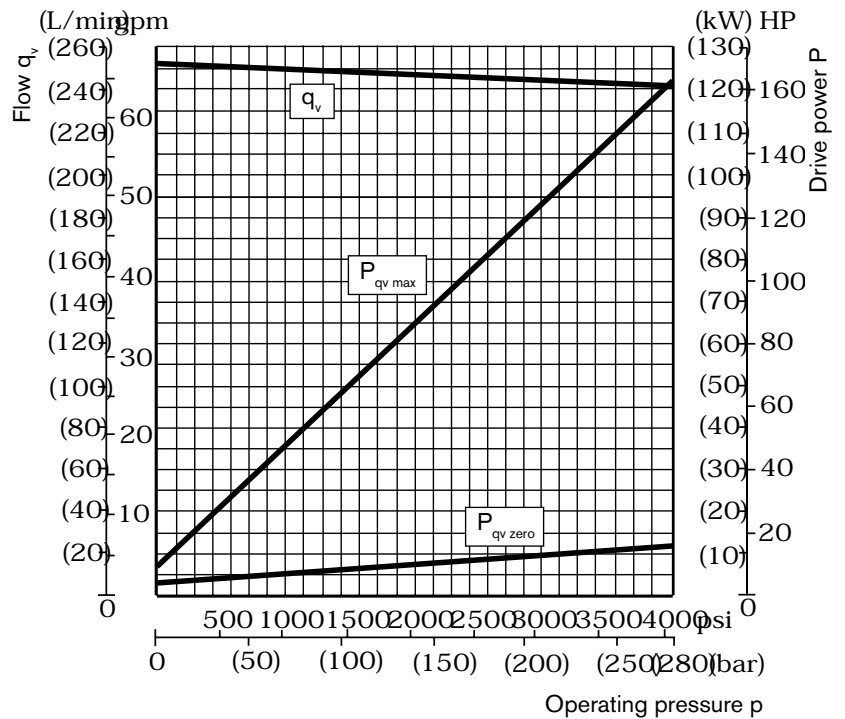
Size 100

--- $n = 1800\text{ rpm}$
 — $n = 2000\text{ rpm}$



Size 140

— $n = 1800\text{ rpm}$



Overall efficiency

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

Volumetric efficiency

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

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 $p_{st} \leq 725 \text{ psi}$ (50 bar) is required.

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

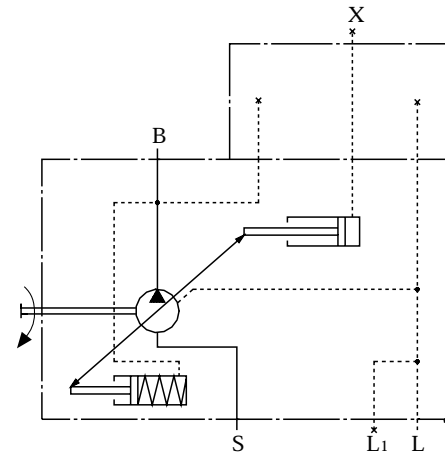
Please note, that the required switching pressure at port X is directly dependent on the actual operating pressure p_B in port B. (See switching pressure diagram)

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

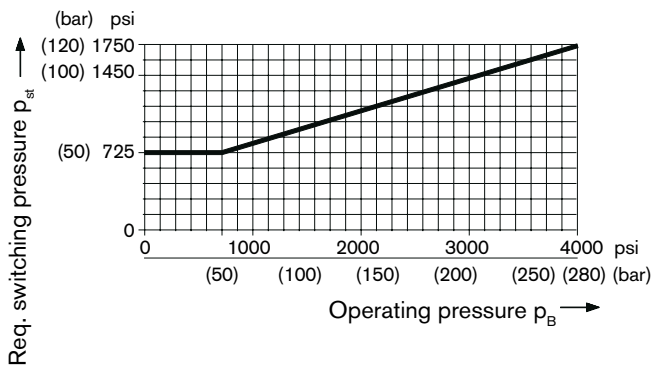
Control pressure p_{st} in $X \leq 725 \text{ psi (50 bar)} \triangleq V_{g \min}$

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

Circuit drawing



Switching pressure diagram



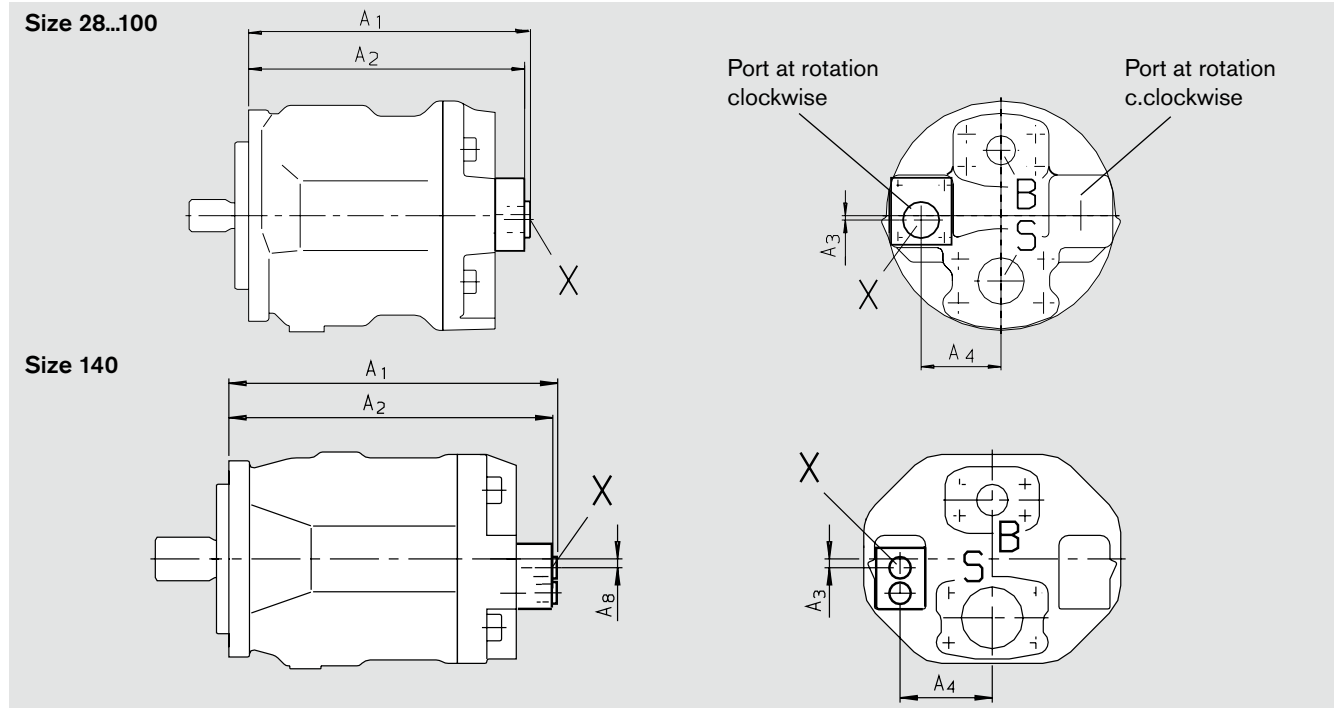
Ports

- B Pressure port
- S Inlet port
- L, L₁ Case drain ports (L₁ plugged)
- X Pilot pressure port (plugged)

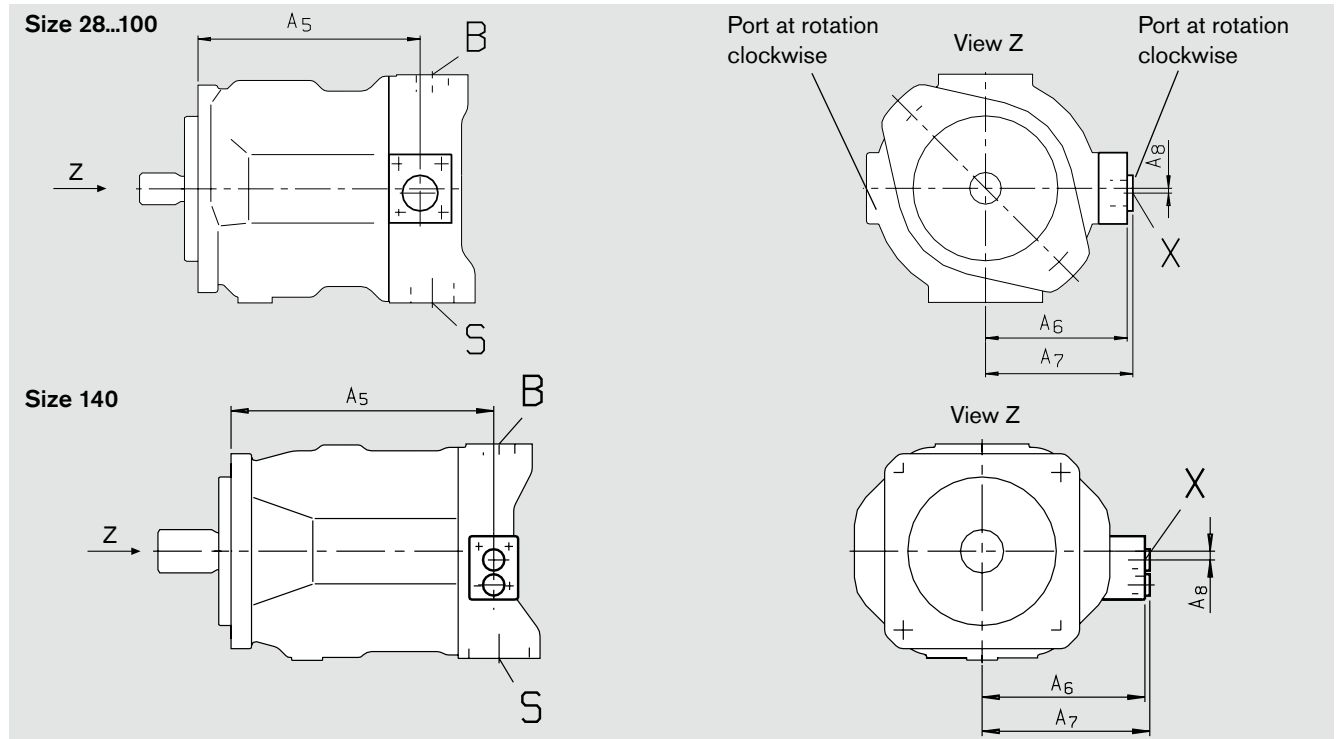
Unit dimensions DG

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

Version 61 N00 - Ports at rear



Version 62 N00 - Ports on side



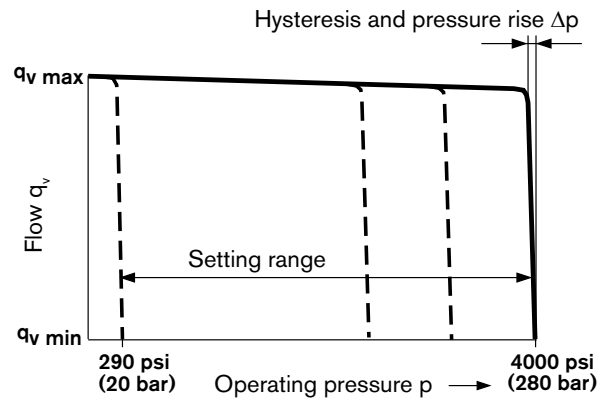
Size	A ₁	A ₂	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	X (closed)
28	7.62 (193.5)	7.48 (190)	0 (0)	2.16 (55)	6.22 (158)	3.94 (100)	4.07 (103.5)	0.12 (3)	R1/4in DIN 3852-1
45	8.37 (212.5)	8.23 (209)	0.12 (3)	2.50 (63.5)	6.81 (173)	4.33 (110)	4.47 (113.5)	0.12 (3)	R1/4in DIN 3852-1
71	9.70 (246.5)	9.55 (242.5)	0.12 (3)	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 $n_1 = 1500 \text{ rpm}$; $t_{oil} = 122^\circ\text{F} / 50^\circ\text{C}$)

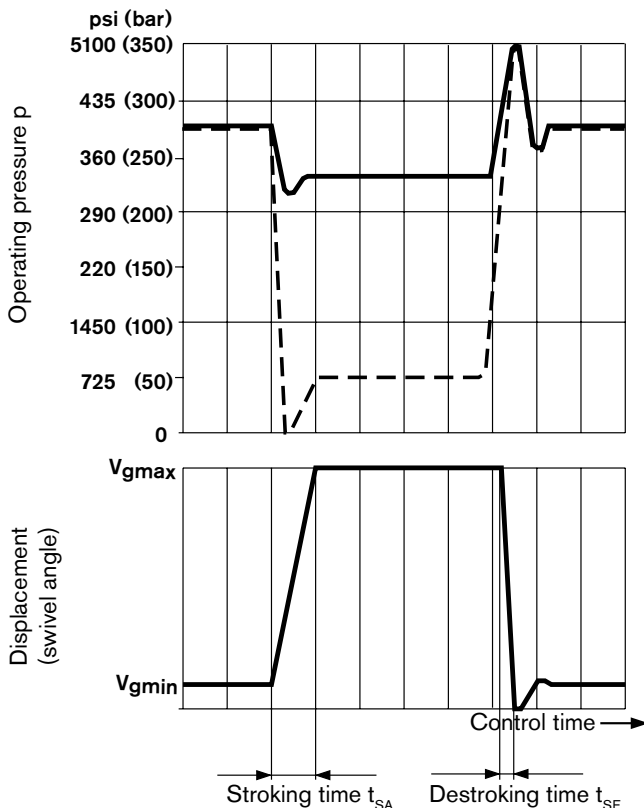


Dynamic characteristic

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

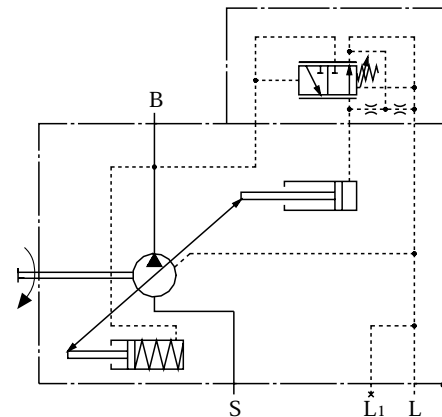
Conditions: $n = 1500 \text{ rpm}$
 $t_{oil} = 122^\circ\text{F} (50^\circ\text{C})$
 Main relief set at 5100 psi (350 bar)

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.

