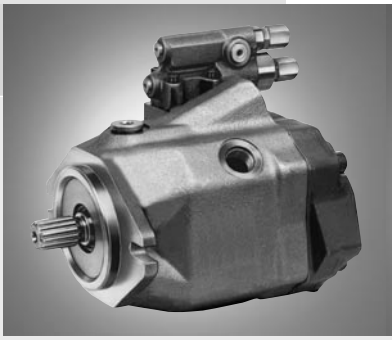
Axial Piston Variable Pump A10VO

RA 92703/03.06 **1**/36
Replaces: 05.04

Technical Data Sheet

Size 10...85
Series 52/53
Nominal pressure 3600 psi (250 bar)
Peak pressure 4600 psi (315 bar)
Open circuit



Series 52



Series 53

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Features

- Variable axial piston pump in swashplate design for hydrostatic drives in open circuits
- Flow is proportional to drive speed and displacement.The flow is infinitely variable by adjustment of the swashplate
- Strong bearings for long service life
- High permissible drive speeds
- High power-weight ratio - small dimensions
- Low noise level
- Good suction characteristics
- Axial and radial loading of drive shaft possible
- Pressure and flow control
- Electro-hydraulic pressure control
- Power control
- Electro-hydraulic displacement control
- Short response times

Ordering code - standard range

A10V(S)	**O**			/	5			–	V				
01	02	03	04		05	06	07		08	09	10	11	12

Axial piston unit

		10	28	45	60/63[1]	85	
01	Swash plate design, variable	●	–	–	–	–	**A10VS**
		–	●	●	●	●	**A10V**

Operating mode

02	Pump, open circuit	**O**

Size

			10	28	45	60/63[1]	85
03	Displacement $V_{g\,max}$	[cm³]	10	28	45	63	85
		[in³]	0.61	1.71	2.75	3.84	5.18

Control devices[2]

04	Pressure control	DR								●	●	●	●	●	**DR**
	with hydraulic flow control														
	X-T open	DFR								–	●	●	●	●	**DFR[2]**
	X-T open	DR				F				–	○	○	○	○	**DRF[2]**
	X-T closed	DFR1								●	●	●	●	●	**DFR1[2]**
	X-T closed	DR				S				–	○	○	○	○	**DRS[2]**
	with flow control, electro-hydraulic adjustment of differential press.(inverse proportional characteristic) (RE 92 709)														
		EF	.	D		.				–	●	○	●	●	**EF.D.**
	with remote pressure control														
	hydraulic	DR			G					●	●	●	●	●	**DRG**
	electric, inverse charact. (RE 92 707)	ED	.							–	●	●	●	●	**ED.**
	Power control														
	with pressure control														
	min. start of control														
	145 to 510 psi (10 to 35 bar)	LA	5	D						–	●	○	●	●	**LA5D**
	520 to 1015 psi (36 to 70 bar)	LA	6	D						–	●	○	●	●	**LA6D**
	1030 to 1520 psi (71 to 105 bar)	LA	7	D						–	●	○	●	●	**LA7D**
	1535 to 2030 psi (106 to 140 bar)	LA	8	D						–	●	○	●	●	**LA8D**
	2045 to 3335 psi (141 to 230 bar)	LA	9	D						–	●	○	●	●	**LA9D**
	with remote pressure control														
	min. start of control see above	LA	X	D	G					–	●	○	●	●	**LAXDG**
	with pressure and flow control, X-T closed														
	min. start of control see above	LA	X	D		S				–	●	○	●	●	**LAXDS**
	with press. and flow control, electro-hydr. adjustment of diff. press. (inverse prop. characteristic), X-T closed (RE 92 709)														
	min. start of control see above	LA	X			S		.		–	●	○	●	●	**LAXS.**
	Electro-proportional displacement control (RE 92 708)														
	with pressure and flow control positive characteristic														
		EP	.	D		.				–	●	○	●	●	**EP.D.**
	with pressure and flow control positive characteristic; deactivation of control at I = 0														
		EK	.	D		.				–	●	○	●	●	**EK.D.**

[1] Size 60 only in series 52; size 63 only in series 53 (see also index 06 in ordering code)

[2] For availability of control options in series 52 and 53 (see also index 06 in ordering code)

A10V(S)	O			/	5			–	V				
01	02	03	04		05	06	07		08	09	10	11	12

Series

05		**5**

	Index	**10**	**28**	**45**	**60**	**63**	**85**	
06	DR, DFR, DFR1, DRG, ED...	●	●	●	●	–	●	**2**[1]
	DR, DRF, DRS, DRG, ED...	–	○	○	–	○	○	**3**
	EF..., LA..., EP..., EK...	–	●	○	–	●	●	**3**

Direction of rotation

07	viewing on shaft end	clockwise	**R**
		counter clockwise	**L**

Seals

08	FKM fluor-rubber	**V**

	Shaft end	**10**	**28**	**45**	**60/63**	**85**	
09	Splined shaft to SAE J744, 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**
	similar to shaft “U“, higher input torque, not for through drive	–	–	●	●	●	**W**
	SAE key	●	●	●	●	●	**K**[2]
	Tapered with Woodruff key	–	●	●	●	–	**C**[2]

Mounting flange

10	SAE 2-hole	●	●	●	●	●	**C**
	SAE 4-hole	–	–	–	●	○	**D**

Port for service lines

11	SAE flange at rear, UNC threads (no through drive)	–	●	●	●	●	**61**
	SAE flange on side, opposite sides, UNC threads	–	●	●	●	●	**62**
	Threaded ports at rear, UN threads (no through drive)	●	●	●	–	–	**64**[2]

Through drive

12	Without through drive (only for port plate 61 and 64)		●	●	●	●	●	**N00**
	Flange SAE J744	Coupler for splined shaft[3]	Sealing					
	82-2 (A)	5/8 in 9T 16/32DP	axial	–	●	●	●	●	**K01**
	82-2 (A)	3/4 in 11T 16/32DP	axial	–	●	●	●	●	**K52**
	101-2 (B)	7/8 in 13T 16/32DP	axial	–	●	●	●	●	**K68**
	101-2 (B)	1 in 15T 16/32DP	axial	–	–	●	●	●	**K04**
	127-4 (C)	1 1/4 in 14T 12/24DP	axial	–	–	–	●	–	**K15**
	127-2 (C)	1 1/4 in 14T 12/24DP	axial	–	–	–	–	●	**K07**
	127-2 (C)	1 1/2 in 17T 12/24DP	axial	–	–	–	–	●	**K24**

[1] Not for new projects. For new projects use series 53 only.
[2] only series 52
[3] 30° pressure angle, flat base, flank centering, fit class 5.

● available ○ in preparation – not available

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). Operation on Skydrol fluid is only possible after consultation with us.

Operating viscosity range

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

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

referred to tank temperature (open circuit).

Limit of viscosity range

For critical operating conditions the following values apply:

ν_{min} = 60 SUS (10 mm²/s)
for short periods (t ≤ 1 min)
at max. perm. fluid temperature of 239 °F (115 °C).

Please note that the max. leakage fluid temperature of 239 °F (115 °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} = 7500 SUS (1600 mm²/s)
for short periods (t ≤ 1 min)
on cold start
p ≤ 435 psi (30 bar), n ≤ 1500 rpm, t_{min} = -13 °F (-25 °C)

At temperatures between -40 °F (-40 °C) and -13 °F (-25 °C) special measures are required, please consult us for further information.

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

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 temperature of X °F (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 oil (case drain oil) 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 239 °F (115 °C).

If it is not possible to comply with the above 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 pressure 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

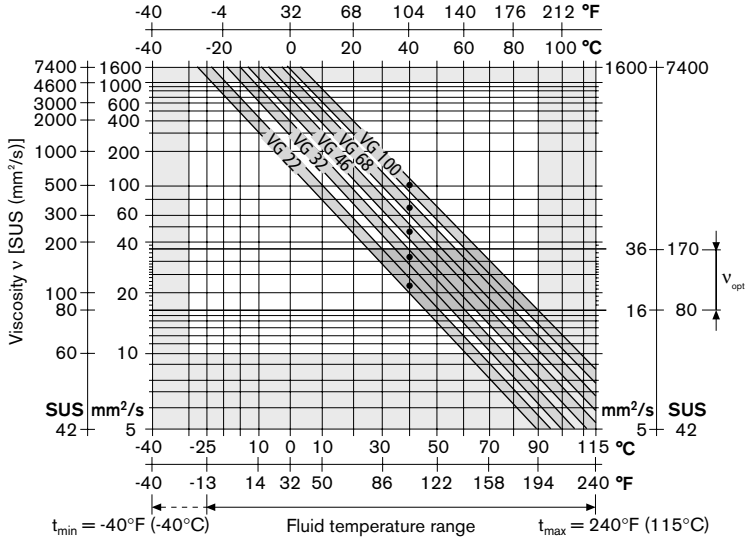
20/18/15 to ISO 4406 is necessary.

At very high temperatures of hydraulic fluid (195 °F (90 °C) up to max. 239 °F (115 °C)) at least cleanliness of

19/17/14 to ISO 4406 is necessary.

