Rexroth
Bosch Group

Axial piston variable pump (A)A10VSO (US-Version)

RA 92711-A/07.09 **1**/40
Replaces: 10.07

Data Sheet

Series 31
Size NG18 to 140
Nominal pressure 4000 psi (280 bar)
Maximum pressure 5100 psi (350 bar)
Open circuit

Contents

Features

- Variable axial piston pump of swashplate design for hydrostatic drives in open circuits
- The flow is proportional to the drive speed and displacement.
- The flow is infinitely variable through adjustment of the swashplate angle.
- 2 case drain ports
- Good suction characteristics
- Permissible continuous pressure 280 bar
- Low noise level
- Long service life
- Axial and radial loading of drive shaft possible
- High power to weight ratio
- Wide range of controls
- Short response times
- The through drive is suitable to mount additional gear or piston pumps of up to the same displacement size, i.e. 100% through drive torque.

Ordering code for standard range

	(A)A10VS	O			/	31		–	V				
01	02	03	04	05		06	07		08	09	10	11	12

Type of rotary group

		18	28	45	71	100	140	
01	HFA, HFB, HFC -Fluids	–	●	●	●	●	●	E
	High-Speed-Version	–	–	●	●	●	●	H

Axial Piston Unit

		18	28	45	71	100	140	
02	Swashplate design, variable	●	●	●	●	●	●	(A)A10VS

Operating mode

03	Pump, open circuit	O

Size

04	Displacement $V_{g\ max}$ in	in	1.10	1.71	2.75	4.33	6.10	8.54
		(cm^3)	(18)	(28)	(45)	(71)	(100)	(140)

Control devices

				18	28	45	71	100	140	
05	Two-point control, directly operated			●	●	●	●	●	●	DG
	Pressure control			●	●	●	●	●	●	DR
		hydraulic, remotely controled		●	●	●	●	●	●	DRG
		with hydraulic flow control,	X - T open	●	●	●	●	●	●	DFR
			X - T closed with flushing function	●	●	●	●	●	●	DFR1
		electric displacement control with press. control		●	●	●	●	●	●	DFE1[1)]
		electric pressure control, inverse proportional curve		●	●	●	●	●	●	ED[2)]
	Pressure, flow and power control			–	●	●	●	●	●	DFLR

Series

06	Series 3, Index 1	31

Direction of rotation

07	Viewed from drive shaft	clockwise	R
		counter-clockwise	L

Seals

08	FKM (Fluor-caoutchouc)	V

Drive shaft

		18	28	45	71	100	140	
09	Splined shaft, ANSI B92.1a, standard shaft	●	●	●	●	●	●	S
	Similar to shaft „S“ however for higher input torque	●	●	●	●	–	–	R
	Splined shaft to SAE J744, reduced diameter, not for through drive	●	–	–	–	●	–	U
	Parallel shaft SAE with key J744 (ISO 3019-1)	●	●	●	●	●	●	K

Mounting flange

		18	28	45	71	100	140	
10	SAE J744 – 2-bolt	●	●	●	●	●	–	C
	SAE J744 – 4-bolt	–	–	–	–	–	●	D

1) see RE 30030
2) see RE 92707

● = Available ❍ = In preperation – Not available ▲ = Not for new projects ▭ = Preferred program

Ordering code for standard range

	(A)A10VS	O			/	31		–	V				
01	02	03	04	05		06	07		08	09	10	11	12

	Service line ports	18	28	45	71	100	140	
11	SAE flanged ports at opposite side, UNC mounting bolts	●	●	●	–	●	●	**62**
	SAE flanged ports at opposite side, UNC mounting bolts	–	–	–	●	–	–	**92**

	Through drive			18	28	45	71	100	140	
12	Without through drive			●	●	●	●	●	●	**N00**
	Flange SAE J744	Coupling for splined shaft[1]								
	82-2 (A)	5/8 in 9T 16/32DP	16-4 (A)	●	●	●	●	●	●	**K01**
	82-2 (A)	3/4 in 11T 16/32DP	19-4 (A-B)	●	●	●	●	●	●	**K52**
	101-2 (B)	7/8 in 13T 16/32DP	22-4 (B)	–	●	●	●	●	●	**K68**
	101-2 (B)	1 in 15T 16/32DP	25-4 (B-B)	–	●	●	●	●	●	**K04**
	127-2 (C)	1 1/4 in 14T 12/24DP	32-4 (C)	–	–	–	●	●	●	**K07**
	127-2 (C)	1 1/2 in 17T 12/24DP	38-4 (C-C)	–	–	–	–	●	●	**K24**
	152-4 (D)	1 3/4 in 13T 8/16DP	44-4 (D)	–	–	–	–	–	●	**K17**

[1] Coupler for splined shaft to ANSI B92.1a-1976 (spline execution to SAE J744)

● = Available ❍ = In preperation – Not available ▲ = Not for new projects ▭ = Preferred program

Technical Data

Hydraulic fluids

Prior to project design, please see our technical data sheets RE 90220 (mineral oil), RE 90221 (environmentally acceptable fluids) and RE 90223 (HF-fluids) for detailed information on fluids and operating conditions.

When using HF- or environmentally acceptable fluids attention must be paid to possible limitations of the technical data, if necessary contact us. (when ordering please state in clear text the fluid to be used). For operation on Skydrol fluid please consult us.

Operating viscosity range

For optimum efficiency and service life we recommend that the operating viscosity be chosen in the range of:

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

referred to tank temperature (open circuit).

Limit of viscosity range

For critical operating conditions the following values apply:

ν_{min} = 60 SUS (10 mm²/s)
for short periods ($t \leq 1$ min)
at max. permissible case drain temperature of 195 °F (90 °C).

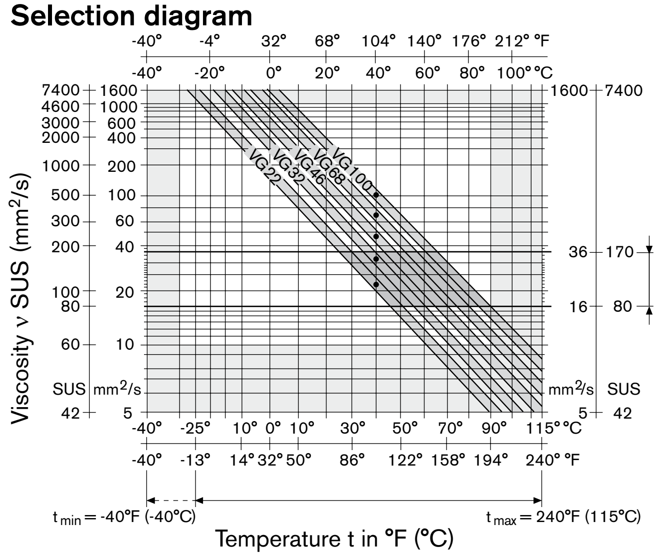
Please note, that the max fluid temperature of 195 °F (90 °C) is also not exceeded in certain areas (for instance bearing area) The fluid temperature in the bearing area is approx. 7 °F (5° K) higher than the average leakage fluid temperature.

ν_{max} = 4640 SUS (1000 mm²/s)
for short periods ($t \leq 1$ min)
on cold start
(t_{min} = $p \leq 435$ psi (30 bar), $n \leq 1000$ rpm, -13 °F (-25 °C))

At temperatures between -13 °F (-25 °C) and -40 °F (-40 °C) special measures may be required, depending on installation conditions . Please consult us for further information.

For detailed information on operation with low temperatures see data sheet RE 90300-03-B.

Selection diagram



Notes on the selection of the hydraulic fluid

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

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

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

Important: The leakage fluid (case drain fluid) temperature is influenced by pressure and input speed, and is always higher than the tank temperature. However, at no point in the circuit may the temperature exceed 195 °F (90 °C).

If it is not possible to comply with these conditions because of 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 service life of the axial piston unit. In order to ensure a reliable functioning of the axial piston unit it is necessary to determine the fluid cleanliness class through a gravimetric evaluation; a cleanliness level of at least 20/18/15 to ISO 4406 is required.

If above mentioned grades cannot be maintained please consult us.

Technical Data

Operating pressure range

Direction of flow

S to B

Pressure at suction port S (inlet)

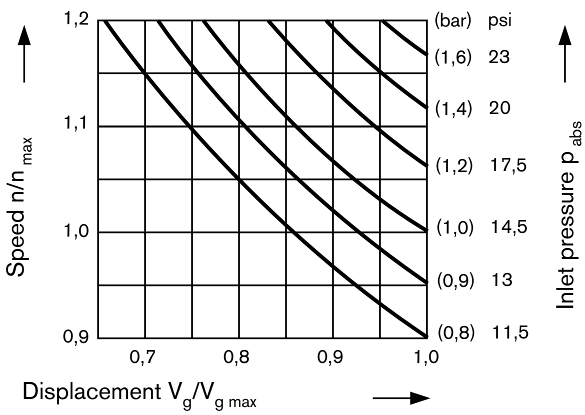
Inlet pressure

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

$p_{abs\ max}$ ______ 145 psi (10 bar)[1)] absolute

Minimum permissible inlet pressure at port S at increased drive speed

In order to prevent damage to the pump (through cavitation) it is necesssary to maintain a minimum inlet pressure. This minimum required inlet pressure level depends on the drive speed and the pump displacement. These values do not apply however to the High-Speed version (see table of values on page 7).



Case drain pressure

Maximum case drain pressure (at ports L, L_1):
Maximum 7 psi (0,5 bar) higher than the inlet pressure at port S, but not higher than 29 psi (2 bar) absolut.

$p_{L\ max\ abs}$ ______ 29 psi (2 bar) [1)]

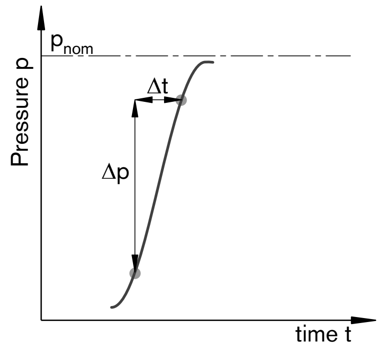
Pressure at service line port (pressure port) B

Nominal pressure p_{nom} ______ 4000 psi (280 bar) absolute

Maximum pressure p_{max} ______ 5100 psi (350 bar) absolute
Total duration of exertion ______ 300 h
Single duration of exertion ______ 2,5 ms

Minimum outlet pressure ______ 145 psi (10 bar)[1)]

Rate of pressure change R_A ___ 232060 psi/s (16000 bar/s)



To safeguard against over pressure pump safety blocks to RE 25880 and RE 25890 for direct mounting onto the SAE flange ports can be ordered separately.

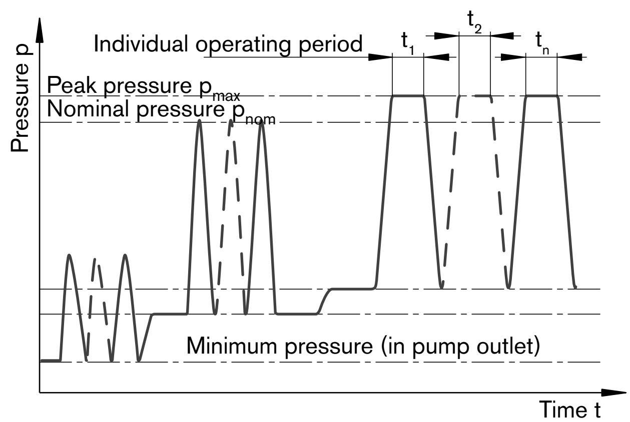
Definition

Nominal pressure p_{nom}
The nominal pressure corresponds to the maximum design pressure.

Maximum pressure p_{max}
The maximum pressure corresponds to the maximum operating pressure within the single operating period. The sum of the single operating periods must not exceed the total operating period.

Minimum pressure (high-pressure side)
Minimum pressure in the pump outlet side (port B) that is required in order to prevent damage to the axial piston unit.

Rate of pressure change R_A
Maximum permissible pressure build-up and pressure reduction speed with a pressure change over the entire pressure range.



Total operating period = $t_1 + t_2 + ... + t_n$

[1)] Other datas on request

Technical data standard units

Table of values (theoretical values, without efficiencies and tolerances; values rounded)

Size			NG	18	28	45	71	100	140
Displacement									
variable pump		$V_{g\,max}$	in^3 (cm^3)	1.10 (18)	1.71 (28)	2.75 (45)	4.33 (71)	6.1 (100)	8.54 (140)
Speed[1]									
maximum at $V_{g\,max}$		n_{max}	rpm	3300	3000	2600	2200	2000	1800
maximum at $V_g < V_{g\,max}$[2]		$n_{max\,perm.}$	rpm	3900	3600	3100	2600	2400	2100
Flow									
at n_{max} und $V_{g\,max}$		$q_{v\,max}$	gpm	15.7	22	31	41	53	67
			(L/min)	(59)	(84)	(117)	(156)	(200)	(252)
at n = 1800 rpm		q_v	gpm	7.2	13.3	21.4	33.8	47.6	67
			(L/min)	(32)	(59)	(81)	(128)	(180)	(252)
Power									
at n_{max}	$\Delta p = 4000$ psi	P_{max}	HP	36.6	51	72	96	124	156
	$\Delta p = 280$ bar		(kW)	(30)	(39)	(55)	(73)	(93)	(118)
at n = 1800 rpm		P	HP(kW)	19 (15)	31 (24)	50 (38)	79 (69)	111 (84)	156 (118)
Torque									
	$\Delta p = 4000$ psi	T_{max}	lb-ft	58	91	146	230	324	453
at $V_{g\,max}$ and	$\Delta p = 280$ bar		(Nm)	(80)	(125)	(200)	(316)	(445)	(623)
	$\Delta p = 1450$ psi	T	lb-ft	14.6	33	53	83	117	164
	$\Delta p = 100$ bar		(Nm)	(30)	(45)	(72)	(113)	(159)	(223)
Torsional stiffness	Drive shaft S	c	lb-ft/rad	8082	16400	27560	53018	89348	125042
			(Nm/rad)	(11000)	(22300)	(37500)	(71884)	(121142)	(169537)
	Drive shaft R	c	lb-ft/rad	10870	19400	30240	56456	–	–
			(Nm/rad)	(14800)	(26300)	(41000)	(76545)	(–)	(–)
	Drive shaft U		lb-ft/rad	5946	12310	22107	38920	67180	–
			(Nm/rad)	(8090)	(16695)	(30077)	(52779)	(91093)	(–)
	Drive shaft K	c	lb-ft/rad	9805	19712	32270	60352	99448	144680
			(Nm/rad)	(13340)	(26189)	(43905)	(82112)	(135303)	(196844)
Moment of inertia rotary unit		J_{TW}	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)
Case volume		V	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)
Weight (without through drive) approx.		m	lbs (kg)	26.5 (12)	33 (15)	46 (21)	73 (33)	99 (45)	132 (60)

1) Values shown are valid for an absolute pressure (p_{abs}) of 15 psi (1 bar) at inlet port S and use with mineral oil (with a specific weight of 0,0073 lb/gal (0,88kg/L)).

2) Values are valid for $V_g \le V_{g\,max}$ or increase of inlet pressure p_{abs} at inlet port S (see diagram page 5)

Note
Exceeding the maximum or falling below the minimum permissible values can lead to a loss of function, a reduction in operational service life or total destruction of the axial piston unit. The permissible values can be determined through calculation.

