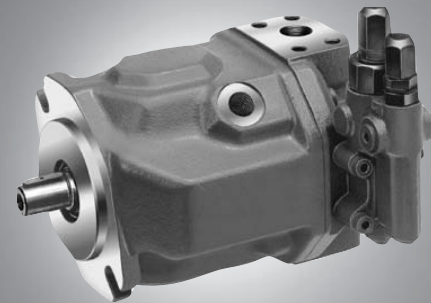


Variable Axial Piston Pump (A)A10VSO

RA 92 711/10.07 1/36
Replaces: 05.04

open circuit

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



Contents

Ordering code - standard range	2
Fluids	4
Technical data	5
Noise level	7
Drive power and flow	8
DG - two point, direct control	10
DR - Pressure control	12
DRG - Pressure control, remote	14
DFR / DFR1 - Pressure flow control	16
DFLR - Pressure / flow / power control	18
Unit dimensions, Size 18	20
Unit dimensions, Size 28	21
Unit dimensions, Size 45	22
Unit dimensions, Size 71	23
Unit dimensions, Size 100	24
Unit dimensions, Size 140	25
Through drives	26
Overview of through drive mounting options	27
Dimensions of through drives	29
Installation notes	34
Safety information	35

Features

- Variable displacement axial piston pump of swashplate design for hydrostatic open circuit systems
- Flow is proportional to drive speed and displacement. It can be infinitely varied by adjustment of the swashplate.
- SAE mounting flange
- Flange connections to SAE
- 2 case drain ports
- Good suction characteristics
- Permissible continuous pressure 4000 psi (280 bar)
- Low noise level
- Long service life
- Axial and radial load 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

Hydraulic Fluid, Type of rotary group

	18...45	71...140	
Mineral oil and HFD (no code)	●	●	
HFA, HFB and HFC - Fluids	●	●	E
High-Speed-Version	-	●	H

Axial Piston Unit

Swashplate design, variable	size 18	A10VS
	size 28 to 140	AA10VS

Type of operation

Pump in open circuit	O
----------------------	---

Size

		18	28	45	71	100	140
Displacement $V_{g \text{ max}}$	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 device

		18	28	45	71	100	140	
Two-position control, direct controls	DG	●	●	●	●	●	●	DG
Pressure control	DR	●	●	●	●	●	●	DR
	DR G	●	●	●	●	●	●	DRG
remote control								
Pressure flow control	DFR	●	●	●	●	●	●	DFR
	DFR 1	●	●	●	●	●	●	DFR1
without orifice between X and tank								
Pressure, flow and power control		-	●	●	●	●	●	DFLR
Pressure and flow control, electronic, see RA30022		●	●	●	●	●	●	DFE1
Electro-hydraulic pressure control, see RE92707		●	●	●	●	●	●	ED

Series

	31
--	----

Direction of rotation

Viewed on shaft end	clockwise	R
	counter clockwise	L

Seals

NBR nitril-caoutchouc, shaft seal in FKM	P
FKM flour-caoutchouc	V

Shaft end

	18	28	45	71	100	140	
SAE Parallel with key	●	●	●	●	●	●	K
SAE Splined shaft	●	●	●	●	●	●	S
SAE Splined shaft (higher through drive torque)	●	●	●	●	-	-	R
SAE Splined shaft (not suitable for through drive)	●	-	●	-	●	-	U

Mounting flange

	18	28	45	71	100	140	
SAE 2-bolt	●	●	●	●	●	-	C
SAE 4-bolt	-	-	-	-	-	●	D

● = available

○ = in preparation

- = not available

Courtesy of CMA/Flodyne/Hydradyne • Motion Control • Hydraulic • Pneumatic • Electrical • Mechanical • (800) 426-5480 • www.cmafah.com

AA10VS O / 31 -

Hydraulic Fluid, Type of rotary group

Axial Piston Unit

Type of operation

Size

Control device

Series

Direction of rotation

Seals

Shaft end

Mounting flange

Service line connections

	18	28	45	71	100	140	
Pressure port B and suction port S: SAE ports at opposite sides	●	●	●	-	●	●	62
UNC fixing threads	-	-	-	●	-	-	92

Through drives

	18	28	45	71	100	140	
without through drive	●	●	●	●	●	●	N00
with through drive to accept an axial piston pump or a gear pump							
Mounting flange SAEJ744							
hub							
sealing							
82-2(A) keyed (A-B) axial	○	●	●	●	●	●	K40 ¹⁾
101-2 (B) keyed (B) axial	-	●	●	●	●	●	K03 ¹⁾
101-2 (B-B) keyed (B-B) axial	-	-	●	●	●	●	K05 ¹⁾
127-2 (C) keyed (C) axial	-	-	-	●	●	●	K08 ¹⁾
127-2 (C) keyed (C) radial	-	-	-	-	●	●	K38 ¹⁾
152-4 (D) keyed (D) axial	-	-	-	-	-	●	K21 ¹⁾
82-2 (A) 5/8 in (A) axial	●	●	●	●	●	●	K01
82-2 (A) 3/4 in (A-B) axial	●	●	●	●	●	●	K52
101-2 (B) 7/8 in (B) axial	-	●	●	●	●	●	K68
101-2 (B) 1 in (B-B) axial	-	-	●	●	●	●	K04
127-2 (C) 1 1/4 in (C) axial	-	-	-	●	●	●	K07
127-2 (C) 1 1/2 in (C-C) axial	-	-	-	-	●	●	K24
152-4 (D) 1 3/4 in (D) axial	-	-	-	-	-	●	K17

¹⁾ Not for new projects. Permitted with reduced through drive torque only (see page 26).

Fluids

We request, that before starting a project, detailed information about the choice of hydraulic fluids and application conditions are taken from our catalog sheets RE 90220 (petroleum oil) and RE 90221 (environmentally acceptable hydraulic fluids).

When using environmentally acceptable hydraulic fluids possible limitations for the technical data apply. If necessary please contact our technical department (please indicate type of the hydraulic fluid used in your application when ordering).

Operating viscosity range

We recommend that the operating viscosity (at operating temperature) for both the efficiency and life of the unit, be chosen within the optimum range of

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

referred to tank temperature at open circuit.

Viscosity limits

The limiting values for viscosity are as follows:

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

short term ($t \leq 1 \text{ min}$)
at a max. permissible leakage oil temperature of $t_{max} = 195 \text{ }^\circ\text{F}$ ($90 \text{ }^\circ\text{C}$).

Please note that the max. fluid temperature of $195 \text{ }^\circ\text{F}$ ($90 \text{ }^\circ\text{C}$) is also not exceeded in certain areas (for instance bearing area). The temperature in the bearing area is approx. $7 \text{ }^\circ\text{F}$ (5 K) higher than the average leakage fluid temperature.

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

short term ($t \leq 1 \text{ min}$)
on cold start
($p \leq 435 \text{ psi}/30 \text{ bar}$, $n \leq 1000 \text{ rpm}$, $t_{min} = -13 \text{ }^\circ\text{F}/-25 \text{ }^\circ\text{C}$)

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 $X \text{ }^\circ\text{F}$ ($^\circ\text{C}$) the operating temperature in the tank is $140 \text{ }^\circ\text{F}$ ($60 \text{ }^\circ\text{C}$). 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 $195 \text{ }^\circ\text{F}$ ($90 \text{ }^\circ\text{C}$).

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.

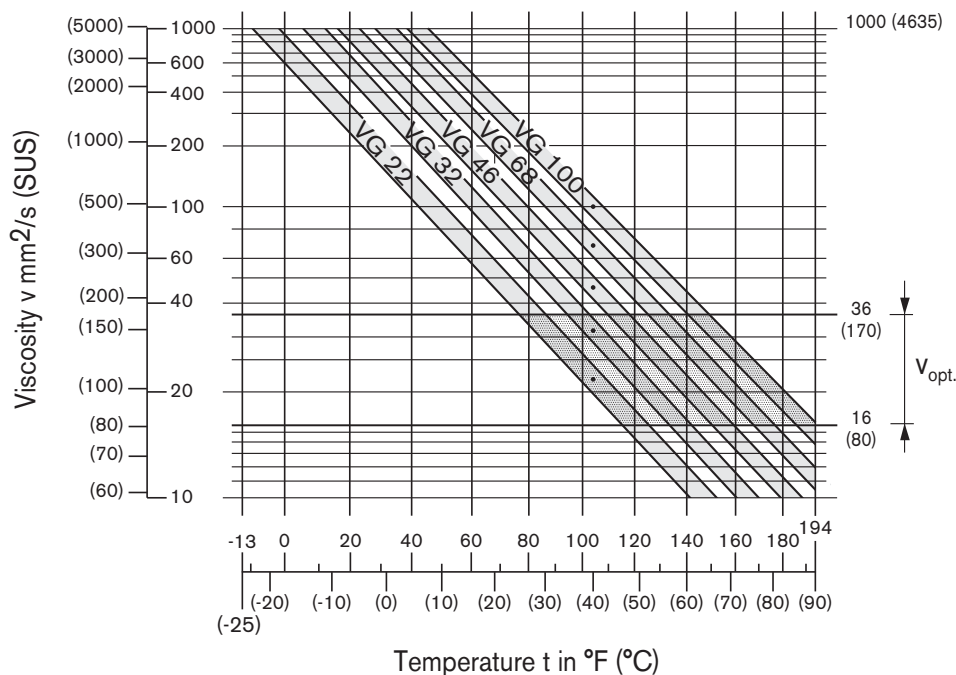
To ensure a reliable functioning of the axial piston unit, a minimum cleanliness of

20/18/15 acc. to ISO 4406¹⁾ is necessary.

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

¹⁾ draft issue 1999

Selection diagram



Technical data

Inlet operating pressure range

Absolute pressure at port S

$p_{abs\ min}$ _____ 12 psi (0,8 bar)

$p_{abs\ max}$ _____ 435 psi (30 bar)

Output operating pressure range

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)

Limitation of pump output pressure spikes is possible with relief valve blocks mounted directly on flange connection, acc. to data sheets RA 25 880 and RE 25 890 to be ordered separately.

Direction of flow

S to B.

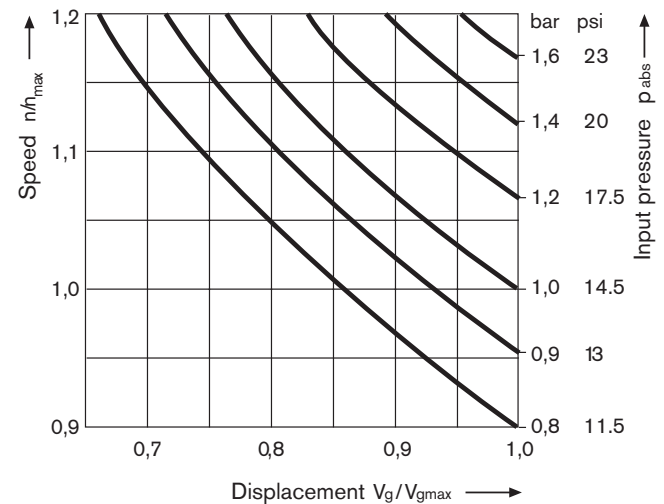
Case drain pressure

The max. permissible pressure of the leakage fluid (at port L, L_1) max. 7 psi (0,5 bar) higher than inlet pressure at port S, but not higher than 29 psi (2 bar) absolute.

$p_{L\ abs\ max}$ _____ 29 psi (2 bar)

Maximum permissible speed (Speed limit)

Graph, showing permissible speed with increased inlet pressure at port S ($p_{w\ abs}$) resp. reduced displacement ($V_g < V_{g\ max}$).



High speed version

The size 71...140 is available in an optional high speed version. This version allows higher drive speeds at max. displacement (higher output flow) without affecting outside dimensions, see table on page 6.

Important: The drive speed increase ($1.2 \cdot n_0$) refers to the standard drive speed n_0 .

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

WRONG: $1.2 \cdot 2400\ rpm = 2880\ rpm$

Mechanical displacement limiter

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

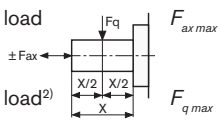
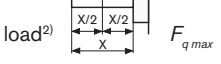
Exception: With DFE1 control a max. displacement screw is not possible at all.

$V_{g\ max}$: for sizes 18 to 140
Setting range from 50 % to $V_{g\ max}$ stepless

$V_{g\ min}$: for sizes 100 to 140
Setting range from zero to 50 % of $V_{g\ max}$ stepless

Technical Data

Table of values

Size	(A)A10VSO Standard AA10VSO High Speed		18	28	45	71	100	140	71	100	140
Displacement	V_g	in ³ (cm ³)	1.10 (18)	1.71 (28)	2.75 (45)	4.33 (71)	6.1 (100)	8.54 (140)	4.33 (71)	6.1 (100)	8.54 (140)
Speed ¹⁾ , max.											
at $V_{g\max}$	$n_{O\max}$	rpm	3300	3000	2600	2200	2000	1800	2550	2300	2050
at increased inlet pressure	$n_{O\max\text{perm}}$	rpm	3900	3600	3100	2600	2400	2100	2600	2400	2100
p_{abs} resp. $V_g < V_{g\max}$											
Flow, max											
at $n_{O\max}$	$q_{vo\max}$	gpm (L/min)	15.7 (59.4)	22 (84)	31 (117)	41 (156)	53 (200)	67 (252)	48 (181)	61 (230)	76 (287)
at $n_E = 1800$ rpm	q_{vo}	gpm (L/min)	7.2 (32)	13.3 (59)	21.4 (81)	33.8 (128)	47.6 (180)	67 (252)	33.8 (128)	47.6 (180)	67 (252)
Power, max. ($\Delta p = 4000$ psi (280 bar))											
at $n_{O\max}$	$P_{O\max}$	HP (kW)	36.6 (28)	51 (39)	72 (55)	96 (73)	124 (93)	156 (118)	112 (84)	142 (107)	177 (134)
at $n_E = 1800$ rpm	P	HP (kW)	19 (15)	31 (24)	50 (38)	79 (69)	111 (84)	156 (118)	79 (69)	111 (84)	156 (118)
Torque, max.											
at $V_{g\max}$ ($\Delta p=4000$ psi (280bar))	T_{\max}	ft-lb (Nm)	58 (80)	91 (125)	146 (200)	230 (316)	324 (445)	453 (623)	230 (316)	324 (445)	453 (623)
at $V_{g\max}$ ($\Delta p=1450$ psi (100bar))	T	ft-lb (Nm)	14.6 (28.6)	33 (45)	53 (72)	83 (113)	117 (159)	164 (223)	83 (113)	117 (159)	164 (223)
Moment of inertia (about drive axis)	J	lbs-ft ² (kgm ²)	0.022 (0.00093)	0.0403 (0.0017)	0.0783 (0.0033)	0.1970 (0.0083)	0.3963 (0.0167)	0.5743 (0.0242)	0.1970 (0.0083)	0.3963 (0.0167)	0.5743 (0.0242)
Fill volume		gal. (L)	0.1 (0.4)	0.2 (0.7)	0.26 (1.0)	0.4 (1.6)	0.6 (2.2)	0.8 (3.0)	0.4 (1.6)	0.6 (2.2)	0.8 (3.0)
Weight (without fluid) ca.	m	lbs (kg)	26.5 (12)	33 (15)	46 (21)	73 (33)	99 (45)	132 (60)	73 (33)	99 (45)	132 (60)
Permissible loading of drive shaft											
max. perm. load		$F_{ax\max}$ lbf (N)	157 (700)	225 (1000)	337 (1500)	540 (2400)	900 (4000)	1080 (4800)	540 (2400)	900 (4000)	1080 (4800)
max. perm. load ²⁾		$F_{q\max}$ lbf (N)	79 (350)	270 (1200)	337 (1500)	427 (1900)	517 (2300)	630 (2800)	427 (1900)	517 (2300)	630 (2800)

- 1) These values are valid for an absolute pressure of 14.5 psi (1 bar) at the suction port S. By reducing the displacement or increasing the input pressure the speed can be increased as shown in the diagram.
- 2) Please consult us for higher radial forces.