If above cleanliness level cannot be met please consult us.

Selection diagram



Operating pressure range

Inlet

Absolute pressure at port S

$p_{abs\ min}$ 12 psi (0.8 bar)

$p_{abs\ max}$ 73 psi (5 bar)

To determine the min. required inlet pressure p_{abs} at inlet port S or the reduction of displacement with higher input speeds see the diagram to the right.

Outlet

Pressure at port B

Nominal pressure p_N 3600 psi (250 bar)

Peak pressure p_{max} 4600 psi (315 bar)

(Pressures to DIN 24312)

Direction of flow

S to B.

Case drain pressure

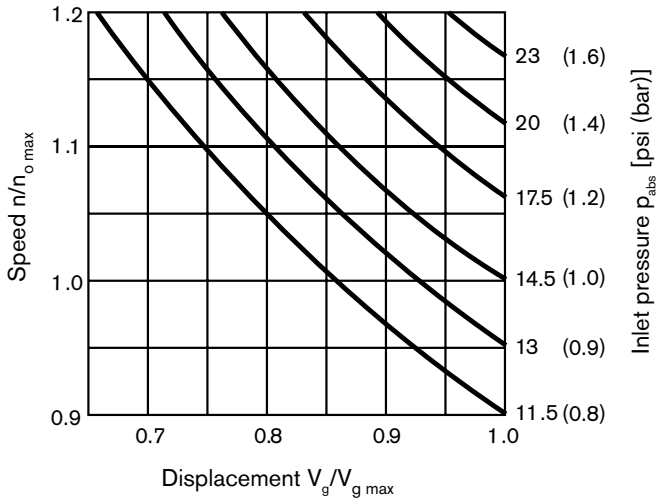
Maximum permissible case drain pressure (port L, $L_{1/2}$):

maximum 7 psi (0.5 bar) higher than the inlet pressure at port S, however not higher than 29 psi (2 bar) absolute

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

Max. permissible speed (Speed limit)

Permissible speed by increase of inlet pressure p_{abs} at the inlet port S or reduction of max. pump displacement



Technical data

Table of values[1)]

Size	A10V(S)O			10	28	45	60	63	85
Displacement		$V_{g\ max}$	in^3	0.61	1.71	2.75	3.66	3.84	5.18
			(cm^3)	(10.5)	(28)	(45)	(60)	(63)	(85)
Speed[2)]									
max. at $V_{g\ max}$		$n_{0\ max}$	min^{-1}	3600	3000	2600[3)]	2700	2600	2500
max. at $V_g \leq V_{g\ max}$		$n_{0\ max\ zul}$	min^{-1}	4320	3600	3120	3240	3140	3000
Flow									
at $n_{0\ max}$		$q_{V0\ max}$	gpm	9.7	22	31	43	43.1	55
			(L/min)	(37)	(84)	(117)	(162)	(163)	(212)
at $n_{0\ max\ zul.}$		$q_{V0\ max\ zul.}$	gpm	11.4	26.6	37	51	52.2	67.3
			(L/min)	(43,2)	(100)	(140)	(194)	(198)	(255)
Power	$\Delta p = 3600$ psi (250 bar)								
at $n_{0\ max}$		$P_{o\ max}$	HP	22	47	65	90	90	119
			(kW)	(16)	(35)	(49)	(68)	(68)	(89)
at $n_{0\ max\ zul.}$		$P_{o\ max\ zul.}$	HP	25.5	56	77.8	108	110	141
			(kW)	(18)	(42)	(58)	(81)	(82,5)	(106)
Torque									
at $V_{g\ max}$	$\Delta p = 3600$ psi	T_{max}	lb-ft	31	82	131	175	184	247
	(250 bar)		(Nm)	(42)	(111)	(179)	(238)	(250)	(338)
	$\Delta p = 1440$ psi	T	lb-ft	13	33	53	70	74	102
	(100 bar)		(Nm)	(16.7)	(44.5)	(71.5)	(95)	(100)	(135)
Moment of inertia (about drive axis)		J	$lbs\text{-}ft^2$	0.0142	0.0403	0.0783	0.1329	0.1329	0.2848
			(kgm^2)	(0.0006)	(0.0017)	(0.0033)	(0.0056)	(0.0056)	(0.012)
Angular acceleration, max.			rad/s^2	8000	5500	4000	3300	3300	2700
Torsional stiffness	Shaft S		lb-ft/rad	6760	16400	27560	48100	48100	105100
			(Nm/rad)	(9200)	(22300)	(37500)	(65500)	(65500)	(143000)
	Shaft R		lb-ft/rad	–	19400	30240	51200	51200	–
			(Nm/rad)	–	(26300)	(41000)	(69400)	(69400)	–
	Shaft U		lb-ft/rad	5020	–	22130	36290	36290	75900
			(Nm/rad)	(6800)	–	(30000)	(49200)	(49200)	(102900)
	Shaft W		lb-ft/rad	–	–	25370	39830	39830	86960
			(Nm/rad)	–	–	(34400)	(54000)	(54000)	(117900)
	Shaft P		lb-ft/rad	7890	–	–	–	–	–
			(Nm/rad)	(10700)	–	–	–	–	–
Case volume			gal	0.05	0.08	0.13	0.21	0.21	0.26
			(L)	(0.2)	(0.3)	(0.5)	(0.8)	(0.8)	(1)
Weight (without fluid)			lbs	17	31	40	48.5	48.5	75
			(kg)	(8)	(14)	(18)	(22)	(22)	(34)

[1)] theoretical values, without considering η_{mh} and η_v, values rounded

[2)] Values are valid with inlet pressure of 1 bar at suction inlet S. With reduced displacement or increased inlet pressure the drive speed can be increased according to the diagram on page 5

[3)] For higher drive speeds, please consult us.

Technical data

Determination of pump size

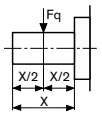
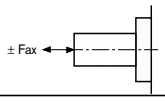
Flow $q_V = \frac{V_g \cdot n \cdot \eta_V}{231\ (1000)}$ [gpm (L/min)]

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

Power $P = \frac{2\pi \cdot T \cdot n}{33.000\ (60000)} = \frac{q_V \cdot \Delta p}{1{,}714\ (600) \cdot \eta_t}$ [HP (kW)]

V_g = geometr. displacement per revolution in in^3 (cm^3)
Δp = pressure differential in psi (bar)
n = drive speed in rpm
η_V = volumetric efficiency
η_{mh} = mechanical-hydraulic efficiency
η_t = overall efficiency ($\eta_t = \eta_V \cdot \eta_{mh}$)

Permissible radial and axial forces on drive shaft

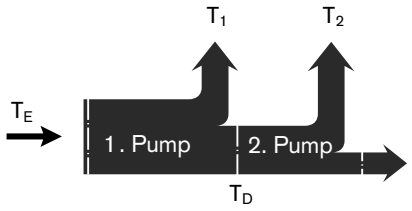
Size				10	28	45	60/63	85
Radial force, max.		bei X/2	$F_{q\ max}$	lbf (N)	56 (250)	270 (1200)	337 (1500)	382 (1700)	450 (2000)
Axial force, max.			$F_{ax\ max}$	lbf (N)	90 (400)	225 (1000)	337 (1500)	450 (2000)	675 (3000)

Permissible input and through drive torques

Size			10	28	45	60/63	85
Torque, max.	T_{max}	ft-lb	31	82	132	176	254
(at $V_{g\ max}$ and Δp = 250 bar[1])		(Nm)	(42)	(111)	(179)	(238)	(345)
Input torque, max.[2]							
for shaft end S	$T_{E\ zul}$	ft-lb (Nm)	93 (126)	146 (198)	235 (319)	465 (630)	851 (1157)
SAE J744 (ANSI B92.1a-1996)		in	3/4	7/8	1	1 1/4	1 1/2
for shaft end R	$T_{E\ zul}$	ft-lb (Nm)	–	166 (225)	295 (400)	479 (650)	–
SAE J744 (ANSI B92.1a-1996)		in	–	7/8	1	1 1/4	–
for shaft end U	$T_{E\ zul}$	ft-lb (Nm)	44 (60)	–	139 (188)	226 (306)	463 (628)
SAE J744 (ANSI B92.1a-1996)		in	5/8	–	7/8	1	1 1/4
for shaft end W	$T_{E\ zul}$	ft-lb (Nm)	–	–	162 (220)	292 (396)	447 (650)
SAE J744 (ANSI B92.1a-1996)		in	–	–	7/8	1	1 1/4
for shaft end K	$T_{E\ zul}$	ft-lb (Nm)	78 (106)	107 (145)	156 (212)	325 (441)	
		in	0.750	0.8750	1.0000	1.2500	1.5000
		(mm)	(19.05)	(22.225)	(25.4)	(31.75)	(38.1)
for shaft end C[3]	$T_{E\ zul}$	ft-lb (Nm)	–	107 (145)	156 (212)	325 (441)	–
Through drive torque, max.							
for shaft end S	$T_{D\ zul}$	ft-lb (Nm)	–	118 (160)	235 (319)	357 (484)	515 (698)
for shaft end R	$T_{D\ zul}$	ft-lb (Nm)	–	130 (176)	270 (365)	357 (484)	–