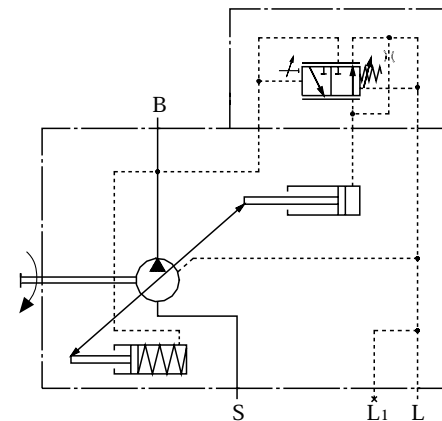


Circuit drawing

Size 18 ... 100



Size 140



Ports

B Pressure port

S Inlet port

L_1, L_2 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.

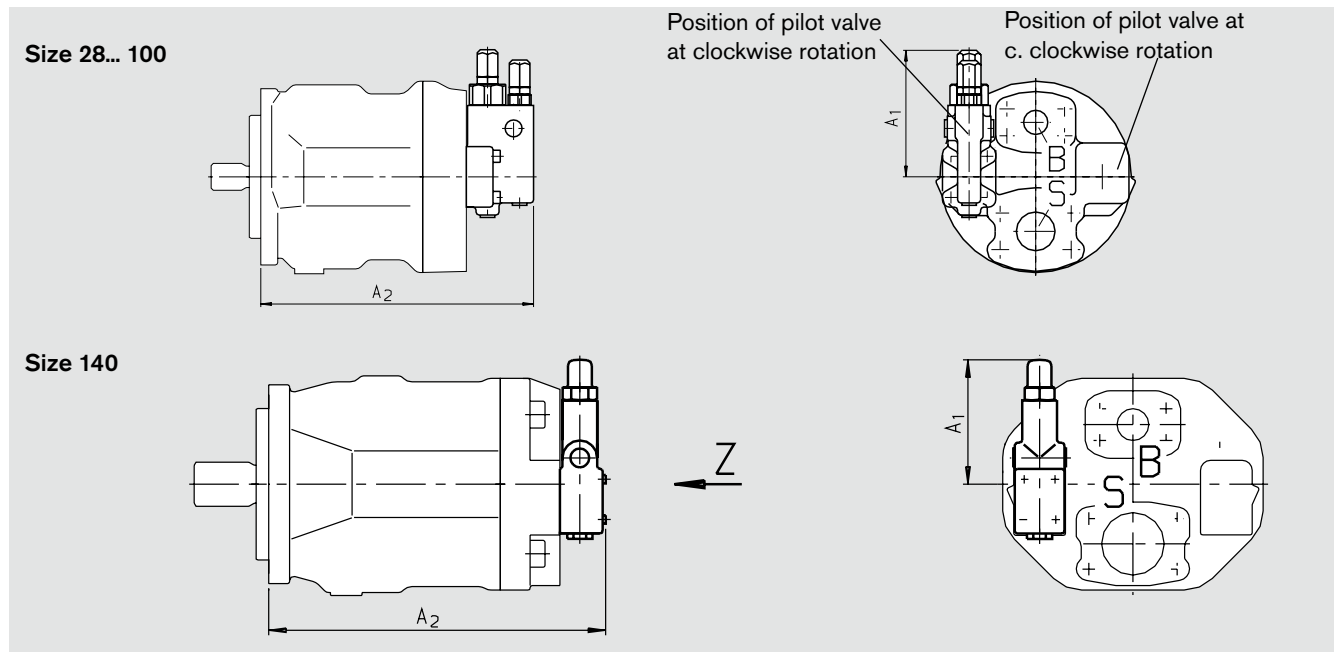
Control times

	t_{SA} [ms]	t_{SA} [ms]	t_{SE} [ms]
Size	against 725 psi (50 bar)	against 3200 psi (220 bar)	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

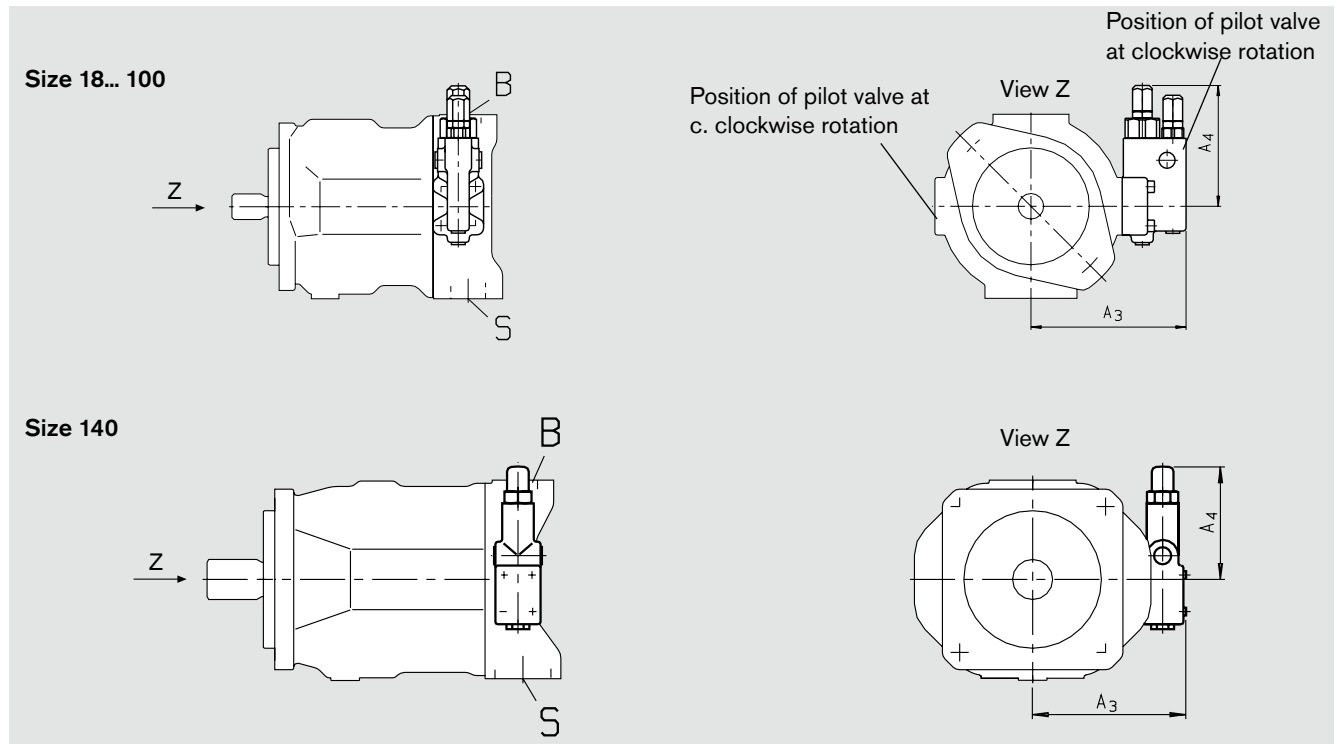
Unit dimensions DR

Version 61 N00 - Ports at rear

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



Version 62 N00 - Ports on side



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 pressure 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 separate pressure relief valve.

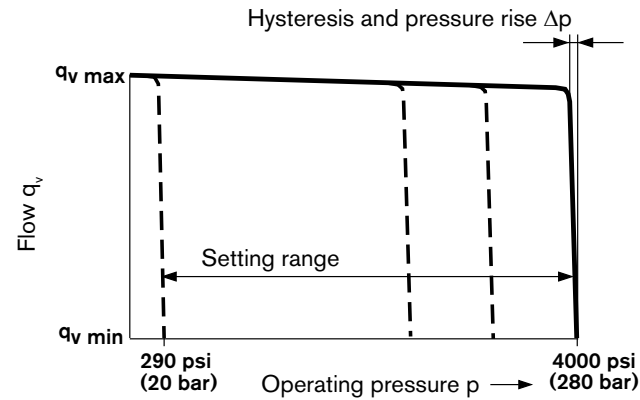
DBDH 6 (hydraulic) to RA 25402 or

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).

Static characteristic

(at $n_1 = 1500 \text{ rpm}$; $t_{oil} = 122^\circ\text{F} / 50^\circ\text{C}$)



Control data

Hysteresis Δp _____ max. 45 psi (3 bar)

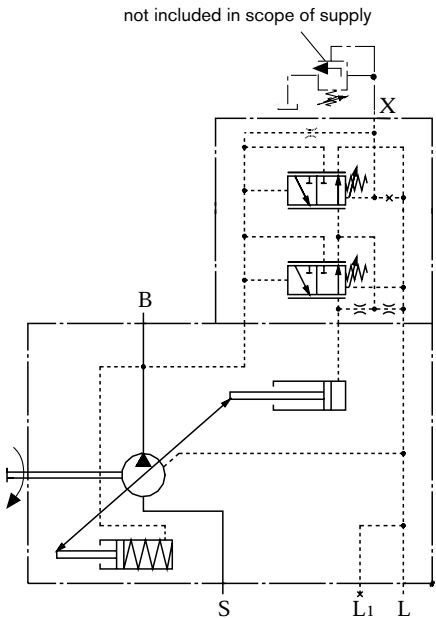
Pressure rise, max.

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

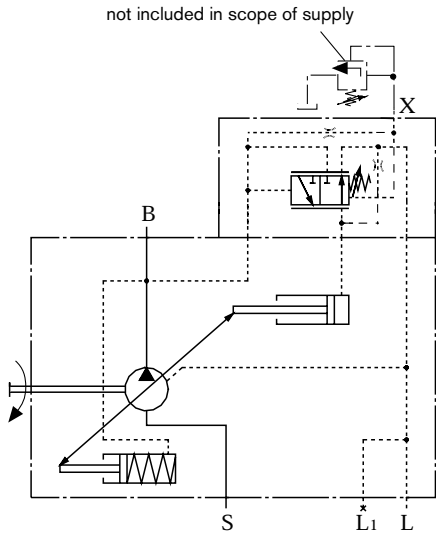
Pilot oil requirement _____ approx. 1.2 gpm (4.5 L/min)

Flow loss at $q_{v \max}$ see pages 10 and 11.

Circuit drawing
Size 18 ... 100



Size 140



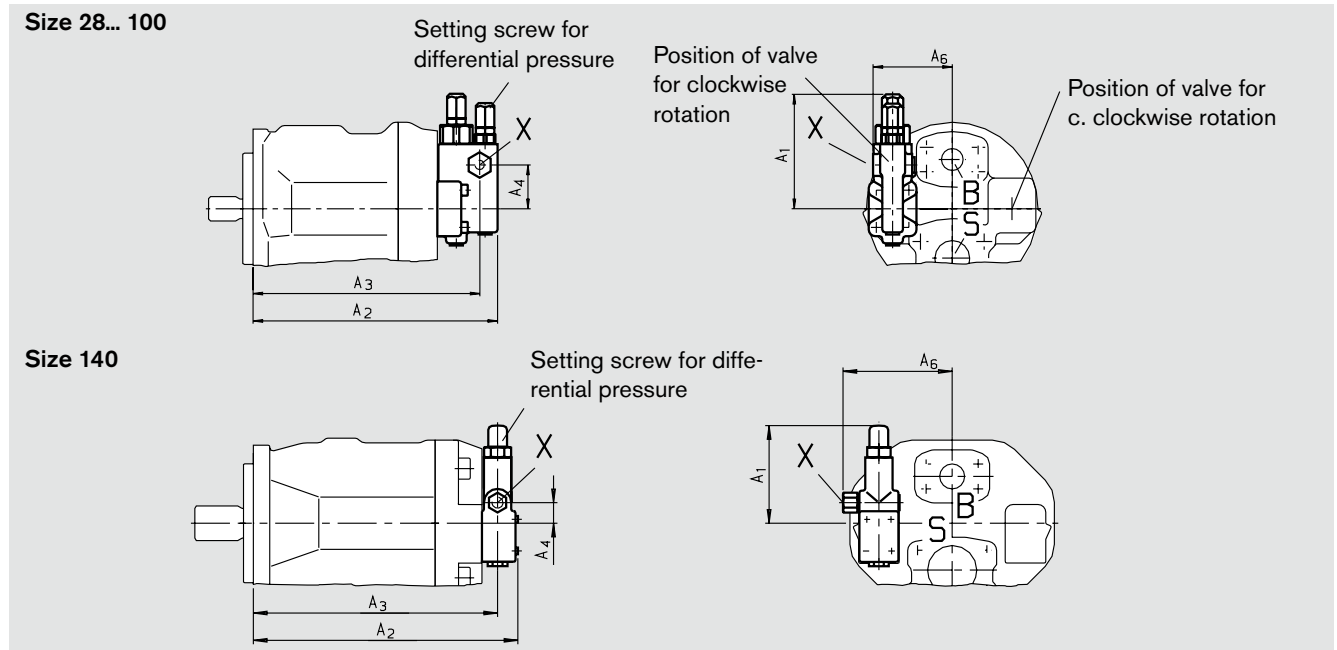
Ports

- B Pressure port
- S Inlet port
- L₁, L₁ Case drain port (L₁ plugged)
- X Pilot pressure port