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] $V_g =$ Displacement per revolution in in³ (cm³)
 $\Delta p =$ Differential pressure in psi (bar)

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] $n =$ Speed in rpm (min⁻¹)
 $\eta_v =$ Volumetric efficiency
 $\eta_{mh} =$ Mechanical-hydraulic efficiency

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] $\eta_t =$ Total efficiency

Noise level

Characteristics for pump

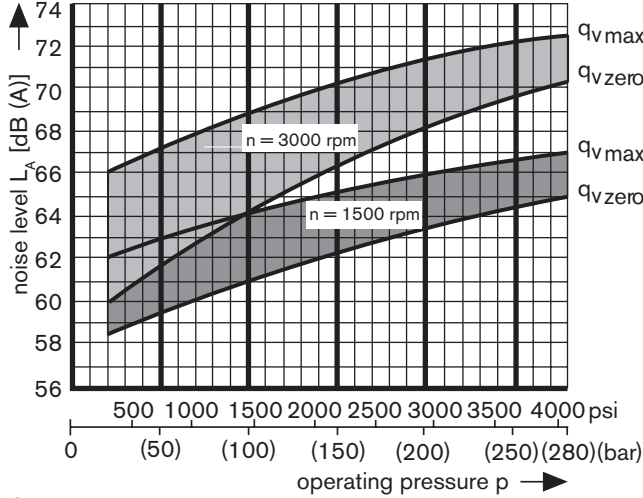
Measured in an anechoic chamber

Distance from microphone to pump = 3.3 ft (1 m)

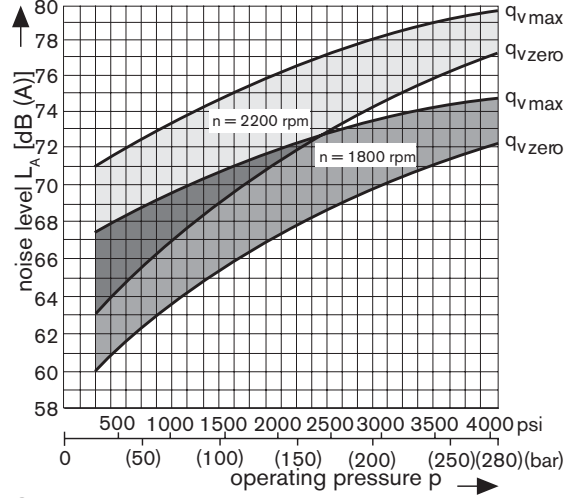
Measuring error: ± 2 dB(A)

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

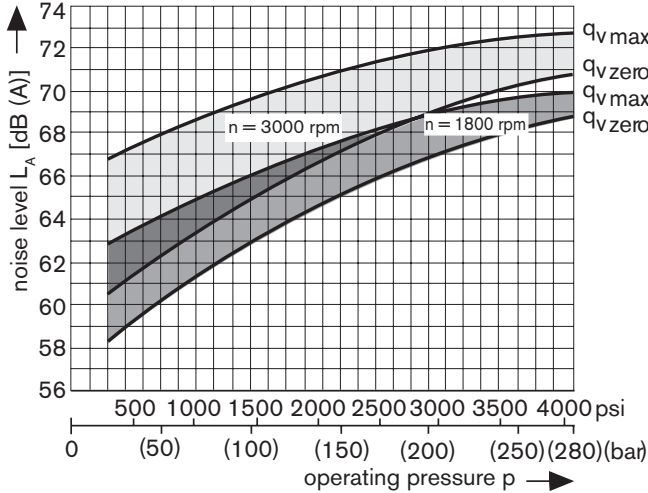
Size 18



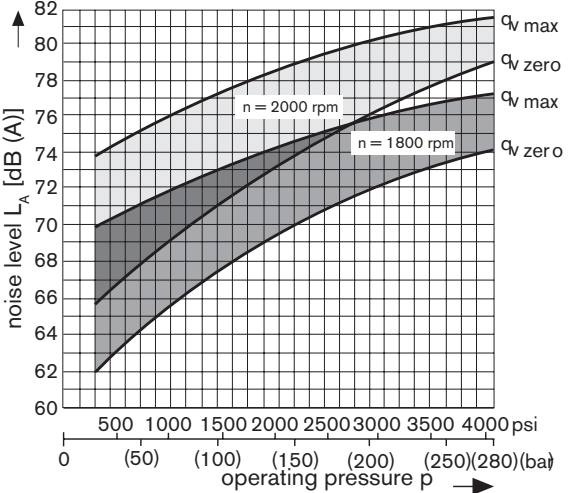
Size 71



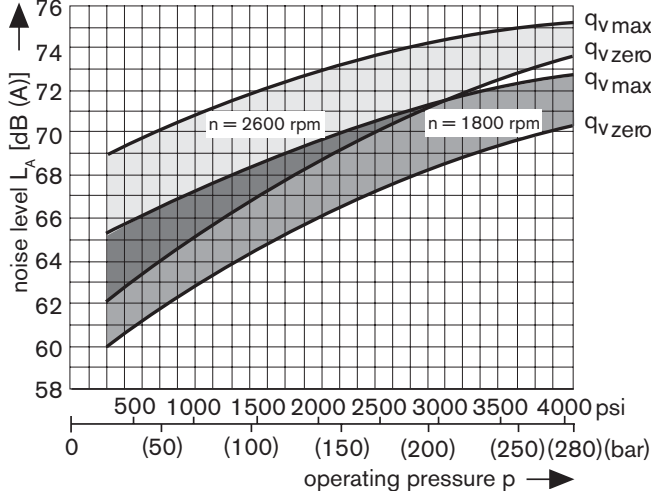
Size 28



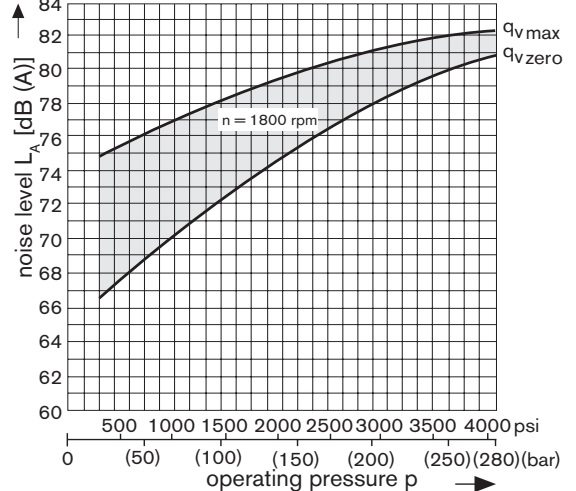
Size 100



Size 45



Size 140

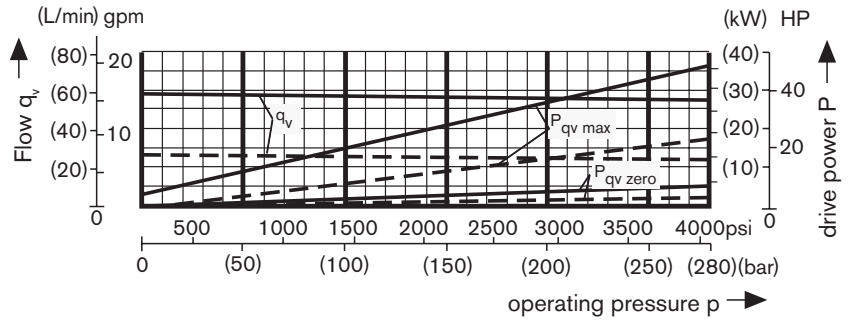


Drive power and flow

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

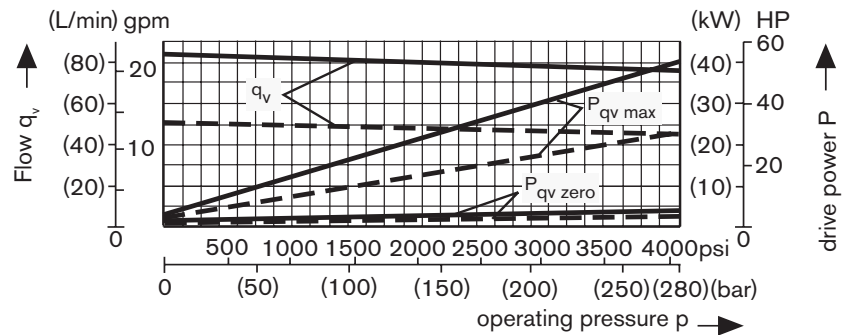
Size 18

- $n = 1500\text{ rpm}$
- $n = 3300\text{ rpm}$



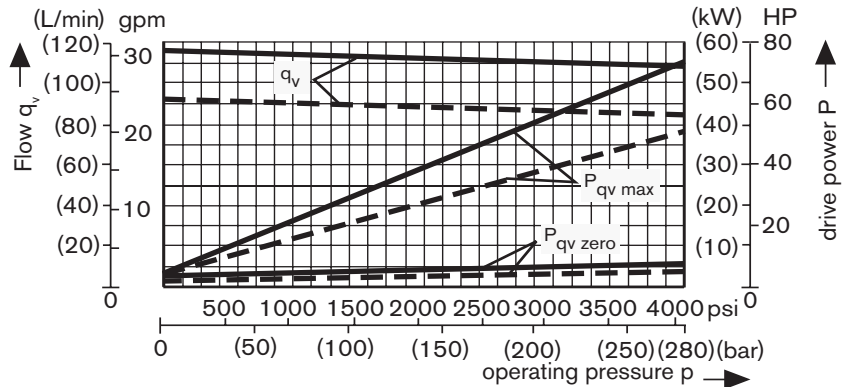
Size 28

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



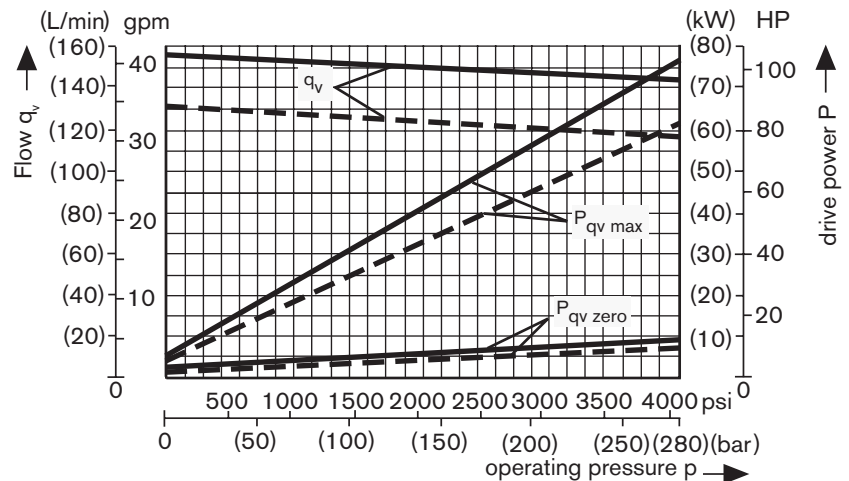
Size 45

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



Size 71

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

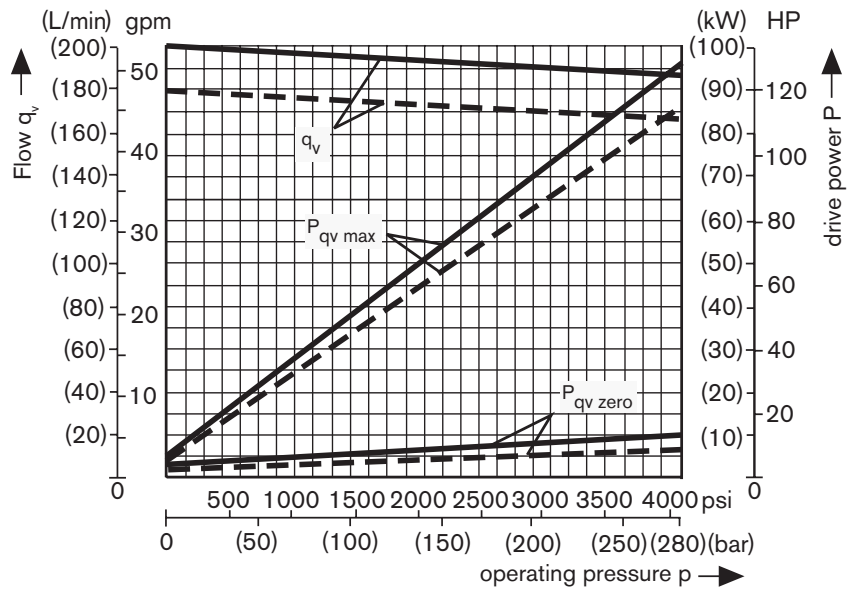


Drive power and flow

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

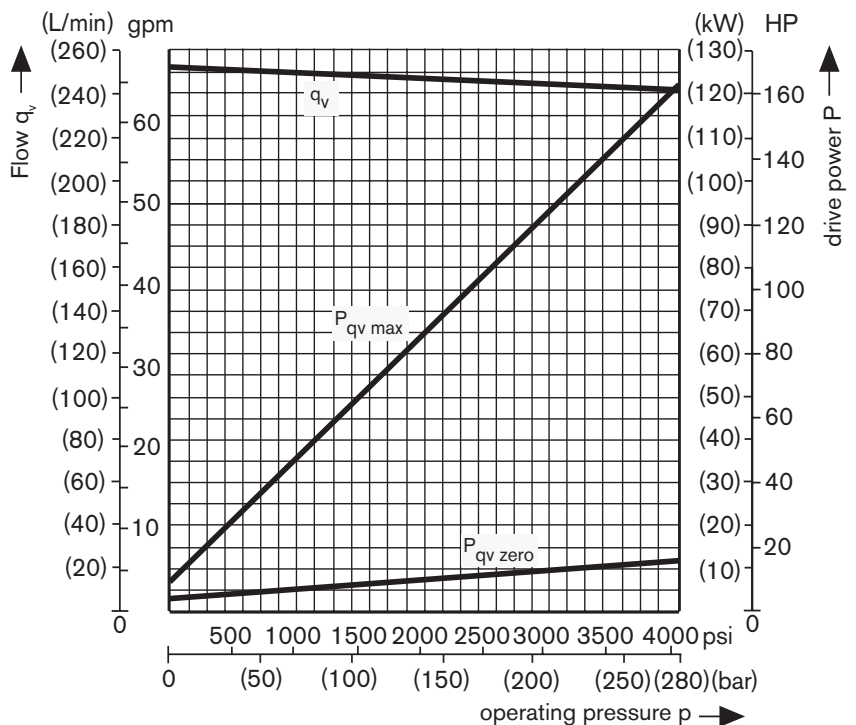
Size 100

- n = 1800 rpm
- n = 2000 rpm



Size 140

- n = 1800 rpm



Overall efficiency

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

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

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

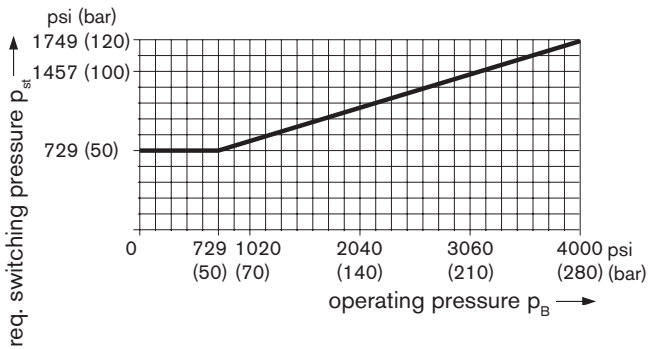
Please note, that the required switching pressure at port X is directly dependent on the actual operating pressure p_B in port B. (See switching pressure diagram)

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

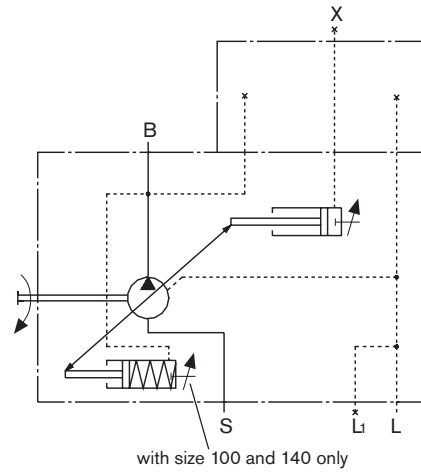
Control pressure p_{st} in $X \geq 729 \text{ psi (50 bar)} \triangleq V_{g \text{ min}}$