Determination of size

Flow $q_V = \dfrac{V_g \cdot n \cdot \eta_V}{231\ (1000)}$ [gpm (L/min)]

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

Power $P = \dfrac{2\pi \cdot T \cdot n}{33000\ (60000)} = \dfrac{q_V \cdot \Delta p}{1714\ (600) \cdot \eta_t}$ [HP (kW)]

V_g = Displacement per revolution in in^3 (cm^3)

Δp = Differential pressure in psi (bar)

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

η_V = Volumetric efficiency

η_{mh} = Mechanical-hydraulic efficiency

η_t = Total efficiency ($\eta_t = \eta_V \cdot \eta_{mh}$)

Technical data high speed units only

Tabel of values (theoretical values, without efficiencies and tolerances; values rounded)

Size			NG	45	71	100	140
Displacement							
variable pump		$V_{g\,max}$	in^3 (cm^3)	2.75 (45)	4.33 (71)	6.1 (100)	8.54 (140)
Speed[1]							
maximum at $V_{g\,max}$		n_{max}	rpm	3000	2550	2300	2050
maximum at $V_g < V_{g\,max}$[2]		$n_{max\,perm.}$	rpm	3300	2800	2500	2200
Flow							
at n_{max} and $V_{g\,max}$		$q_{v\,max}$	gpm	35	48	61	76
			(L/min)	(135)	(181)	(230)	(287)
at n = 1800 rpm		q_v	gpm	21.4	33.8	47.6	67
			(L/min)	(81)	(128)	(180)	(252)
Power							
at n_{max}	$\Delta p = 4000$ psi	P_{max}	HP	83	112	142	177
	$\Delta p = 280$ bar		(kW)	(62)	(84)	(107)	(132)
at n = 1800 rpm		P	HP(kW)	50 (38)	79 (59)	111 (84)	156 (118)
Torque							
at $V_{g\,max}$ and	$\Delta p = 4000$ psi	T_{max}	lb-ft	146	230	324	453
	$\Delta p = 280$ bar		(Nm)	(200)	(316)	(445)	(623)
	$\Delta p = 1450$ psi	T	lb-ft	53	83	117	164
	$\Delta p = 100$ bar		(Nm)	(72)	(113)	(159)	(223)
Torsional stiffness	Drive shaft S	c	lb-ft/rad	27560	53018	89348	125042
			(Nm/rad)	(37500)	(71884)	(121142)	(169537)
	Drive shaft R	c	lb-ft/rad	30240	56456	–	–
			(Nm/rad)	(41000)	(76545)	(–)	(–)
	Drive shaft U		lb-ft/rad	22107	–	66953	–
			(Nm/rad)	(30077)	(–)	(34463)	(–)
	Drive shaft K	c	lb-ft/rad	32270	60352	99448	144680
			(Nm/rad)	(43905)	(82112)	(135303)	(196844)
Moment of inertia rotary unit		J_{TW}	lbs-ft^2 (kgm^2)	0.0783 (0.0033)	0.1970 (0.0083)	0.3963 (0.0167)	0.5743 (0.0242)
Case volume		V	gal (L)	0.26 (1.0)	0.4 (1.6)	0.6 (2.2)	0.8 (3.0)
Weight (without through drive) approx.		m	lbs (kg)	46 (21)	73 (33)	99 (45)	132 (60)

1) Values shown are valid for an absolute pressure (p_{abs}) of 15 psi (1 bar) at inlet port S and use with mineral oil (with a specific weight of 0,0073 lb/gal (0,88kg/L)).

2) Don´t ecxeed the maximum flow.

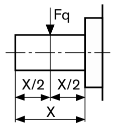
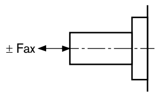
The pump sizes 45, 71, 100, 140 are optionaly available in a high speed version.
In comparison with the standard units, pumps in this version can be operated at higher input speeds without any change in outer dimensions.

Note

Exceeding the maximum or falling below the minimum permissible values can lead to a loss of function, a reduction in operation service life or total destruction of the axial piston unit. The permissible values can be determined through calculation.

Technical data

Permissible radial and axial forces on drive speed

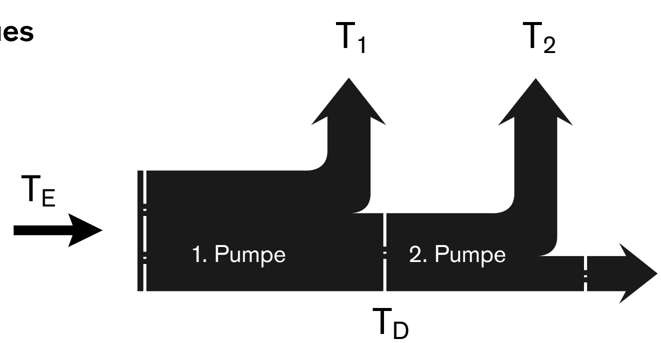
Size			NG		18	28	45	71	100	140
Radial force, max.		at X/2	$F_{q\ max}$	lbf	79	270	337	427	517	630
				(N)	(350)	(1200)	(1500)	(1900)	(2300)	(2800)
Axial force, max.			F_{ax}	lbf	157	225	337	540	900	1080
				(N)	(700)	(1000)	(1500)	(2400)	(4000)	(4800)

Permissible input and through drive torques

Size	NG		18	28	45	71	100	140
Torque, max.								
(at $V_{g\ max}$ and $\Delta p = 4000$ psi	T_{max}	lb-ft	58	91	146	230	324	453
(280 bar[1]))		(Nm)	(80)	(125)	(200)	(316)	(445)	(623)
Input torque, max.[2]								
at drive shaft S	$T_{E\ zul}$	lb-ft	92	146	235	462	814	1195
		(Nm)	(124)	(198)	(319)	(626)	(1104)	(1620)
SAE J744 (ANSI B92.1a-1996)		in	3/4	7/8	1	1 1/4	1 1/2	1 3/4
at drive shaft R	$T_{E\ zul}$	lb-ft	118	184	295	475	–	–
		(Nm)	(160)	(250)	(400)	(644)	(–)	(–)
SAE J744 (ANSI B92.1a-1996)		in	3/4	7/8	1	1 1/4	–	–
at drive shaft K	$T_{E\ zul}$	lb-ft	77	107	156	319	553	875
		(Nm)	(104)	(145)	(212)	(433)	(750)	(1186)
		in	0.7500	0.8750	1.0000	1.2500	1.5000	1.7500
		(mm)	(19.05)	(22.225)	(25.4)	(31.75)	(38.1)	(44.45)
Through drive torque, max.								
at drive shaft S	$T_{D\ zul}$	lb-ft	80	118	235	363	574	934
		(Nm)	(108)	(160)	(319)	(492)	(778)	(1266)
at drive shaft R	$T_{D\ zul}$	lb-ft	88	130	269	404	–	–
		(Nm)	(120)	(176)	(365)	(548)	(–)	(–)
at drive shaft K	$T_{D\ zul}$	lb-ft	77	107	156	319	553	875
		(Nm)	(104)	(145)	(212)	(433)	(750)	(1186)

1) Efficiency not considered
2) For drive shaft without radial force

Distribution of torques



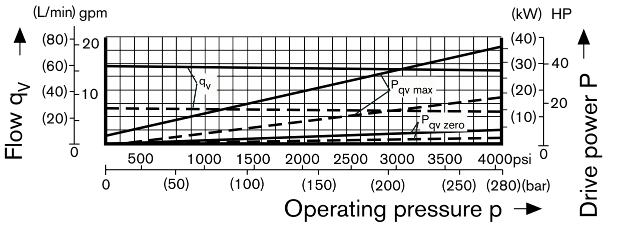
Operating curves for pumps with pressure control

Drive power and flow

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

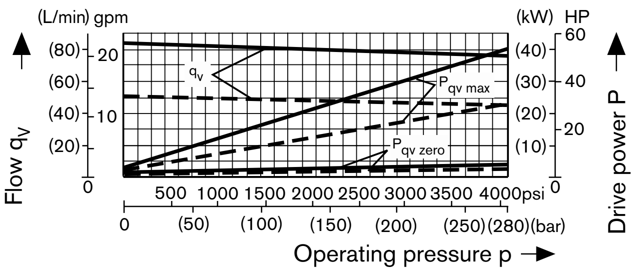
Size 18

– – – n = 1800 rpm
——— n = 3300 rpm



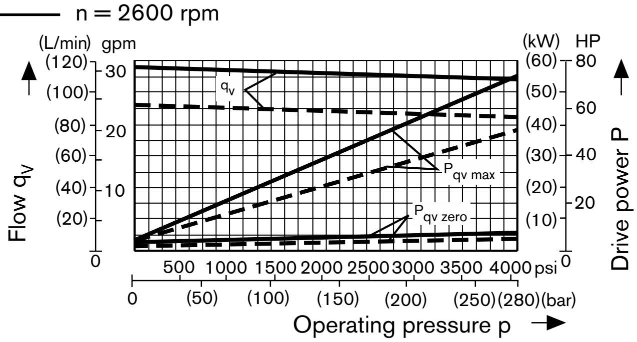
Size 28

– – – n = 1800 rpm
——— n = 3000 rpm



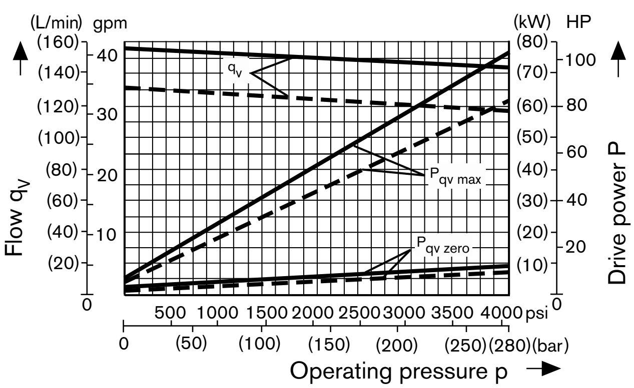
Size 45

– – – n = 1800 rpm
——— n = 2600 rpm



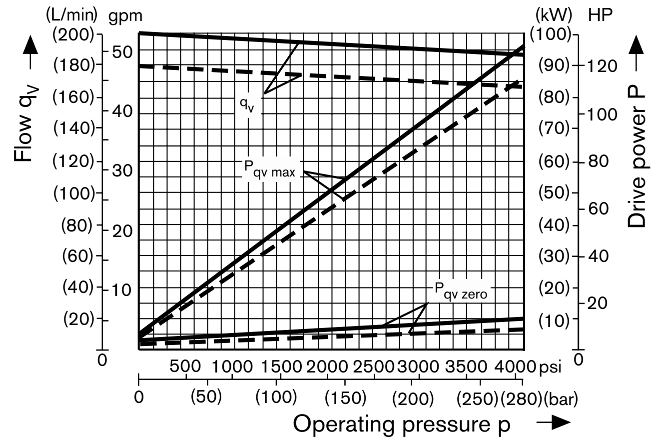
Size 71

– – – n = 1800 rpm
——— n = 2200 rpm



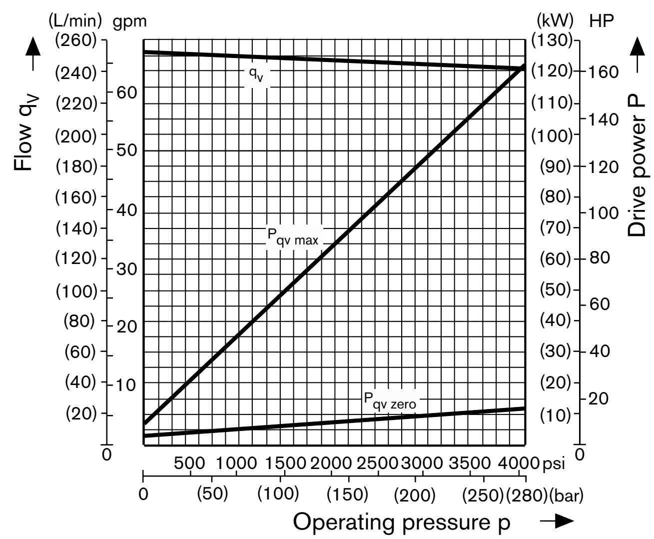
Size 100

– – – n = 1800 rpm
——— n = 2000 rpm



Size 140

——— n = 1800 rpm



DG – Two point, direct control

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

This will supply control fluid directly to the stroking piston; a minimum pressure of $p_{st} \geq 725$ psi (50 bar) is required.

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

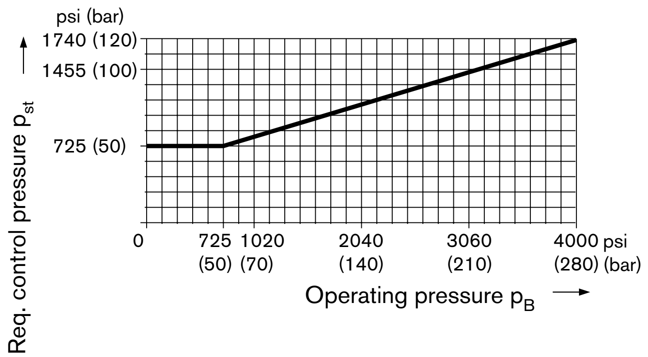
Please note, that the required control pressure at port X is directly dependent on the actual operating pressure p_B in port B (see control pressure diagram).

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

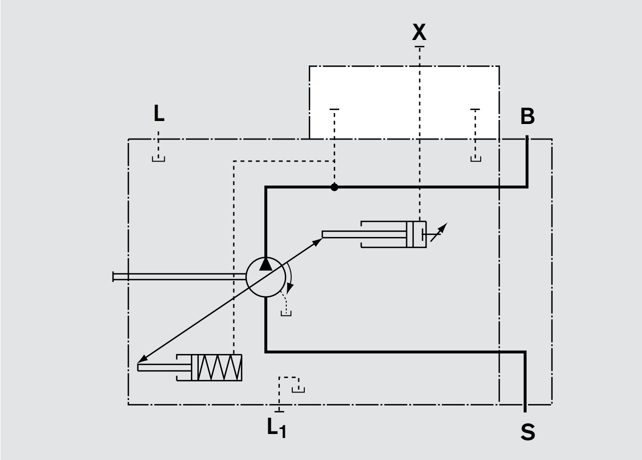
Control pressure p_{st} in X ≥ 725 psi (50 bar) $\triangleq V_{g\,min}$

The max. permissible control pressure is p_{st} = 1740 psi (120 bar).

Control pressure diagram



Schematic DG



Ports

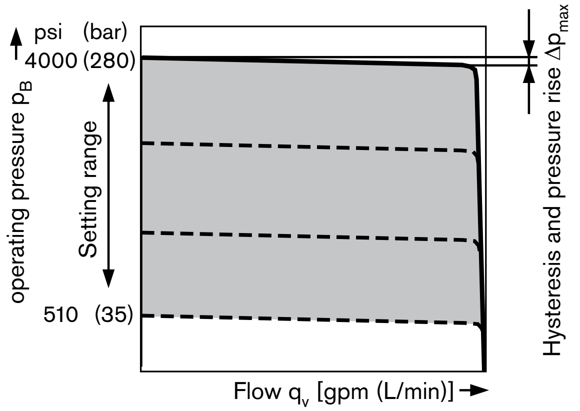
B	Outlet port
S	Inlet port
L, L_1	Case drain port (L_1 plugged)
X	Pilot pressure port (plugged)

DR – Pressure control

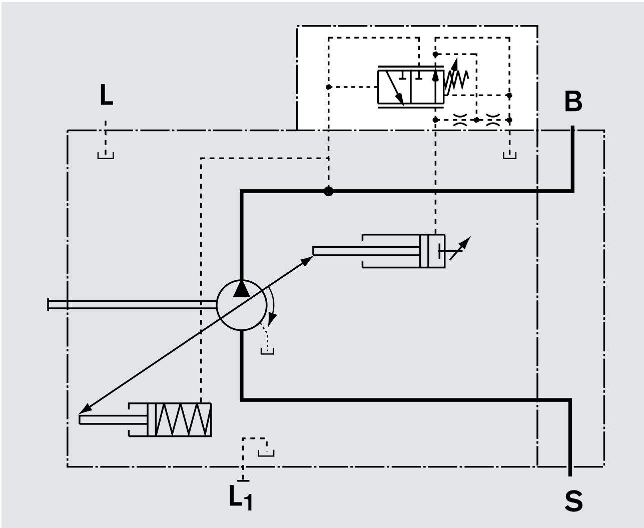
The DR-pressure control limits the maximum pressure at the pump outlet within the pump's control range. The pump therefore supplies only the amount of fluid as required by the actuators. This maximum pressure level can be set steplessly at the control valve.

Static characteristic

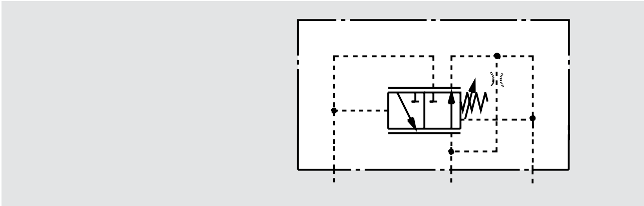
at n_1 = 1500 rpm; t_{fluid} = 122 °F (50 °C)



Schematic DR size 18 up to 100



Size 140



Ports

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

Controller data

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

Pressure increase, max

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

Maximum pilot fluid consumption_______of 0.8 gpm (3 L/min)

Flow loss at q_{Vmax} see page 9.