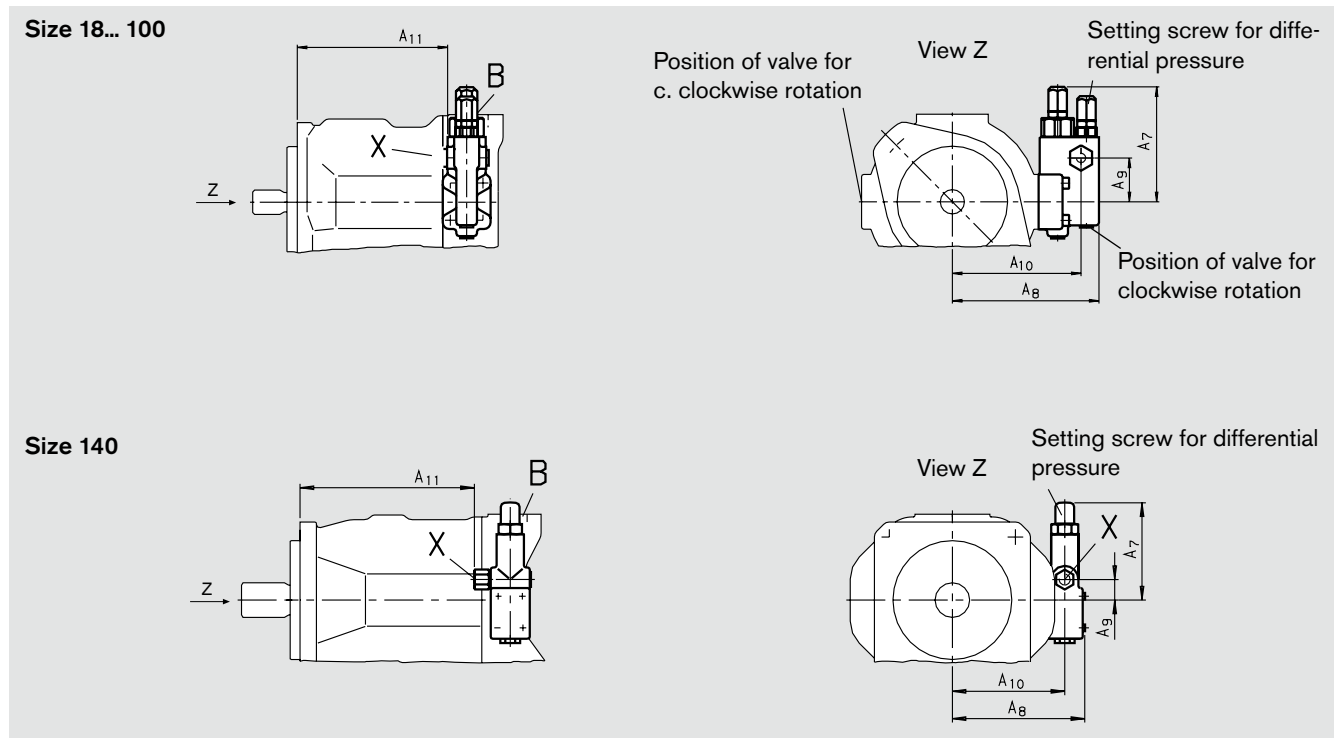
Unit dimensions DRG

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

Version 61 N00 - Ports at rear



Version 62 N00 - Ports on side



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

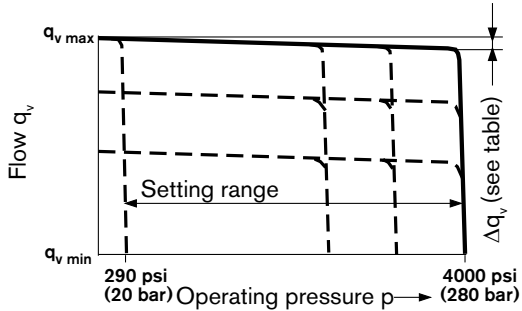
DFR / DFR1 - Pressure flow control

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.

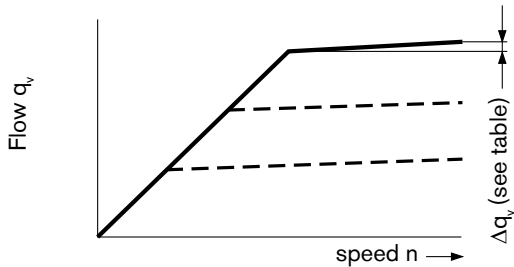
For function and content of pressure control see pages 14/15.

Static characteristic

(at $n_1 = 1500 \text{ rpm}$; $t_{oil} = 122^\circ\text{F} / 50^\circ\text{C}$)

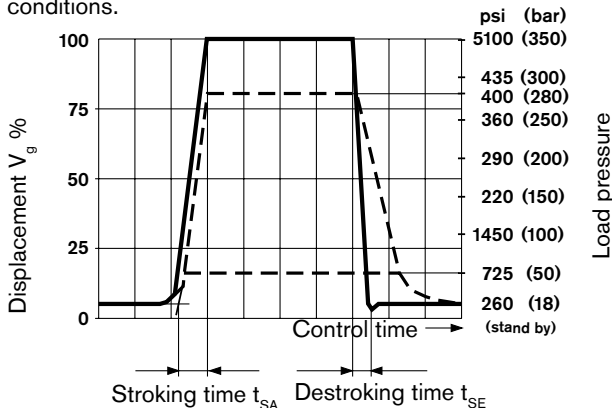


Static characteristic at variable speed



Dynamic characteristic operating curve

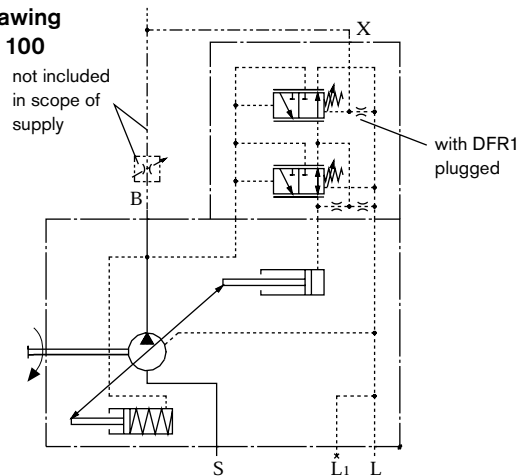
The curves shown are measured average values under test conditions.



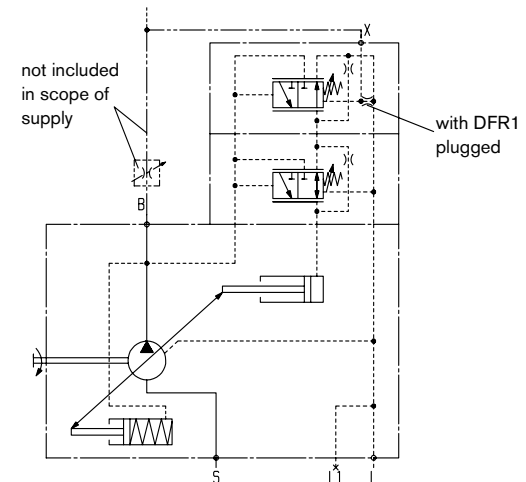
Size	$t_{SA} [\text{ms}]$ 4000 psi (280 bar)-stand by	$t_{SE} [\text{ms}]$ 4000 psi (280 bar)-stand by	$t_{SE} [\text{ms}]$ 725 psi (50 bar)-stand by
18	40	15	40
28	40	20	40
45	50	25	50
71	60	30	60
100	120	60	120
140	130	60	130

Circuit drawing

Size 18 ... 100



Size 140



Ports

- B Pressure port
- S Inlet port
- L₁, L₁ Case drain port (L₁ 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 $p = 260 \pm 30 \text{ psi}$ ($18 \pm 2 \text{ bar}$) results. (depends on Δp)

Control data

For technical data of pressure control see page 20.

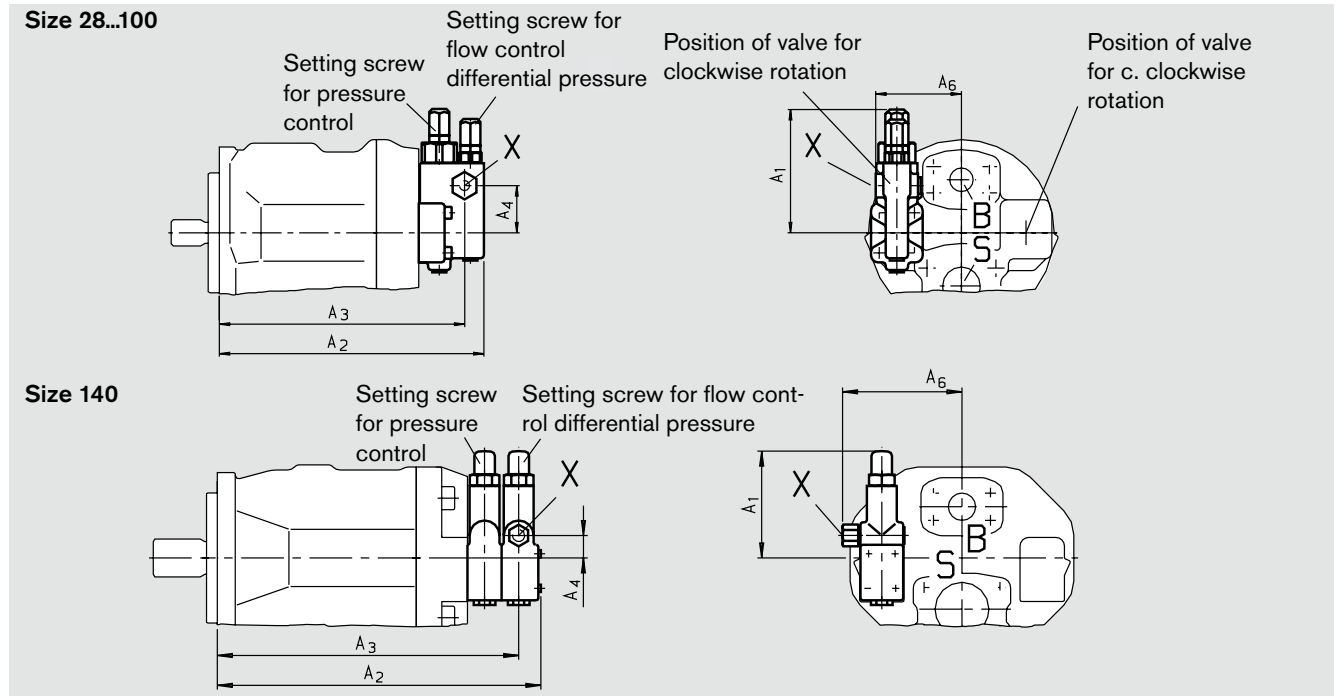
Max. flow deviation (hysteresis and rise) measured at drive speed $n = 1500 \text{ rpm}$.

Size	18	28	45	71	100	140
$\Delta q_{v \max}$ 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)

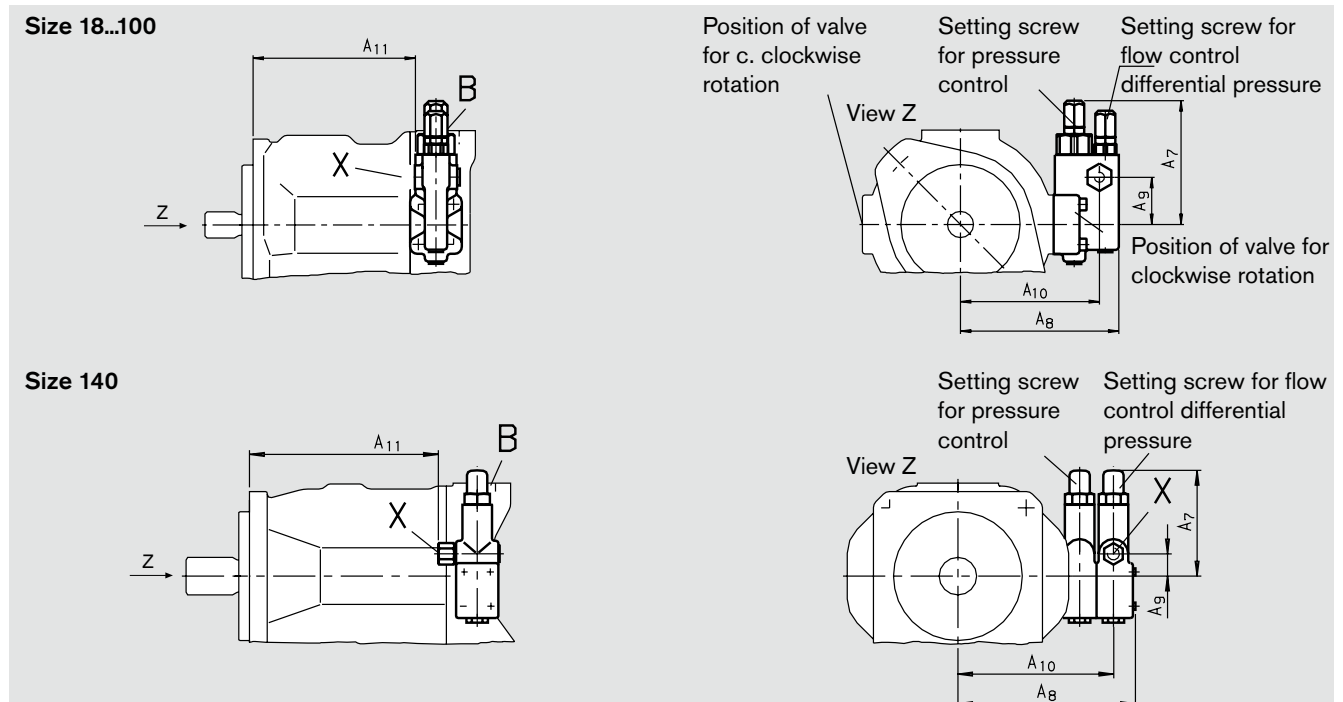
Unit dimensions DFR/DFR1

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

Version 61 N00 - Ports at rear



Version 62 N00 - Ports on side



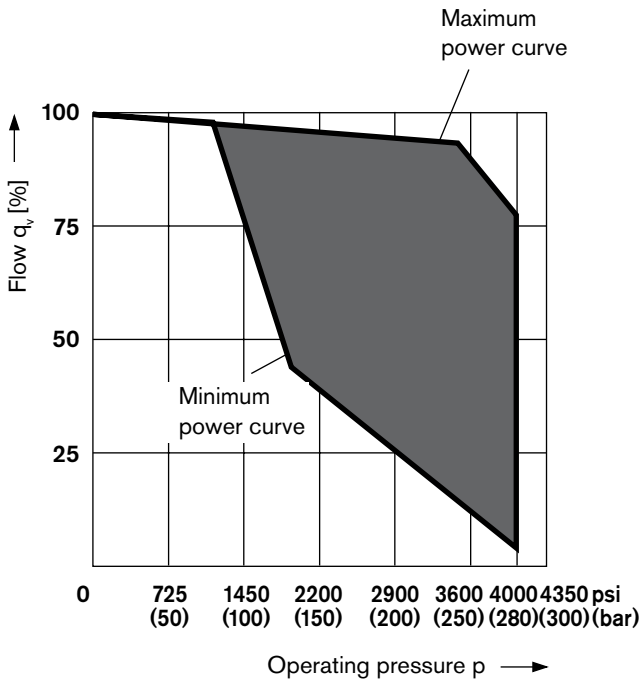
Size	A ₁	A ₂	A ₃	A ₄	A ₆	A ₇	A ₈	A ₉	A ₁₀	A ₁₁	Port X
18	-	-	-	-	-	4.13(105)	4.96(126)	1.57(40)	4.29(109)	5.12(130)	7/16-20 UNF-2B; 0.39(10)deep
28	4.29(109)	8.86(225)	8.23(209)	1.69(43)	2.87(73)	4.17(106)	5.35(136)	1.57(40)	4.69(119)	5.51(140)	7/16-20 UNF-2B; 0.39(10)deep
45	4.17(106)	9.61(244)	8.98(228)	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.