[1] Without considering efficiency
[2] For shaft without side load
[3] only for series 52

Distribution of torques



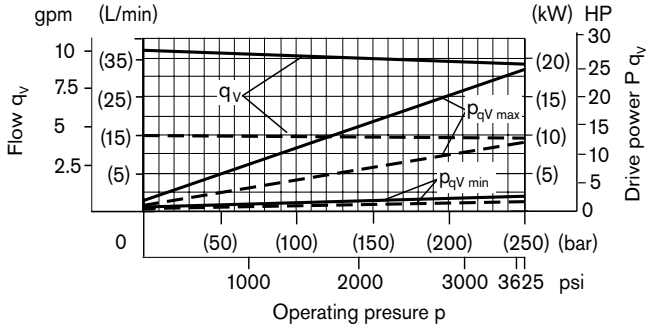
Operating curves for pumps with pressure control

Drive power and flow

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

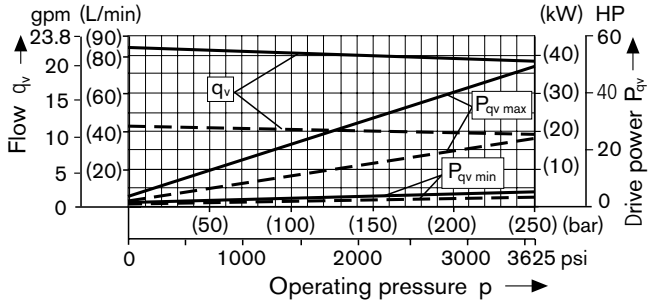
Size 10

– – – – n = 1500 rpm
——— n = 3600 rpm



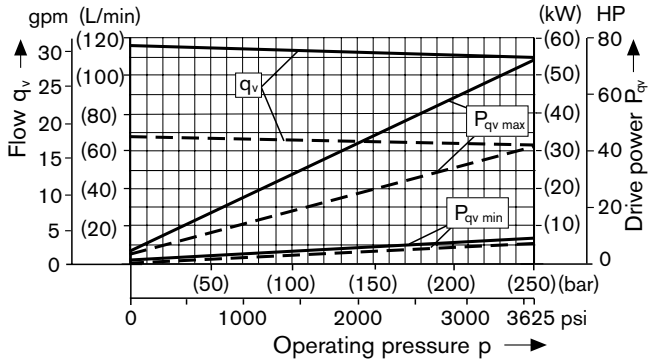
Size 28

– – – – n = 1500 rpm
——— n = 3000 rpm



Size 45

– – – – n = 1500 rpm
——— n = 2600 rpm



Overall efficiency

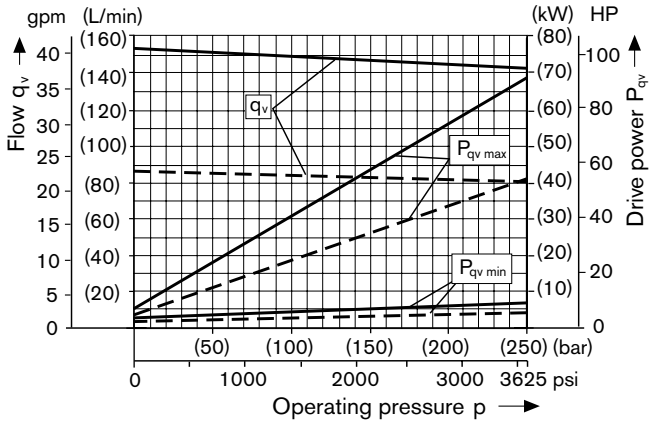
$$\eta_t = \frac{q_V \bullet p}{P_{pV\ max} \bullet 600}$$

Volumetric efficiency

$$\eta_V = \frac{q_V}{q_{V\ theor}}$$

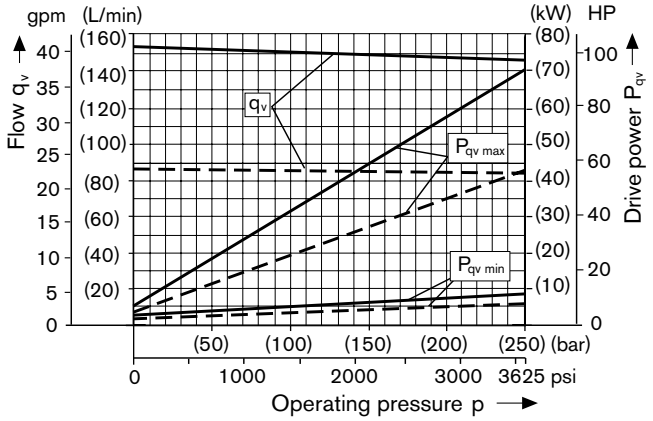
Size 60

– – – – n = 1500 rpm
——— n = 2700 rpm



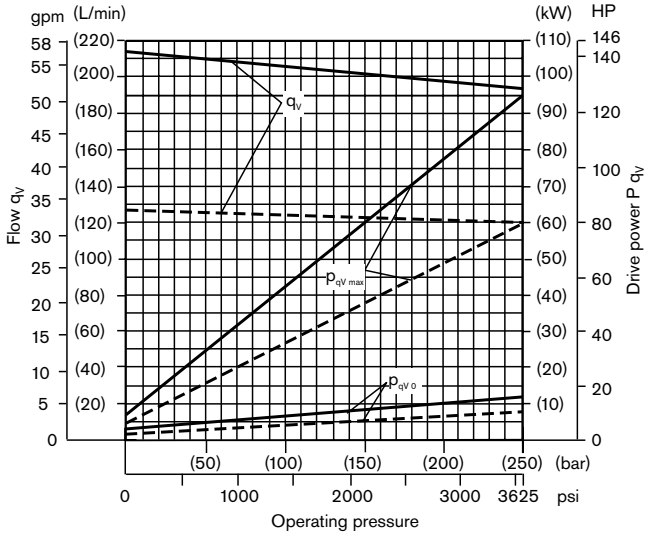
Size 63

– – – – n = 1500 rpm
——— n = 2700 rpm



Size 85

– – – – n = 1500 rpm
——— n = 2500 rpm

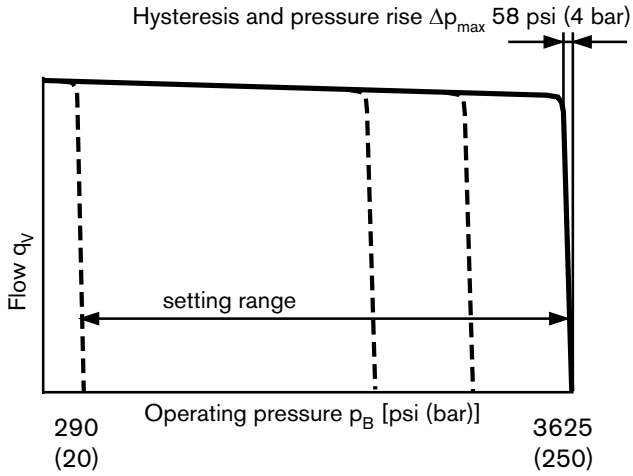


DR - Pressure control

The pressure control serves to maintain a constant pressure in the hydraulic system, within the control range of the pump. The pump therefore supplies only the amount of hydraulic fluid required by the actuators. The pressure can be steplessly set at the pilot valve

Static characteristic

at $n_1 = 1500$ rpm; $t_{fluid} = 120°F$ (50 °C)

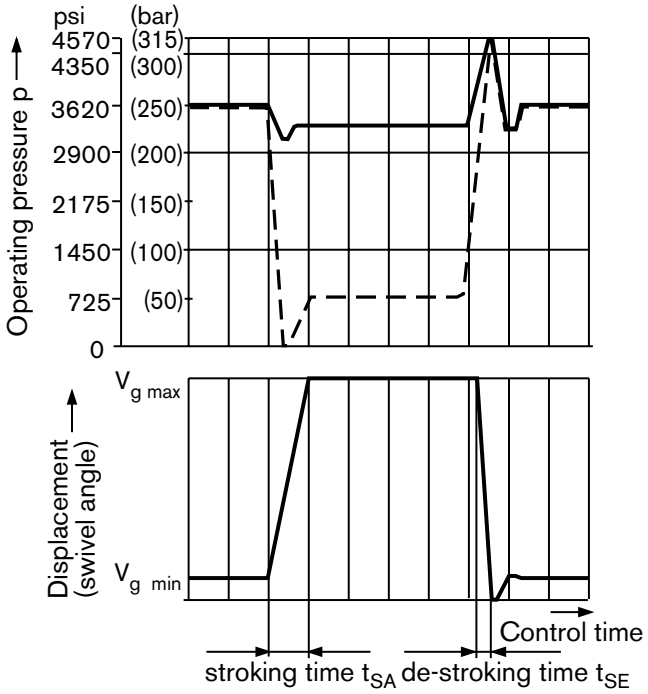


Dynamic characteristic

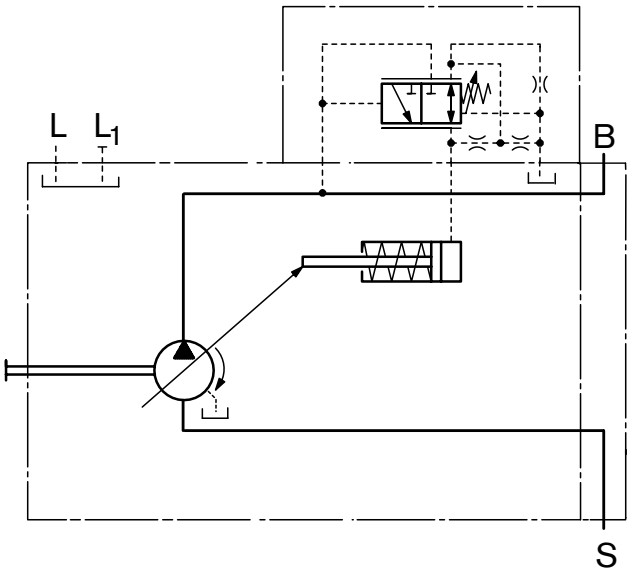
The curves show average measured values under test conditions:

Conditions: n = 1500 rpm
t_{fluid} = 120°F (50 °C)
Line main relief set at 4570 psi (315 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.



Schematic: DR



Ports

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

Control data

Hysteresis and repeatibility Δp max. 45 psi (3 bar)
Pilot oil consumption max. approx. 0.8 gpm (3 L/min)
Flow loss at $q_{V\ max}$ see page 8

Control times

NG	t_{SA} [ms] against 725 psi (50 bar)	t_{SA} [ms] against 3200 psi (220 bar)	t_{SE} [ms] to center 3600 psi (250 bar)
10	70	50	15
28	70	65	20
45	85	75	25
60	100	80	30
85	120	100	40

DRG - Pressure control, remote

The DRG-control valve enables a remote setting of max. pump pressure, below the setting of the DR-control spool, see page 9.

For the remote setting of pressure it is necessary to pipe an external relief valve to port X. This valve is not included with supply of pump.

The differential pressure at the DRG-spool is set as standard to 290 psi (20 bar), and this results in a pilot flow of approx. 0.4 gpm (1.5 l/min). If another setting is required (range between 145-320 psi (10 and 22 bar)), please state this in clear text

We recommend, that one of the following is used as the separate relief valve:

– DBDH 6 (hydraulic) to RE 25 402 or

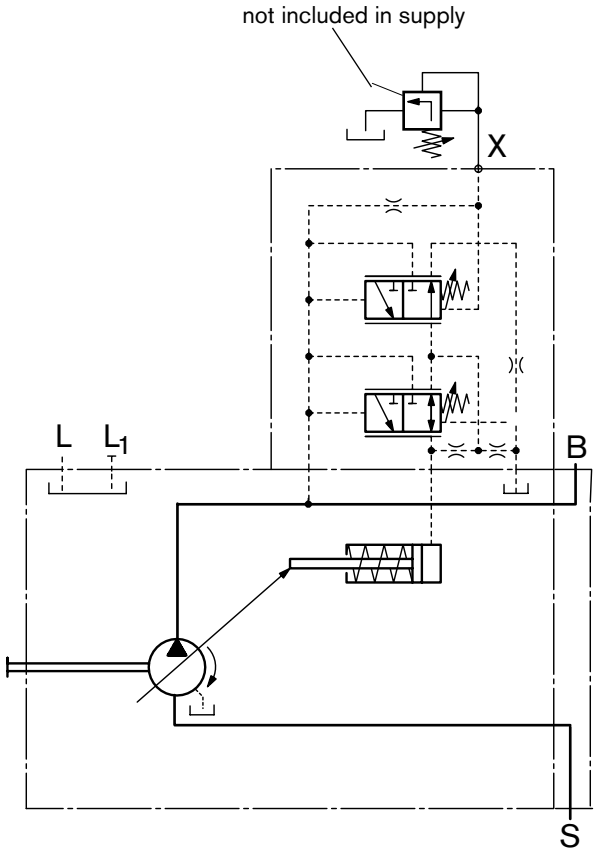
– DBETR -SO381 with orifice dia. 0.03 inch (0.8 mm) in P (electric) to RE 29 166

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

Control data

See page 9

Schematic : DRG



Ports

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

DRF (DFR) and DRS (DFR1) - Pressure and flow control

Execution of control valve as described on page 9 and 10 .

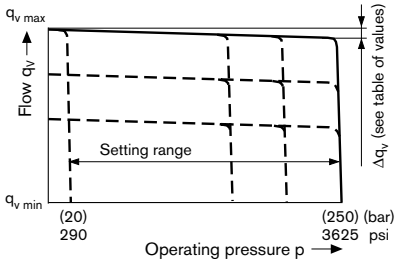
In addition to the pressure control function, the pump flow to the actuator may be varied by means of a differential pressure (eg. over an orifice or a directional control valve). The pump supplies only the amount of fluid as required by the actuator.

The pressure control overrides the flow control function.

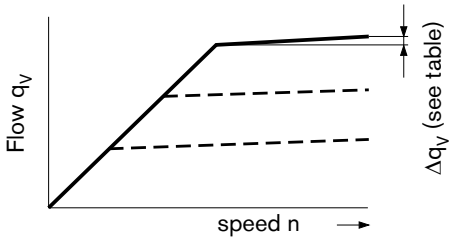
The DRS (DFR1) valve has no connection between X-port and pump housing.

Static characteristic

Flow control at n_1 = 1500 rpm; t_{fluid} = 120°F (50 °C)

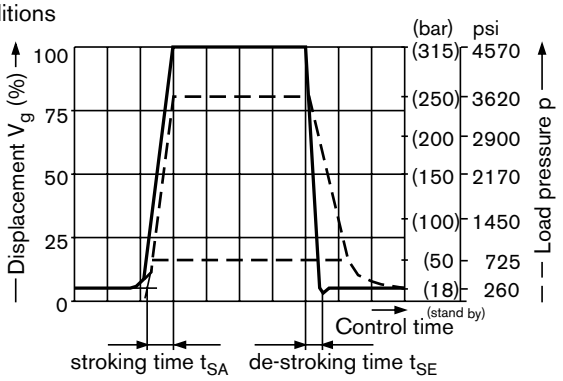


Static characteristic at variable speed



Dynamic characteristic of flow control

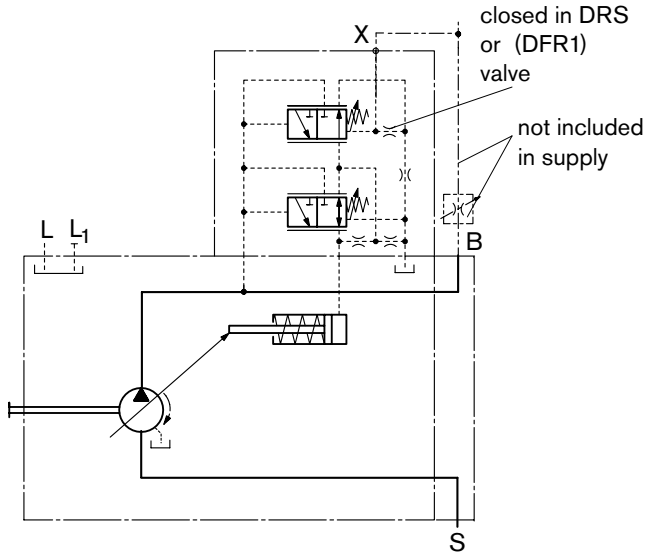
The curves shown are measured average values under test conditions



Control times

Size	t_{SA} [ms] stand by - 3600 psi (250 bar)	t_{SE} [ms] stand by - 3600 psi (250 bar)	t_{SE} [ms] 725 psi - stand by (50 bar)
10	60	15	40
28	70	20	50
45	85	25	60
60	90	30	75
85	100	35	100

Schematic: DRF (DFR)



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.

When port X is unloaded to tank (and outlet B is closed) a zero stroke pressure ("stand by") of p = 260 ± 30 psi (18 ± 2 bar) results (depends on Δp-setting).

Control data

For pressure control data see page 9.

Max. flow deviation (hysteresis and rise) measured at a drive speed of n = 1500 rpm

Size	10	28	45	60	85
Δqv_{max} [gpm	0.13	0.26	o.48	0.66	0.82
(L/min)]	(0.5)	(1.0)	(1.8)	(2.5)	(3.1)

Pilot oil consumption DFR (DRF) max. ca. 0.8...1.2 gpm (3...4.5 L/min)
Pilot oil consumption DFR1 (DRS) max. ca. 0.8 gpm (3 L/min)
Flow loss at q_{Vmax} see page 8

Possible control valves to be used on port B
(not included with supply of pump)

LS-Mobile control valves
Mobile valve block M4-12 (RE 64278)
Mobile valve block M4-15 (RE 64282)

LUDV-Mobile control valves
Mobile valve block M6-15 (RE 64284)
Mobile valve block M7-22 (RE 64287)

LA... - Pressure, flow and power control

Execution of pressure control like DR(G), see page 9/10.
Execution of pressure and flow control like DRS, see page 11.