DRG – Pressure control, remote

The DR-pressure control (see page 11) is overriding this DRG-remote setting of max. outlet pressure.

A pressure relief valve can be externally piped to port X for remote setting of pressure below the setting of the DR control valve spool. This relief valve is not included in the pump supply.

The differential pressure at the DRG-control spool is set as standard to 290 psi (20 bar). This results in a pilot fluid flow to the relief valve of approx. 0.4 gpm (1,5 L/min) at port X. If another setting is required (range from 145 and 320 psi (10 to 22 bar)) please state in clear text.

As a separate relief valve we can recommend:

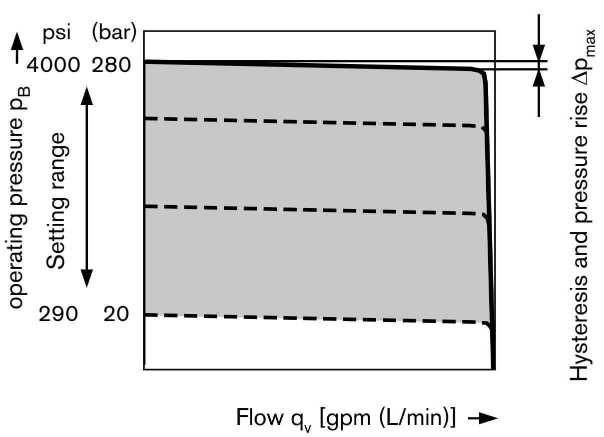
DBDH 6 (hydraulic) to RE 25402 or

DBETR-SO 381 with orifice dia. 0.03 inch (0,8 mm) in P (electric) to RE 29166.

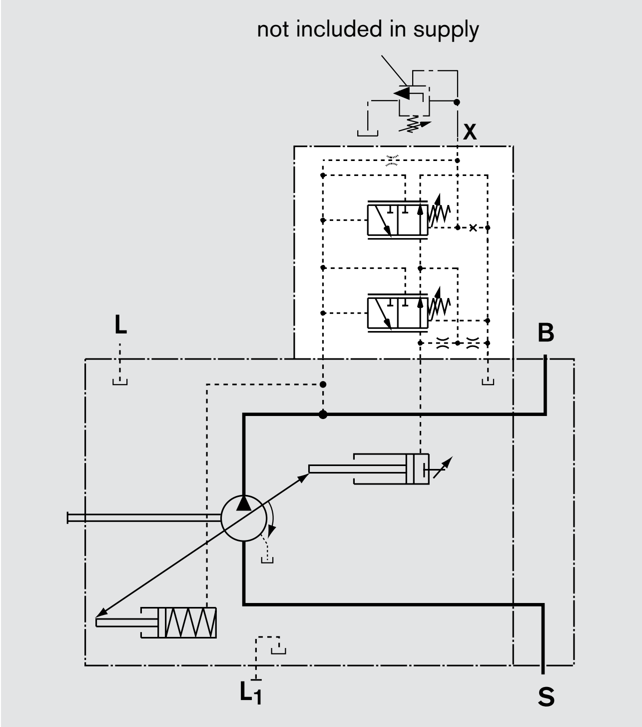
The max. lenght of piping should not exceed 6.6 ft (2 m).

Static characteristic

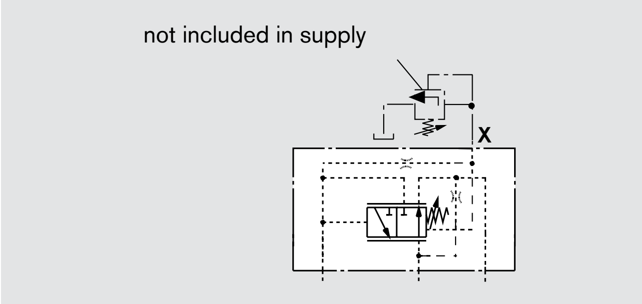
at n_1 = 1500 rpm; t_{fluid} = 122 °F (50 °C)



Schematic DRG size 18 up to 100



Size 140



Ports

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

Controller data

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

Pressure increase, max

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

Maximum pilot fluid consumption_______of 0.8 gpm (3 L/min)

Flow loss at q_{Vmax} see page 9.

DFR/DFR1 – Pressure and flow control

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

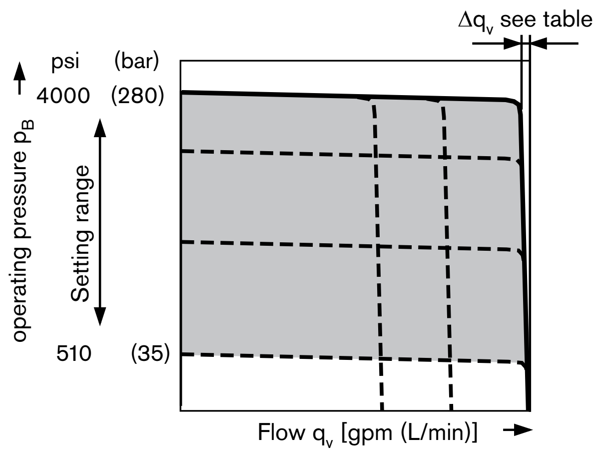
The pressure control overrides the flow control function.

Note

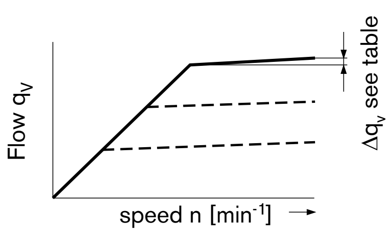
The DFR1-valve version has no connection between X and the tank (pump housing).
Unloading the LS-pilot line must be possible in the valve system.
Because of the flushing function sufficient unloading of the X-line must also be provided.

Static characteristic

Flow controller at $n_1 = 1500$ rpm; $t_{fluid} = 122°F$ (50°C))



Static characteristic at variable speed



Control data

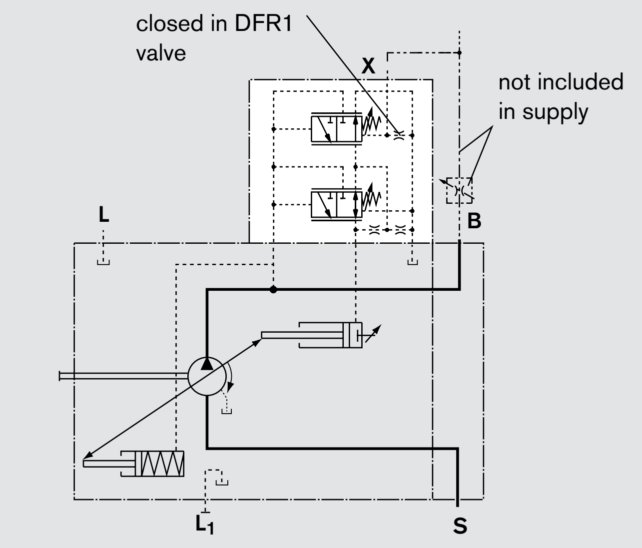
For pressure control see page 11.

Max. flow deviation measured at a drive speed of n = 1500 rpm.

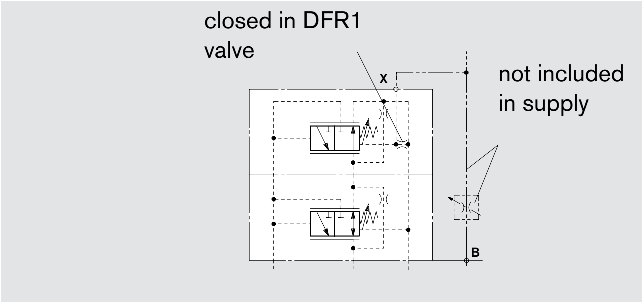
Size	18	28	45	71	100	140
Δqv_{max}						
gpm	0.24	0.26	0.48	0.75	1.06	1.60
(L/min)	(0,9)	(1,0)	(1,8)	(2,8)	(4,0)	(6,0)

Pilot fluid consumption DFR max. approx. 0.8...1.2 gpm (3...4,5 L/min)
Pilot fluid consumption DFR1 max. approx. 0.8 gpm (3 L/min)
Flow loss at q_{Vmax} see page 9

Schematic DFR size 18 up to 100



Size 140



Ports

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

Differential pressure Δp

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

Unloading port X to tank (with outlet port B closed) results in a zero stroke (standby) pressure of p = 260 ± 30 psi (18 ± 2 bar) (dependent on the Δp setting).

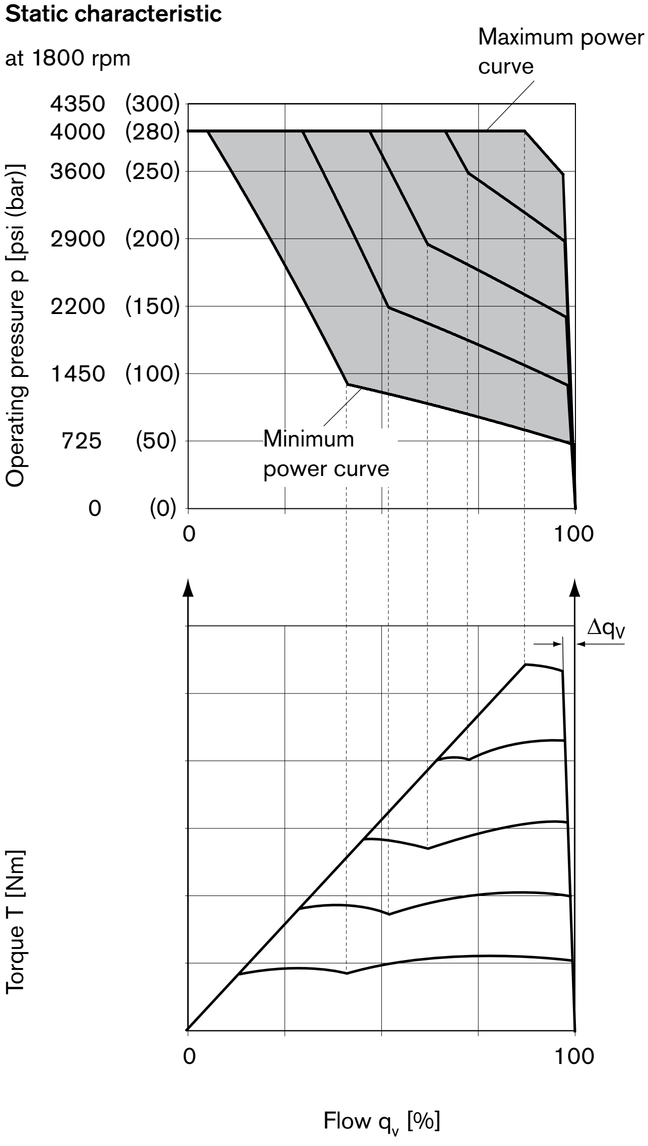
DFLR – Pressure-flow-power control

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 posssible below the limit of the power curve.

Static characteristic

at 1800 rpm



The power characteristic is set at the factory, please state your requierements in clear text e.g. 27 HP (20 kW) at 1800 rpm.

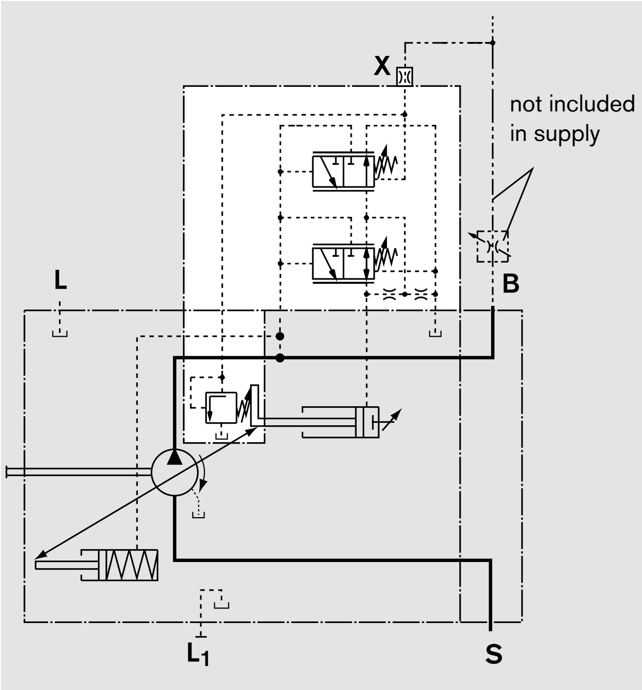
Control data

For technical data constant pressure control see page 11.
For technical data flow control see page 13.

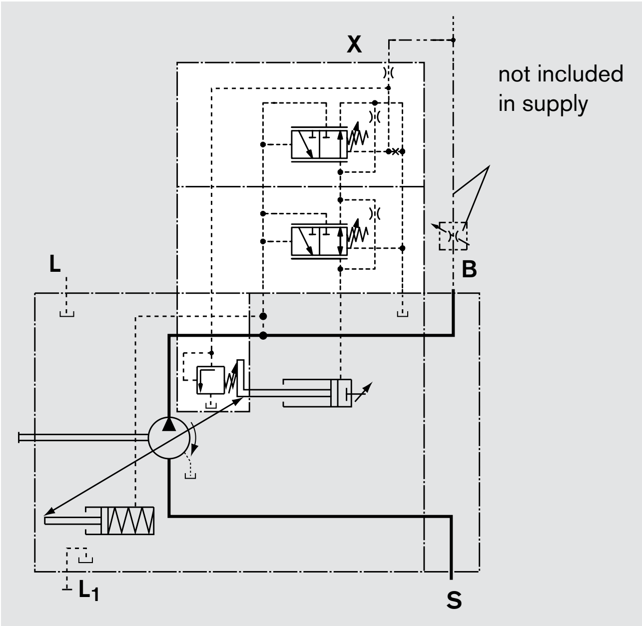
Start of control ______ from up to 735 psi (50 bar) and above 3480 psi (240 bar)
Pilot fluid consumption ___ max. approx. 1.45 gpm (5,5 L/min)

Flow loss at q_{max} see page 9.