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

Switching pressure diagram



Circuit drawing



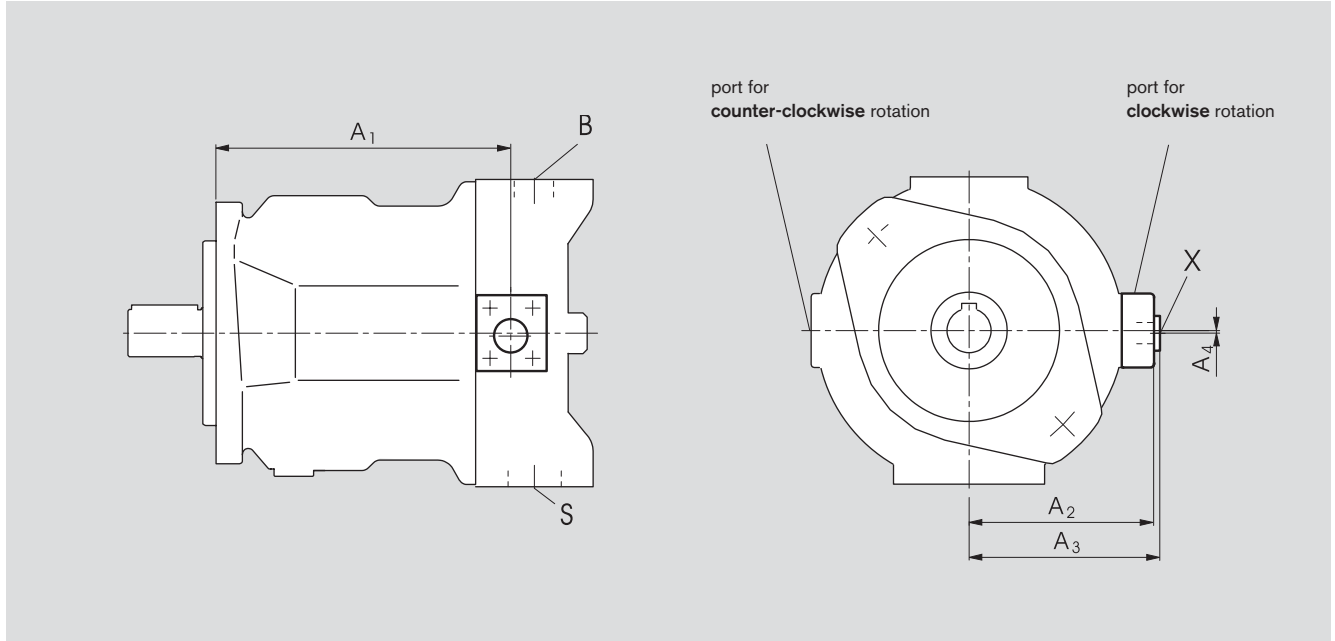
Ports

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

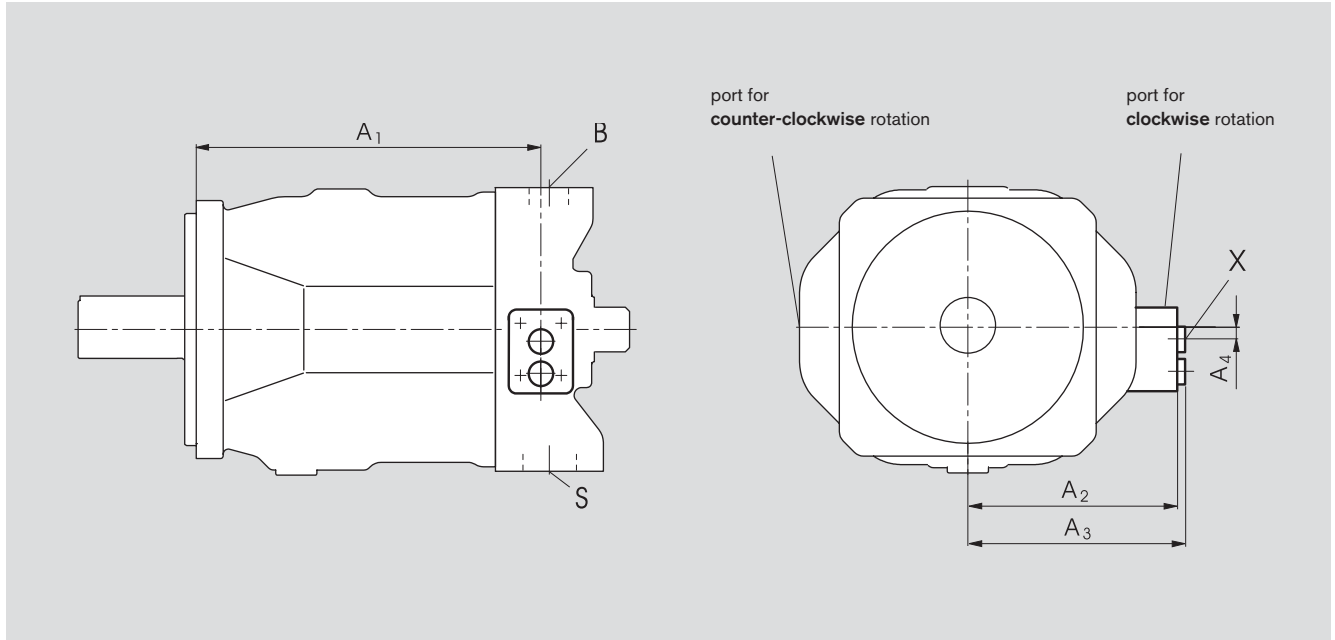
Unit dimensions DG

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

Size 18 ... 100



Size 140



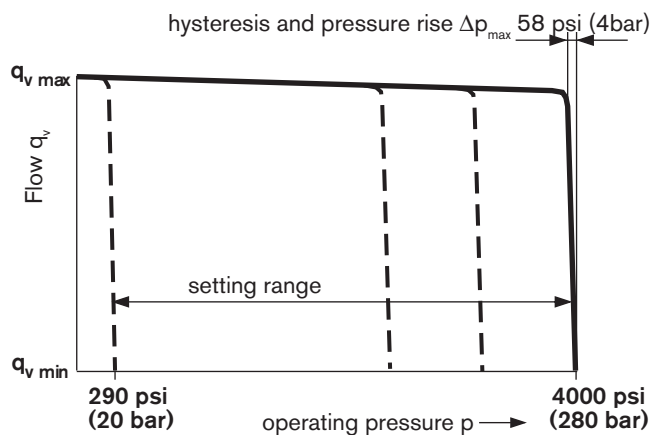
Size	A_1	A_2	A_3	A_4	X (plugged)
18	5.83 (148)	3.52 (89.5)	3.68 (93.5)	0.12 (3)	R 1/4 in
28	6.22 (158)	3.94 (100)	4.07 (103.5)	0.12 (3)	R 1/4 in
45	6.81 (173)	4.33 (110)	4.47 (113.5)	0.12 (3)	R 1/4 in
71	7.91 (201)	4.86 (123.5)	5.02 (127.5)	0.12 (3)	R 1/4 in
100	10.55 (268)	5.06 (128.5)	5.22 (132.5)	0.12 (3)	R 1/4 in
140	10.55 (268)	6.02 (153)	6.22 (158)	0.18 (4)	R 1/4 in

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

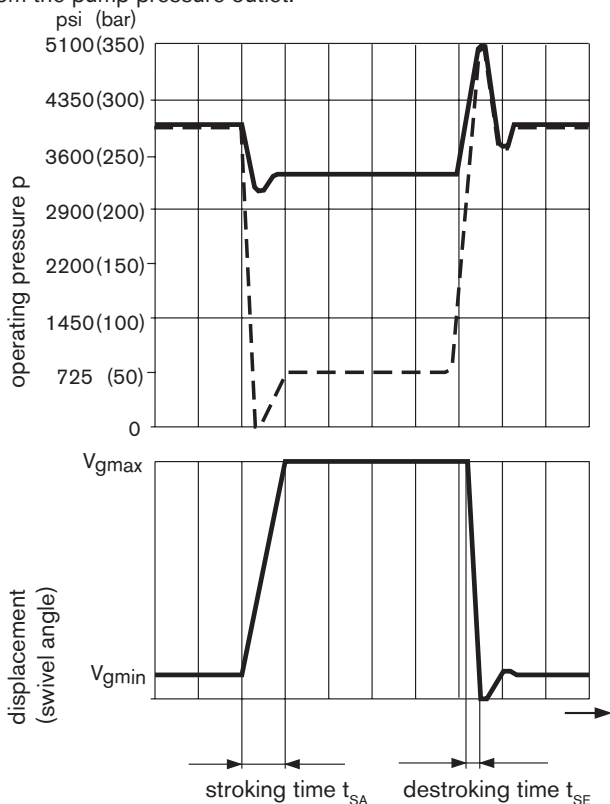


Dynamic characteristic

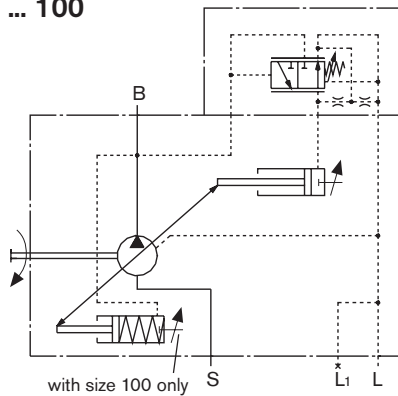
The opening curves are mean values measured under test conditions with the unit mounted inside the tank.

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

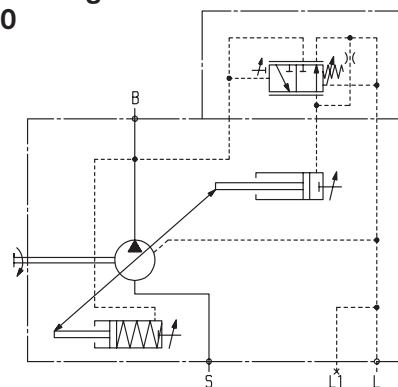
Stepped loading by suddenly opening or closing the pressure line using a pressure relief valve at 3.3 ft (1 m) downstream from the pump pressure outlet.



Circuit drawing Size 18 ... 100



Circuit drawing Size 140



Ports

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

Controller data

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

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

Flow loss at $q_{v \text{ max}}$ see pages 8 and 9.

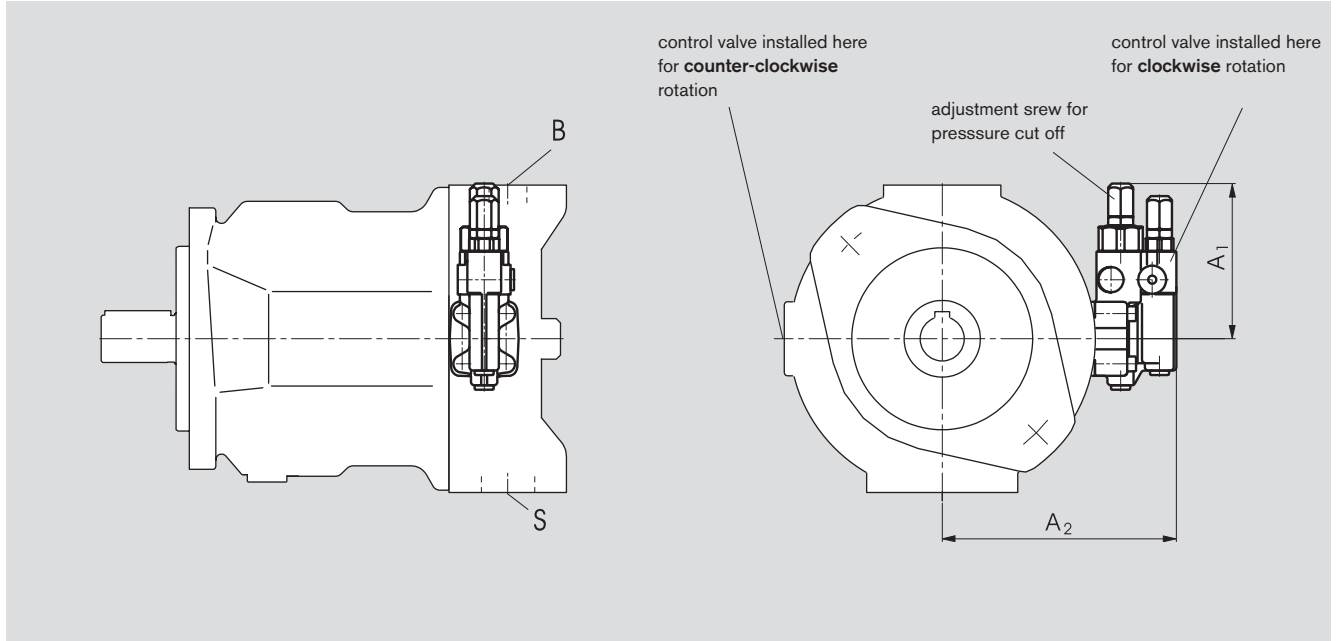
Control times

	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

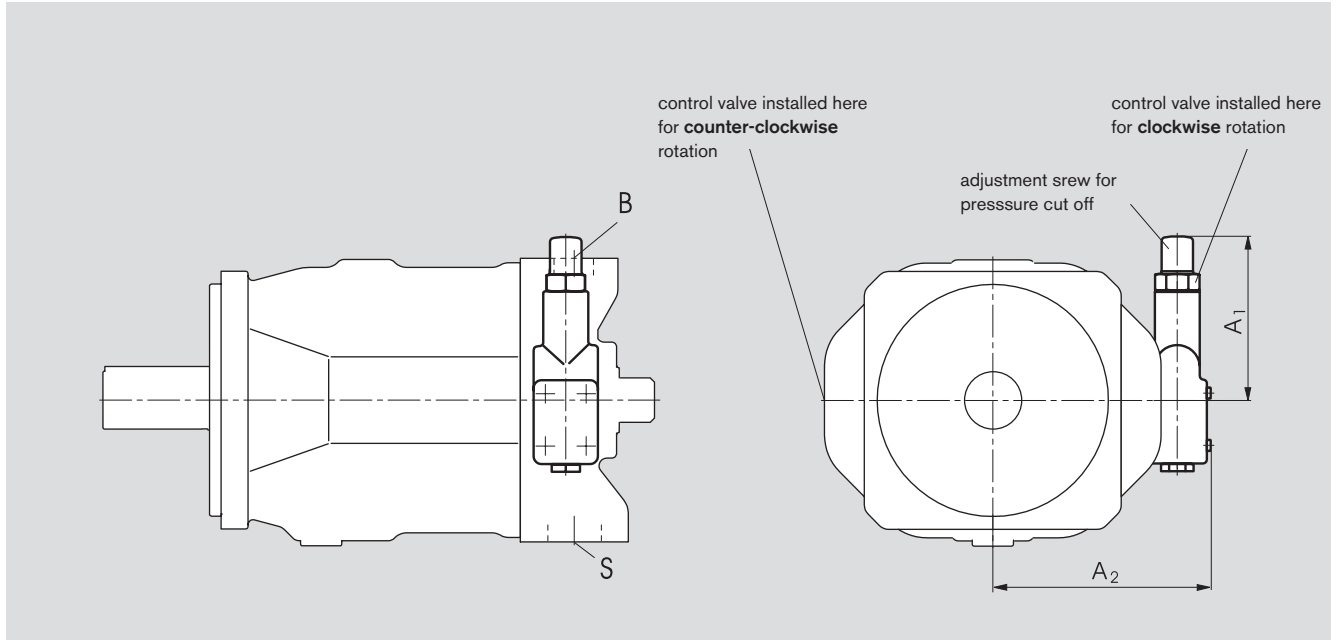
Before finalising your design, please request a certified installation drawing. Dimensions in inches (mm).

Size 18 ... 100



On sizes 18 to 100 the DFR valve is used. The flow control spool is blocked and not tested.

Size 140



Size	A ₁	A ₂
18	4.13 (105)	4.96 (126)
28	4.17 (106)	5.35 (136)
45	4.17 (106)	5.75 (146)
71	4.17 (106)	6.30 (160)
100	4.17 (106)	6.50 (165)
140	5.00 (127)	6.65 (169)

DRG - Pressure control, remote

Function and design same as 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 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.

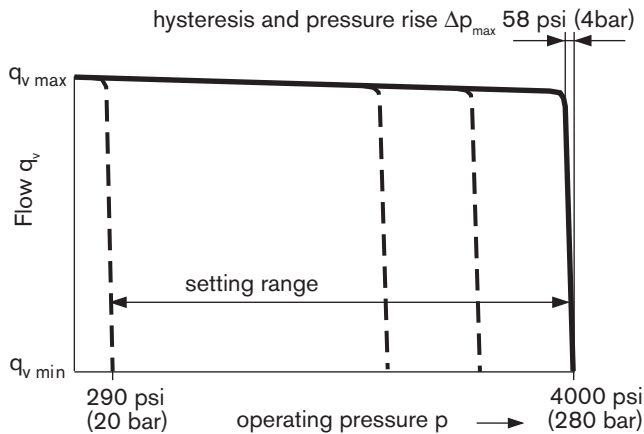
We recommend that one of the following is used as the separate pressure relief valve.

DBDH 6 /hydraulic to RA 25402 or DBETR-SO 381 with orifice DIA 0.03 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 $n_1 = 1500 \text{ rpm}$; $t_{oil} = 122^\circ\text{F} / 50^\circ\text{C}$)



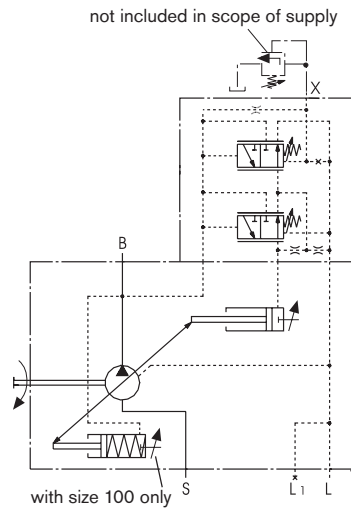
Control data

Hysteresis Δp _____ max. 45 psi (3 bar)

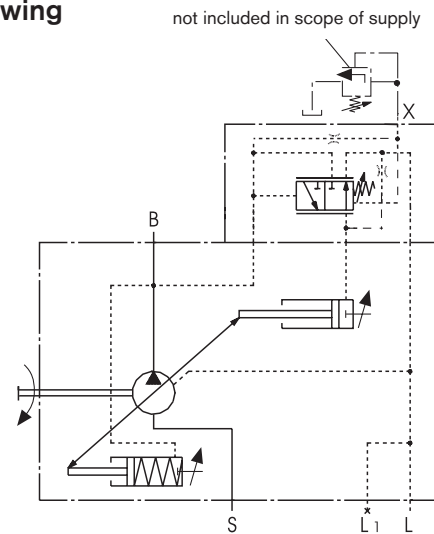
Pilot oil requirement _____ approx. 1.2 gpm (4,5 L/min)

Flow loss at q_{vmax} see pages 8 and 9.