In order to achieve **limit the max. drive torque** with varying operating pressures, the swivel angle and with it the output flow of the pump is varied in such a manner, that the product of flow and pressure remains constant.

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

When ordering please state the max. pump input torque in clear text.

Control data

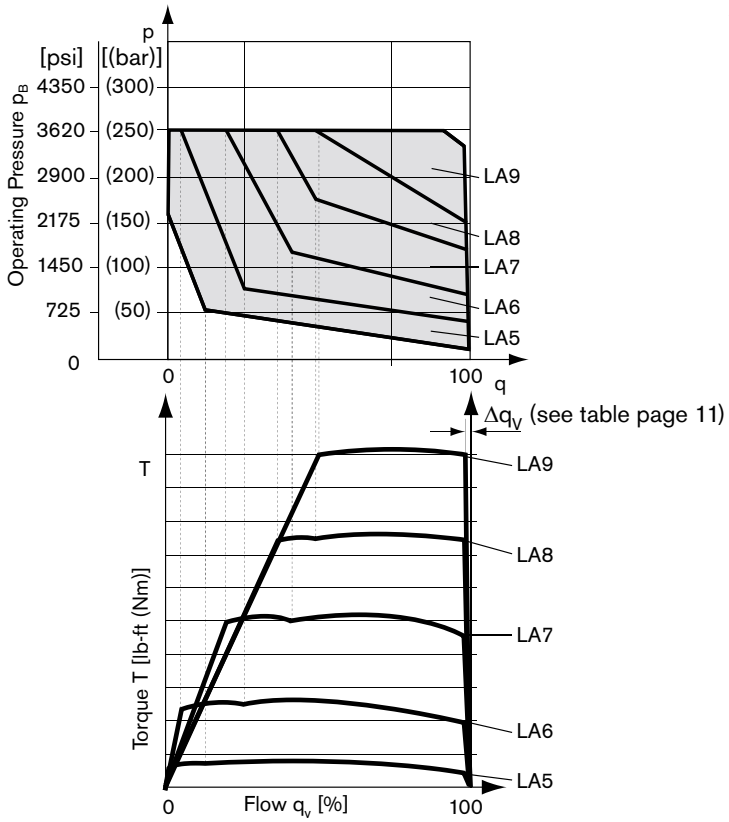
For technical data of pressure control see page 9.

For technical data of pressure and flow control see page 11.

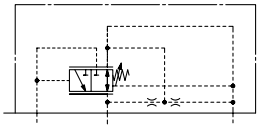
Pilot oil consumption max. approx. 0.8 gpm (3.0 L/min)
Flow loss at $q_{V\,max}$ see page 8

Start of control [psi] (bar)	Size	Torque T [lb-ft.(Nm)] 28	45	63	85	Ordering code
145 to 510 (10 to 35)		4.4 - 14 (6 - 19)	7.4 - 22.1 (10 - 30)	11 - 32 (15 - 43)	15 - 42 (20 - 57)	LA5
520 to 1015 (36 to 70)		14 - 26.5 (19.1 - 36)	22.2 - 43.5 (30.1 - 59)	32 - 61 (43.1 - 83)	42 - 83 (57.1 - 112)	LA6
1030 to 1520 (71 to 105)		26.6 - 38.4 (36.1 - 52)	43.6 - 62 (59.1 - 84)	61 - 88 (83.1 - 119)	83 - 118 (112.1 - 160)	LA7
1535 to 2030 (106 to 140)		38.4 - 51.6 (52.1 - 70)	62 - 83 (84.1 - 112)	88 - 116 (119.1 - 157)	118 - 156 (160.1 - 212)	LA8
2045 to 3335 (141 to 230)		51.7 - 86.3 (70.1 - 117)	83 - 139 (112.1 - 189)	116 - 195 (157.1 - 264)	156 - 263 (212.1 - 357)	LA9

Static characteristic and torque curves

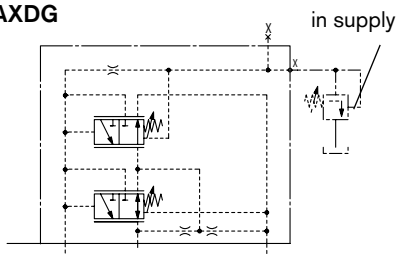


Schematic: LAXD



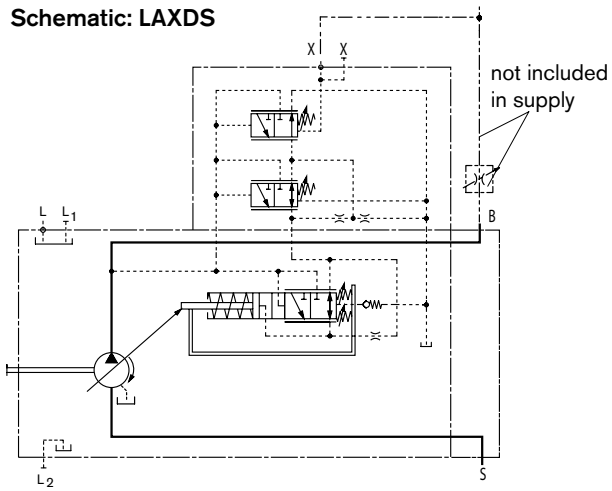
Schematic: LAXDG

not included in supply



Schematic: LAXDS

not included in supply



Ports

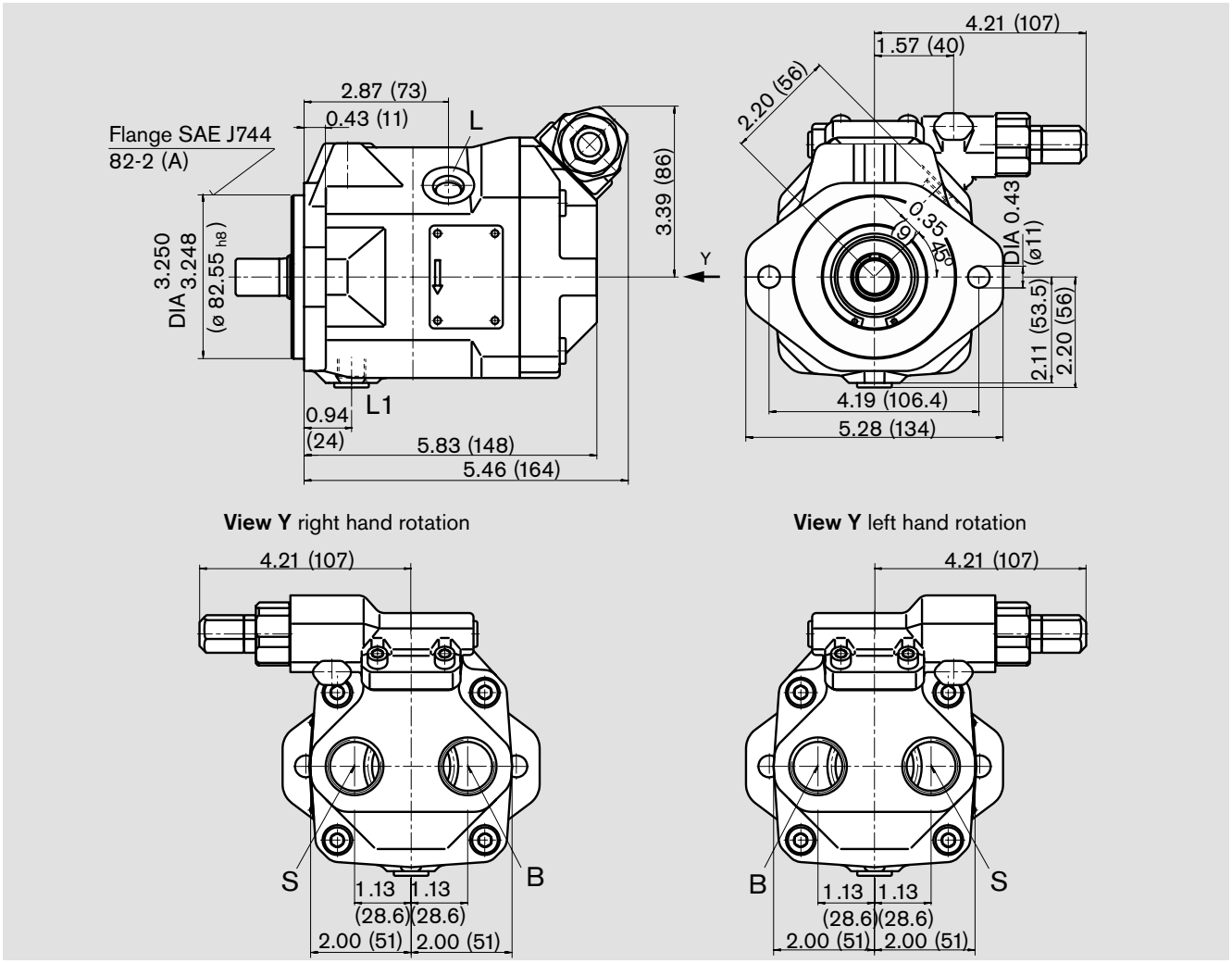
B	Outlet port
S	Inlet port
L, L_1 ,L_2	Case drain ports (L_1 ,L_2 plugged)
X	Pilot pressure port