Schematic DFLR Size 28 up to 100



Size 140



Ports

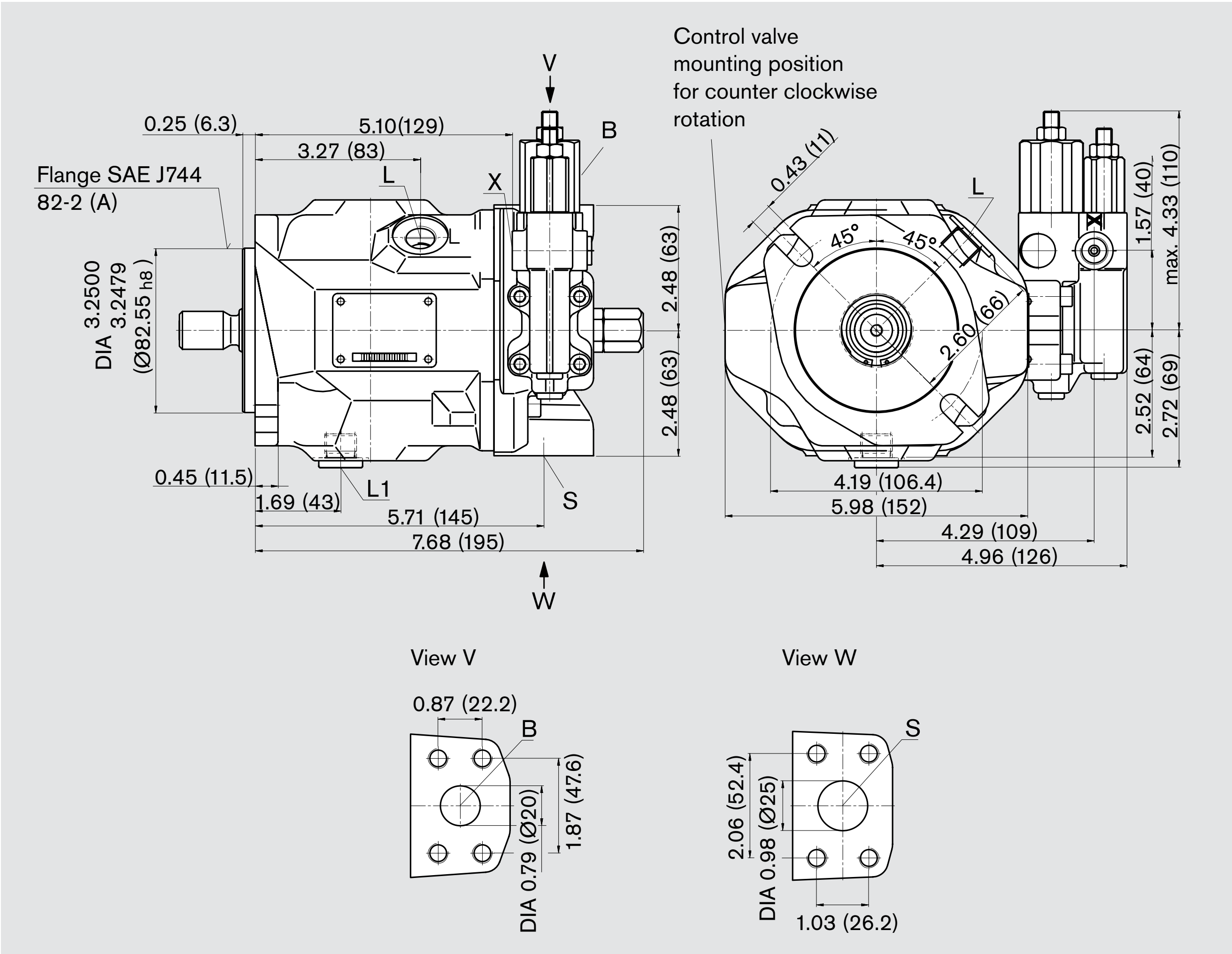
B	Outlet port
S	Inlet port
L, L_1	Case drain port (L_1 plugged)
X	Pilot pressure port

Notes

Dimensions, size 18

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

DFR/DFR1 Pressure and flow control; clockwise rotation



Ports

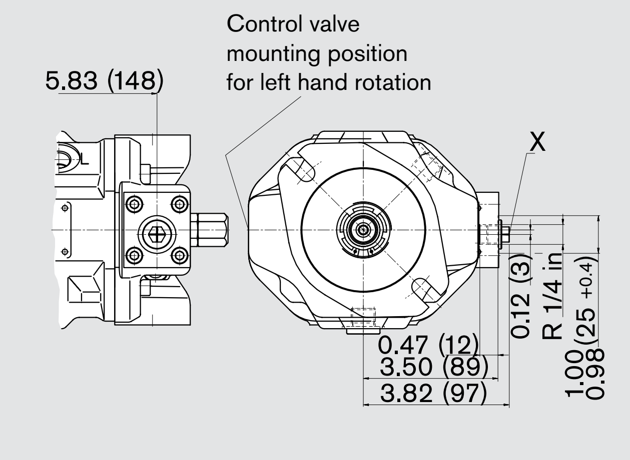
Designation	Port for	Standard	Size [1]	Peak press. [psi (bar)] [2]	State
B	Service line (standard pressure range) Fixing thread	SAE J518 ISO 68	3/4 in 3/8-16 UNC-2B; 0.79 20 deep	 5100 (350)	O
S	Suction (standard pressure range) Fixing thread	SAE J518 ISO 68	1 in 3/8-16 UNC-2B; 0.79 20 deep	 75 (5)	O
L	Case drain	ISO 11926	9/16-18 UNF-2B	30 (2)	O [3]
L_1	Case drain	ISO 11926	9/16-18 UNF-2B	30 (2)	plugged [3]
X	Pilot pressure	ISO 11926	7/16-20UNF-2B; 0.45 (11.5) deep	5100 (350)	O
X	Control press. for DG control	DIN 3852	R 1/4 in	1740 (120)	O

[1] For the max. tightening torques the instructions on page 36 must be observed.
[2] Application dependent pressure spikes can occur.. Please consider this when selecting measuring equipment or fittings
[3] Dependent on the installation position, port L or L_1 must be connected
O = Must be connected (plugged on delivery)

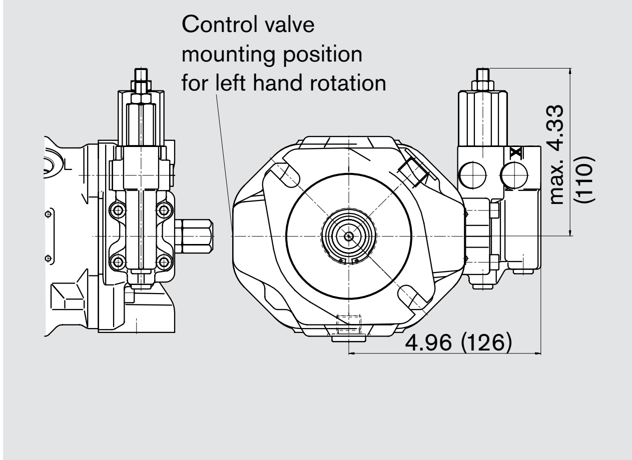
Dimensions, size 18

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

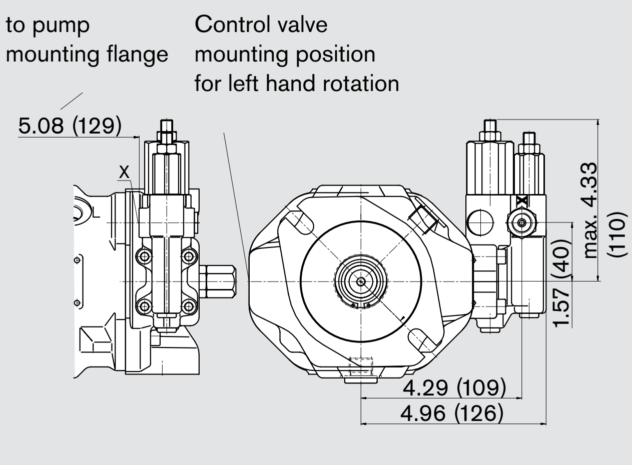
DG
Two point, direct control



DR
Pressure control



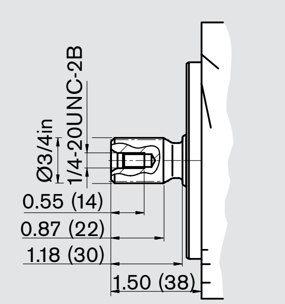
DRG
Pressure control, remote



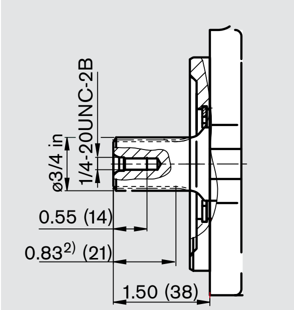
For details of hydraulic connections see page 16

Drive shafts

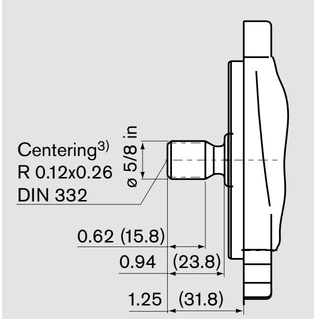
S Splined shaft 3/4 in 11T 16/32 DP[1)] SAE J744 - 19-4 (A-B)



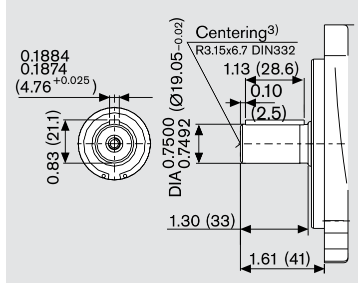
R Splined shaft 3/4 in 11T 16/32 DP[1)] SAE J744 - 19-4 (A-B)



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



K Parallel with key ISO 3019-1 22-1

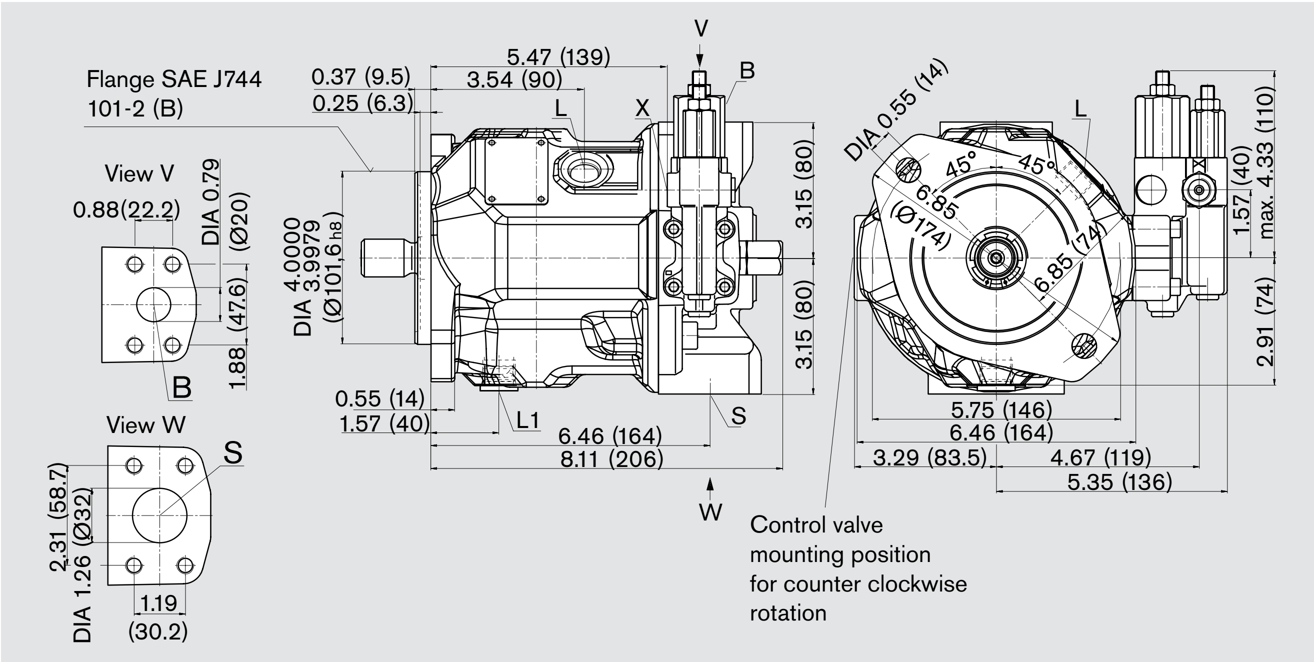


1) ANSI B92.1a-1976, 30° pressure angle, flat root side fit, flank centering, tolerance class 5
2) Usuable spline length
3) Axial locking of the coupling e.g. via clamping or radial mounting binding screw

Dimensions, size 28

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

DFR/DFR1 Pressure and flow control; clockwise rotation



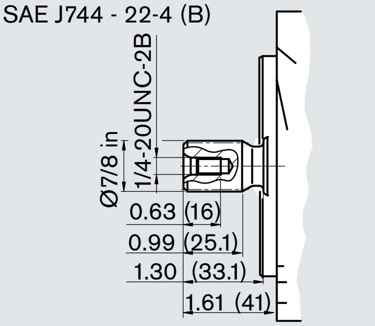
Ports

Designation	Port for	Standard	Size [1]	Peak press. [psi (bar)] [2]	State
B	Service line (standard pressure range) Fixing thread	SAE J518 ISO 68	3/4 in 3/8-16 UNC-2B; 0.79 (20) deep	 5100 (350)	O
S	Inlet (standard pressure range Fixing thread	SAE J518 ISO 68	1 1/4 in 7/16-14 UNC-2B; 0.94 (24) deep	 75 (5)	O
L, L_1	Case drain (L_1 plugged)	ISO 11926	3/4-16 UNF-2B; 0.47 (12) deep	30 (2)	O [3]
X	Pilot pressure	ISO 11926	7/16-14UNC-2B; 0.47 (12) deep	5100 (350)	O
X	Control pressure for DG control	DIN 3852	R 1/4 in	1740 (120)	O

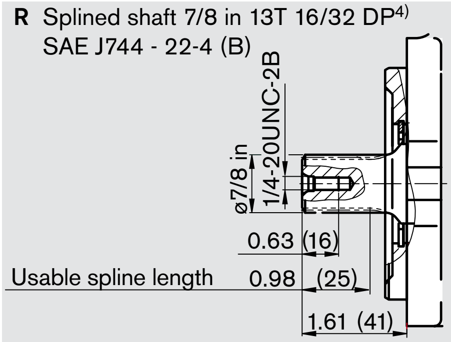
[1] For the max. tightening torques the instructions on page 36 must be observed.
[2] Application dependent pressure spikes can occur.. Please consider this when selecting measuring equipment or fittings
[3] Dependent on the installation position, port L or L_1 must be connected
O = Must be connected (plugged on delivery)

Drive shaft

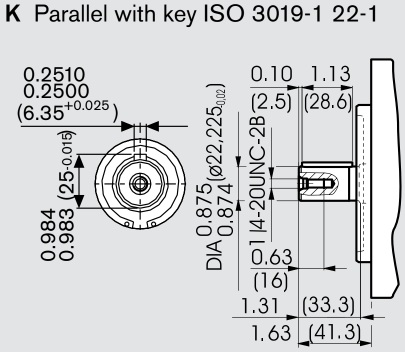
S Splined shaft 7/8 in 13T 16/32 DP[4]
SAE J744 - 22-4 (B)



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



K Parallel with key ISO 3019-1 22-1

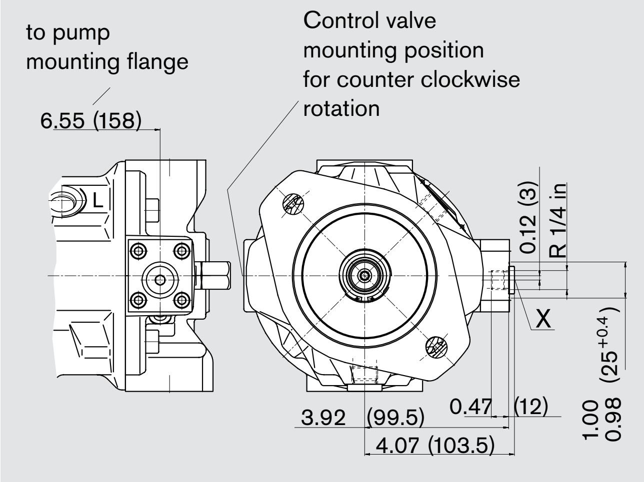


[4] ANSI B92.1a-1976, 30° pressure angle, flat base, flank centering, fit class 5