Circuit drawing Size 18 ... 100



Circuit drawing Size 140



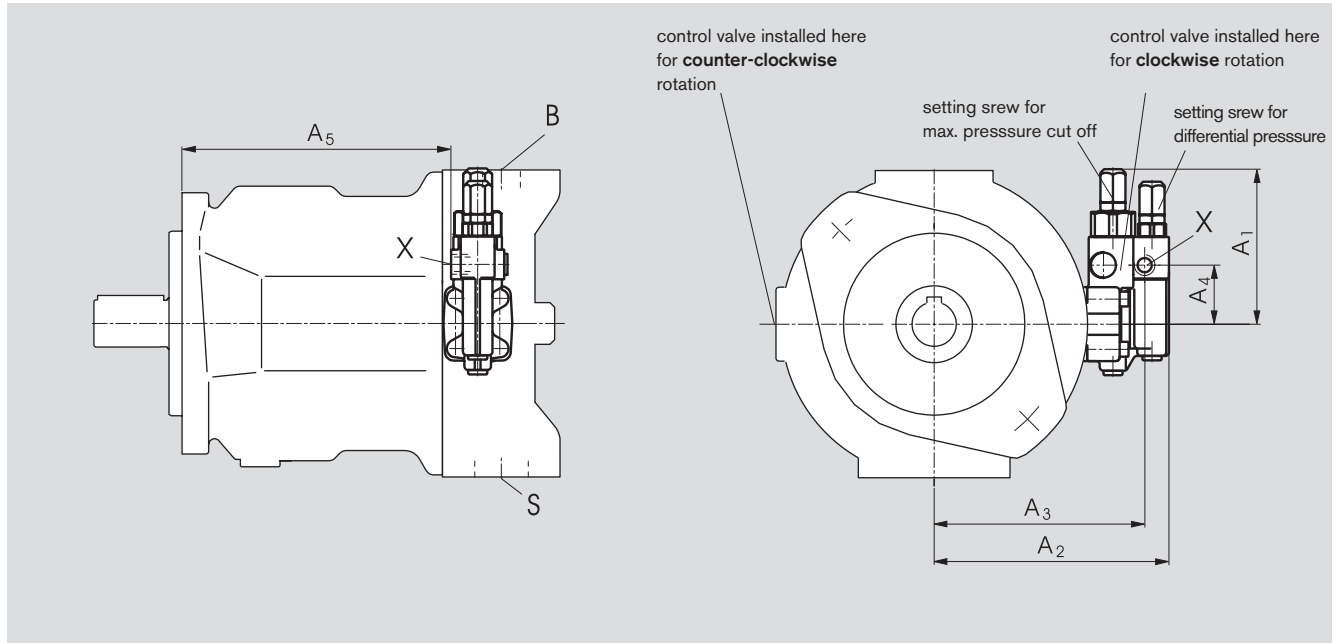
Ports

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

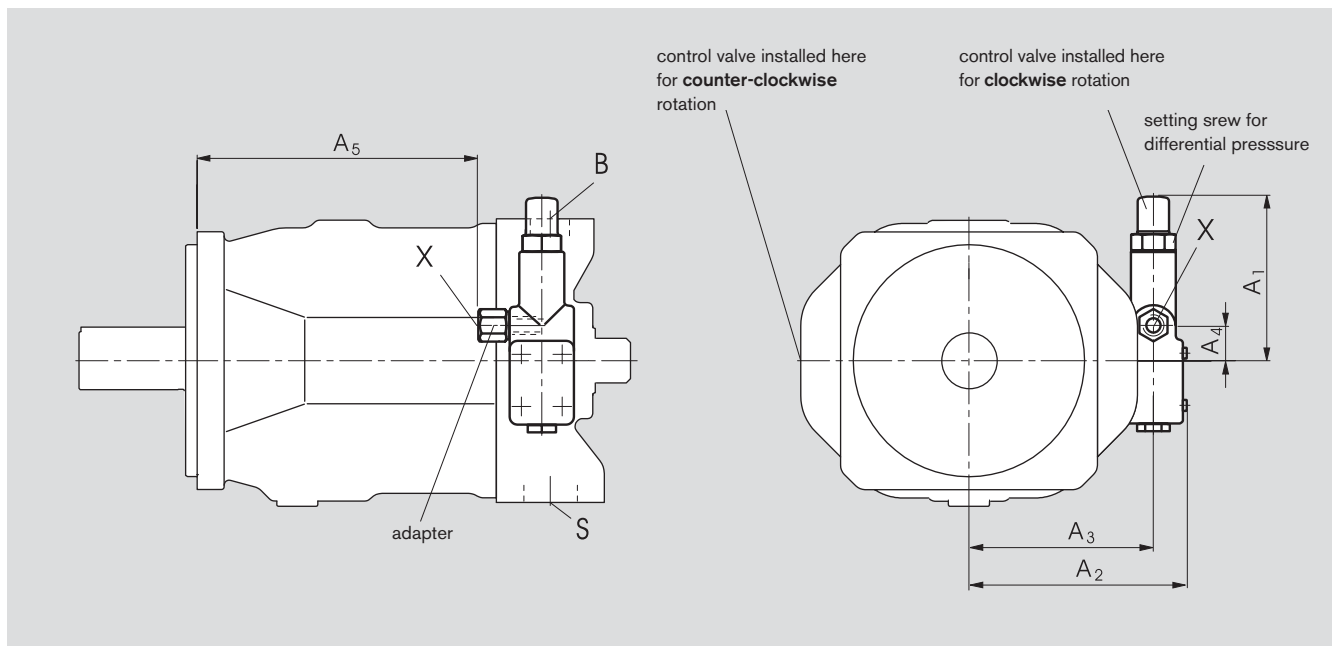
Unit dimensions DRG

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

Size 18 ... 100



Size 140



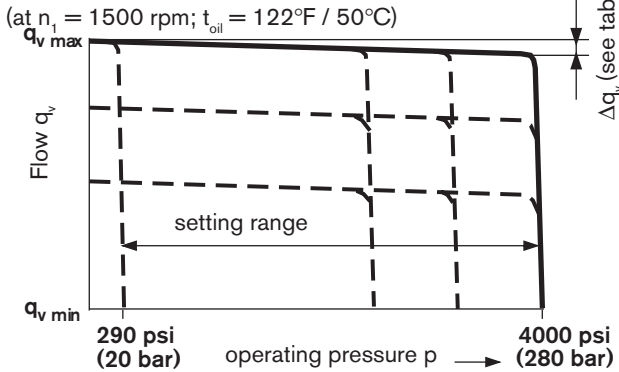
Size	A ₁	A ₂	A ₃	A ₄	A ₅	Port X
18	4.11 (104,5)	4.94 (125)	4.29 (109)	1.57 (40)	5.12 (130)	7/16-20 UNF-2B; 0.45 (11,5) deep
28	4.17 (106)	5.35 (136)	4.69 (119)	1.57 (40)	5.43 (138)	7/16-20 UNF-2B; 0.45 (11,5) deep
45	4.17 (106)	5.75 (146)	5.08 (129)	1.57 (40)	6.02 (153)	7/16-20 UNF-2B; 0.45 (11,5) deep
71	4.17 (106)	6.30 (160)	5.63 (143)	1.57 (40)	7.13 (181)	7/16-20 UNF-2B; 0.45 (11,5) deep
100	4.17 (106)	6.50 (165)	5.83 (148)	1.57 (40)	9.76 (248)	7/16-20 UNF-2B; 0.45 (11,5) deep
140	5.00 (127)	6.65 (169)	5.63 (143)	1.06 (27)	8.74 (222)	9/16-18 UNF-2B; 0.51 (13) deep

DFR / DFR1 - Pressure flow control

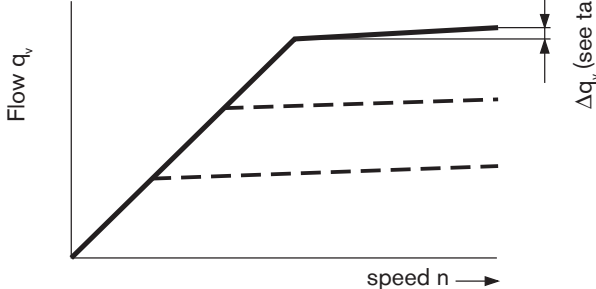
In addition to the pressure control function, the pump flow to the actuator may be varied by means of a differential pressure (e.g. over an orifice or directional control valve). The pump supplies only the amount of fluid as required by the actuator. In the DFR1-valve version the orifice between the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

For function and content of pressure control see pages 12.

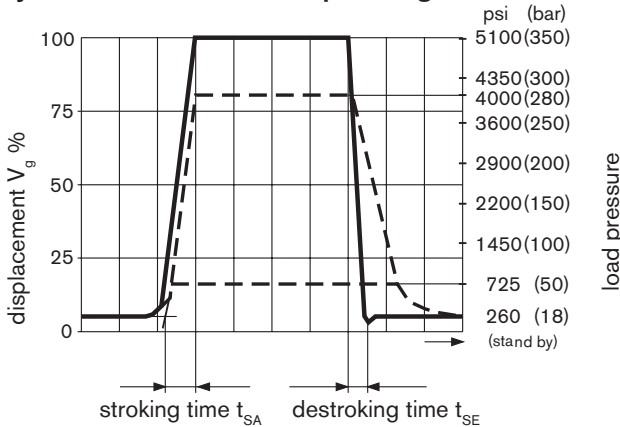
Static characteristic



Static characteristic at variable speed

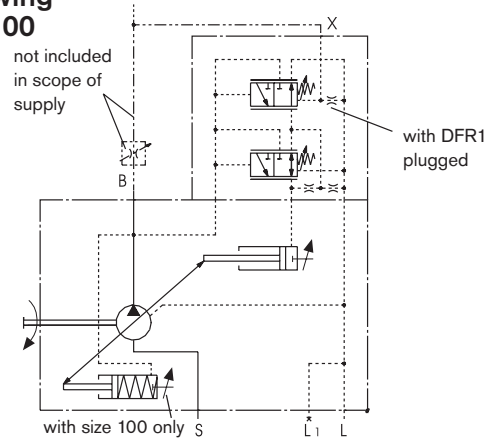


Dynamic characteristic operating curve

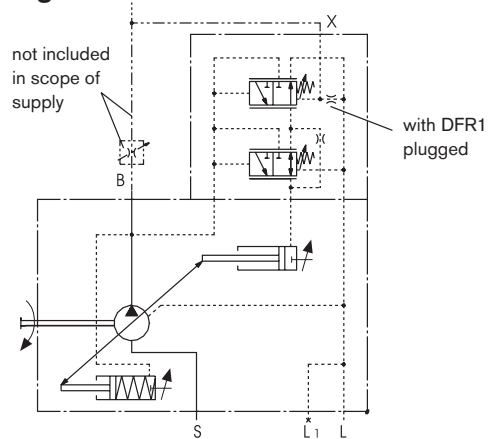


Size	t_{SA} [ms]	t_{SE} [ms]	t_{SE} [ms]
	4000 psi	4000 psi	725 psi
	(280 bar)-stand by	(280 bar)-stand by	(50 bar)-stand by
18	40	15	40
28	40	20	40
45	50	25	50
71	60	30	60
100	120	60	120
140	130	60	130

Circuit drawing Size 18 ... 100



Circuit drawing Size 140



Ports

- B Pressure port
- S Inlet port
- L, L₁ Drain port (L₁ closed)
- X Pilot pressure port

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 12.

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	0.75	1.06	1.60
(L/min)	(0,9)	(1,0)	(1,8)	(2,8)	(4,0)	(6,0)

DFR pilot oil consumption ___ max. approx. 0.8 ... 1.2 gpm (3 ... 4,5 L/min)

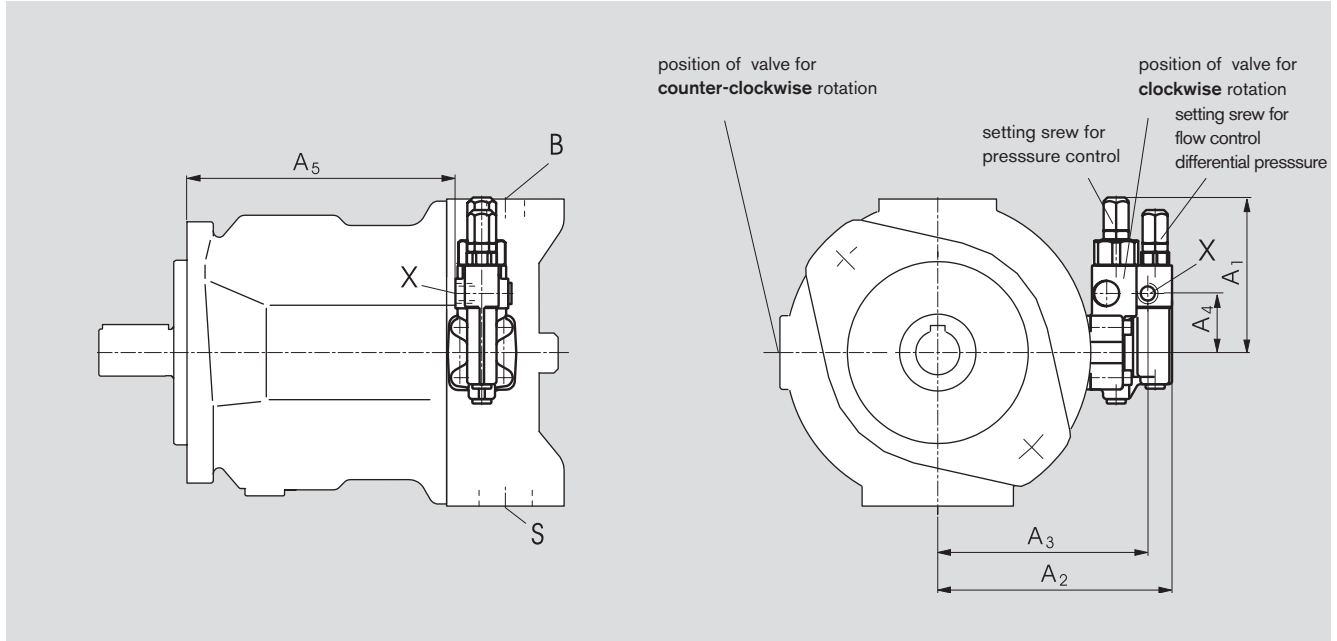
DFR1 pilot oil consumption ___ max. approx. 0.8 gpm (3 L/min)

Flow loss at $q_{v \max}$ see pages 8 and 9.

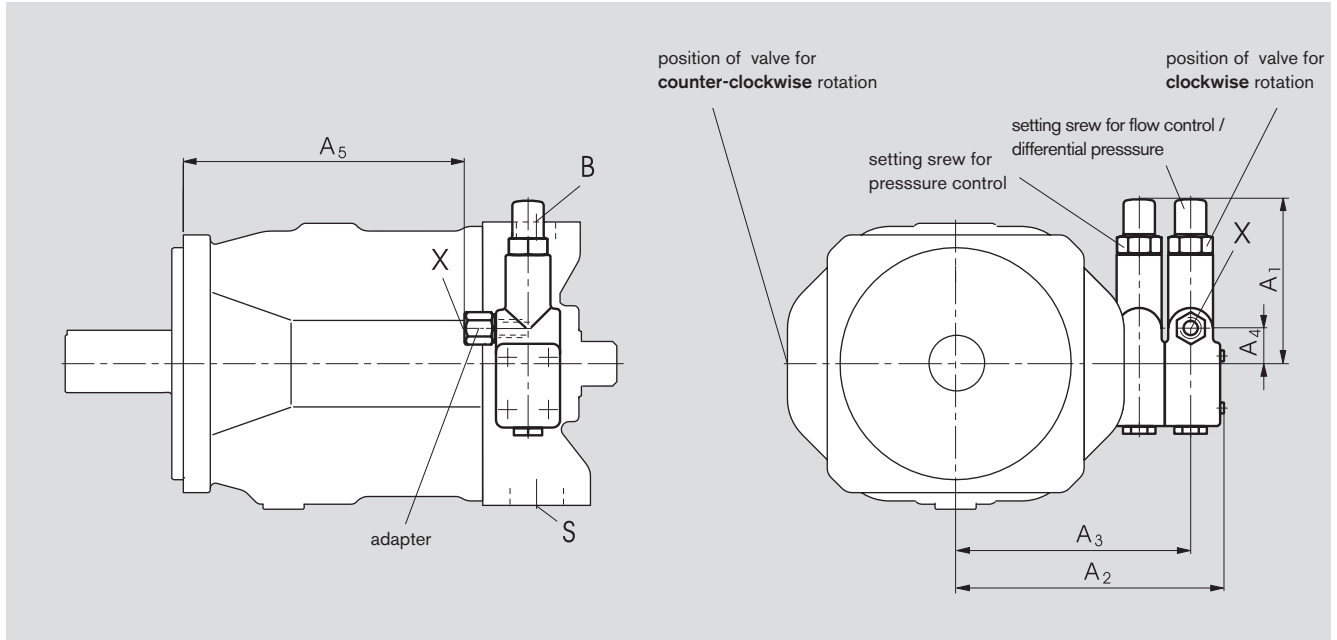
Unit dimensions DFR

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

Size 18 ... 100



Size 140



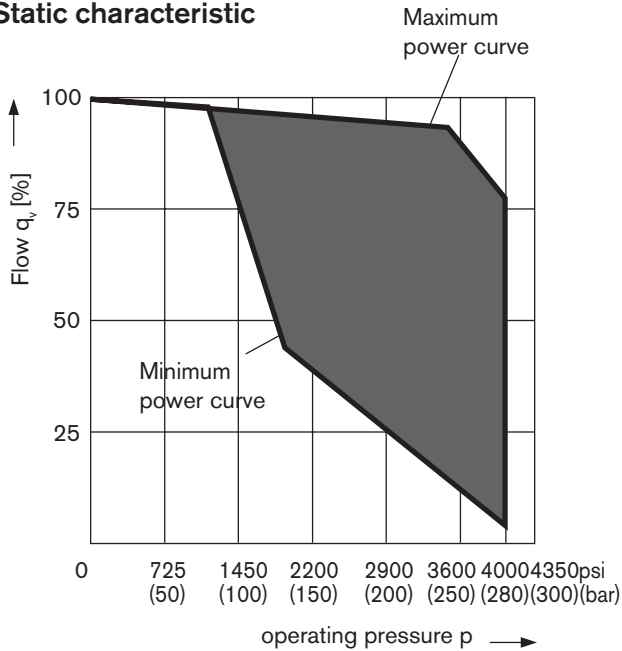
Size	A ₁	A ₂	A ₃	A ₄	A ₅	Port X
18	4.13 (105)	4.96 (126)	4.29 (109)	1.57 (40)	4.29 (109)	7/16-20 UNF-2B; 0.45 (11,5) deep
28	4.17 (106)	5.35 (136)	4.69 (119)	1.57 (40)	5.43 (138)	7/16-20 UNF-2B; 0.45 (11,5) deep
45	4.17 (106)	5.75 (146)	5.08 (129)	1.57 (40)	6.02 (153)	7/16-20 UNF-2B; 0.45 (11,5) deep
71	4.17 (106)	6.30 (160)	5.63 (143)	1.57 (40)	7.13 (181)	7/16-20 UNF-2B; 0.45 (11,5) deep
100	4.17 (106)	6.50 (165)	5.83 (148)	1.57 (40)	9.76 (248)	7/16-20 UNF-2B; 0.45 (11,5) deep
140	5.00 (127)	8.23 (209)	7.20 (183)	1.06 (27)	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. 27 HP (20 kW) at 1800 rpm.

Control data

For technical data constant pressure control see page 12.

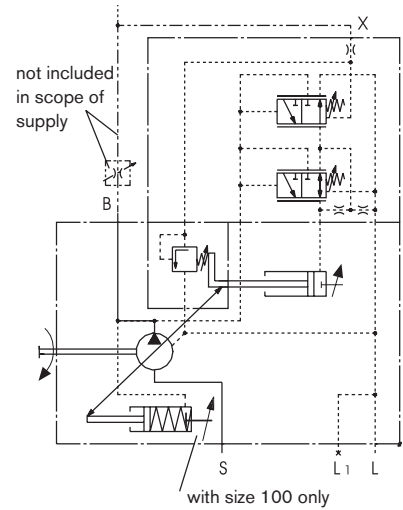
For technical data flow control see page 16.