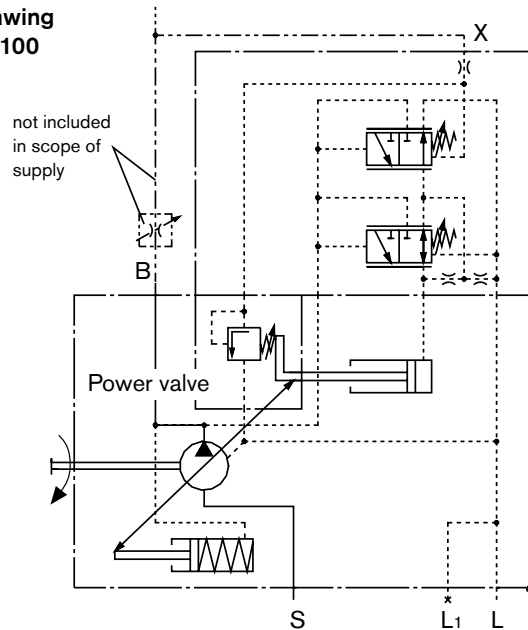
For technical data flow control see page 18.

Start of control _____ from 1160 psi (80 bar)

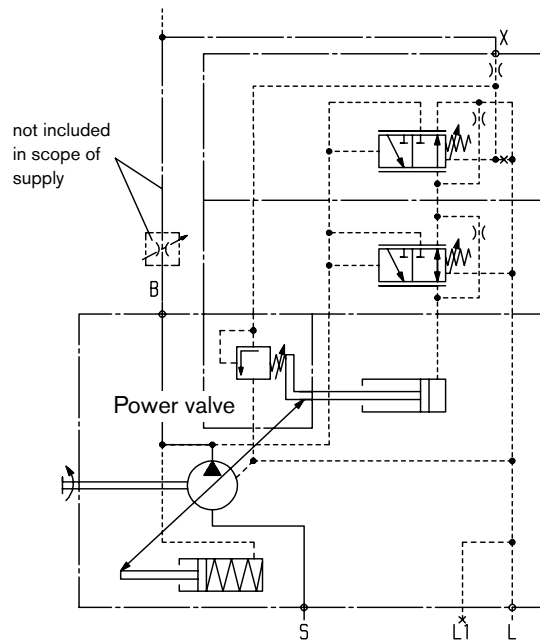
Pilot oil consumption _____ max. approx. 1.45 gpm (5.5 L/min)

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

Circuit drawing Size 28 ... 100



Size 140



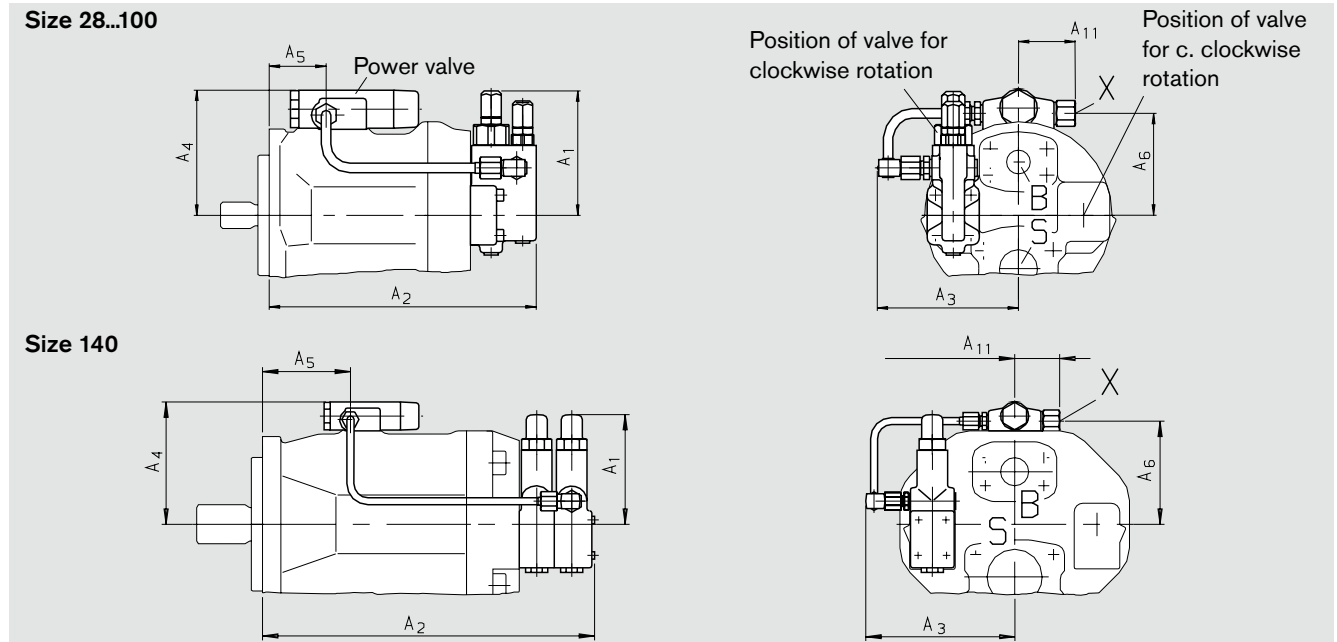
Ports

- B Pressure port
- S Inlet port
- L, L₁ Case drain port (L₁ plugged)
- X Pilot pressure port

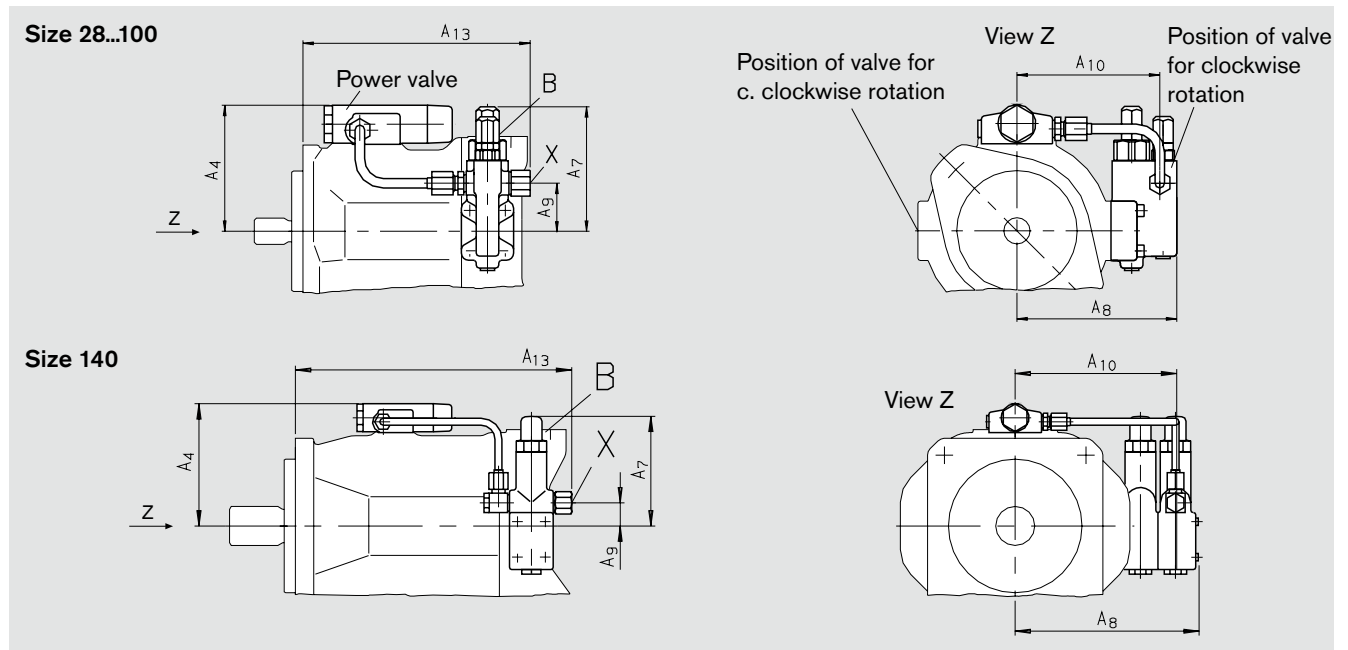
Unit dimensions DFLR

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

Version 61 N00 - Ports at rear



Version 62 N00 - Ports on side



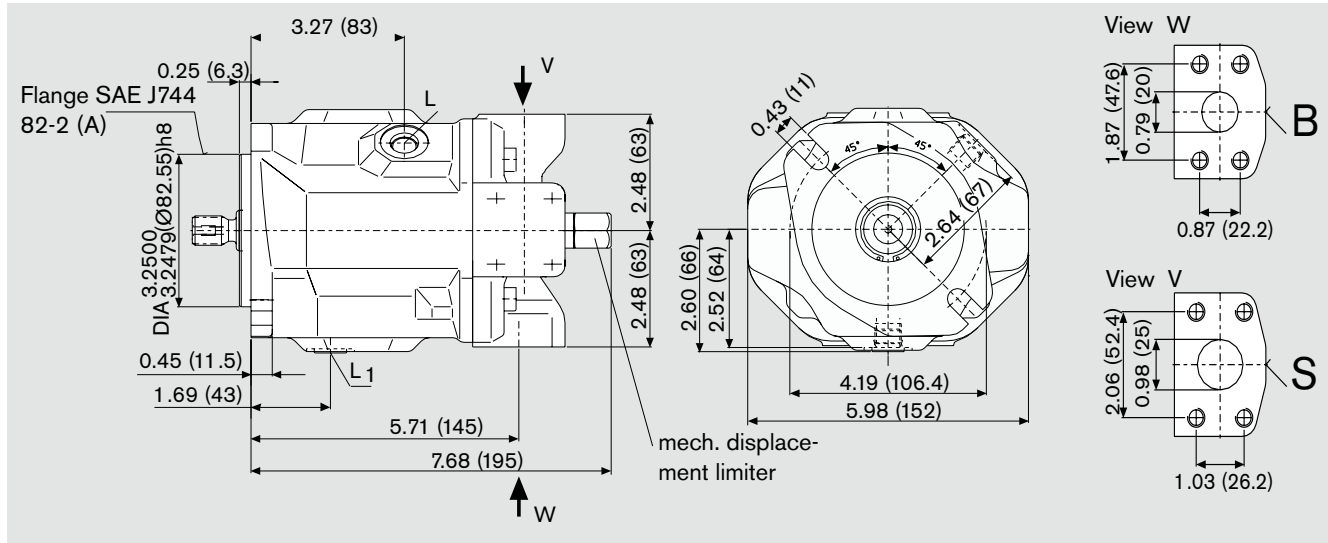
Size	A ₁	A ₂	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀	A ₁₁	A ₁₃	Port X
28	4.29 (109)	8.86 (225)	4.72 (120)	4.21 (107)	1.89 (48)	3.39 (86)	4.17 (106)	5.35 (136)	1.57 (40)	4.68 (119)	1.89 (48)	7.64 (194)	7/16-20 UNF-2B; 0.39(10)deep
45	4.17 (106)	9.61 (244)	5.08 (129)	4.41 (112)	2.13 (54)	3.60 (91.5)	4.17 (106)	5.75 (146)	1.57 (40)	5.08 (129)	1.89 (48)	8.23 (209)	7/16-20 UNF-2B; 0.39(10)deep
71	4.17 (106)	10.94 (278)	5.47 (139)	4.88 (124)	2.72 (69)	4.07 (103.5)	4.17 (106)	6.30 (160)	1.57 (40)	5.63 (143)	1.89 (48)	9.33 (237)	7/16-20 UNF-2B; 0.39(10)deep
100	4.17 (106)	13.54 (344)	5.71 (145)	5.08 (129)	4.37 (111)	4.27 (108.5)	4.17 (106)	6.50 (165)	1.57 (40)	5.83 (148)	1.89 (48)	11.97 (305)	7/16-20 UNF-2B; 0.39(10)deep
140	5.00 (127)	14.92 (379)	5.83 (148)	5.51 (140)	3.90 (99)	4.86 (123.5)	5.00 (127)	8.23 (209)	1.06 (27)	7.20 (183)	1.89 (48)	12.36 (314)	7/16-20 UNF-2B; 0.39(10)d.(Mod. 61) 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).