Notes

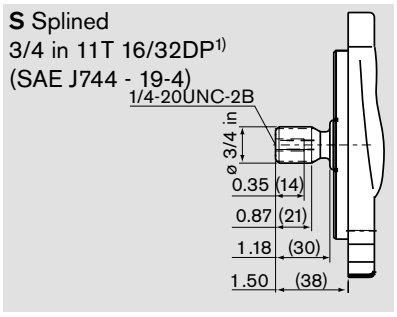
Unit dimensions, size 10

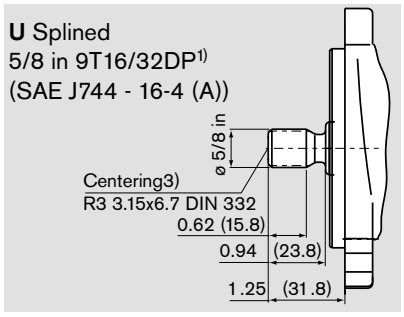
Before finalizing your design please request a certified installation drawing.
Dimensions in inches and (mm)

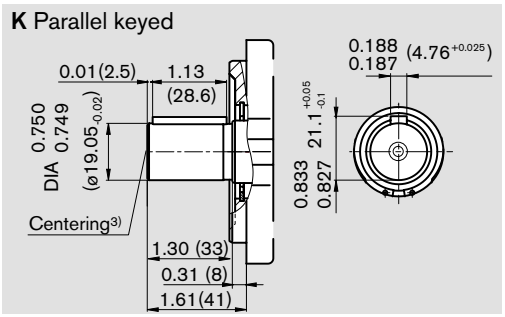
A10VSO10 DR/52R(L)-VXC64N00



Shaft ends







Ports

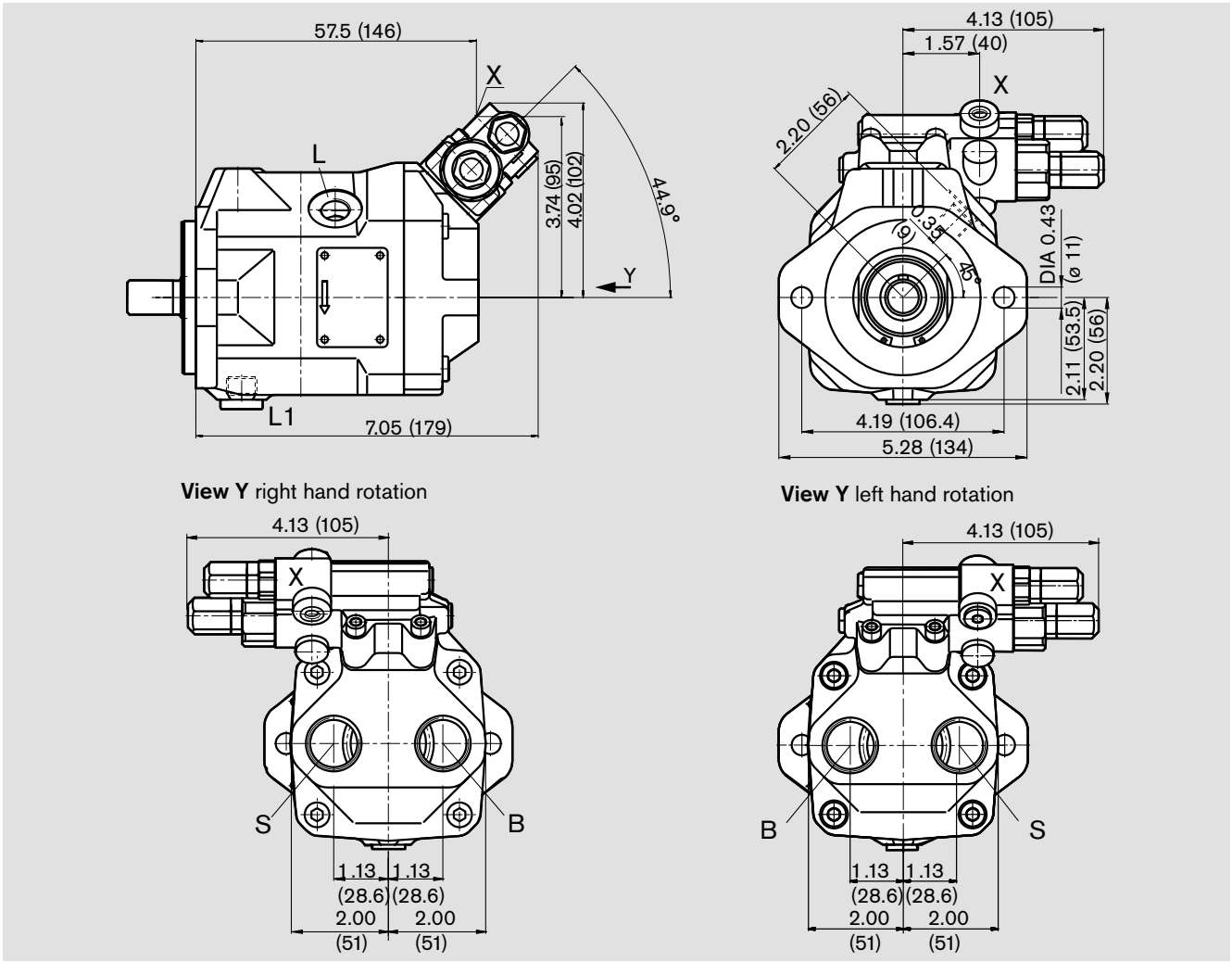
				Tightening torque, max. 2)
B	Outlet port, SAE flange	ISO 11926	1 1/16-12UNF-2B 0.79 (20) deep	261 lb-ft (360 Nm)
S	Inlet port, SAE flange	ISO 11926	1 1/16-12UNF-2B 0.79 (20) deep	261 lb-ft (360 Nm)
L/L_1	Case drain port (L_1plugged)	ISO 11926	9/16-18UNF-2B	58 lb-ft (80Nm)

1) ANSI B92.1a-1996, 30° pressure angle, flat base, flank centering, fit class 5
2) see general information
3) axial retention of coupling half eg. with clamp coupling or with clamping screw

Unit dimensions, size 10

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

A10VSO10 DFR1/52R(L)-VXC64N00



Ports

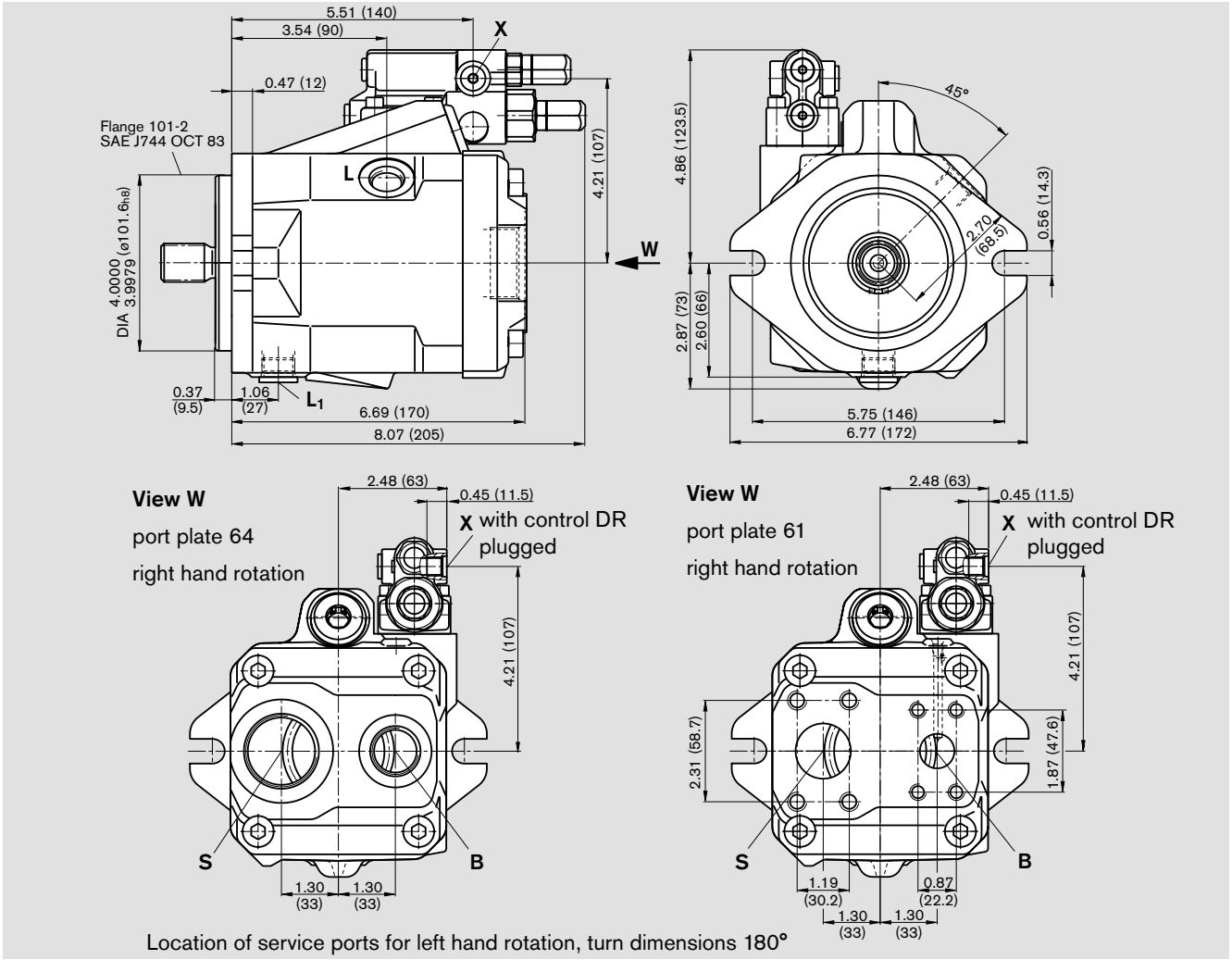
				Tightening torque, max. [1]
B	Outlet port, SAE flange	ISO 11926	1 1/16-12UNF-2B 0.79 (20) deep	261 lb-ft (360 Nm)
S	Inlet port, SAE flange	ISO 11926	1 1/16-12UNF-2B 0.79 (20) deep	261 lb-ft (360 Nm)
L/L_1	Case drain port (L_1 plugged)	ISO 11926	9/16-18UNF-2B	58 lb-ft (80Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B	29 lb-ft (40Nm)