Start of control _____ from 1160 psi (80bar)

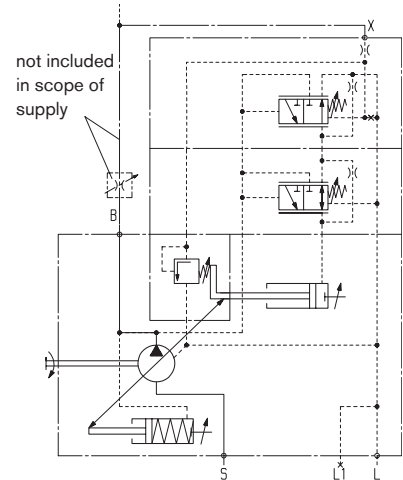
Pilot oil consumption ___ max. approx. 1.45 gpm (5,5 L/min)

Flow loss at q_{vmax} see pages 8 and 9.

Circuit drawing Size 28 ... 100



Circuit drawing Size 140



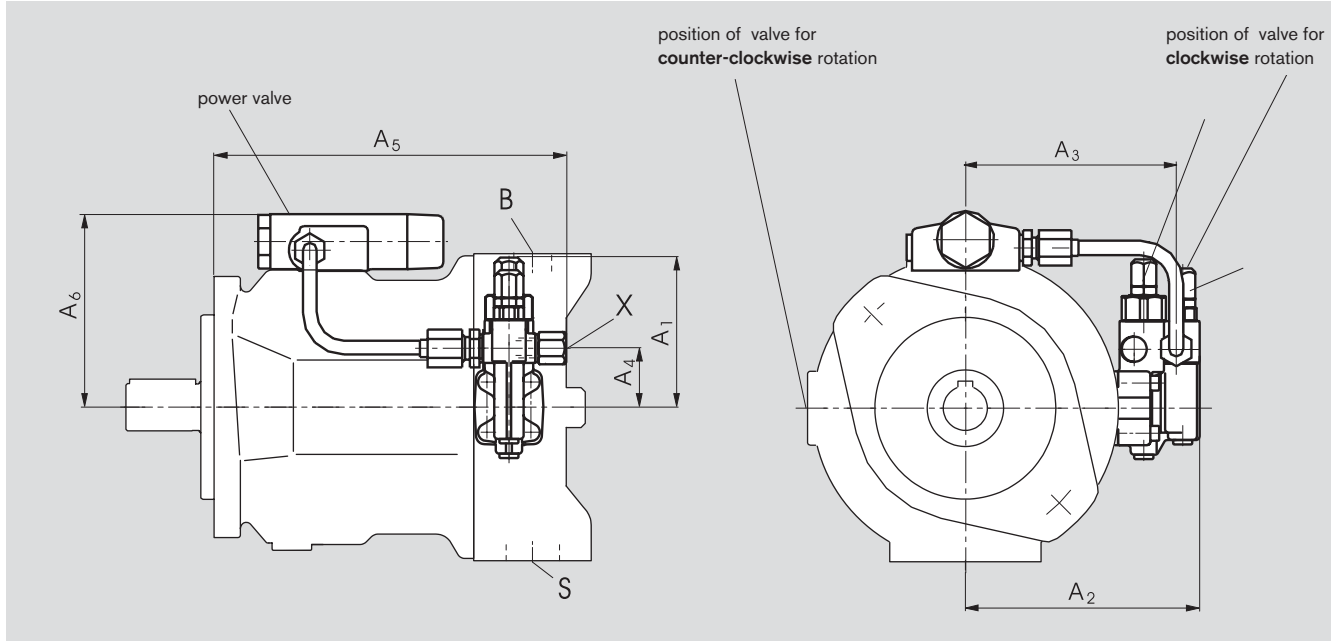
Ports

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

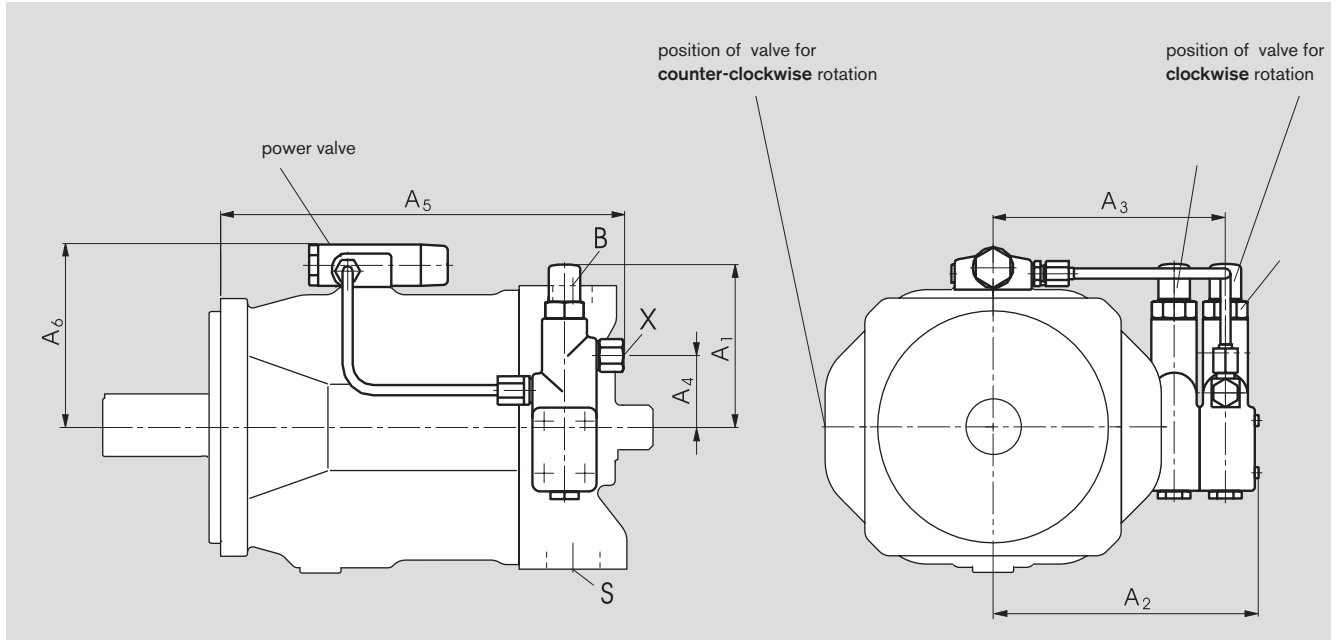
Unit dimensions DFLR

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

Size 28 ... 100



Size 140

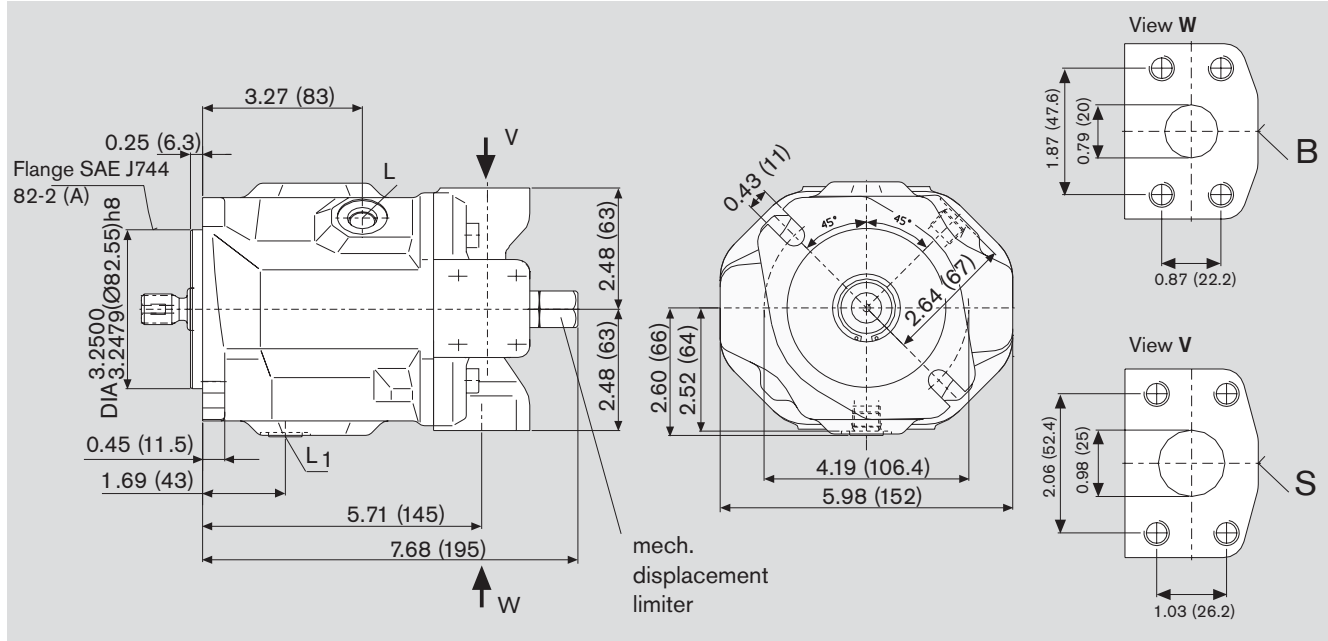


Size	A ₁	A ₂	A ₃	A ₄	A ₅	A ₆	Port X
28	4.17 (106)	5.35 (136)	4.69 (119)	1.57 (40)	7.60 (193)	4.21 (107)	7/16-20 UNF-2B; 0.39 (10) deep
45	4.17 (106)	5.75 (146)	5.08 (129)	1.57 (40)	8.23 (209)	4.41 (112)	7/16-20 UNF-2B; 0.39 (10) deep
71	4.17 (106)	6.30 (160)	5.63 (143)	1.57 (40)	9.37 (238)	4.88 (124)	7/16-20 UNF-2B; 0.39 (10) deep
100	4.17 (106)	6.50 (165)	5.83 (148)	1.57 (40)	11.93 (303)	5.08 (129)	7/16-20 UNF-2B; 0.39 (10) deep
140	5.00 (127)	8.23 (209)	7.20 (183)	2.22 (56,4)	12.36 (314)	5.51 (140)	9/16-18 UNF-2B; 0.51 (13) deep

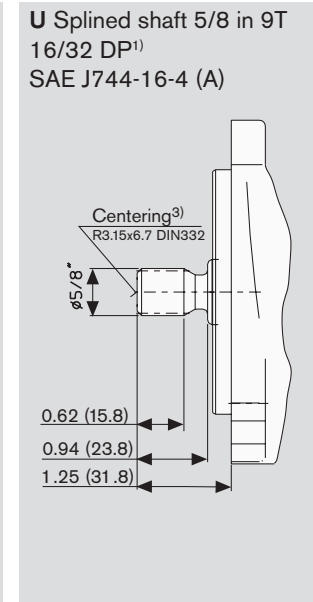
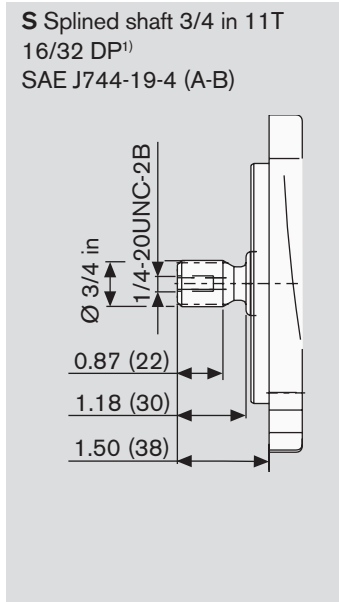
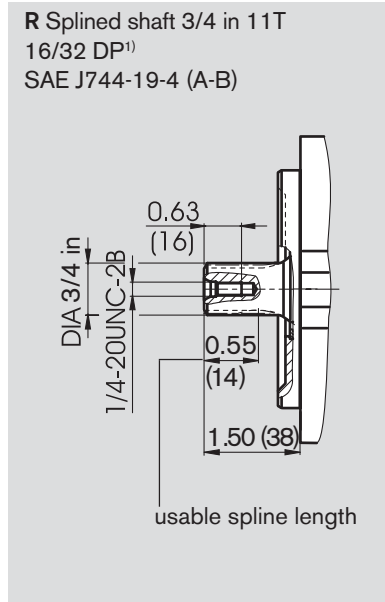
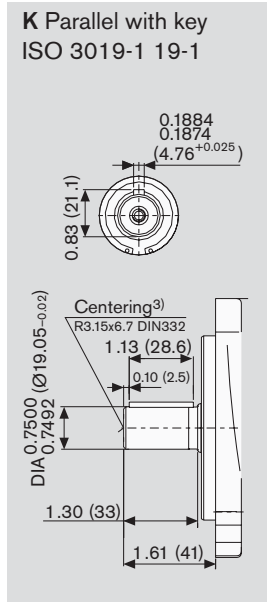
Unit dimensions, Size 18

Version AA10VSO 18 XXXX/31X-XXX62N00

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



Shaft ends



Ports

B	Pressure port (standard pressure range)	SAE J518	3/4 in
	Threading in bolt holes	ISO 68	3/8-16 UNC-2B; 0.79 (20) deep
S	Inlet port (standard pressure range)	SAE J518	1 in
	Threading in bolt holes	ISO 68	3/8-16 UNC-2B; 0.79 (20) deep
L/L ₁	Case drain port (L ₁ plugged)	ISO 11926	9/16-18 UNF-2B

Tightening torques, max.²⁾

29 lb-ft (40 Nm)
29 lb-ft (40 Nm)
59 lb-ft (80 Nm)

¹⁾ANSI B92.1a-1976, pressure angle 30°, flat root side fit, tolerance class 5

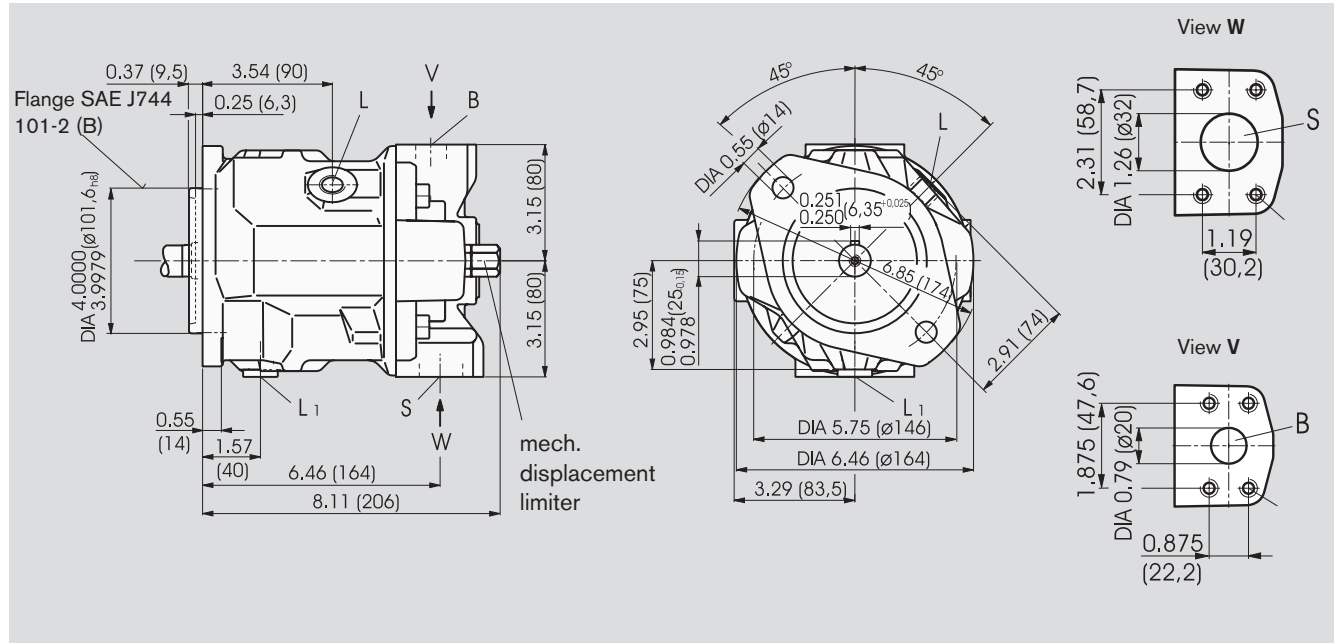
²⁾See safety information

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

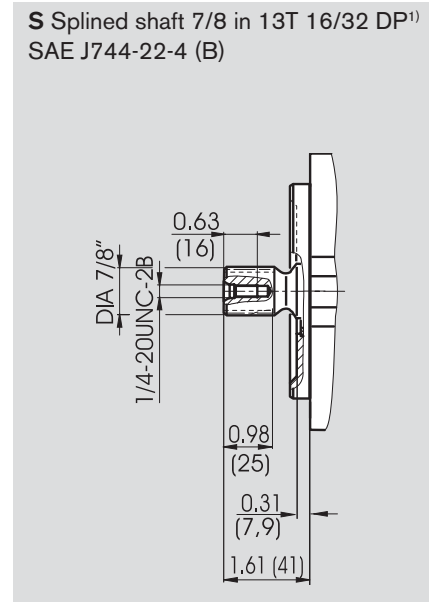
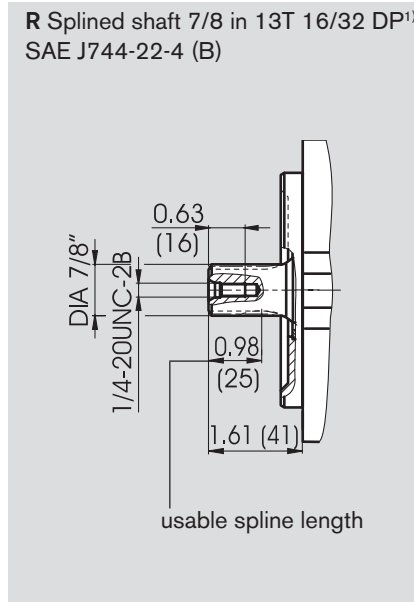
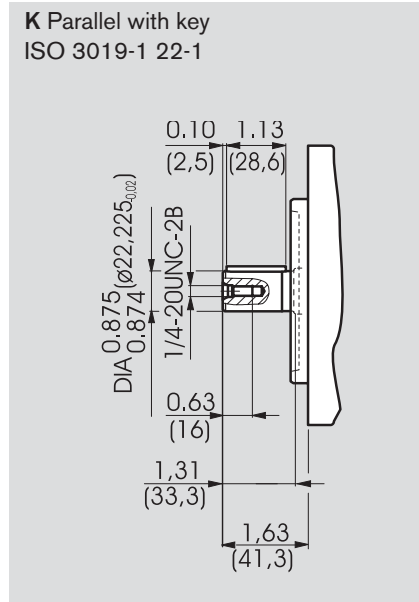
Unit dimensions, Size 28