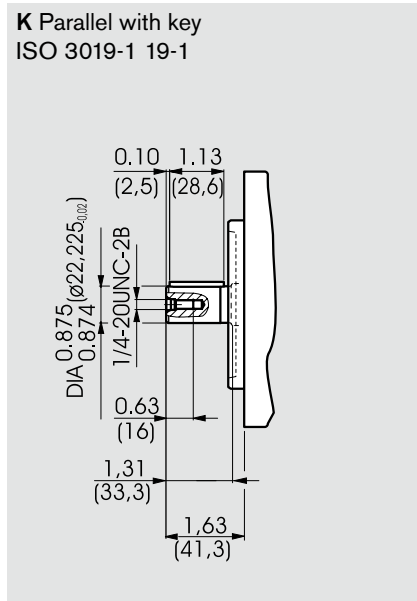
Version 62 N00

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

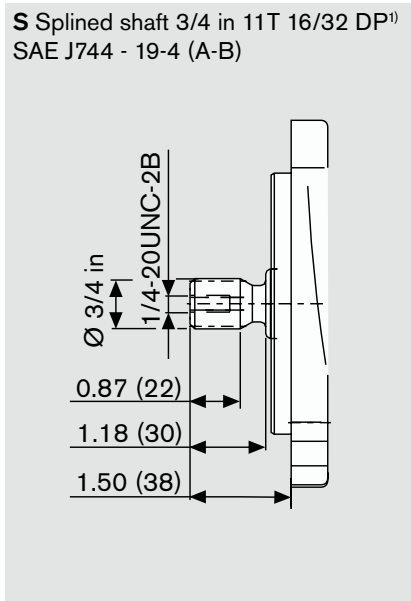


Shaft ends (acc. to SAE J744 OCT83)

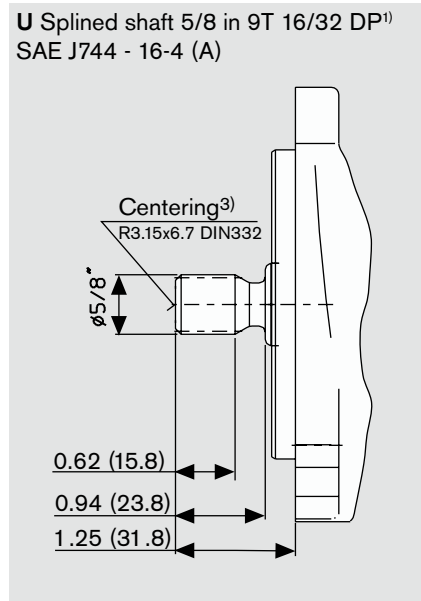
K Parallel with key
ISO 3019-1 19-1



S Splined shaft 3/4 in 11T 16/32 DP¹⁾
SAE J744 - 19-4 (A-B)



U Splined shaft 5/8 in 9T 16/32 DP¹⁾
SAE J744 - 16-4 (A)



Ports

				Tightening torques, max. ¹⁾
B	Pressure port (standard pressure range) Fixing thread	SAE J518 ISO 68	3/4 in 3/8-16 UNC-2B; 0.79 (20) deep	29 lb-ft (40 Nm)
S	Inlet port (standard pressure range) Fixing thread	SAE J518 ISO 68	1 in 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

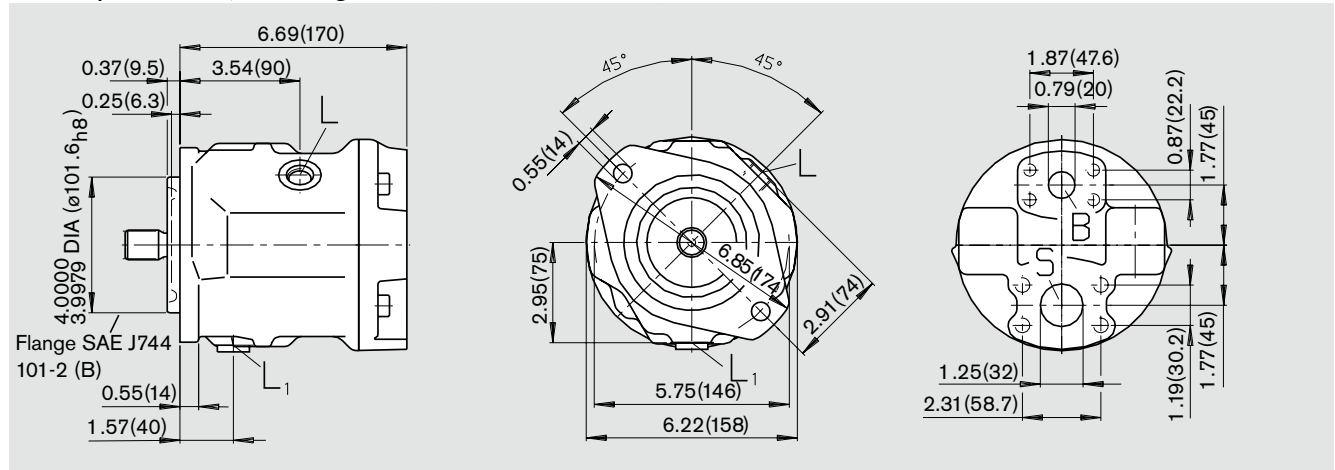
³⁾ Axial locking of the coupling e.g. via clamping coupling or radial mounted binding screw

Unit dimensions, Size 28

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

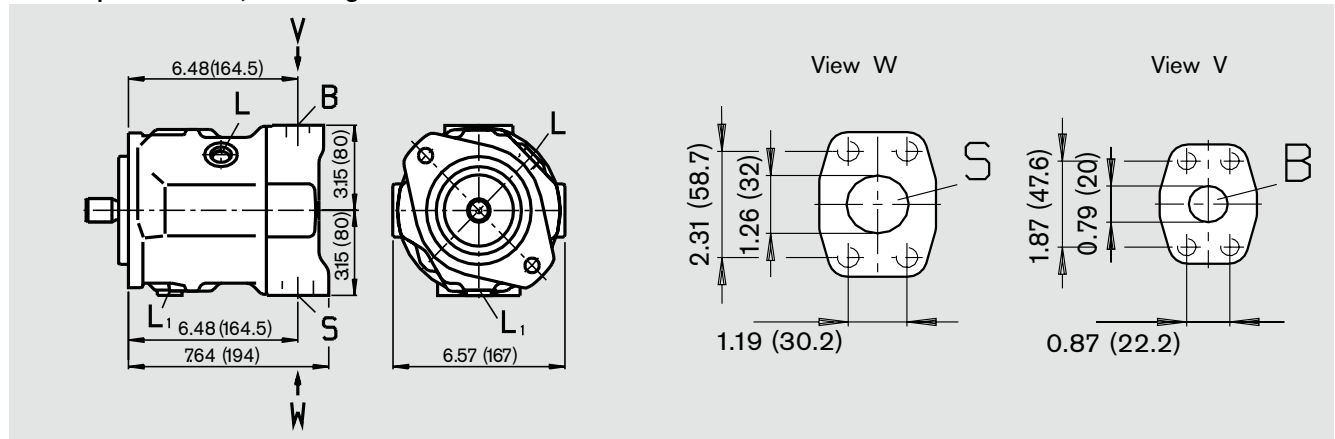
Version 61 N00

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



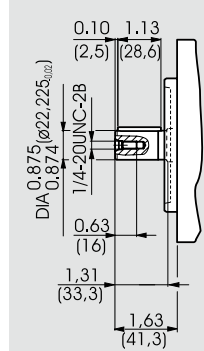
Version 62 N00

Service ports on side, no through drive

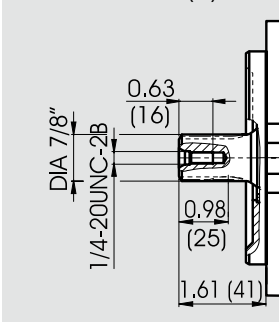


Shaft ends (acc. to SAE J744 OCT83)

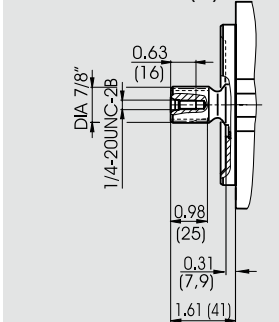
K Parallel with key ISO 3019-1 22-1



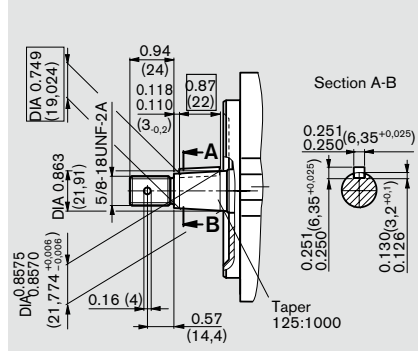
R Splined shaft 7/8 in 13T 16/32 DP¹⁾ SAE J744 - 22-4 (B)



S Splined shaft 7/8 in 13T 16/32 DP¹⁾ SAE J744 - 22-4 (B)



C Tapered shaft ISO 3019-1 22-1



Ports

B	Pressure port (standard pressure range) Fixing thread	SAE J518 ISO 68	3/4 in 3/8-16 UNC-2B; 0.71 (18) deep	29 lb-ft (40 Nm)
S	Inlet port (standard pressure range) Fixing thread	SAE J518 ISO 68	1 1/4 in 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)

Tightening torques, max.¹⁾

¹⁾ ANSI B92.1a-1976, pressure angle 30°, flat base, flank centering, fit class 5

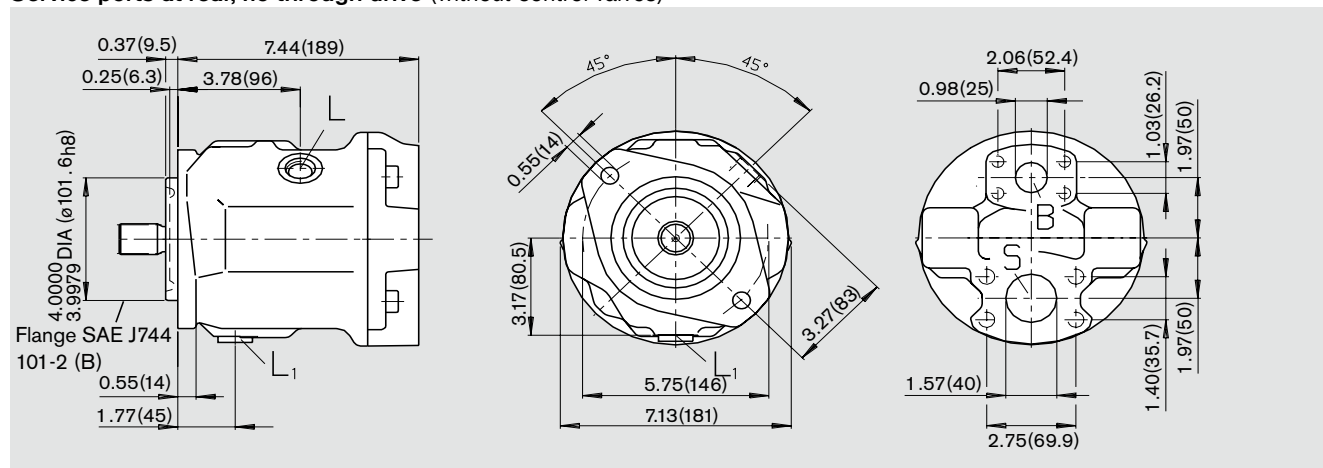
²⁾ See safety information

Unit dimensions, Size 45

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

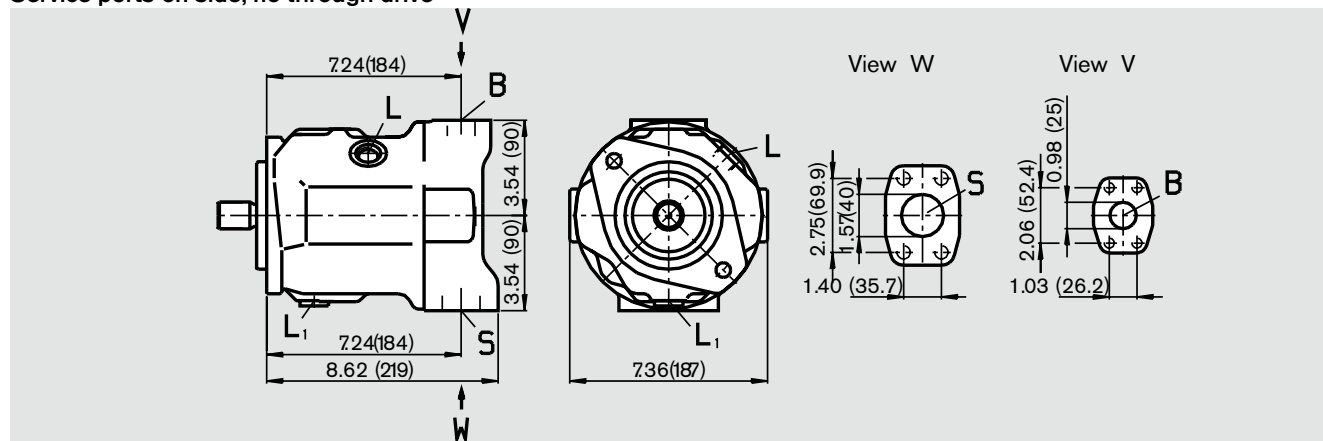
Version 61 N00

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

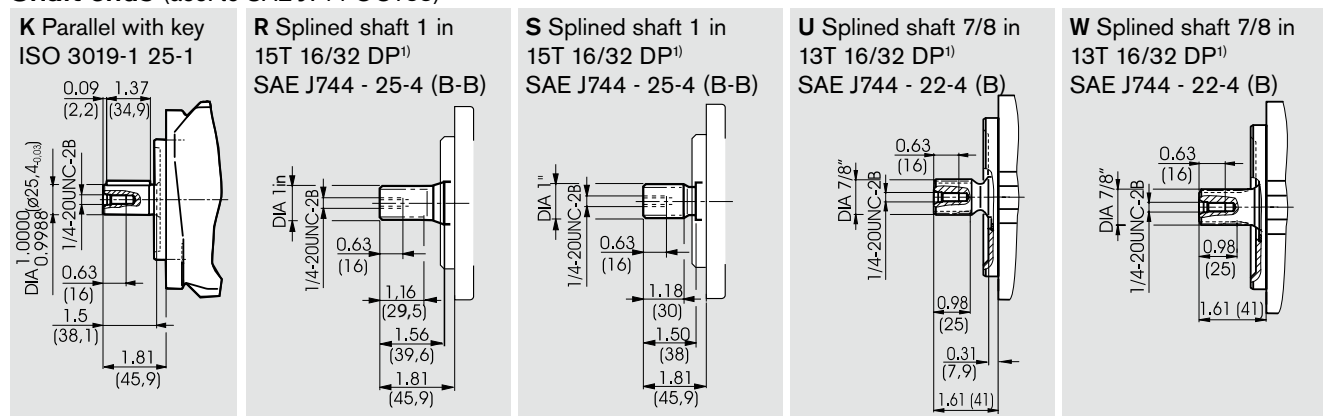


Version 62 N00

Service ports on side, no through drive



Shaft ends (acc. to SAE J744 OCT83)