[1] see general information

Unit dimensions, size 28

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

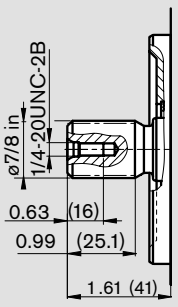
A10VO28 DR(DRG, DFR, DFR1)/52R(L)-VXC61(64)N00



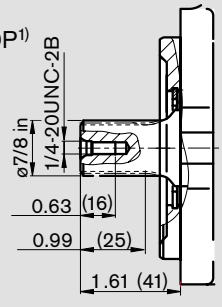
Location of service ports for left hand rotation, turn dimensions 180°

Shaft ends

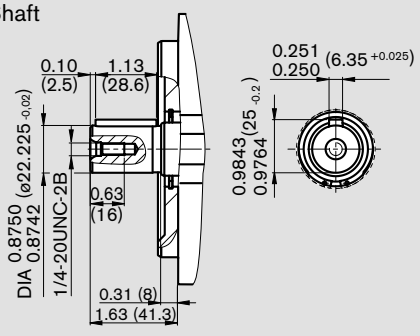
S Splined
7/8 in 13T 16/32DP[1)]
(SAE J744 -
22-4(A-B))



R Splined
7/8 in 18T 16/32DP[1)]
(SAE J744 -
22-4(A-B))



K Shaft



Ports- Plate 64, Ports plate 61 see page 17

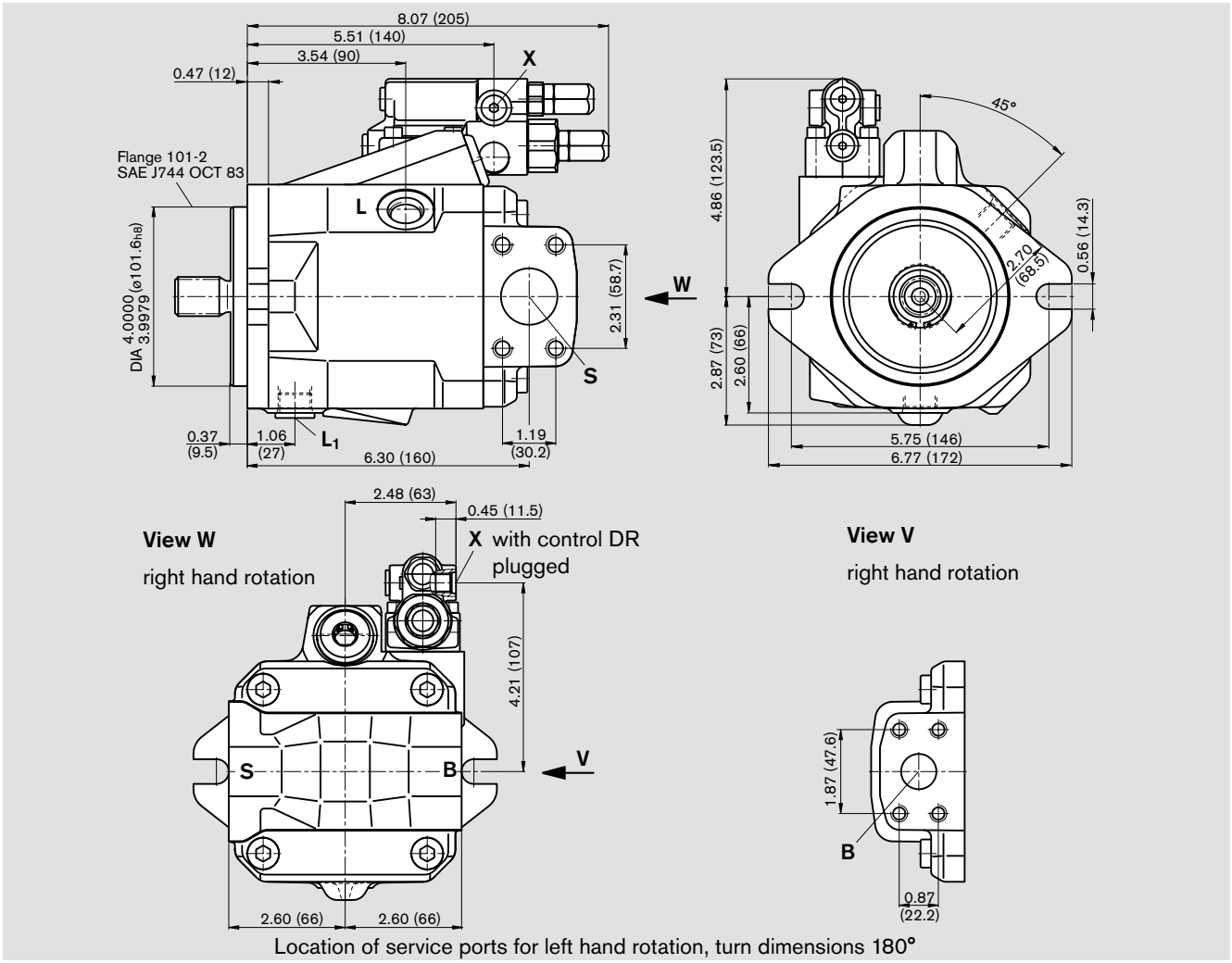
				Tightening torque, max. [2)]
B	Outlet port, threaded	ISO 11926	1 1/16-12UNF-2B 0.79 (20) deep	261 lb-ft (360 Nm)
S	Inlet port, threaded	ISO 11926	1 5/8-12UN-2B 0.79 (20) deep	696 lb-ft (960 Nm)
L/L_1	Case drain port (L_1 plugged)	ISO 11926	3/4-16UNF-2B	116 lb-ft (160Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B	29 lb-ft (40Nm)

[1)] ANSI B92.1a-1996, 30° pressure angle, flat base, flank centering, fit class 5
[2)] see general information

Unit dimensions, size 28

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

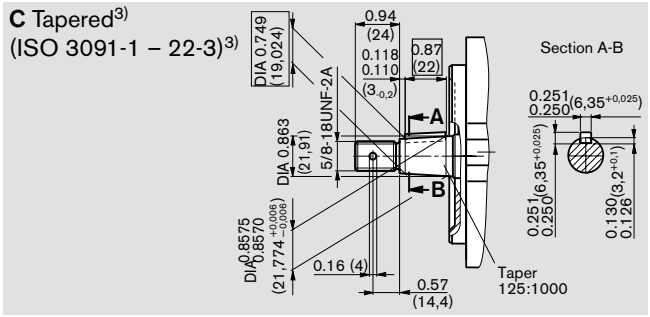
A10VO28 DR(DRG, DFR, DFR1)/52R(L)-VXC62N00



Location of service ports for left hand rotation, turn dimensions 180°

Shaft ends

C Tapered[3]
(ISO 3091-1 – 22-3)[3]



Ports- plate 62 (port plate 61 see also page 16)