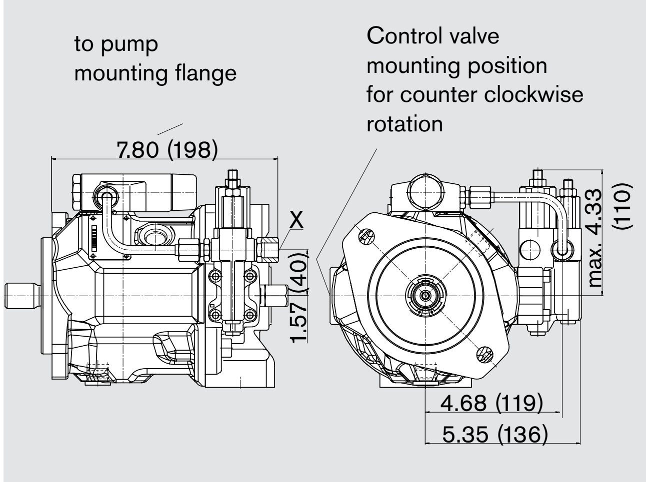
Dimensions, size 28

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

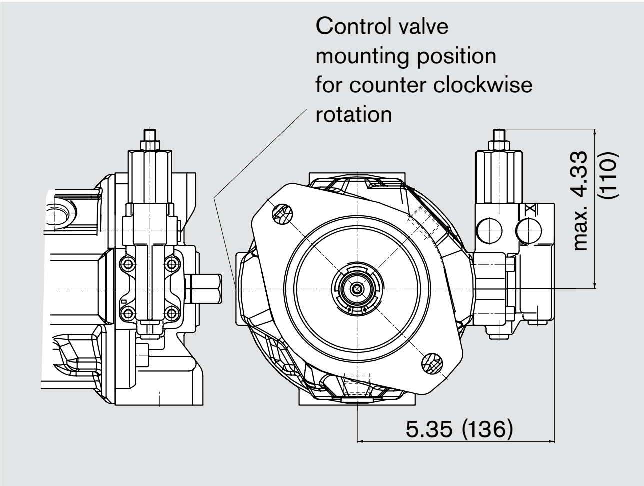
DG
Two point, direct control



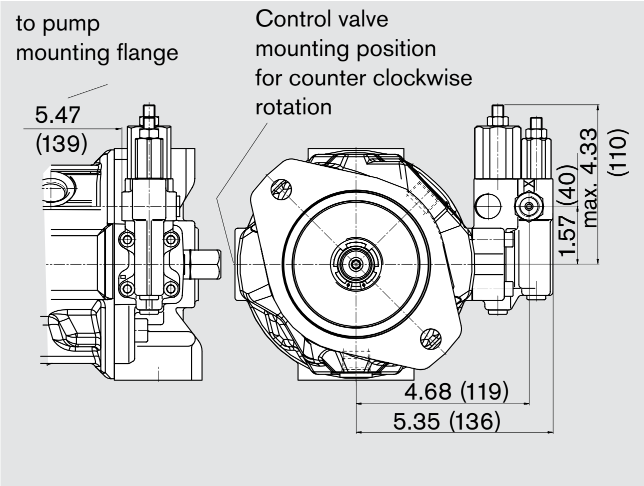
DFLR
Pressure, flow and power control



DR
Pressure control



DRG
Pressure control, remote

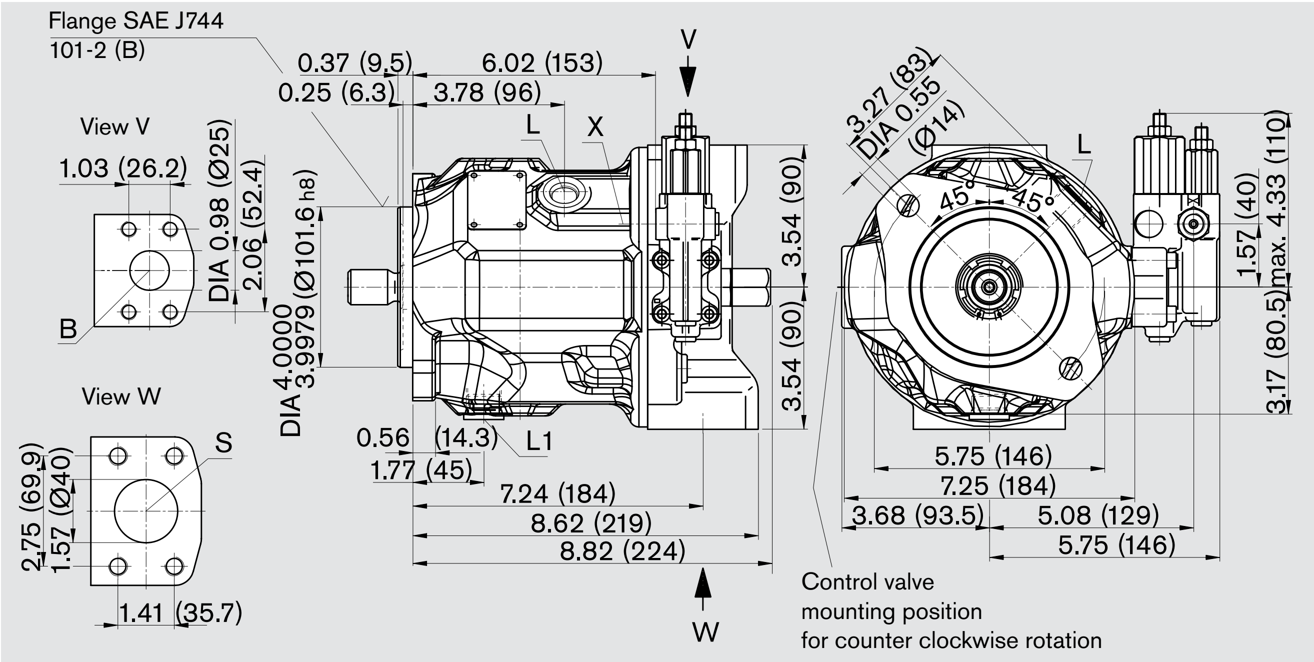


For details of hydraulic connections see page 18

Dimensions, size 45

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

DFR/DFR1 Pressure and flow control; clockwise rotation



Ports

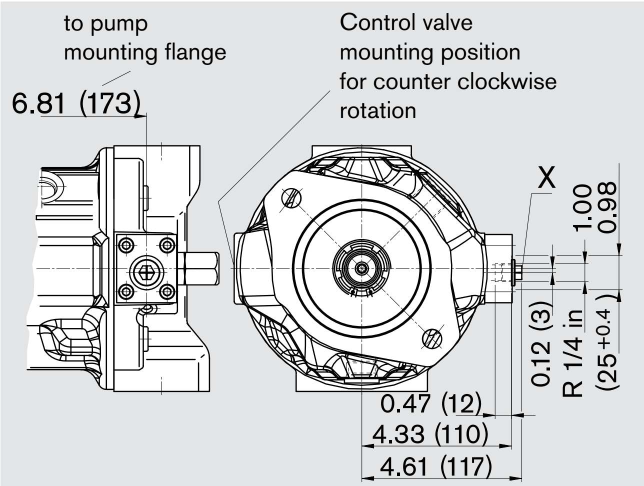
Designation	Port for	Standard	Size [1]	Peak press. [bar] [2]	State
B	Service line (standard pressure range) Fixing thread	SAE J518 ISO 68	1 in 3/8-16 UNC-2B; 0.71 (18) deep	5100 (350)	O
S	Inlet (standardpressure range) Fixing thread	SAE J518 ISO 68	1 1/2 in 1/2-13 UNC-2B; 0.87 (22) deep	75 (5)	O
L	Case drain	ISO 11926	7/8-14 UNF-2B	30 (2)	O [3]
L_1	Case drain	ISO 11926	7/8-14 UNF-2B	30 (2)	plugged [3]
X	Pilot pressure	ISO 11926	7/16-20 UNF-2B; 0.45 (11,5) deep	5100 (350)	O
X	Control pressure for DG control	DIN 3852	R 1/4 in	1740 (120)	O

[1] For the max. tightening torques the instructions on page 36 must be observed.
[2] Application dependent pressure spikes can occur.. Please consider this when selecting measuring equipment or fittings
[3] Dependent on the installation position, port L or L_1 must be connected
O = Must be connected (plugged on delivery)

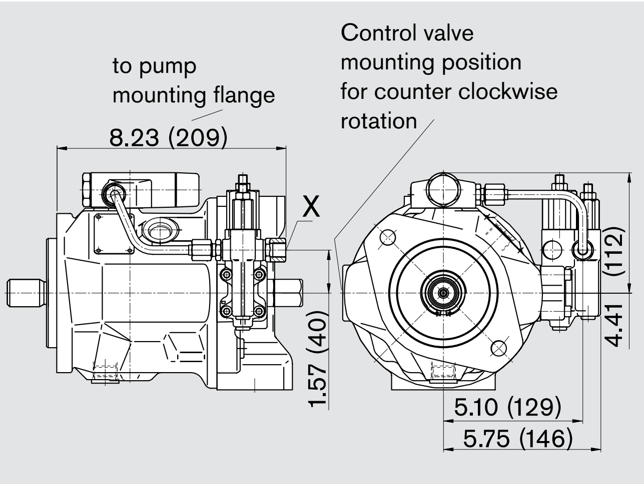
Dimensions, size 45

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

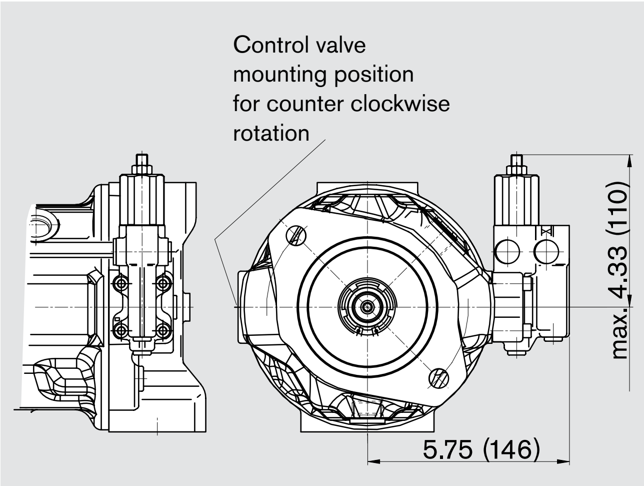
DG
Two point, direct control



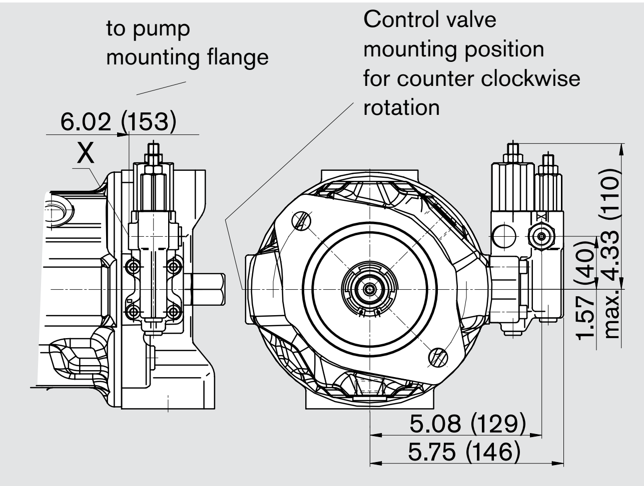
DFLR
Pressure, flow and power control



DR
Pressure control

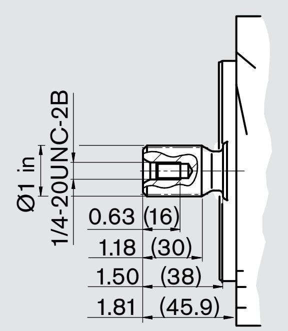


DRG
Pressure control, remote

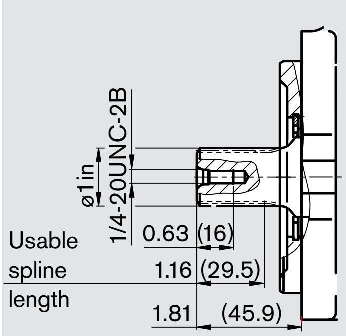


Drive shaft

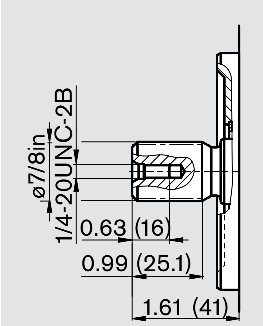
S Splined shaft 1 in
15T 16/32 DP[4]
SAE J744 - 25-4 (B-B)



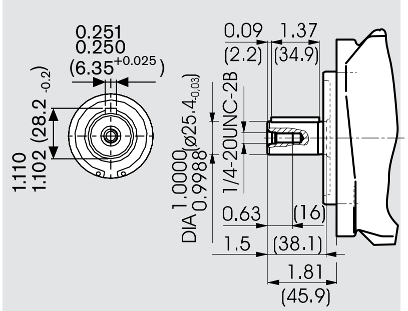
R Splined shaft 1 in
15T 16/32 DP[4]
SAE J744 - 25-4 (B-B)



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



K Parallel with key
ISO 3019-1
25-1

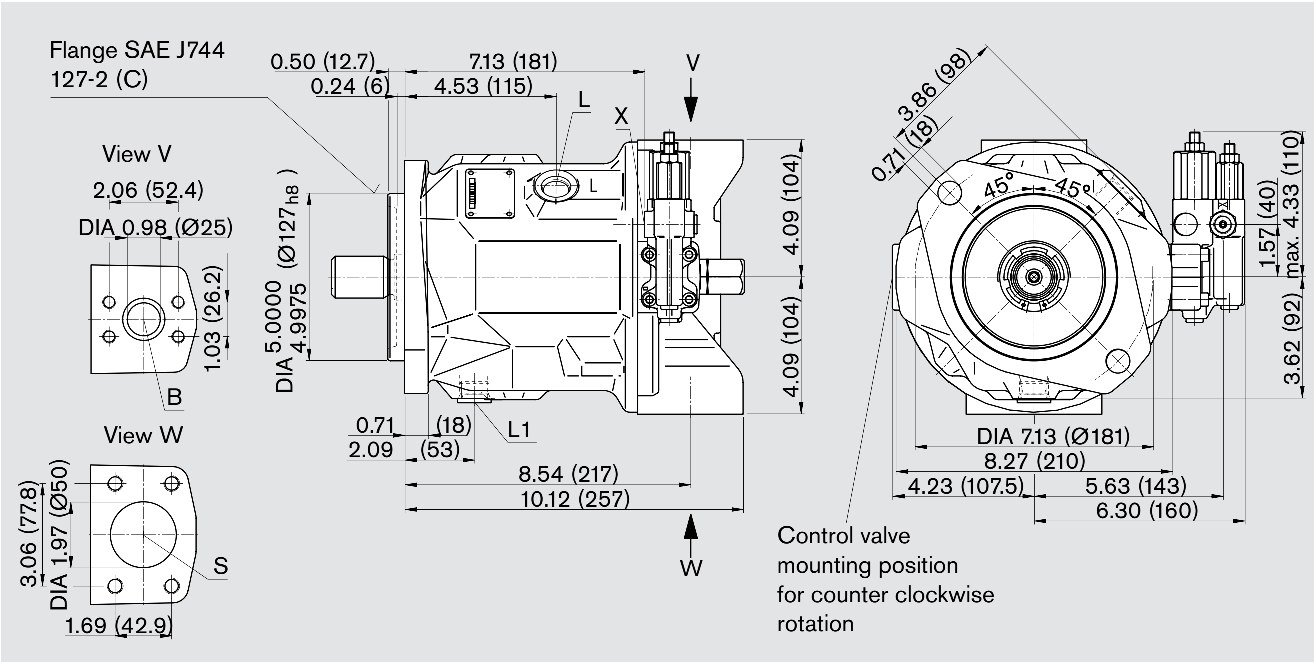


[4] ANSI B92.1a-1976, 30° pressure angle, flat base, flank centering, fit class 5

Dimensions, size 71

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

DFR/DFR1 Pressure and flow control; clockwise rotation



Ports

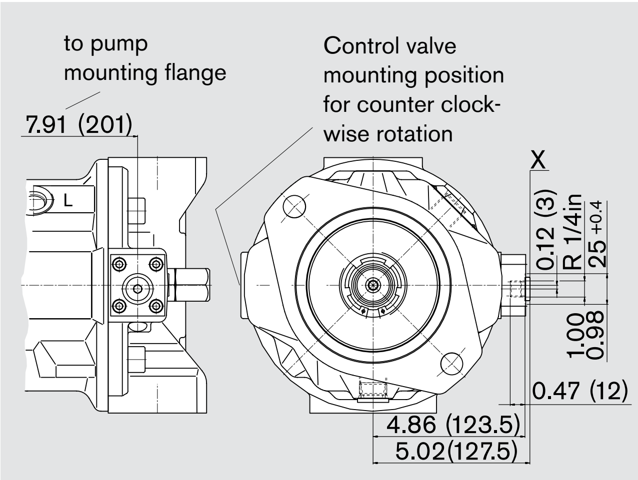
Designation	Port for	Standard	Size [1]	Peak press. [psi (bar)] [2]	State
B	Service line (standard pressure range) Fixing thread	SAE J518 ISO 68	1 in 3/8-16 UNC-2B; 0.71 (18) deep	 5100 (350)	O
S	Inlet (standard pressure range) Fixing thread	SAE J518 ISO 68	2 in 1/2-13 UNC-2B; 0.87 (22) deep	 75 (5)	O
L	Case drain	ISO 11926	7/8-14 UNF-2B	30 (2)	O [3]
L_1	Case draint	ISO 11926	7/8-14 UNF-2B	30 (2)	plugged [3]
X	Pilot pressure	ISO 11926	7/16-20 UNF-2B; 0.45 (11.5) deep	5100 (350)	O
X	Control pressure for DG control	DIN 3852	R 1/4 in	1740 (120)	O

[1] For the max. tightening torques the instructions on page 36 must be observed.
[2] Application dependent pressure spikes can occur.. Please consider this when selecting measuring equipment or fittings
[3] Dependent on the installation position, port L or L_1 must be connected
O = Must be connected (plugged on delivery)