Version AA10VSO 28 XXXX/31X-XXX62N00

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



Shaft ends



Ports

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

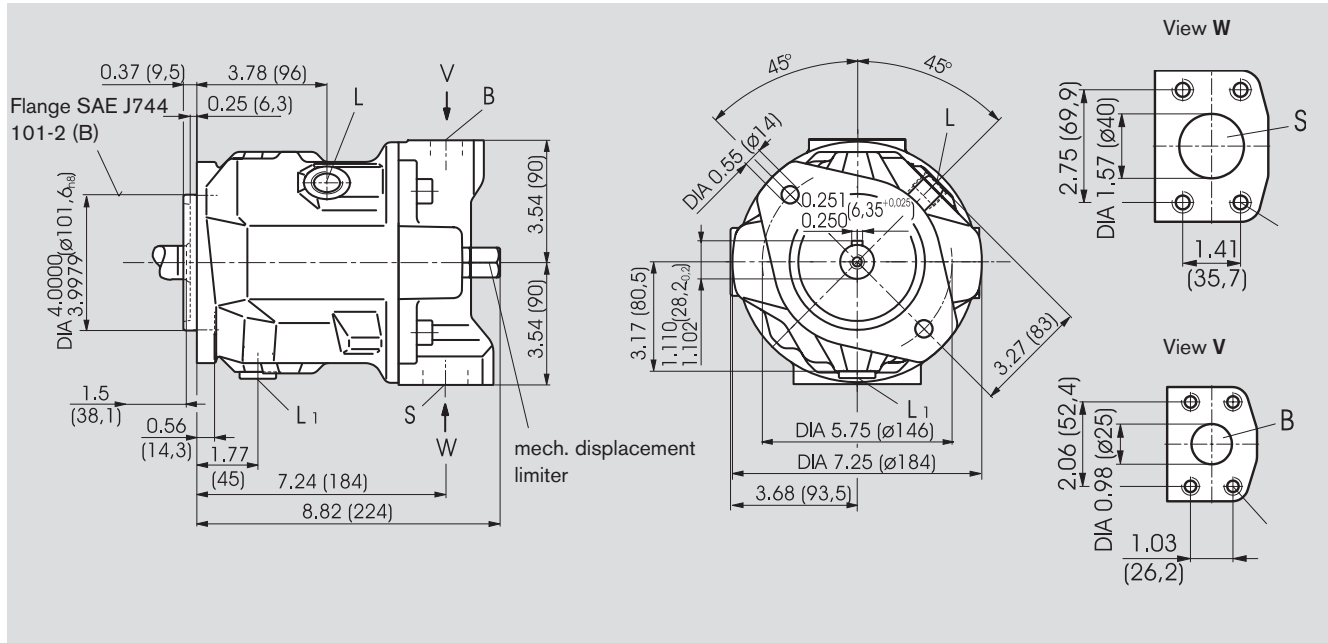
¹⁾ANSI B92.1a-1976, pressure angle 30°, flat root side fit, tolerance class 5

²⁾See safety information

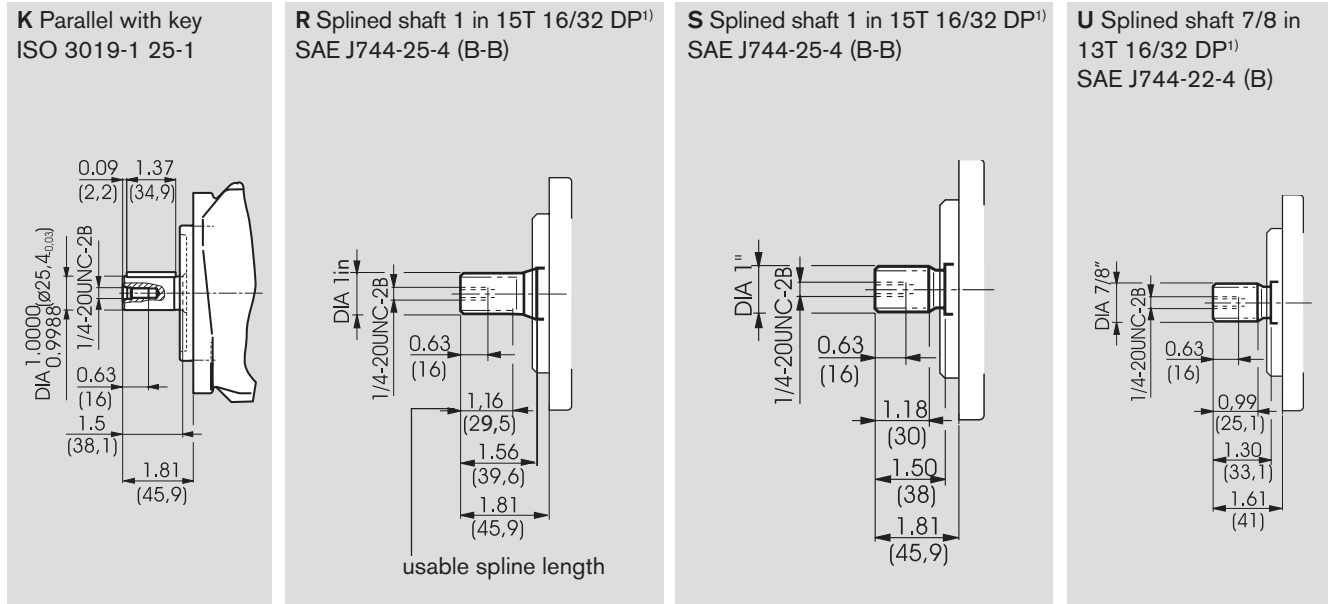
Unit dimensions, Size 45

Version AA10VSO 45 XXXX/31X-XXX62N00

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



Shaft ends



Ports

Port	Description	Standard	Size	Depth	Tightening torques, max. ²⁾
B	Pressure port (standard pressure range)	SAE J518	1 in		
	Threading in bolt holes	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		
	Threading in bolt holes	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)

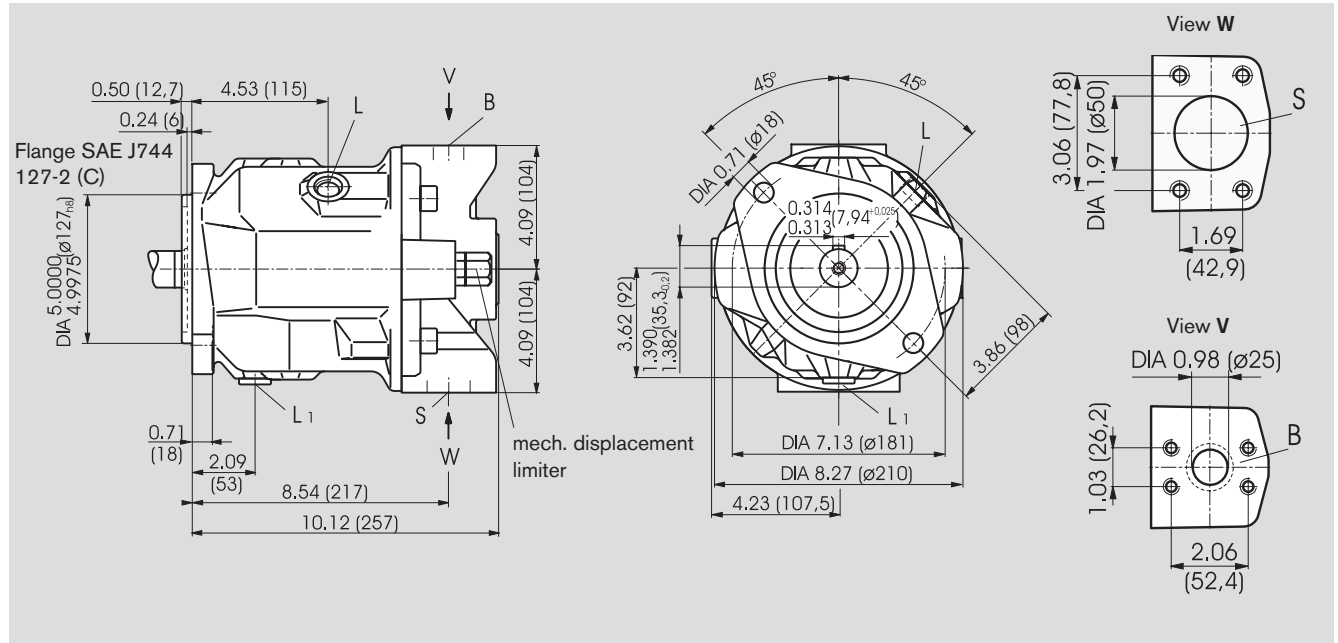
¹⁾ANSI B92.1a-1976, pressure angle 30°, flat root side fit, tolerance class 5

²⁾See safety information

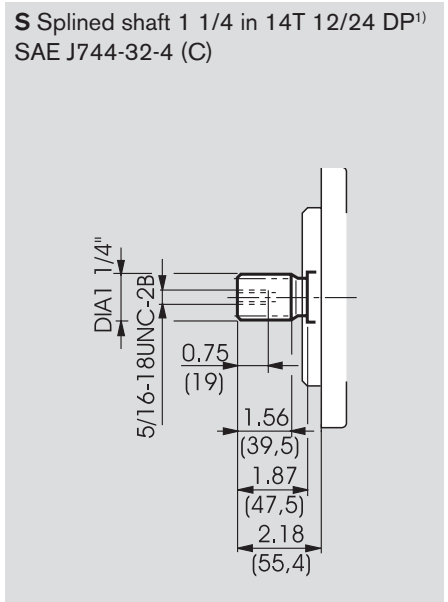
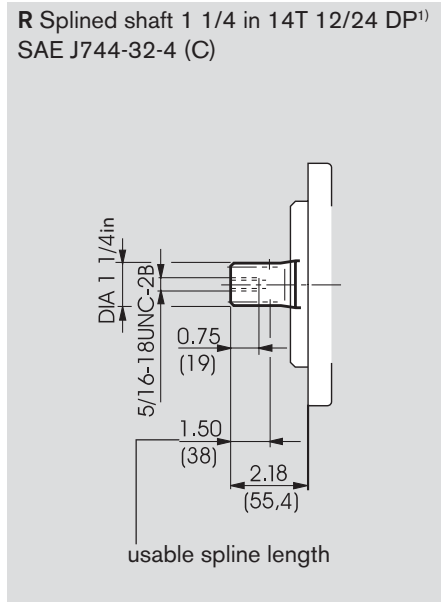
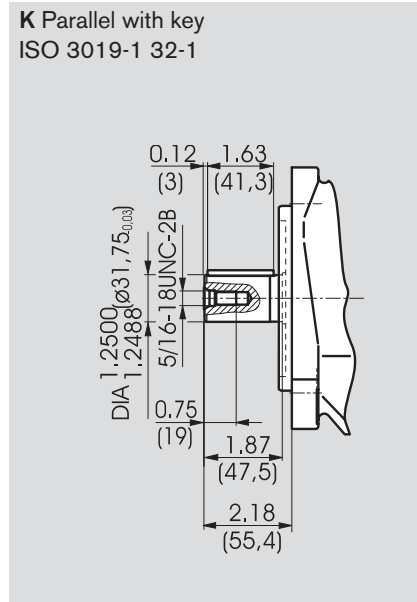
Unit dimensions, Size 71

Version AA10VSO 71 XXXX/31X-XXX92N00

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



Shaft ends



Ports

Port	Description	SAE	ISO	Depth	Tightening torques, max. ²⁾
B	Pressure port (standard pressure range)	SAE J518	1 in		
	Threading in bolt holes	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		
	Threading in bolt holes	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)

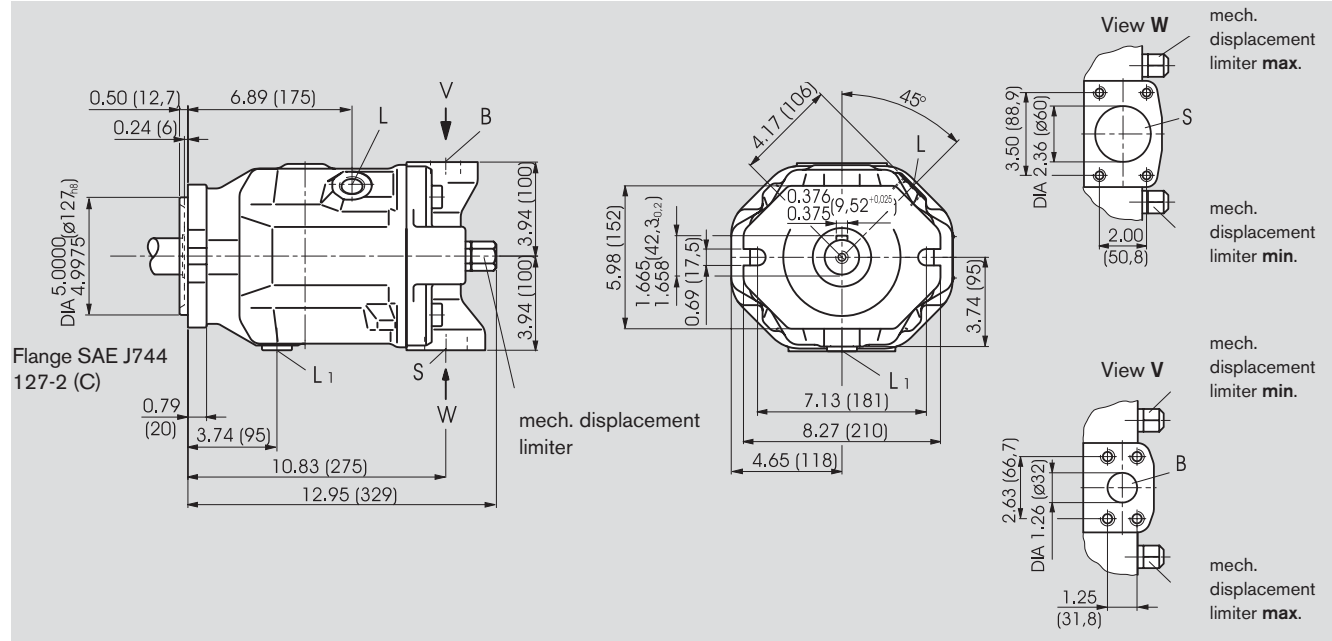
¹⁾ANSI B92.1a-1976, pressure angle 30°, flat root side fit, tolerance class 5

²⁾See safety information

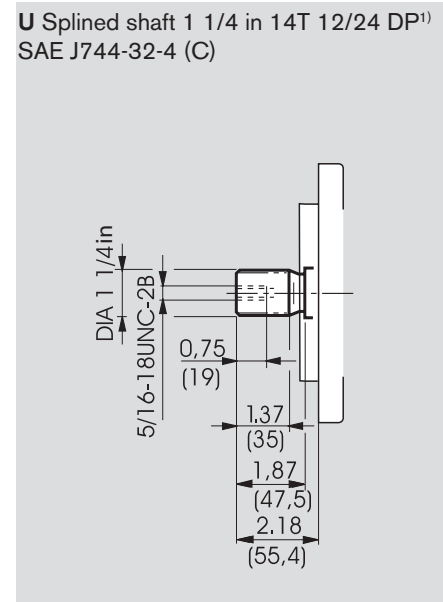
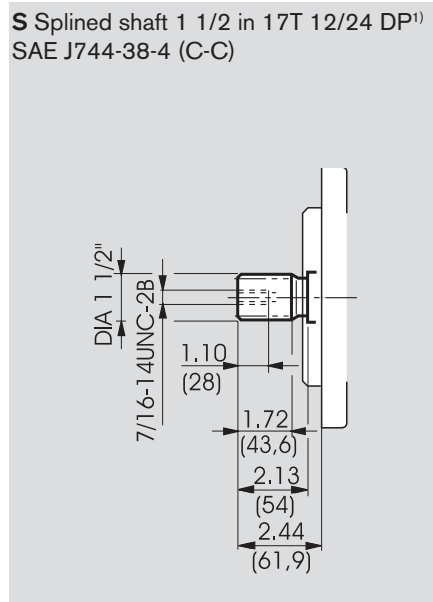
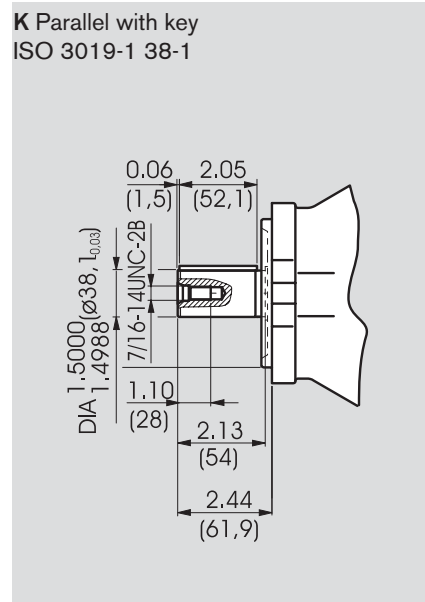
Unit dimensions, Size 100

Version AA10VSO 100 XXXX/31X-XXX62N00

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



Shaft ends



Ports

B	Pressure port (high pressure range) Threading in bolt holes	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) Threading in bolt holes	SAE J518 ISO 68	2 1/2 in 1/2-13 UNC-2B; 0.94 (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.²⁾