Ports

				Tightening torques, max. ¹⁾
B	Pressure port (standard pressure range) Fixing thread	SAE J518 ISO 68	1 in 3/8-16 UNC-2B; 0.71 (18) deep	29 lb-ft (40 Nm)
S	Inlet port (standard pressure range) Fixing thread	SAE J518 ISO 68	1 1/2 in 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

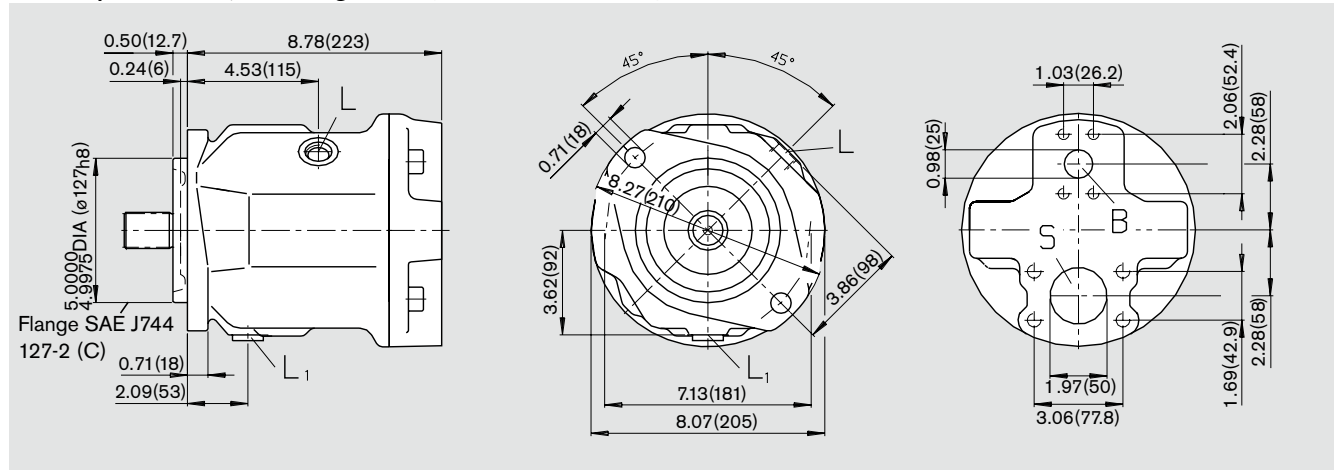
²⁾ See safety information

Unit dimensions, Size 71

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

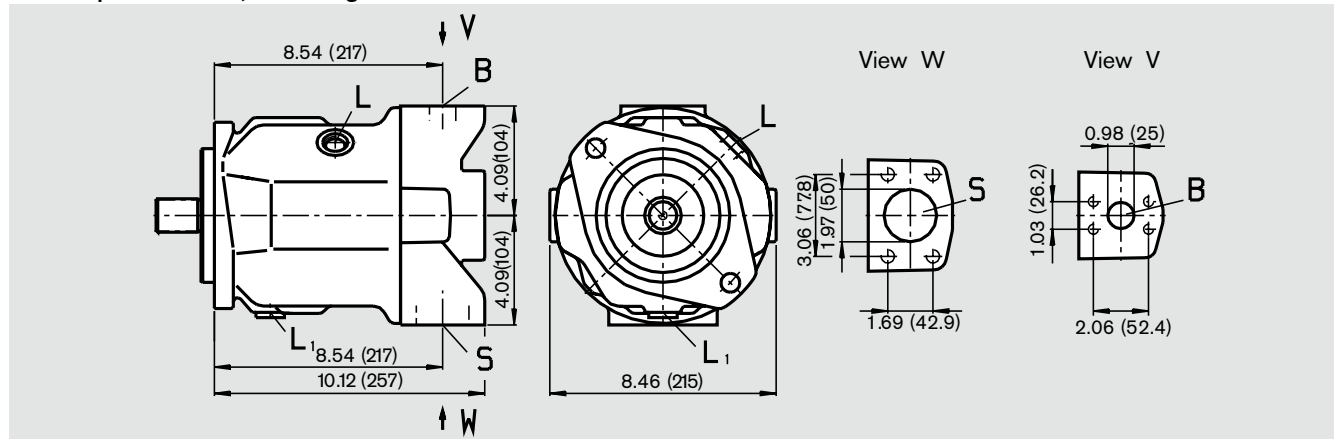
Version 91 N00

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



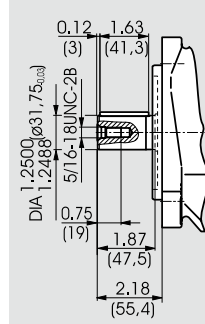
Version 92 N00

Service ports on side, no through drive

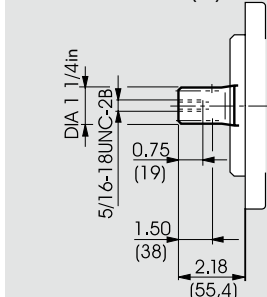


Shaft ends (acc. to SAE J744 OCT83)

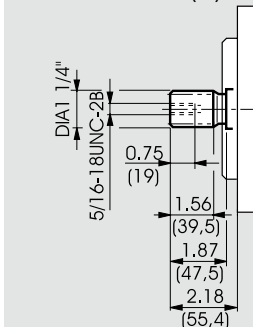
K Parallel with key ISO 3019-1 32-1



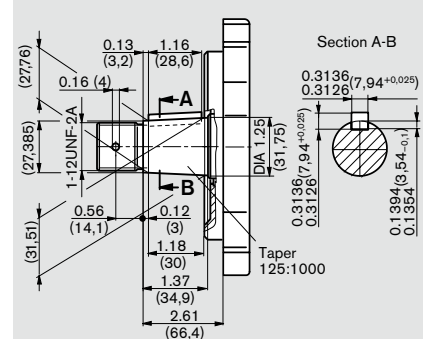
R Splined shaft 1 1/4 in 14T 12/24 DP¹⁾ SAE J744 - 32-4 (C)



S Splined shaft 1 1/4 in 14T 16/32 DP¹⁾ SAE J744 - 32-4 (C)



C Tapered shaft ISO 3019-1 32-3



Ports

B	Pressure port (standard pressure range) Fixing thread	SAE J518 ISO 68	1 in 3/8-16 UNC-2B; 0.71 (18) deep	29 lb-ft (40 Nm)
S	Inlet port (standard pressure range) Fixing thread	SAE J518 ISO 68	2 in 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)

Tightening torques, max.¹⁾

¹⁾ ANSI B92.1a-1976, pressure angle 30°, flat base, flank centering, fit class 5

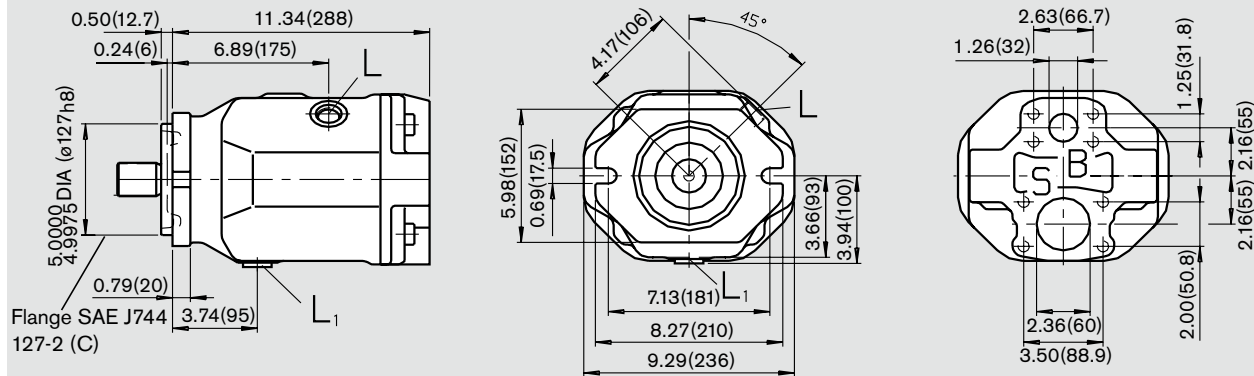
²⁾ See safety information

Unit dimensions, Size 100

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

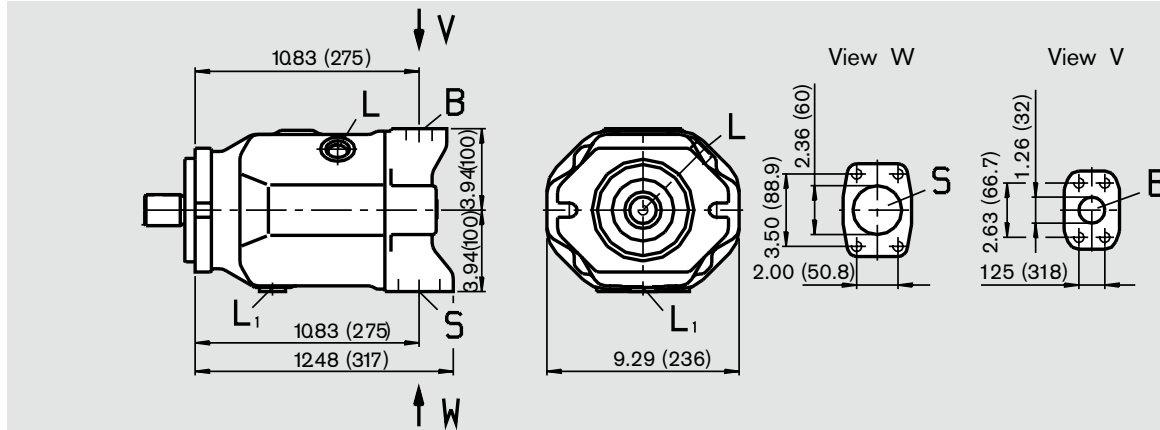
Version 61 N00

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



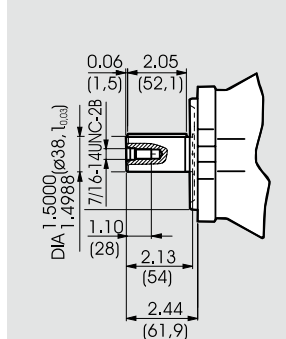
Version 62 N00

Service ports on side, no through drive

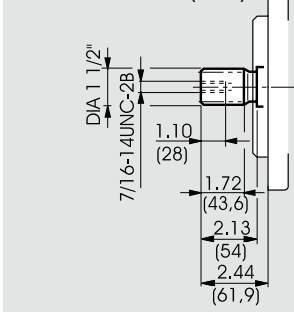


Shaft ends (acc. to SAE J744 OCT83)

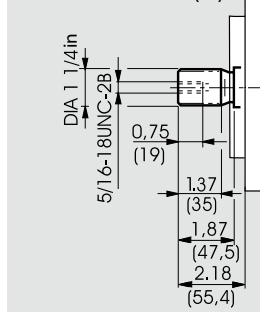
K Parallel with key
ISO 3019-1 38-1



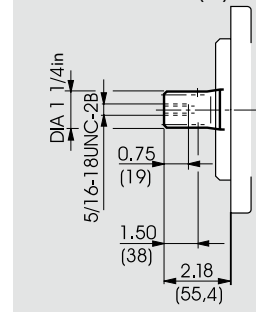
S Splined shaft 1 1/2 in 17T
12/24 DP¹⁾
SAE J744 - 38-4 (C-C)



U Splined shaft 1 1/4 in 14T
12/24 DP¹⁾
SAE J744 - 32-4 (C)



W Splined shaft 1 1/4 in 14T
12/24 DP¹⁾
SAE J744 - 32-4 (C)



Ports

B	Pressure port (high pressure range) Fixing thread	SAE J518 ISO 68	1 1/4 in 1/2-13 UNC-2B; 0.75 (19) deep	66 lb-ft (90 Nm)
S	Inlet port (standard pressure range) Fixing thread	SAE J518 ISO 68	2 1/2 in 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)