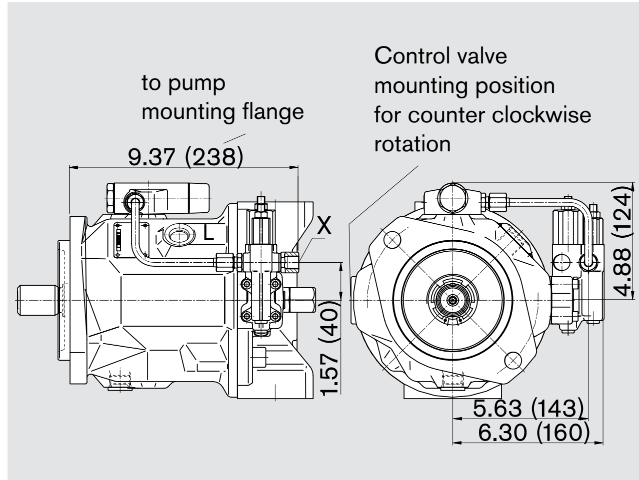
Dimensions, size 71

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

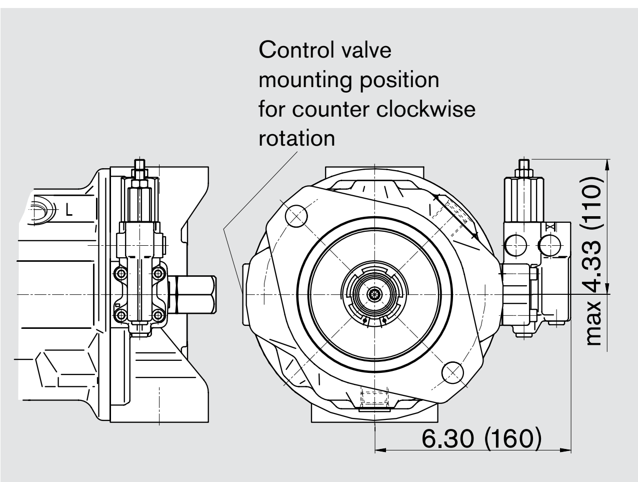
DG
Two point, direct control



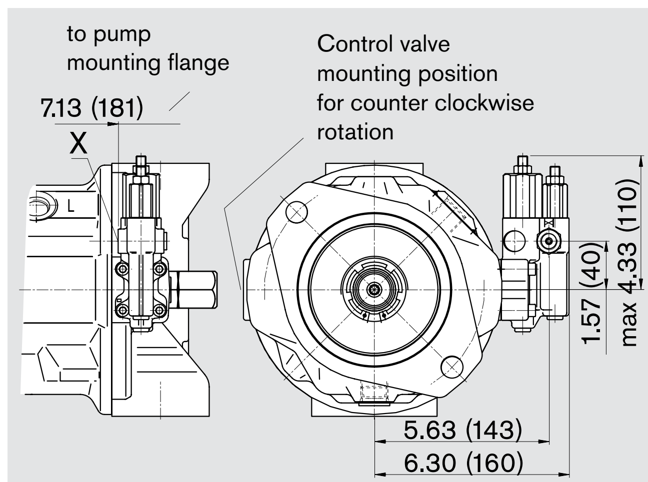
DFLR
Pressure, flow and power control



DR
Pressure control

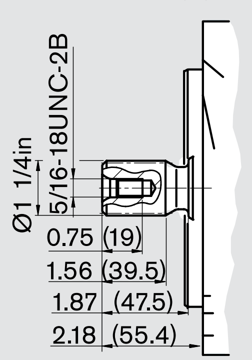


DRG
Pressure control, remote

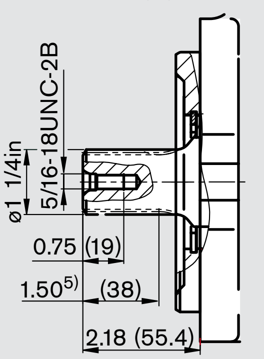


Drive shafts

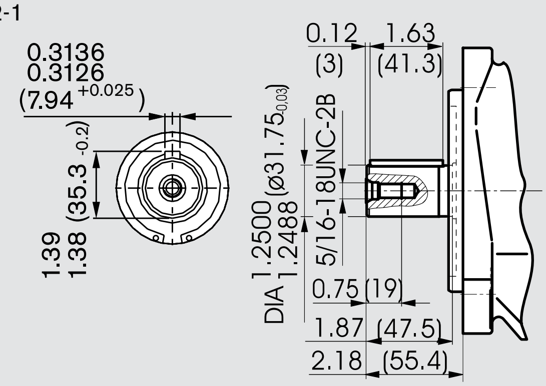
S Splined shaft 1 1/4 in
14T 12/24 DP[4)]
SAE J744 - 32-4 (C)



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



K Parallel with key
ISO 3019-1
32-1

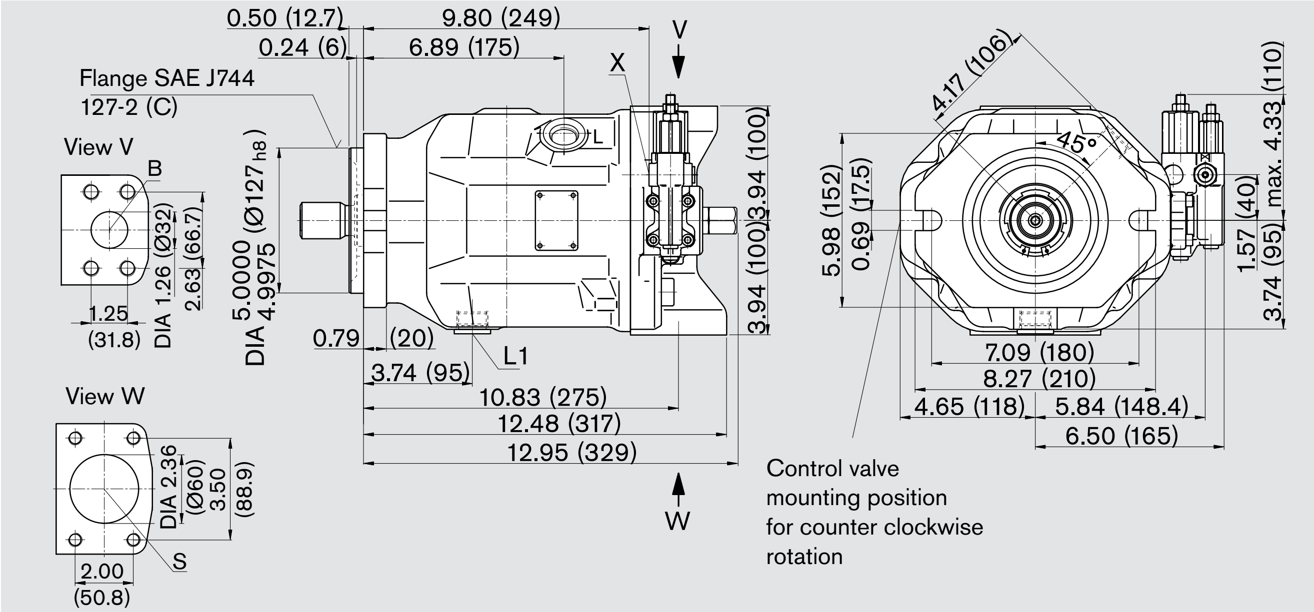


4) ANSI B92.1a-1976, 30° pressure angle, flat base, flank centering, fit class 5
5) Usable spline length

Dimensions, size 100

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

DFR/DFR1 Pressure and flow control; clockwise rotation



Ports

Designation	Port for	Standard	Size 1)	Peak press. [psi (bar)] 2)	State
B	Service line (high pressure range) Fixing thread	SAE J518 ISO 68	1 1/4 in 1/2-13 UNC-2B; 0.75 (19) deep	 5100 (350)	O
S	Inlet (standard pressure range Fixing thread	SAE J518 ISO 68	2 1/2 in 1/2-13 UNC-2B; 1.06 (27) deep	 75 (5)	O
L	Case drain	ISO 11926	1 1/16-12 UNF-2B	30 (2)	O 3)
L_1	Case drain	ISO 11926	1 1/16-12 UNF-2B	30 (2)	plugged 3)
X	Pilot pressure	ISO 11926	7/16-20 UNF-2B; 0.45 (11.5) deep	5100 (350)	O
X	Control pressure for DG control	DIN 3852	R 1/4 in	1740 (120)	O

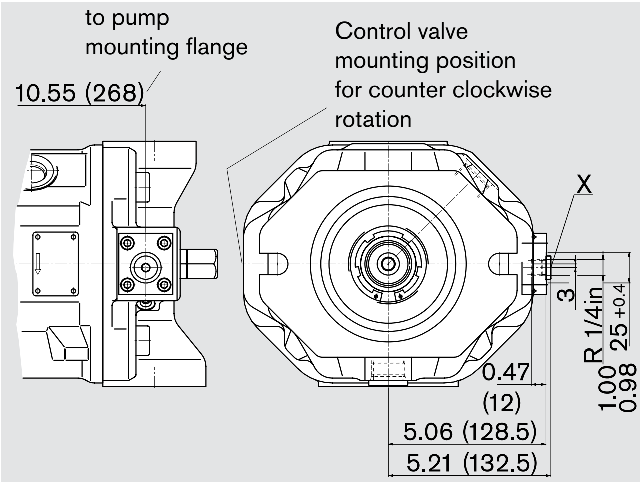
1) For the max. tightening torques the instructions on page 36 must be observed.
2) Application dependent pressure spikes can occur.. Please consider this when selecting measuring equipment or fittings
3) Dependent on the installation position, port L or L_1 must be connected
O = Must be connected (plugged on delivery)

Dimensions, size 100

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

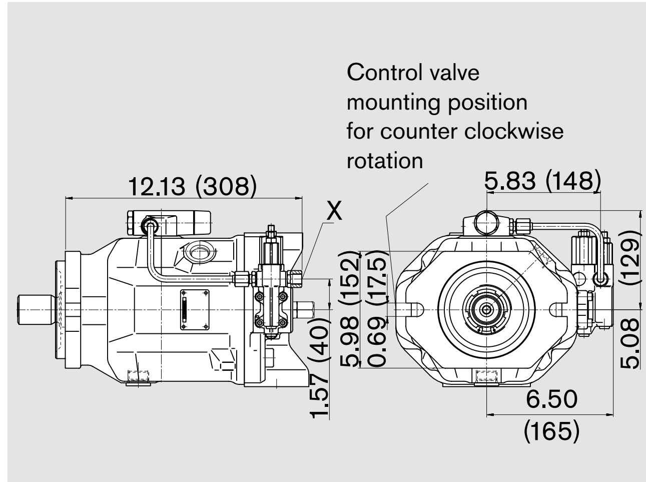
DG

Two point, direct control



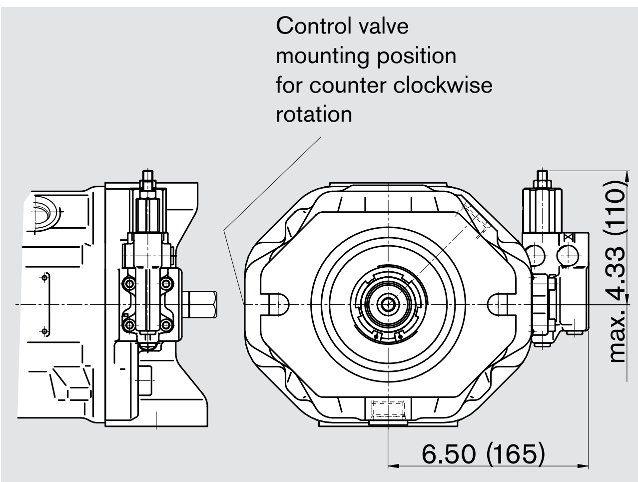
DFLR

Pressure, flow and power control



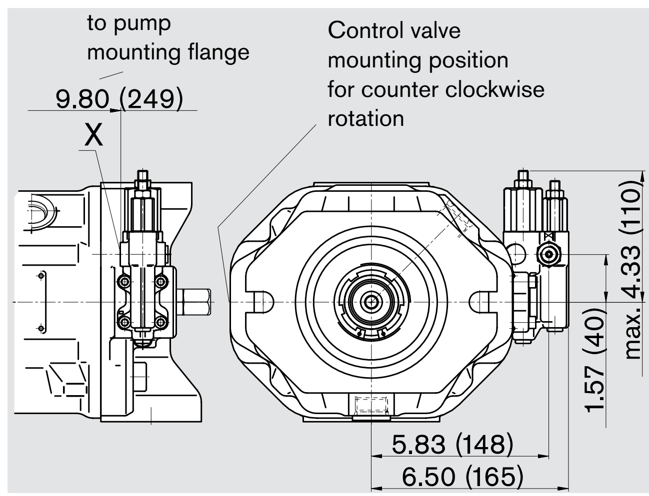
DR

Pressure control



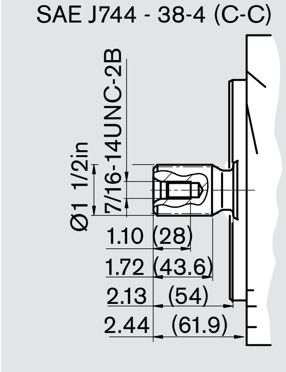
DRG

Pressure control, remote

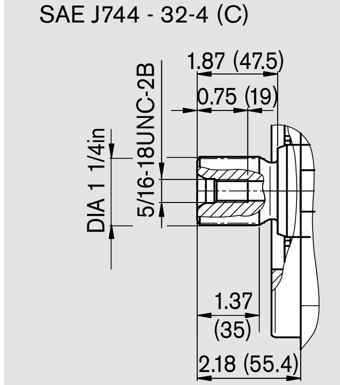


Drive shafts

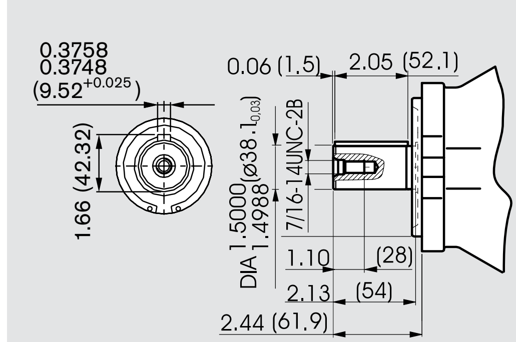
S Splined shaft 1 1/2 in
17T 12/24 DP[4)]
SAE J744 - 38-4 (C-C)