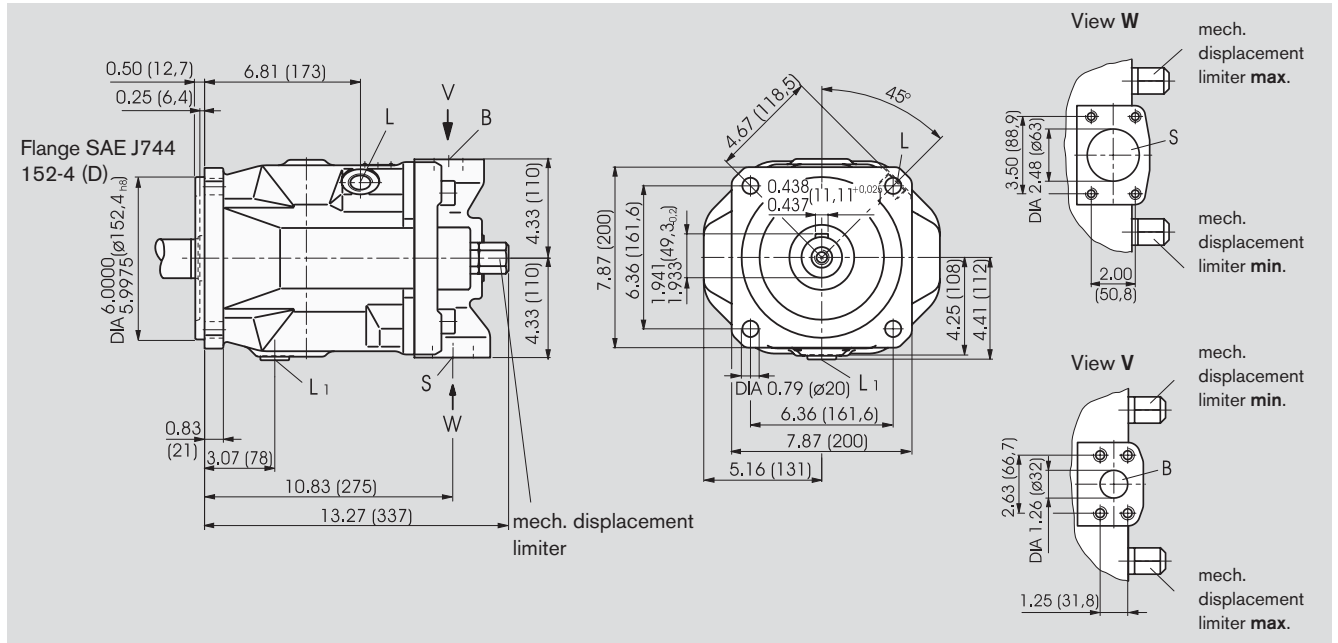
¹⁾ANSI B92.1a-1976, pressure angle 30°, flat root side fit, tolerance class 5

²⁾See safety information

Unit dimensions, Size 140

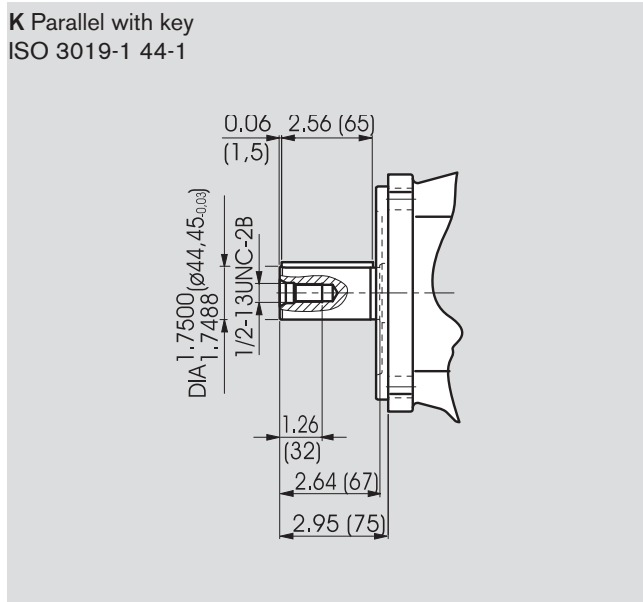
Version AA10VSO 140 XXXX/31X-XXX62N00

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

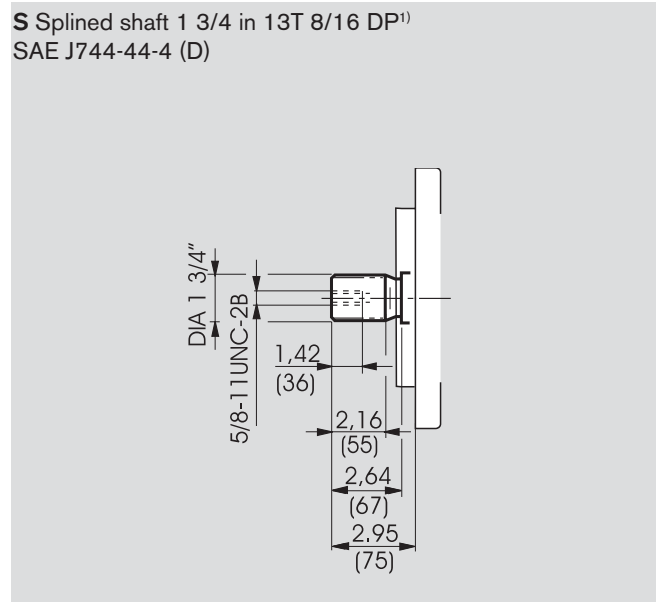


Shaft ends

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

Port	Description	SAE	ISO	Keyway Depth	Tightening torques, max. ²⁾
B	Pressure port (high pressure range)	SAE J518	1 1/4 in	0.75 (24) deep	66 lb-ft (90 Nm)
	Threading in bolt holes	ISO 68	1/2-13 UNC-2B; 0.75 (24) deep		66 lb-ft (90 Nm)
S	Inlet port (standard pressure range)	SAE J518	2 1/2 in	0.94 (24) deep	66 lb-ft (90 Nm)
	Threading in bolt holes	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 root side fit, tolerance class 5

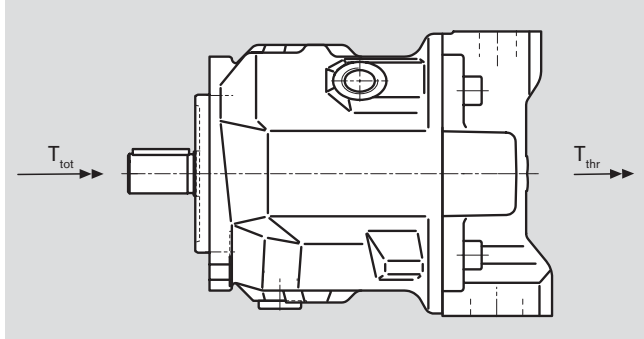
²⁾See safety information

Through drives

Axial piston units (A)A10VSO 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 (K40-K...). 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 torque.



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.

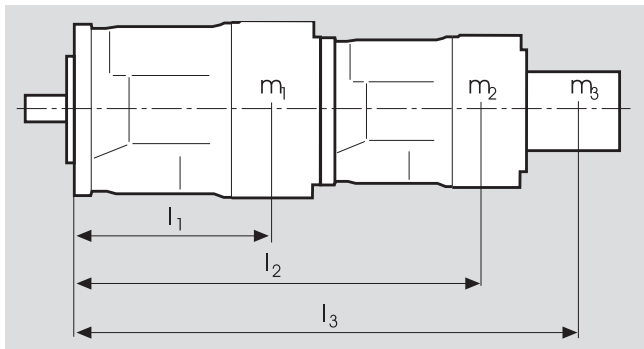
Max. perm. input torque T_{tot}			18	28	45	71	100	140With shaft
U	T_{tot}	lb.ft (Nm)	43 (59)	- (-)	139 (188)	- (-)	439 (595)	- (-)
With shaft K	T_{tot}	lb.ft (Nm)	77 (104)	107 (145)	156 (212)	319 (433)	553 (750)	875 (1186)
With shaft S	T_{tot}	lb.ft (Nm)	92 (124)	146 (198)	235 (319)	462 (626)	814 (1104)	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)	88 (120)	130 (176)	269 (365)	404 (548)	- (-)	- (-)
Keyed shaft	$T_{thr \text{ keyed}}$	lb.ft (Nm)	53 (72)	83 (112)	132 (179)	209 (283)	293 (398)	411 (557)

T_{tot} = max. permissible input torque pump 1

T_{thr} = max. permissible through drive torque

$T_{thr \text{ keyed}}$ = max. permissible through drive torque at through drive to keyed shaft

Permissible overhang moment



m_1, m_2, m_3 weight of pump [lbs (kg)]

l_1, l_2, l_3 distance to center of gravity [in (mm)]

$$T_m = (m_1 \cdot l_1 + m_2 \cdot l_2 + m_3 \cdot l_3) \cdot \frac{1}{12} \text{ [lb.ft]}$$

$$\dots \cdot \frac{1}{102} \text{ [Nm]}$$

Size		18	28	45	71	100	140
Permissible overhang moment T_m	lb.ft (Nm)	369 (500)	649 (880)	1010 (1370)	1593 (2160)	2213 (3000)	3319 (4500)
at dyn. acceleration 10g = 98.1 m/s ²	T_m	37 (50)	65 (88)	101 (137)	159 (216)	221 (300)	332 (450)
Weight	m lbs (kg)	26,5 (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)	5.12 (130)	5.91 (150)	6.30 (160)	6.30 (160)

Overview of through drive mounting options

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

Through drives - (A)A10VSO			Mounting option - 2 nd pump			
Flange	hub	code	(A)A10VSO.../31 ...	A10V(S)O.../52	gear pump	available on
SAE J744	keyed		size (shaft)	size (shaft)		size
82-2(A)	keyed (A-B)	K40	18 (K)	10 (K)	-	18-100
101-2 (B)	keyed (B)	K03	28 (K)	28 (K)	-	28-140
101-2 (B-B)	keyed (B-B)	K05	45 (K)	60, 45 (K)	-	45-140
127-2 (C)	keyed (C)	K08	71 (K)	-	-	71-140
127-2 (C)	keyed (C)	K38	100 (K)	85 (K)	-	100-140
152-4 (D)	keyed (D)	K21	140 (K)	-	-	140
SAE J744	splined					
82-2 (A)	5/8 in (A)	K01	18 (U)	-	size F	18-140
82-2 (A)	3/4 in (A-B)	K52	18 (S, R)	10 (S)	-	18-140
101-2 (B)	7/8 in (B)	K68	28 (S, R) 45 (U) ¹⁾	28 (S, R) 45 (U, W) ¹⁾	size N, G	28-140
101-2 (B)	1 in (B-B)	K04	45 (S, R)	45 (S, R) 60 (U, W) ²⁾	-	45-140
127-2 (C)	1 1/4 in (C)	K07	71 (S, R) 100 (U) ³⁾	85 (U, W) ³⁾	-	71-140
127-2 (C)	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

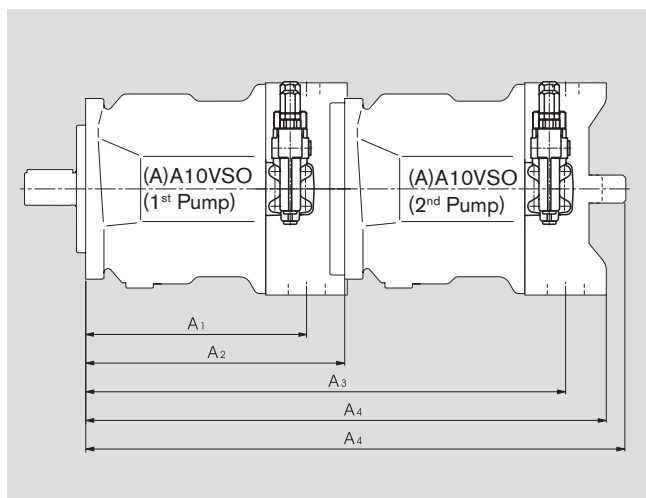
Before finalising your design, please request a certified installation drawing. Dimensions in inches (mm).

(A)A10VSO		(2 nd pump)					
(1 st pump)		18	28	45	71	100	140
18	A ₁	145					
	A ₂	182					
	A ₃	327					
	A ₄	377					
28	A ₁	165	165				
	A ₂	204	204				
	A ₃	349	368				
	A ₄	399	410				
45	A ₁	184	184	184			
	A ₂	229	229	229			
	A ₃	374	393	413			
	A ₄	424	435	453			
71	A ₁	217	217	217	217		
	A ₂	267	267	267	267		
	A ₃	412	431	451	484		
	A ₄	462	473	491	524		
100	A ₁	275	275	275	275	275	
	A ₂	338	338	338	338	338	
	A ₃	483	502	522	555	613	
	A ₄	533	544	562	595	667	
140	A ₁	275	275	275	275	275	275
	A ₂	350	350	350	350	350	350
	A ₃	495	514	534	567	625	625
	A ₄	545	556	574	607	679	688

Dimensions in millimeters

(A)A10VSO		(2 nd pump)					
(1 st pump)		18	28	45	71	100	140
18	A ₁	5.71					
	A ₂	7.16					
	A ₃	12.87					
	A ₄	14.84					
28	A ₁	6.49	6.49				
	A ₂	8.03	8.03				
	A ₃	13.74	14.49				
	A ₄	15.71	16.14				
45	A ₁	7.24	7.24	7.24			
	A ₂	9.02	9.02	9.02			
	A ₃	14.72	15.47	16.26			
	A ₄	16.69	17.13	17.83			
71	A ₁	8.54	8.54	8.54	8.54		
	A ₂	10.51	10.51	10.51	10.51		
	A ₃	16.22	16.97	17.76	19.06		
	A ₄	18.19	18.62	19.33	20.63		
100	A ₁	10.83	10.83	10.83	10.83	10.83	
	A ₂	13.31	13.31	13.31	13.31	13.31	
	A ₃	19.02	19.76	20.55	21.85	24.13	
	A ₄	20.98	21.42	22.13	23.43	26.26	
140	A ₁	10.83	10.83	10.83	10.83	10.83	10.83
	A ₂	13.78	13.78	13.78	13.78	13.78	13.78
	A ₃	19.49	20.24	21.02	22.32	24.61	24.61
	A ₄	21.46	21.89	22.60	23.90	26.73	27.09

Dimensions in inches



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:

AA10VSO71 DR/31 L-PKC92K68 + AA10VSO28 DR/31L-PSC62N00

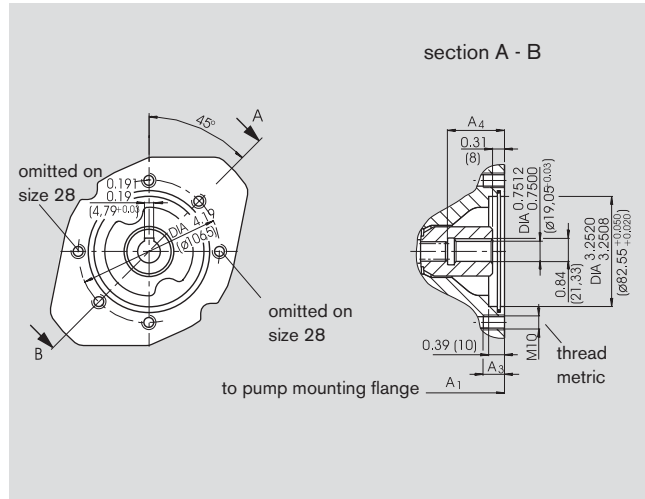
2. If a **gear pump or a radial piston pump is to be factory mounted** as a second pump please consult the factory.