Tightening torques, max.¹⁾

¹⁾ ANSI B92.1a-1976, pressure angle 30°, flat base, flank centering, fit class 5

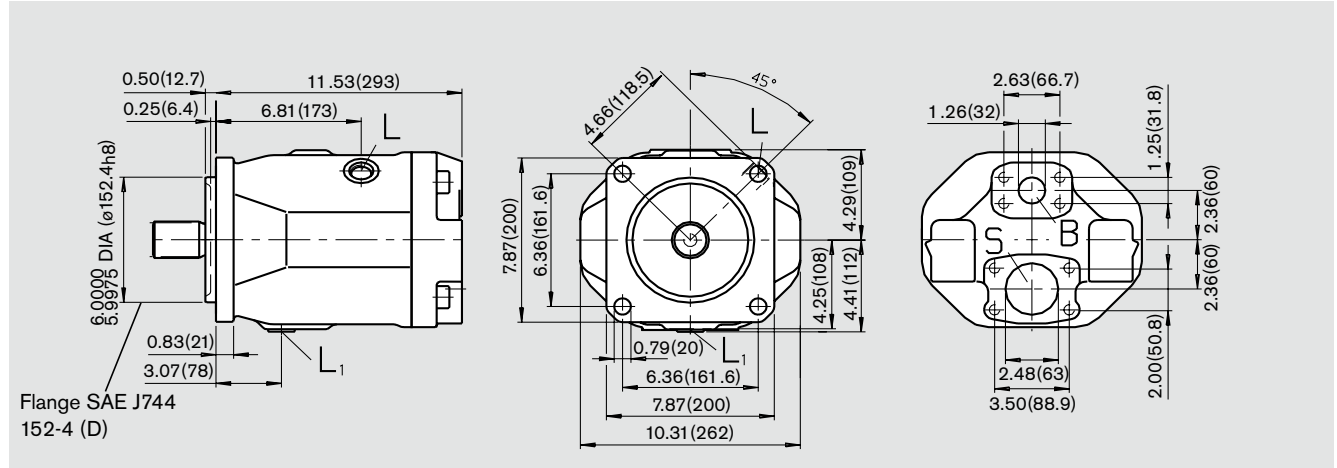
²⁾ See safety information

Unit dimensions, Size 140

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

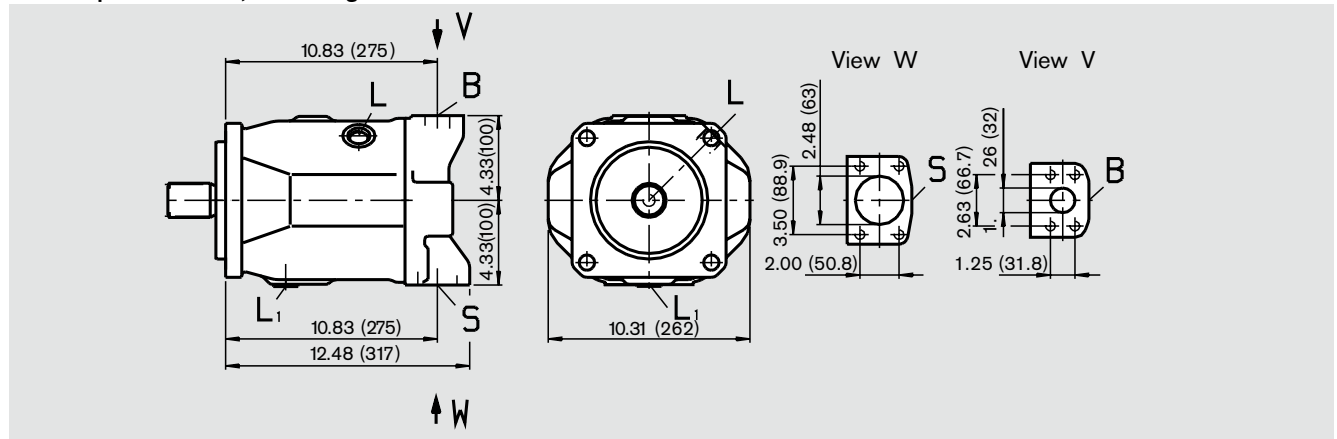
Version 61 N00

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



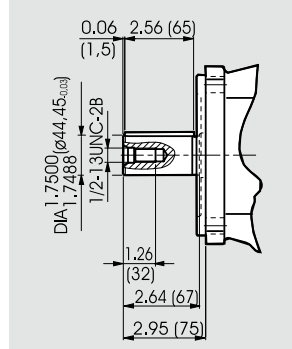
Version 62 N00

Service ports on side, no through drive

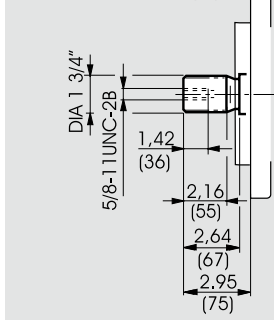


Shaft ends (acc. to SAE J744 OCT83)

K Parallel with key
ISO 3019-1 44-1



S Splined shaft 1 3/4 in 13T
8/16 DP¹⁾
SAE J744 - 44-4 (D)



Ports

Tightening torques, max.¹⁾

B	Pressure port (high pressure range) Fixing thread	SAE J518 ISO 68	1 1/4 in 1/2-13 UNC-2B; 0.94 (24) deep	66 lb-ft (90 Nm)
S	Inlet port (standard pressure range) Fixing thread	SAE J518 ISO 68	2 1/2 in 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

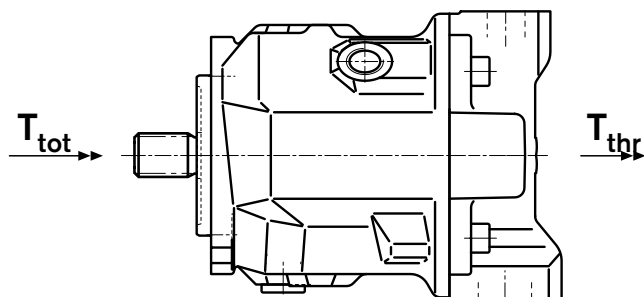
²⁾ See safety information

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

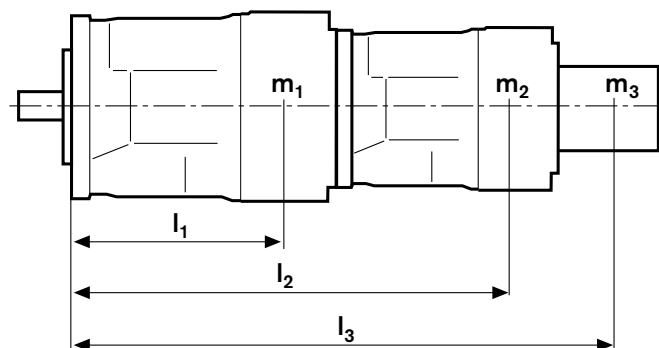


The drive torques for pump 1 and pump 2 can be split up as required. However the max. permissible input torque T_{tot} as well as the max. permissible through drive torque T_{thr} may not be exceeded.

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 pump 1
 T_{thr} = Max. permissible through drive torque

Permissible overhang moment



$$\begin{aligned}
 m_1, m_2, m_3 & \text{ Weight of pump} & \text{in lbs (kg)} \\
 l_1, l_2, l_3 & \text{ Distance to center of gravity} & \text{in in (mm)} \\
 T_m &= (m_1 \cdot l_1 + m_2 \cdot l_2 + m_3 \cdot l_3) \cdot \frac{1}{12} & \text{in (lb-ft)} \\
 & \dots \cdot \frac{1}{102} & \text{in (Nm)}
 \end{aligned}$$

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 M_{mper} lb-ft (Nm)	37 (50)	65 (88)	101 (137)	159 (216)	221 (300)	332 (450)
10g 98.1 m/sec ²						
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		Code	Mounting option - 2. pump			Through dr. available on size
Flange (SAE J744)	Coupler for shaft ANSI B.92.1a-1976		(A)A10V(S)O.../31... Size (shaft)	A10V(S)O.../52... Size (shaft)	Gear pump	
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

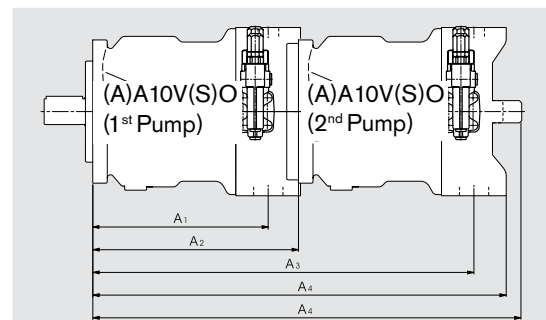
A10V(S)O (2. Pump)	AA10VSO 18				A10VO 28				A10VO 45				A10VO 71				A10VO 100				A10VO 140			
	A ₁	A ₂	A ₃	A ₄	A ₁	A ₂	A ₃	A ₄	A ₁	A ₂	A ₃	A ₄	A ₁	A ₂	A ₃	A ₄	A ₁	A ₂	A ₃	A ₄	A ₁	A ₂	A ₃	A ₄
A10VSO 18	5.71 (145)	7.17 (182)	12.87 (327)	14.84 (377)	6.50 (165)	8.03 (204)	13.74 (349)	15.71 (399)	7.24 (184)	9.02 (229)	14.72 (374)	16.69 (424)	8.54 (217)	10.51 (267)	16.22 (412)	18.19 (462)	10.83 (275)	13.31 (338)	19.02 (483)	20.98 (533)	10.83 (275)	13.78 (350)	19.49 (495)	21.46 (545)
A10VO 28	-	-	-	-	6.50 (165)	8.03 (204)	14.53 (369)	15.67 (398)	7.24 (184)	9.02 (229)	15.51 (394)	16.65 (423)	8.54 (217)	10.51 (267)	17.01 (432)	18.15 (461)	10.83 (275)	13.31 (338)	19.80 (503)	20.94 (532)	10.83 (275)	13.78 (350)	20.28 (515)	21.42 (544)
A10VO 45	-	-	-	-	-	-	-	-	7.24 (184)	9.02 (229)	16.30 (413)	17.64 (448)	8.54 (217)	10.51 (267)	17.76 (451)	19.36 (486)	10.83 (275)	13.31 (338)	20.55 (522)	21.93 (557)	10.83 (275)	13.78 (350)	21.02 (534)	22.40 (569)
A10VO 71	-	-	-	-	-	-	-	-	-	-	-	-	8.54 (217)	10.51 (267)	19.06 (484)	20.63 (524)	10.83 (275)	13.31 (338)	21.85 (555)	23.43 (595)	10.83 (275)	13.78 (350)	22.32 (567)	23.90 (607)
A10VO 100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.83 (275)	13.31 (338)	24.13 (613)	25.79 (655)	10.83 (275)	13.78 (350)	24.61 (625)	26.26 (667)
A10VO 140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.83 (275)	13.78 (350)	24.61 (625)	26.26 (667)

- 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

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

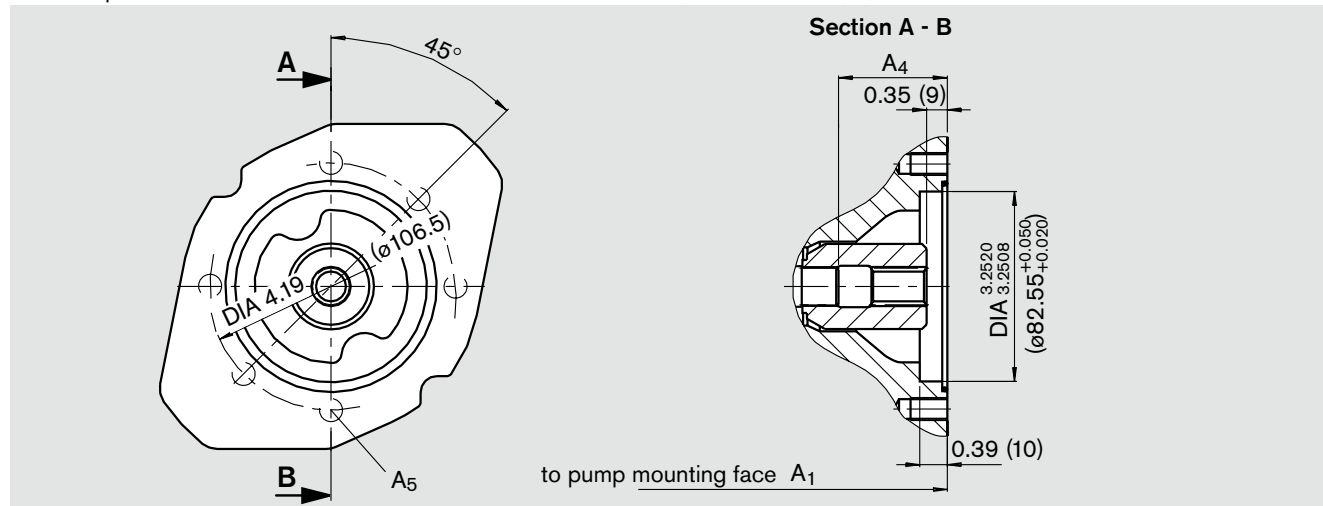


Dimensions of through drives

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

K01 Flange SAE J744 - 82-2 (A)

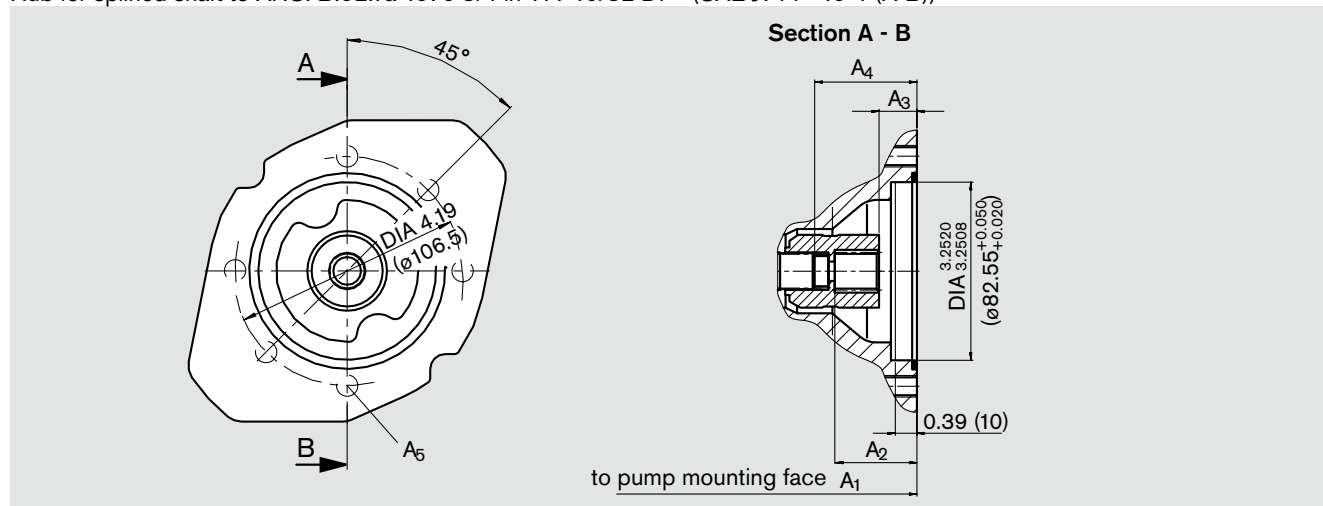
Hub for splined shaft to ANSI B.92.1a-1976 5/8 in 9T 16/32 DP¹ (SAE J744-16-4(A))



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 DP¹ (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