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



K Parallel with key
ISO 3019-1
38-1

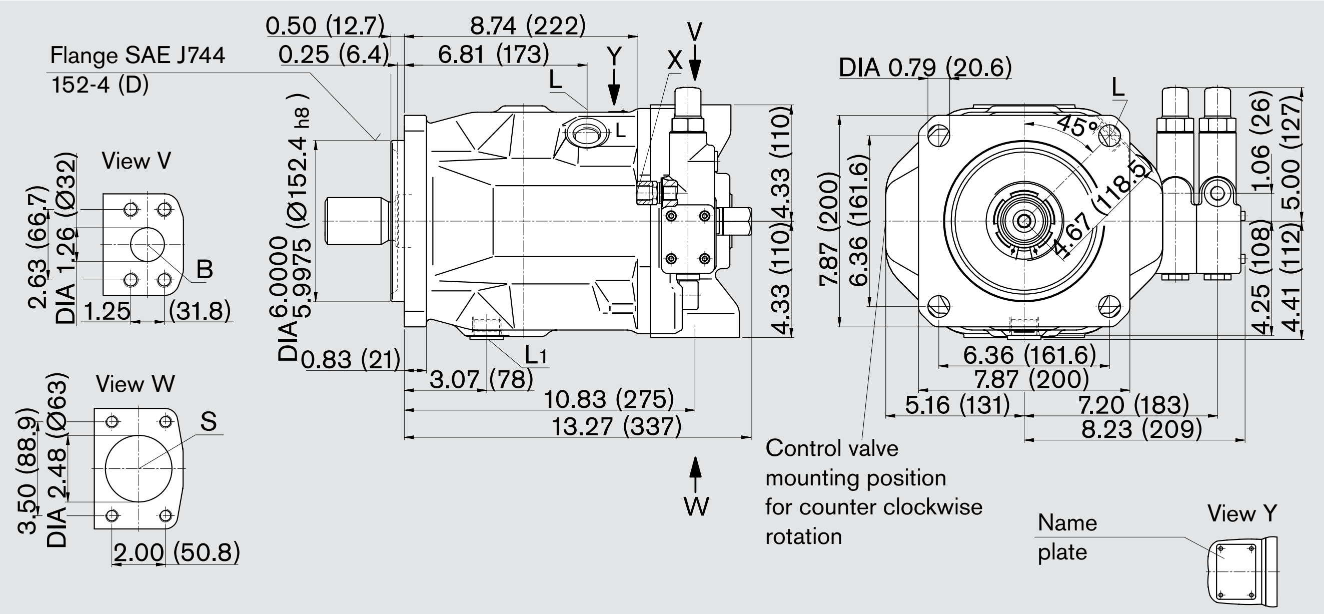


4) ANSI B92.1a-1976, 30° pressure angle, flat base, flank centering, fit class 5

Dimensions, size 140

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

DFR/DFR1 Pressure and flow control; clockwise rotation



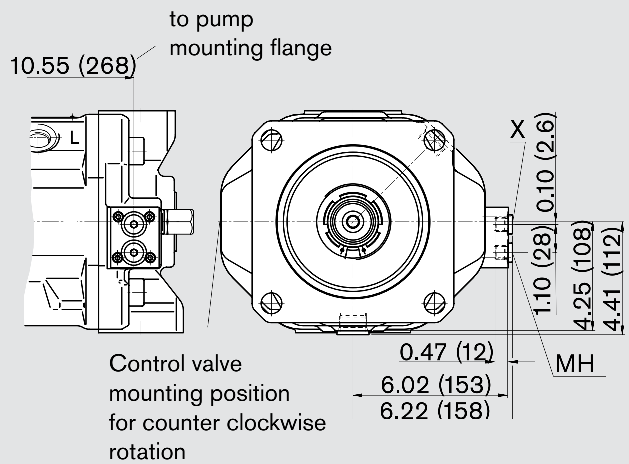
Ports

Designation	Port for	Standard	Size [1]	Peak press. [psi (bar)] [2]	State
B	Service line (high pressure range) Fixing thread	SAE J518 ISO 68	1 1/4 in 1/2-13 UNC-2B; 0.94 (24) deep	 5100 (350)	O
S	Inlet (standard pressure range) Fixing thread	SAE J518 ISO 68	2 1/2 in 1/2-13 UNC-2B; 0.94 (24) deep	 75 (5)	O
L	Case drain	ISO 11926	1 1/16-12 UNF-2B	30 (2)	O [3]
L_1	Case drain	ISO 11926	1 1/16-12 UNF-2B	30 (2)	plugged [3]
X	Pilot pressure	ISO 11926	9/16-18 UNF-2B; 0.51 (13) deep	5100 (350)	O
X	Pilot pressure for DG control	DIN 3852	M14 x 1.5; 0.47 (12) deep	1740 (120)	O
M_H	Control pressure for DG control	DIN 3852	M14 x 1.5; 0.47 (12) deep	5100 (350)	plugged [3]

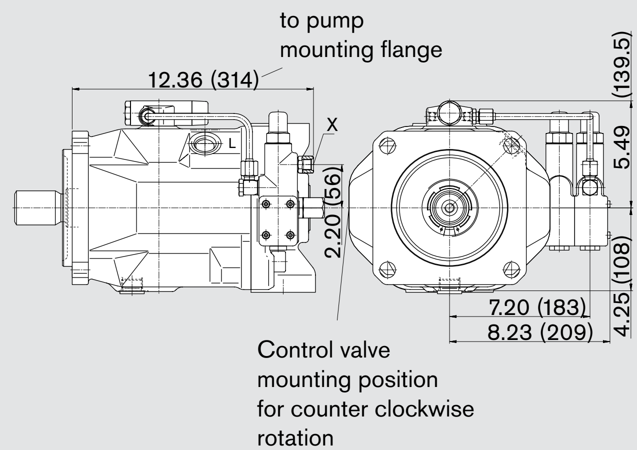
[1] For the max. tightening torques the instructions on page 36 must be observed.
[2] Application dependent pressure spikes can occur.. Please consider this when selecting measuring equipment or fittings
[3] Dependent on the installation position, port L or L_1 must be connected
O = Must be connected (plugged on delivery)

Dimensions, size 140

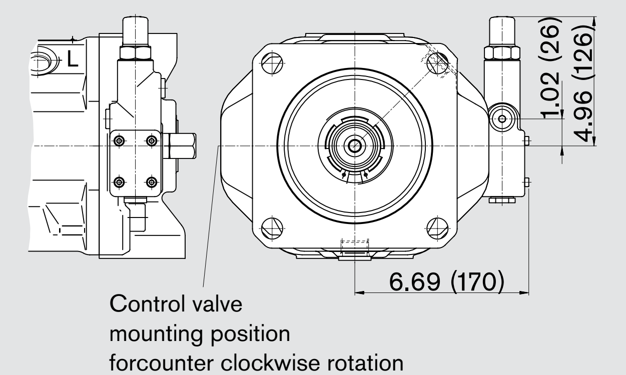
DG
Two point, direct control



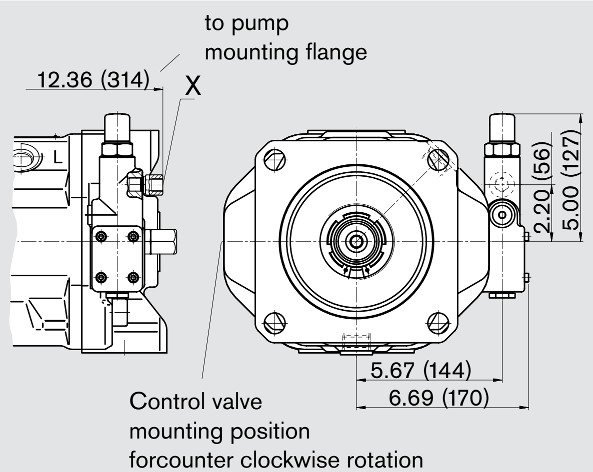
DFLR
Pressure, flow and power control



DR
Pressure control

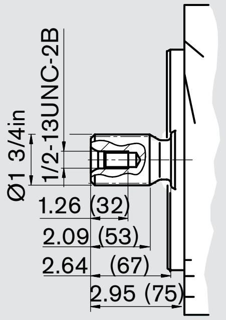


DRG
Pressure control, remote

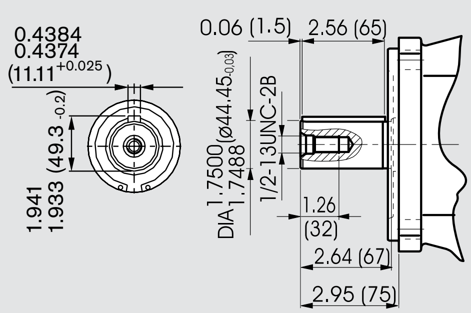


Drive shafts

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



K Parallel with key
ISO 3019-1
44-1

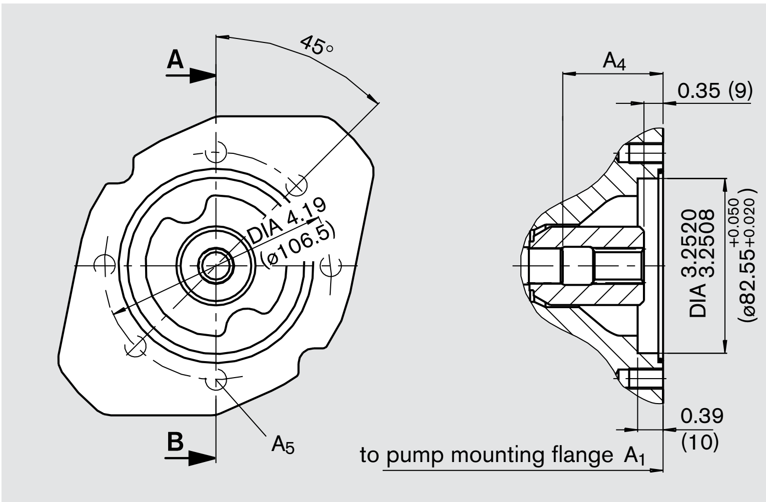


[4] ANSI B92.1a-1976, 30° pressure angle, flat base, flank centering, fit class 5

Through drive dimensions

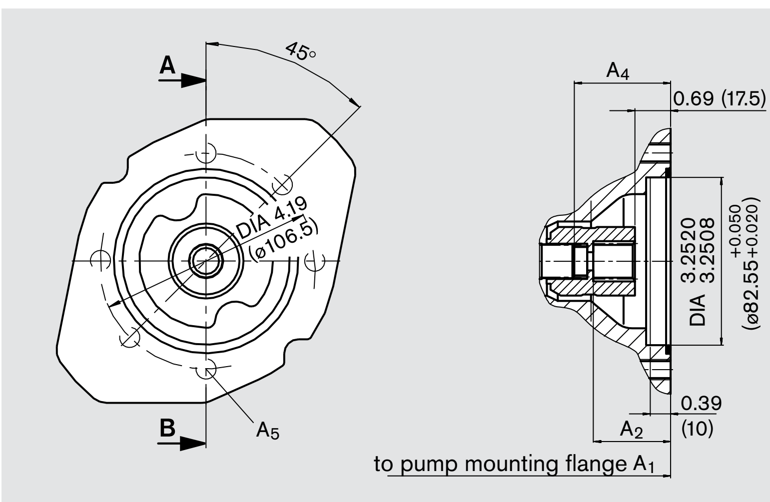
Before finalizing your design request a certified installation drawing.
Dimensions in inches and (mm).

K01 Flange SAE J744 - 82-2 (A)
Coupler for splined shaft to ANSI B92.1a-1996 5/8in 9T 16/32 DP[1] (SAE J744 - 16-4 (A))



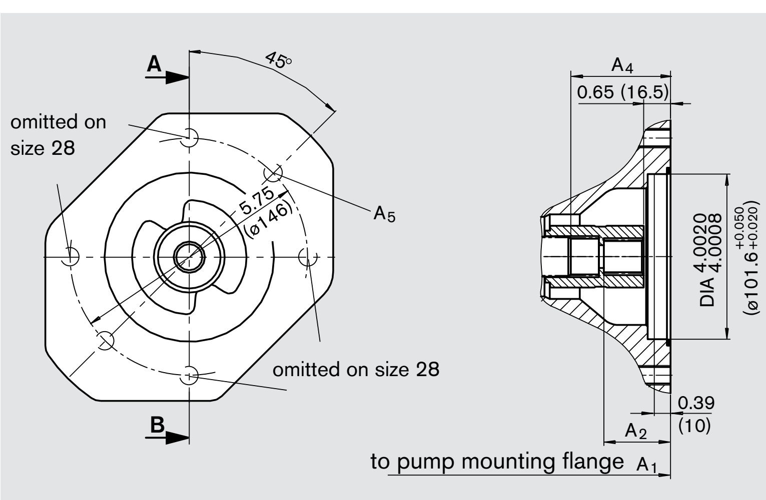
Size	A_1	A_4	A_5
18	7.16 (182)	1.69 (43)	M10; 0.57 (14.5) deep
28	8.03 (204)	1.85 (47)	M10; 0.62 (16) deep
45	9.02 (229)	2.09 (53)	M10; 0.62 (16) deep
71	10.51 (267)	2.40 (61)	M10; 0.78 (20) deep
100	13.31 (338)	2.56 (65)	M10; 0.78 (20) deep
140	13.78 (350)	0.03 (77)	M10; 0.63 (17) deep

K52 Flange SAE J744 - 82-2 (A)
Coupler for splined shaft to ANSI B92.1a-1996 3/4in 11T 16/32 DP[1] (SAE J744 - 19-4 (A-B))



Size	A_1	A_2	A_4	A_5
18	7.16 (182)	1.54 (39)	1.69 (43)	M10; 0.57 (14.5) deep
28	8.03 (204)	1.54 (39)	1.85 (47)	M10; 0.62 (16) deep
45	9.02 (229)	1.54 (39)	2.09 (53)	M10; 0.62 (16) deep
71	10.51 (267)	1.54 (39)	2.40 (61)	M10; 0.78 (20) deep
100	13.31 (338)	1.54 (39)	2.56 (65)	M10; 0.78 (20) deep
140	13.78 (350)	1.54 (39)	0.03 (77)	M10; 0.63 (17) deep

K68 Flange SAE J744 - 101-2 (B)
Coupler for splined shaft to ANSI B92.1a-1996 7/8in 13T 16/32 DP[1] (SAE J744 - 22-4 (B))



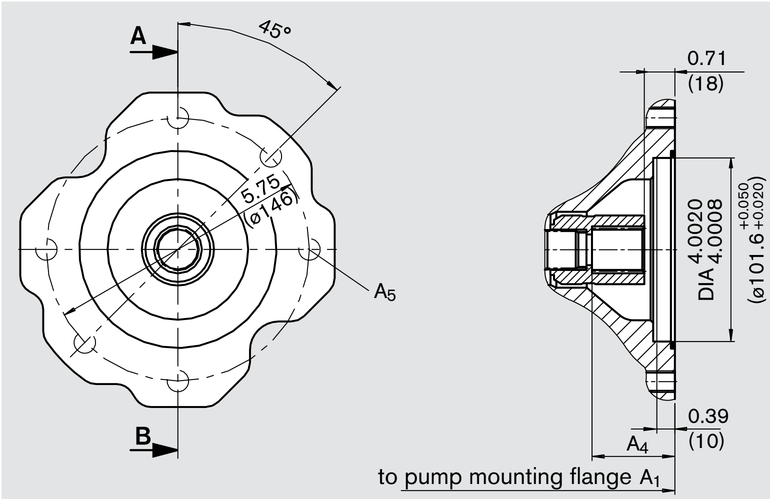
Size	A_1	A_2	A_4	A_5
28	8.03 (204)	1.65 (42)	1.85 (47)	M12; through bore
45	9.02 (229)	1.65 (42)	2.09 (53)	M12; 0.71 (18) deep
71	10.51 (267)	1.65 (42)	2.40 (61)	M12; 0.79 (20) deep
100	13.31 (338)	1.65 (42)	2.56 (65)	M12; 0.79 (20) deep
140	13.78 (350)	1.65 (42)	3.03 (77)	M12; 0.79 (20) deep

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

Through drive dimensions

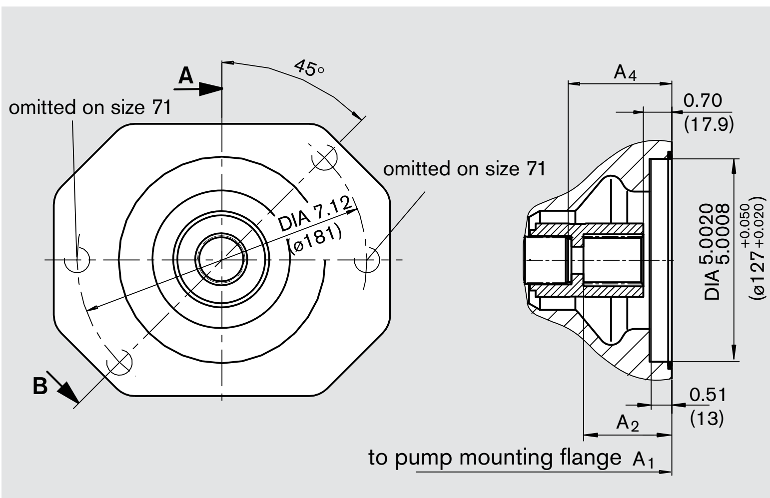
Before finalizing your design request a certified installation drawing.
Dimensions in inches and (mm).