Dimensions of through drives

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

K40¹⁾ Flange SAE J744 - 82-2 (A)

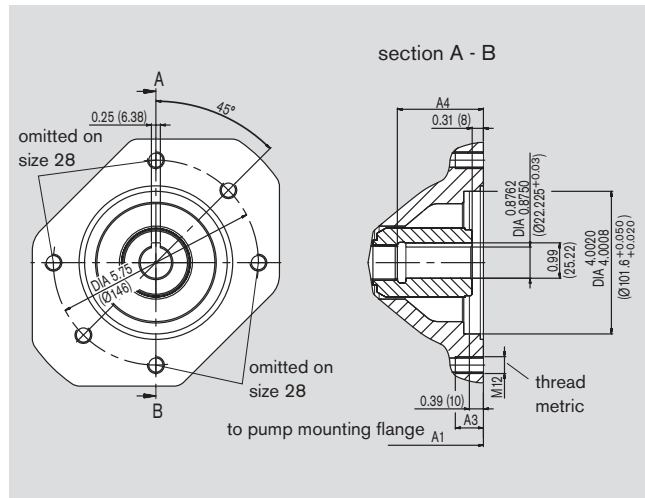
Hub for keyed shaft to ISO 3019-1 19-1



Size	A ₁	A ₃	A ₄
28	8.03 (204)	0.63 (16)	1.85 (47)
45	9.02 (229)	0.63 (16)	2.09 (53)
71	10.51 (267)	0.79 (20)	2.40 (61)
100	13.31 (338)	0.79 (20)	2.56 (65)
140	13.78 (350)	0.67 (17)	3.03 (77)

K03¹⁾ Flange SAE J744 - 101-2 (B)

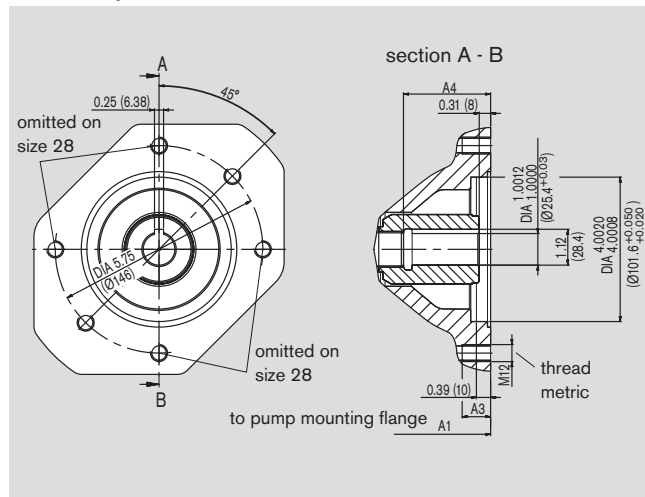
Hub for keyed shaft to ISO 3019-1 22-1



Size	A ₁	A ₃	A ₄
28	8.03 (204)	0.71 (18)	1.85 (47)
45	9.02 (229)	0.71 (18)	2.09 (53)
71	10.51 (267)	0.79 (20)	2.40 (61)
100	13.31 (338)	0.79 (20)	2.56 (65)
140	13.78 (350)	0.79 (20)	3.03 (77)

K05¹⁾ Flange SAE J744 - 101-2 (B-B)

Hub for keyed shaft SAE to ISO 3019-1 25-1



Size	A ₁	A ₃	A ₄
45	9.02 (229)	0.71 (18)	2.09 (53)
71	10.51 (267)	0.79 (20)	2.40 (61)
100	13.31 (338)	0.79 (20)	2.56 (65)
140	13.78 (350)	0.79 (20)	3.03 (77)

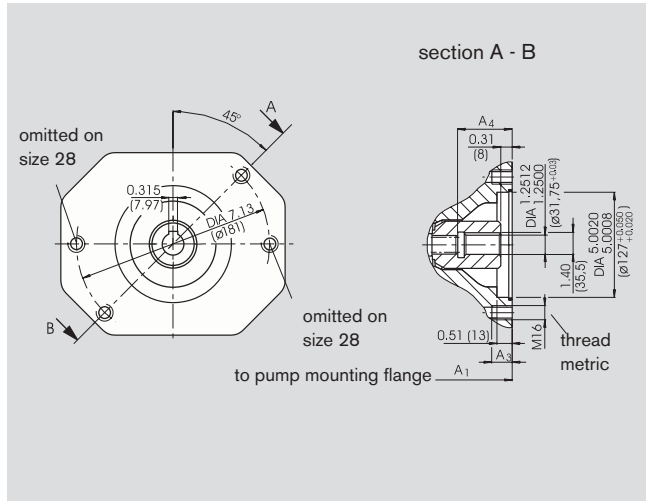
¹⁾ Not for new projects. Permitted with reduced through drive torque only (see page 26).

Dimensions of through drives

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

K08¹⁾ Flange SAE J744 - 127-2 (C)

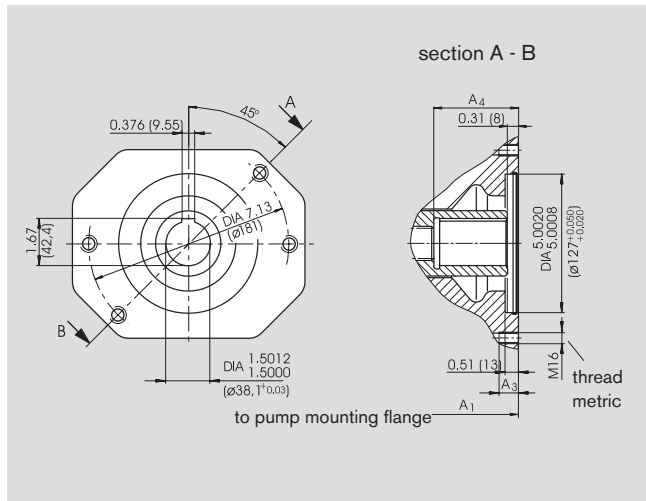
Hub for keyed shaft to ISO 3019-1 32-1



Size	A ₁	A ₃	A ₄
71	10.51 (267)	0.71 (18)	2.40 (61)
100	13.31 (338)	0.95 (24)	2.52 (64)
140	13.78 (350)	0.95 (24)	2.62 (66,5)

K38¹⁾ Flange SAE J744 - 127-2 (C)

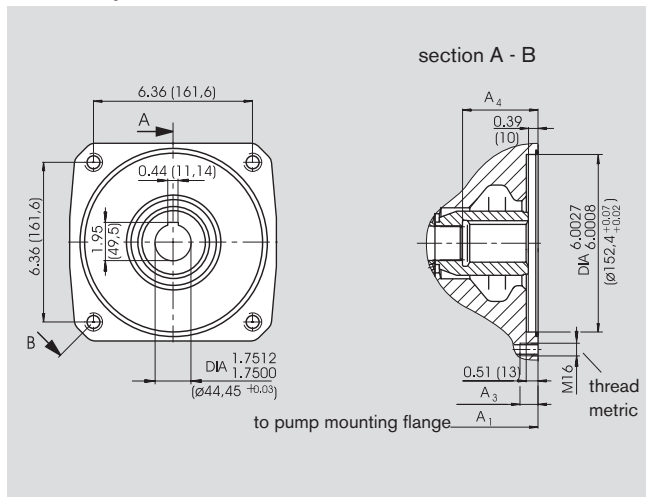
Hub for keyed shaft SAE to ISO 3019-1 38-1



Size	A ₁	A ₃	A ₄
100	13.31 (338)	0.95 (24)	2.56 (65)
140	13.78 (350)	0.95 (24)	3.03 (77)

K21¹⁾ Flange SAE J744 - 152-4 (D)

Hub for keyed shaft to ISO 3019-1 44-1



Size	A ₁	A ₃	A ₄
140	13.78 (350)	approx. 0.83 (ca. 21)	3.03 (77)

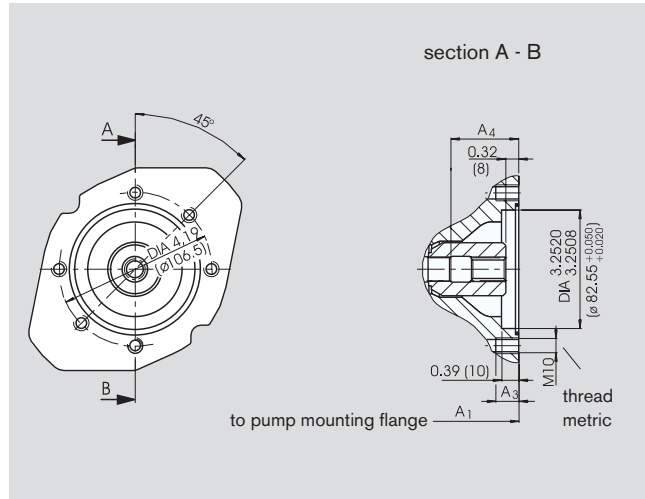
¹⁾ Not for new projects. Permitted with reduced through drive torque only (see page 26).

Dimensions of through drives

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

K01 Flange SAE J744 - 82-2 (A)

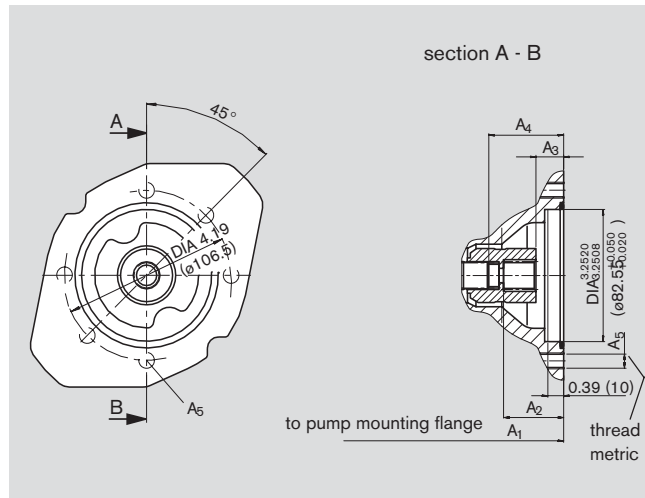
Hub for splined shaft to ANSI B.92.1a-1976 5/8 in 9T 16/32 DP¹⁾ (SAE J744 - 16-4 (A))



Size	A ₁	A ₃	A ₄
18	7.16 (182)	0.57 (14,5)	1.65 (42)
28	8.03 (204)	0.63 (16)	1.85 (47)
45	9.02 (229)	0.63 (16)	2.09 (53)
71	10.51 (267)	0.79 (20)	2.40 (61)
100	13.31 (338)	0.79 (20)	2.56 (65)
140	13.78 (350)	0.63 (17)	3.03 (77)

K52 Flange SAE J744 - 82-2 (A)

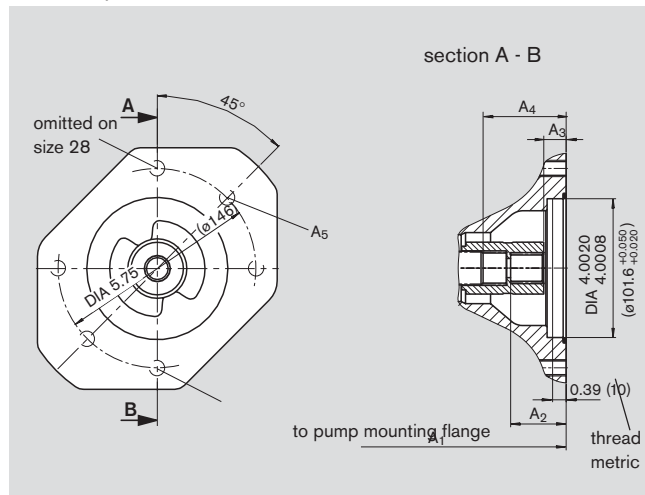
Hub for splined shaft to ANSI B.92.1a-1976 3/4 in 11T 16/32 DP¹⁾ (SAE J744 - 19-4 (A-B))



Size	A ₁	A ₂	A ₃	A ₄	A ₅
18	7.16 (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

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	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

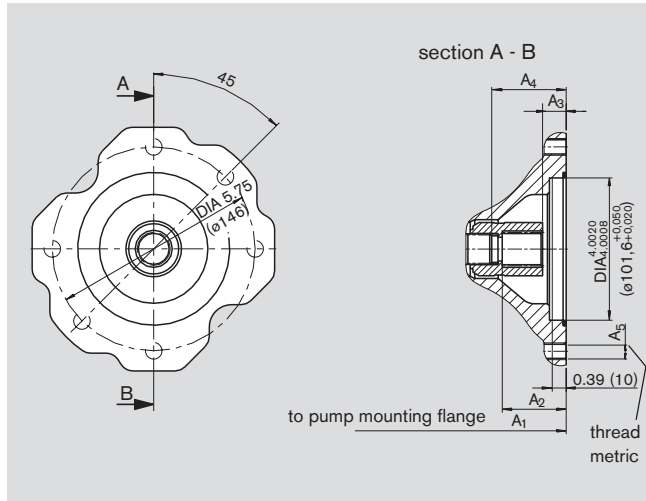
¹⁾pressure angle 30°, flat root side fit, tolerance class 5

Dimensions of through drives

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

K04 Flange SAE J744 - 101-2 (B)

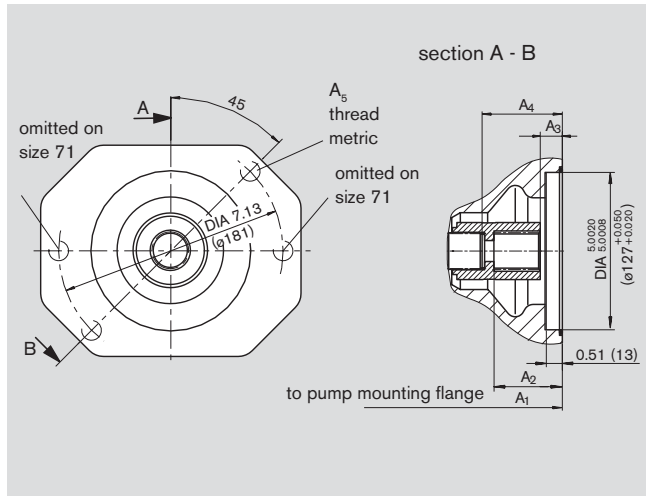
Hub for splined shaft to ANSI B.92.1a-1976 1 in 15T 16/32 DP¹⁾ (SAE J744 - 25-4 (B-B))



Size	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

K07 Flange SAE J744 - 127-2 (C)

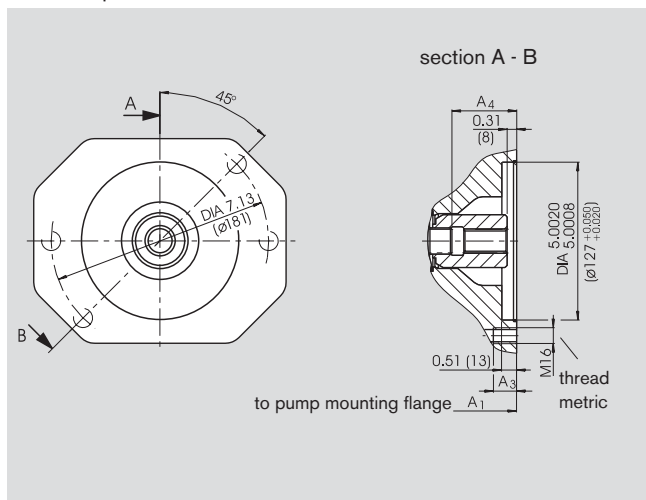
Hub for splined shaft to ANSI B.92.1a-1976 1 1/4 in 14T 12/24 DP¹⁾ (SAE J744 - 32-4 (C))



Size	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; 0.70 (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	A ₁	A ₃	A ₄
100	13.31 (338)	0.95 (24)	2.56 (65)
140	13.78 (350)	0.95 (34)	3.03 (77)

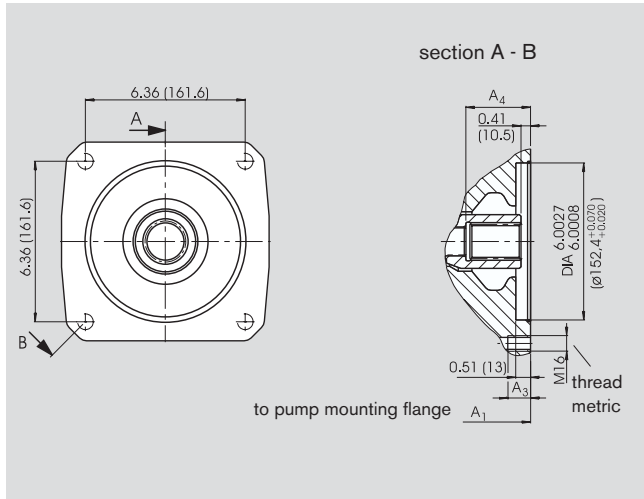
¹⁾pressure angle 30°, flat root side fit, tolerance class 5

Dimensions of through drives

Before finalising 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))



Size	A ₁	A ₃	A ₄
140	13.78 (350)	approx. 0.83 (ca. 21)	3.03 (77)

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.

The case drain hose corresponding to the size of the case drain port should be installed at the highest case drain port location.

Vertical installation (shaft end upwards)

Following installation conditions must be taken into account:

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, close port "L" (compare item limiting conditions)

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

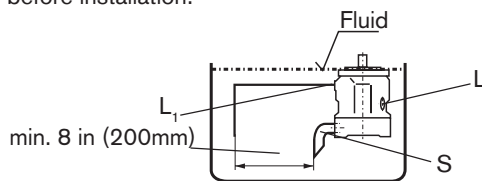


fig. 1

Arrangement outside the reservoir

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

Limiting condition:

Min. pump inlet pressure $p_{abs\ min} = 12\ \text{psi}\ (0,8\ \text{bar})$ 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 $h_{max} = 31.5\ \text{in}\ (800\ \text{mm})$ (Immersion depth $h_{t\ min} = 8\ \text{in}/200\ \text{mm}$).

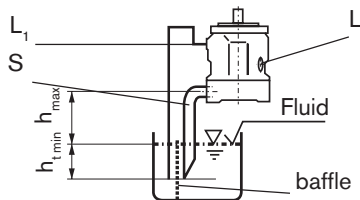


fig. 2

Overall pressure loss

$$\Delta p_{Ges} = \Delta p_1 + \Delta p_2 + \Delta p_3 \leq (1 - p_{abs\ min}) = 0,2\ \text{bar}$$

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

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

ρ = density [kg/m³]

l = pipe length [m]

dv/dt = rate of change in fluid velocity [m/s²]

Δp_2 : Pressure loss due to static head

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

h = head [m]

ρ = density [kg/m³]

g = gravity. = 9,81 m/s²

Δp_3 : line losses (elbows etc.)

Horizontal installation

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

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 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. (compare limiting conditions)

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

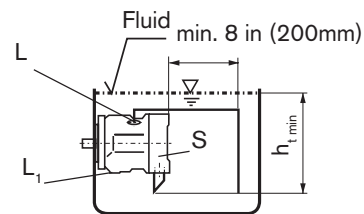


fig. 3

Arrangement outside the reservoir

Fill pump housing before commissioning.

Pipe port "S" and the higher port "L" or "L₁"

a) When mounting above the reservoir: see fig. 4 (compare item limiting conditions)

b) Mounting below the reservoir: pipe ports "L" and "S" according to fig. 5, "L" closed.

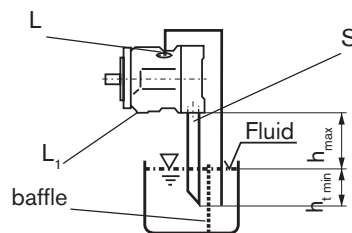


fig. 4

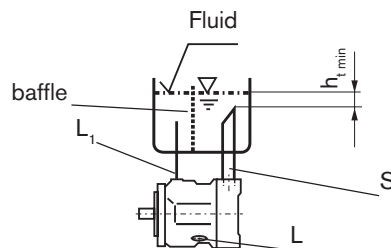


fig. 5

Safety information

- Pump (A)A10VSO 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).
Manufacturers information concerning the maximum permitted tightening torques of the various fittings is to be observed!
For ISO68/DIN 13 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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