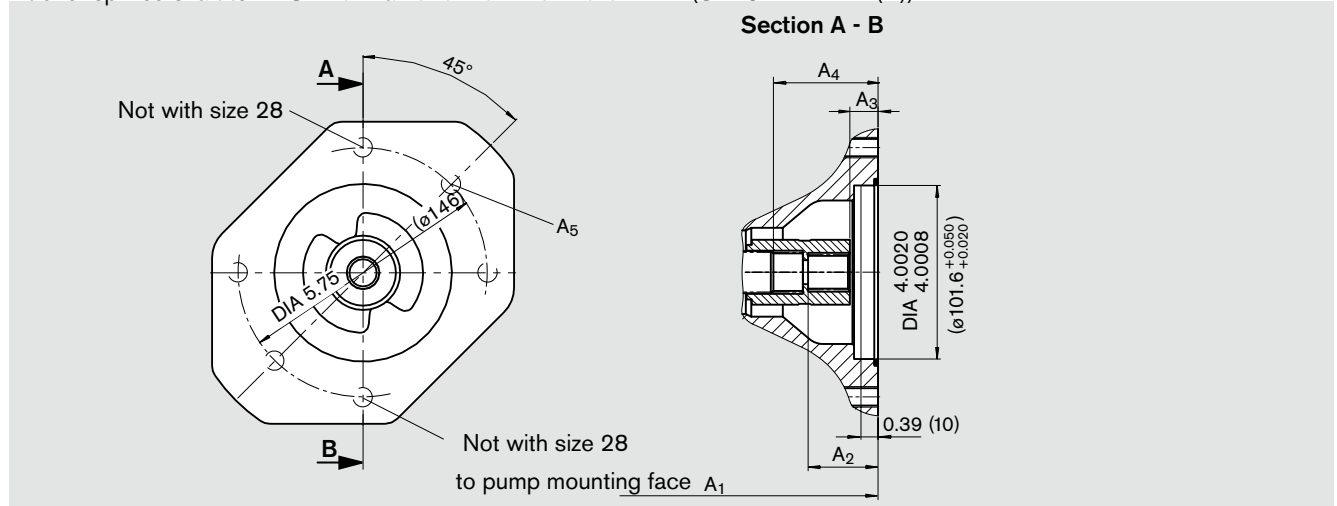
¹) pressure angle 30°, flat root side fit, tolerance class 5

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)

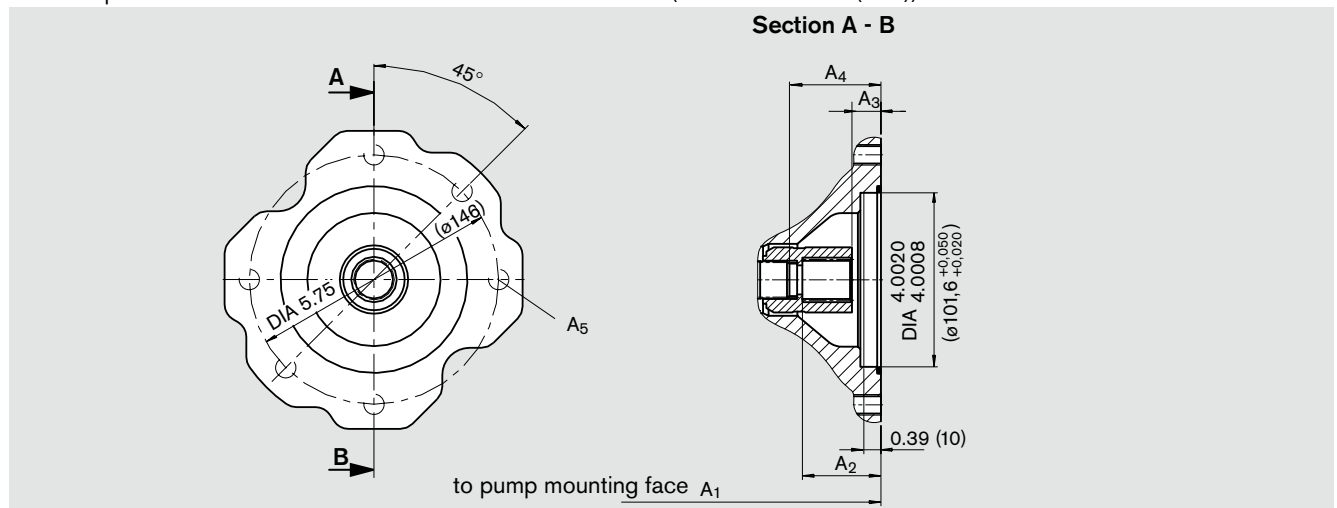
Hub for splined shaft to ANSI B.92.1a-1976 7/8 in 13T 16/32 DP¹⁾ (SAE J744 - 22-4 (B))



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 DP¹⁾ (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

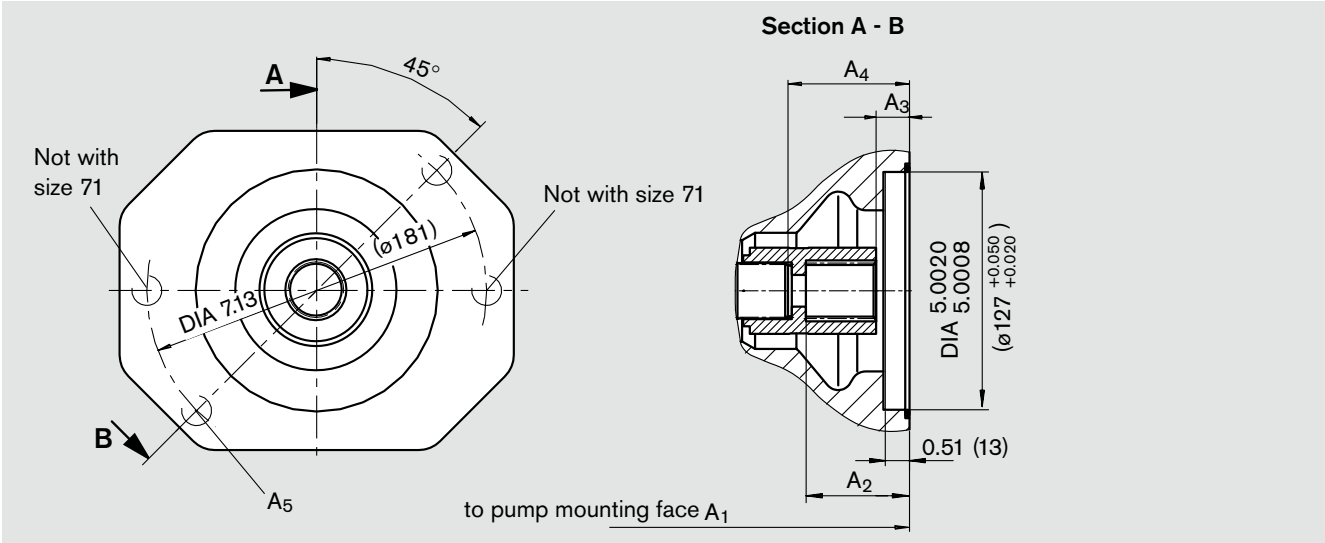
¹⁾pressure angle 30°, flat root side fit, tolerance class 5

Dimensions through drives

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

K07 Flange SAE J744 - 127-2 (C)

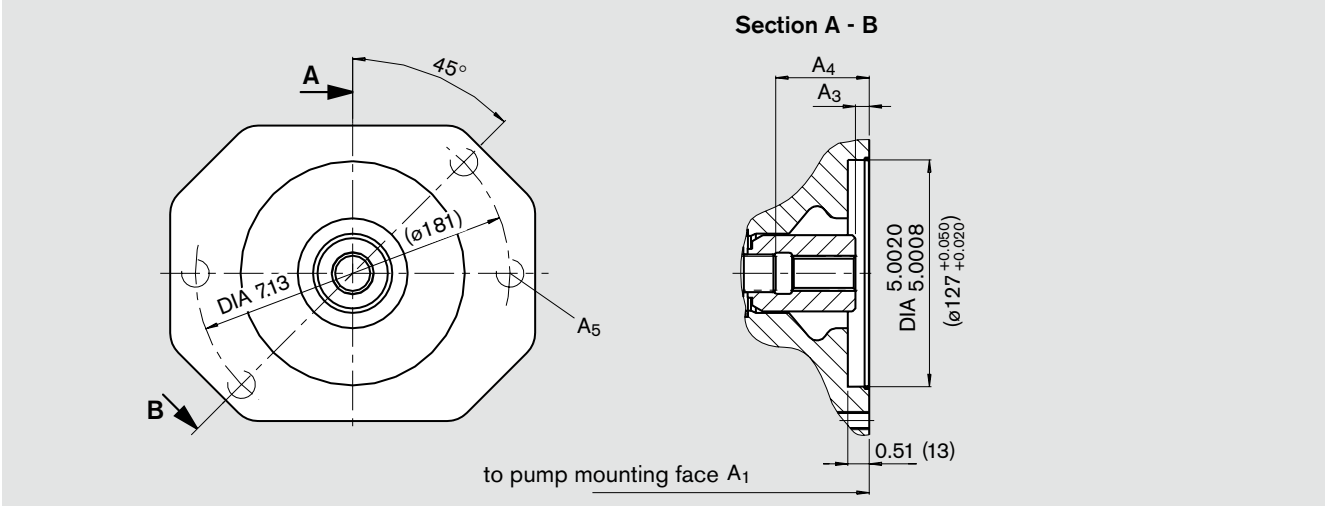
Hub for splined shaft to ANSI B.92.1a-1976 1 1/4 in 14T 12/24 DP¹⁾ (SAE J744 - 32-4 (C))



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 DP¹⁾ (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

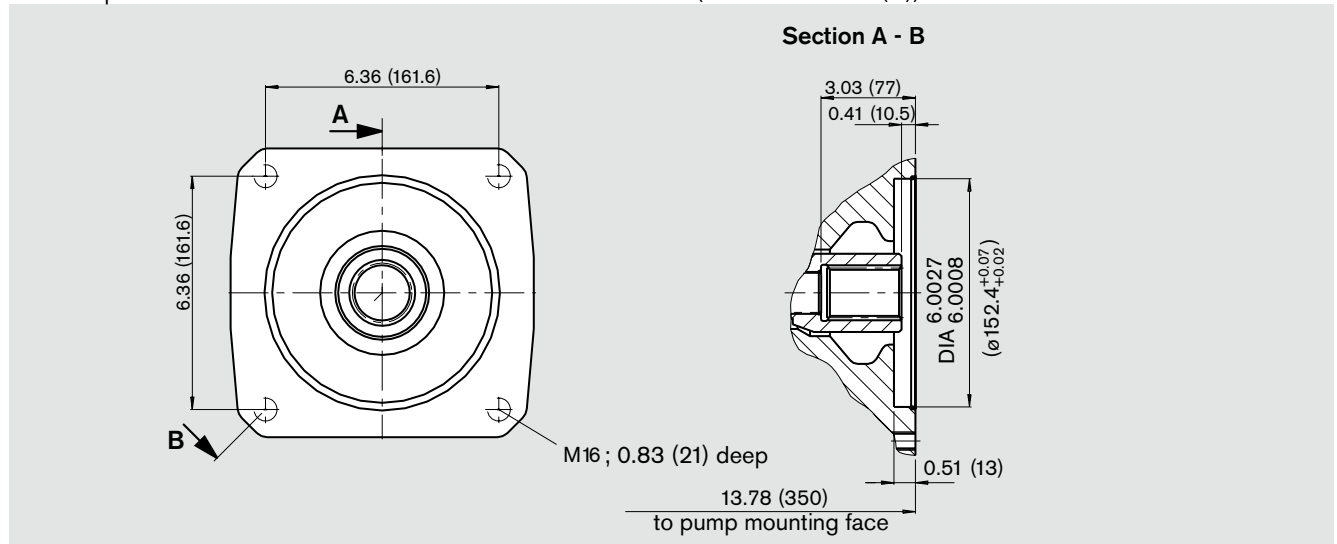
¹⁾pressure angle 30°, flat root side fit, tolerance class 5

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 DP¹⁾ (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", "L₁" and "S" open; L₁ 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 "L₁".

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

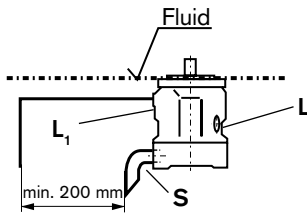


Fig. 1

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 $h_{t\ min} = 7.8\ in/200\ mm$).

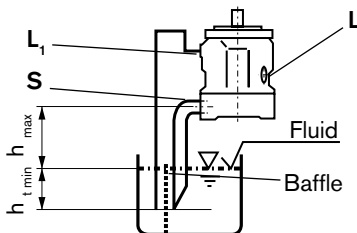


Fig. 2

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

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

ρ = density $[kg/m^3]$

l = pipe length $[m]$

dv/dt = rate of change in fluid velocity $[m/s^2]$

Δp_2 : Pressure loss due to static head

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

h = height $[m]$

ρ = density $[kg/m^3]$

g = gravity. = $9.81\ m/s^2$

Δp_3 : line losses (elbows etc.)

2. Horizontal installation

The pump must be installed in such a manner, that either "L" or "L₁" is at the top.

2.1 Arrangement inside the reservoir

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

Close "L₁", "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 "L₁" closed. Conditions correspond with item 1.2.1.

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

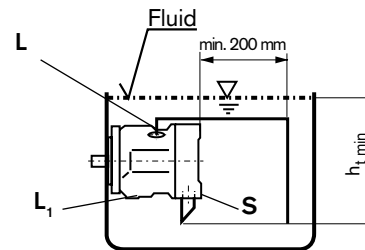


Fig. 3

2.2 Arrangement outside the reservoir

Fill pump housing before commissioning.

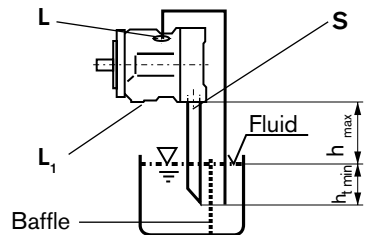


Fig. 4

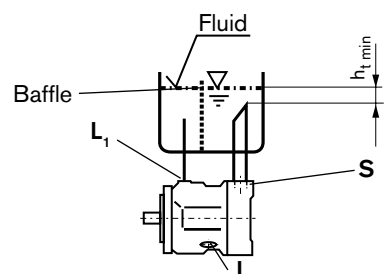


Fig. 5

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!

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