K04 Flange SAE J744 - 101-2 (B)
Coupler for splined shaft to ANSI B92.1a-1996 1in 15T 16/32 DP[1] (SAE J744 - 25-4 (B-B))



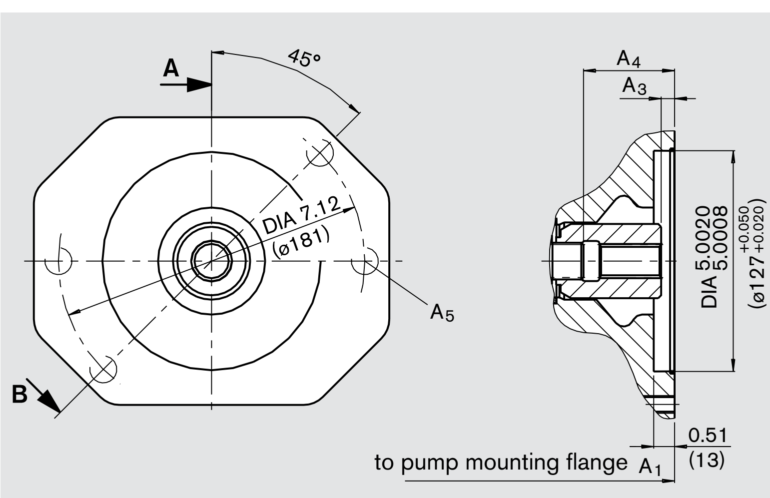
NG	A_1	A_4	A_2
45	9.02 (229)	1.85 (47)	M12; 0.71 (18) deep
71	10.51 (267)	1.85 (47)	M12; 0.79 (20) deep
100	13.31 (338)	1.85 (47)	M12; 0.79 (20) deep
140	13.78 (350)	1.85 (47)	M12; 0.79 (20) deep

K07 Flange SAE J744 - 127-2 (C)
Coupler for splined shaft to ANSI B92.1a-1996 1 1/4in 14T 12/24 DP[1] (SAE J744 - 32-4 (C))



Size	A_1	A_2	A_4	A_5
71	10.51 (267)	2.22 (56.5)	2.40 (61)	M16; through bore
100	13.31 (338)	2.22 (56.5)	2.56 (65)	M16; through bore
140	13.78 (350)	2.22 (56.5)	3.03 (77)	M16; 0.94 (24) deep

K24 Flange SAE J744 - 127-2 (C)
Coupler for splined shaft to ANSI B92.1a-1996 1 1/2in 17T 12/24 DP[1] (SAE J744 - 38-4 (C-C))



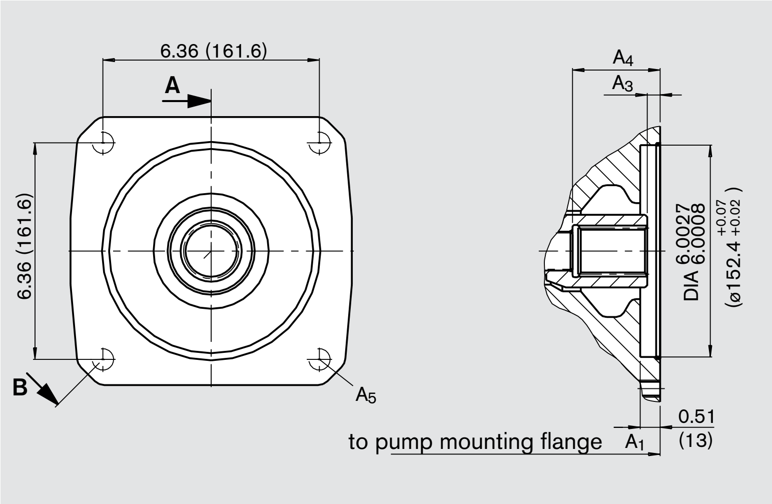
Size	A_1	A_3	A_4	A_5
100	13.31 (338)	0.31 (8)	2.56 (65)	M16; 0.79 (20) deep, through bore
140	13.78 (350)	0.31 (8)	3.03 (77)	M16; 0.94 (24) deep

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

Through drive dimensions

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

K17 Flange SAE J744 - 152-4 (D)
Coupler for splined shaft to ANSI B92.1a-1996 1 3/4in 13T 8/16 DP[1)](SAE J744 - 44-4 (D))



Size	A_1	A_3	A_4	A_5
140	13.78 (350)	0.31 (8)	3.03 (77)	M16; through bore

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

Combination pumps A10VSO + A10VSO

The use of combination pumps offers the possibility of independent pump circuits without the need for a splitter gearbox.

When ordering combination pumps the designations for the 1. and the 2. pump must be joined by a „+" sign.

Example:
A10VSO 100DR/31R-PSC12K07 +
A10VSO 71DR/31R-PSC12N00

If a gear pump or a radial piston pump must be factory-mounted please consult us.

The A10V(S)O axial piston unit can be supplied with a through drive according to the ordering code on page 3. The through drive version is designated by the code numbers (K01-K68). If no other pumps are factory-mounted, the simple type designation is sufficient.

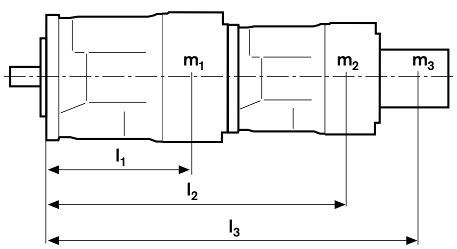
The delivery of a pump with through drive includes the shaft coupler, the seal and if applicable an adapter flange.

Every through drive is closed with a **non protective** cover upon delivery. Prior to start up this cover must be replaced by a pressure tight cover (or a 2nd pump).
Through drives can be ordered with a pressure tight cover. Please indicate in clear text.

Permissible overhang moment

It is permissible to combine two single pumps of the same size (tandem pump) and operate the combination with a max. permissible dynamic acceleration of 10*g* (98.1 m/s²) without additional support.

Size			18	28	45	71	100	140
Permissible overhang moment								
static	T_m	lb-ft (Nm)	369 (500)	649 (880)	1010 (1370)	1593 (2160)	2213 (3000)	3319 (4500)
dynamic at 10*g* (98.1 m/s²))	T_m	lb-ft (Nm)	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)
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)



m_1, m_2, m_3	weight of pump	[lbs (kg)]
l_1, l_2, l_3	distance to center of gravity	[in (mm)]

$$Tm = (m_1 \bullet l_1 + m_2 \bullet l_2 + m_3 \bullet l_3) \bullet \frac{1}{12} \text{ [lb-ft]}$$

$$Tm = (m_1 \bullet l_1 + m_2 \bullet l_2 + m_3 \bullet l_3) \bullet \frac{1}{102} \text{ [Nm]}$$

Overview of attachments

Through drive - A10V(S)O			Mounting option second pump			Through drive available on size
Flange (SAE-J744)	Coupler for splined shaft	Code	A10V(S)O/31 Size (shaft)	A10V(S)O/52 (53) Size (shaft)	Gear pump	
82-2 (A)	16-4 (5/8 in)	**K01**	18 (U)	10 (U) (18 (U))	Series F	18 to 140
	19-4 (3/4 in)	**K52**	18 (S, R)	10 (S) (18 (S, R))	Series F	18 to 140
101-2 (B)	22-4 (7/8 in)	**K68**	28 (S, R) 45 (U, W)[1)]	28 (S, R) 45 (U, W)[1)]	Series N, G	28 to 140
	25-4 (1 in)	**K04**	28 (S, R) 45 (S, R)	45 (S, R) 63 (U, W)[2)]		28 to 100
127-2 (C)	32-4 (1 1/4 in)	**K07**	71 (S, R) 100 (U)[3)]	85 (U, W)[3)]		71 to 140
	38-4 (1 1/2 in)	**K24**	100 (S)	85 (S)		100 to 140
152-4 (4-bold D)	44-4 (1 3/4 in)	**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

Installation instructions

General

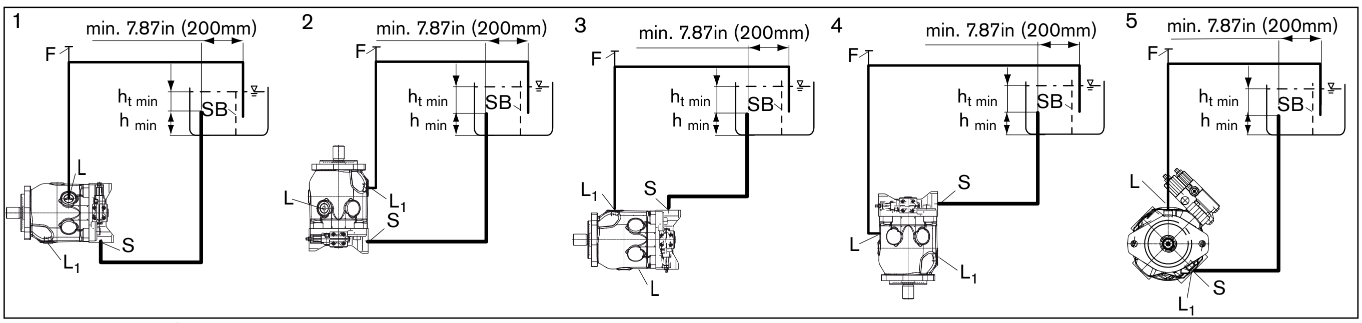
The pump housing must be filled with fluid and air bleeded during commissioning and operation. This is also to be observed, following a longer standstill period as the system may empty via the hydraulic lines.
Especially with the installation position „drive shaft upwards or drive shaft downwards“ attention must be paid to a complete filling and deaeration, since there is a risk, that the bearings and shaft seal run dry and overheat.
The highest of the case drain ports must be connected to tank with piping material for standard pressure rating suitable for the port size. In order to obtain the lowest noise level, all connections (inlet, outlet, and case drain line) must be linked by flexible members to the tank. Also, avoid above-tank installation.
In case of a combination pump with different case drain pressures make sure, that each pump has it‘s own case drain line to tank.
In all operating states, the suction line and case drain line must flow into the tank below the minimum fluid level ($h_{t\ min}$ = 7.87 in (200 mm)). The permissible suction height h is a result of the oveall pressure loss, but may not be greater than h_{max} = 31.50 in (800 mm). Under static and dynamic loading the suction pressure at port S may not be below $p_{abs\ min}$ = 12 psi (0.8 bar) absolute.

Installation position

See the following examples 1 to 15. Recommended positions: 1 and 3.
Other installation positions are also possible, please consult us.

Mounting below the reservoir (Standard)

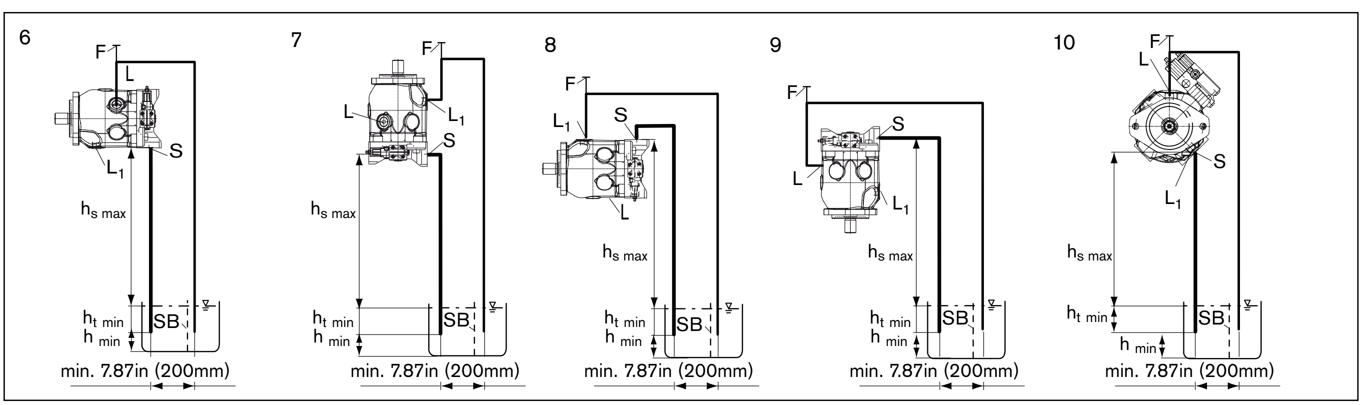
Mounting below the reservoir means, that the pump is mounted below the minimum fluid level. The pump can be mounted next to or below the reservoir.



Position	Air bleed	Filling
1, 3 and 5	F	S + L, L_1 (F)
2 and 4	F	S + L, L_1 (F)

Above reservoir

Installation above the reservoir means, that the pump is mounted above the minimum fluid level. A check valve in the case drain line is only permissible in individual cases. Consult us for approval.

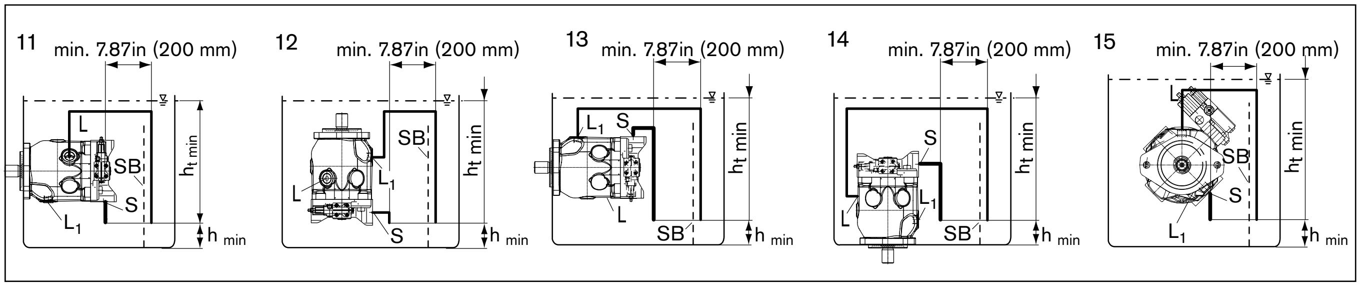


Position	Air bleed	Filling
6, 8 and 10	F	L, L_1 (F)
7 and 9	F	S + L, L_1 (F)

Installation instructions

Inside the reservoir

Mounting inside the reservoir. This means that the pump is mounted within the fluid volume.



Position	Air bleed	Filling
11, 13 and 15	L, L_1	L, L_1
12 and 14	L, L_1	S + L, L_1

L/L_1 = case drain port, F = air bleed or fill port, S = inlet port, SB = baffle (baffle plate), h_{min} = 3.94 in (100 mm), $h_{t\,min}$ = 7.87 in (200 mm), $h_{S\,max}$ = 31.50 in (800 mm)

Notes

Notes

General instruction

– The pump A10VSO was designed for operation in open loop circuits

– Systems design, installation and commissioning requires trained technicians or tradesmen. Be sure to read the entire operating instructions throughly and completely befor using the axial piston unit. If necessary, request them at Rexroth.

– All hydraulic ports can only be used for the fastening of hydraulic service lines.

– During and shortly after operation of a pump the housing and especially a solenoid can be extremely hot, avoid being burned; take suitable safety measures (wear protective clothing).

– Dependent on the operating conditions of the axial piston pump (operating pressure, fluid temperature) deviations in the performance curves can occur.

– Pressure ports:
All materials and port threads are selected and designed in such a manner, that they can withstand the peak pressures.
The machine and system manufacturer must ensure, that all connecting elements and hydraulic lines are suitable for the actual operating pressures.

– Pressure cut off and pressure control are not suitable for providing system protection against excessive pressures. A suitable overall main line relief valve must be incorporated.

– All given data and information must be adhered to.

– The following tightening torques are valid:

- Female threads in the axial piston unit:
the maximum permissible tightening torques M_{GMax} are maximum values for the female threads in the pump casting and may not be exceeded. Value see table below.

- Fittings:
please comply with the manufacturer's information regarding the max. permissible tightening torques for the used fittings.

- Fastening bolts:
for fastening bolts to ISO 68 we recommend to check the permissible tightening torques in each individual case to VDI 2230.

- Plugs:
for the metal plugs, supplied with the axial piston unit the following min. required tightening torques M_V apply (see table).

Thread size in ports		Maximum permissible tightening torque $M_{G\ max}$	Min. required tightening torque M_V	Across the flats in Allan screw
R 1/4 in	DIN 3852	48 lb-ft (70 Nm)		
7/8-14 UNF-2B	ISO 11926	174 lb-ft (240 Nm)	93 lb-ft (127 Nm)	3/8 in
1 1/16-12 UNF-2B	ISO 11926	261 lb-ft (360 Nm)	108 lb-ft (147 Nm)	9/16 in
7/16-20UNF-2B	ISO 11926	29 lb-ft (40 Nm)	11 lb-ft (15 Nm)	3/16 in
9/16-18 UNF-2B	ISO 11926	59 lb-ft (80 Nm)	18 lb-ft (25 Nm)	1/4 in
3/4-16 UNF-2B	ISO 11926	118 lb-ft (160 Nm)	45 lb-ft (62 Nm)	5/16in

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

Bosch Rexroth Corporation
2315 City Line Road
Bethlehem, PA 18017-2131
USA
Telephone (610) 694-8300
Facsimile (610) 694-8467
www.boschrexroth-us.com