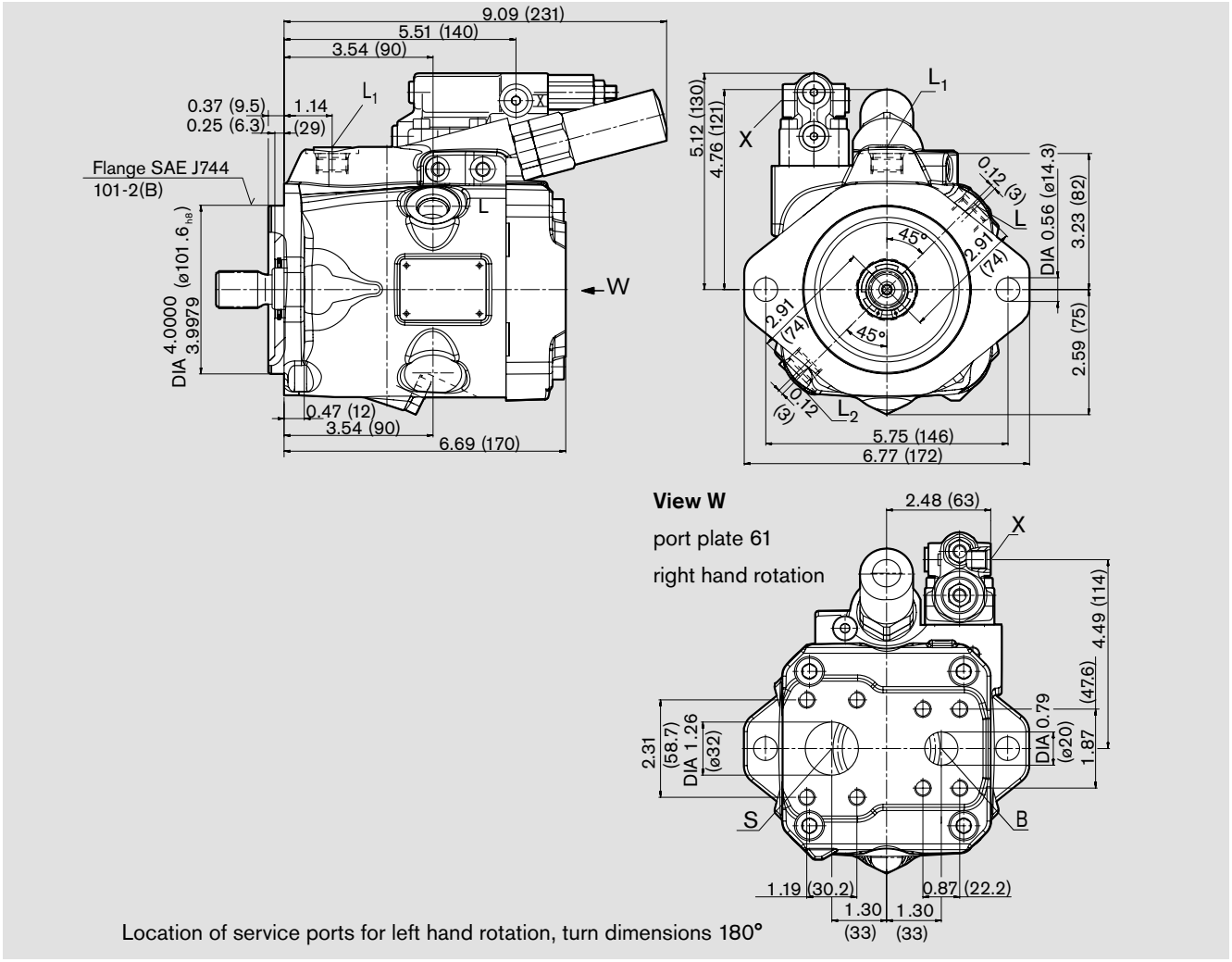
				Tightening torque, max. [2]
B	Outlet port, SAE flange(code 61)	SAE J518	3/4in	
	Fixing thread	ISO 68	3/8-16UNC-2B; 0.75 (19) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61)	SAE J518	1 1/4in	
	Fixing thread	ISO 68	7/16-14UNC-2B; 0.79 (20) deep	48 lb-ft (66 Nm)
L/L_1	Case drain port (L_1 plugged)	ISO 11926	3/4-16UNF-2B	116 lb-ft (160Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B	29 lb-ft (40Nm)

[1] ANSI B92.1a-1996, 30° pressure angle, flat base, flank centering, fit class 5
[2] see general information
[3] for series 52 only

Unit dimensions, size 28

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

A10VO28 LAXDX/53R(L)-VXC61N00



Location of service ports for left hand rotation, turn dimensions 180°

Shaft Ends see page 16

Ports

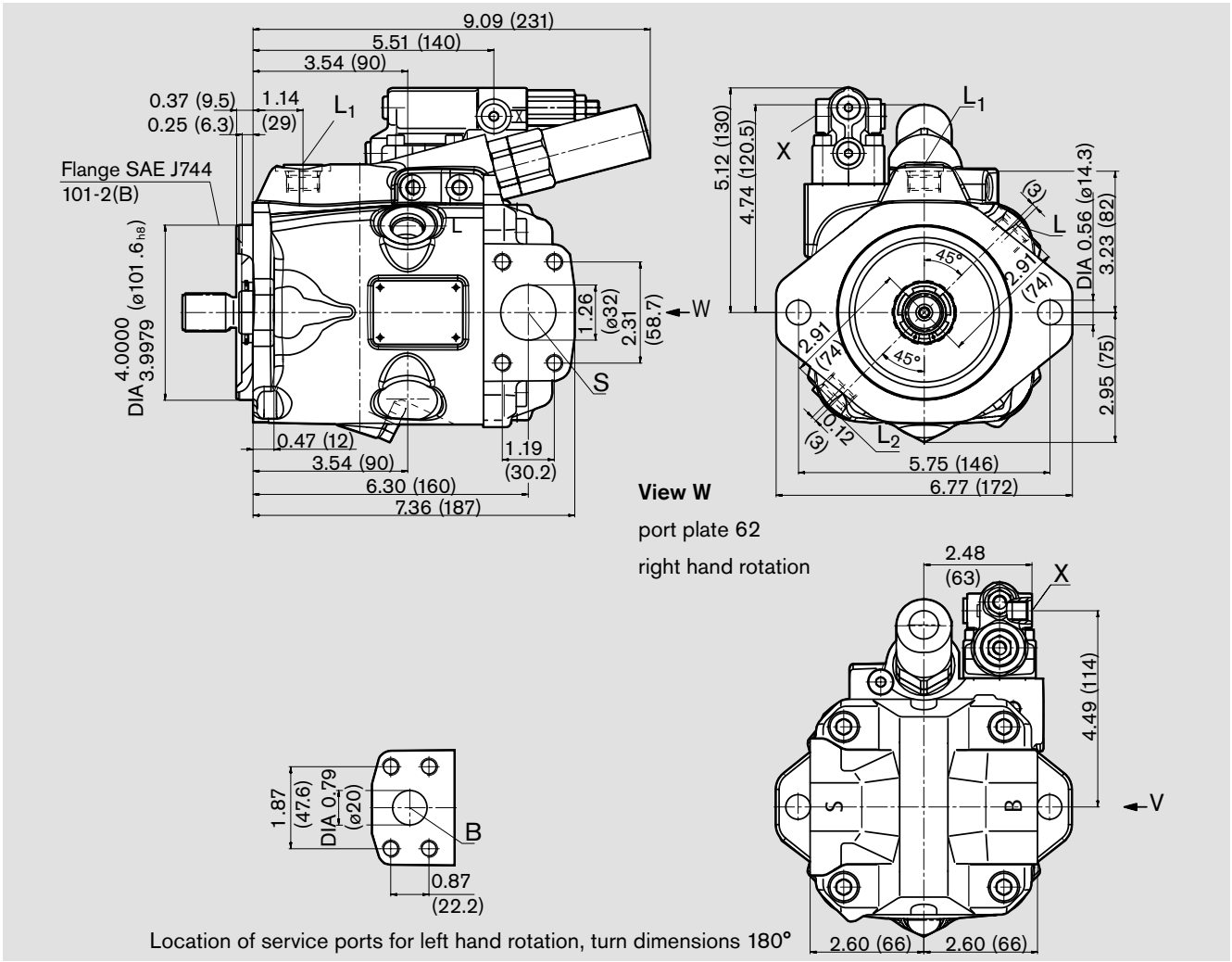
				Tightening torque, max. [2]
B	Outlet port, SAE flange(code 61)	SAE J518	3/4in	
	Fixing thread	ISO 68	3/8-16UNC-2B; 0.75 (19) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61)	SAE J518	1 1/4in	
	Fixing thread	ISO 68	7/16-14UNC-2B; 0.79 (20) deep	48 lb-ft (66 Nm)
$L/L_{1/2}$	Case drain port ($L_{1/2}$ plugged)	ISO 11926	3/4-16UNF-2B	116 lb-ft (160Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B	29 lb-ft (40Nm)

[1] ANSI B92.1a-1996, 30° pressure angle, flat base, flank centering, fit class 5
[2] see general information

Unit dimensions, size 28

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

A10VO28 LAXDX/53R(L)-VXC62N00



Location of service ports for left hand rotation, turn dimensions 180°

Shaft Ends see page 16

Ports

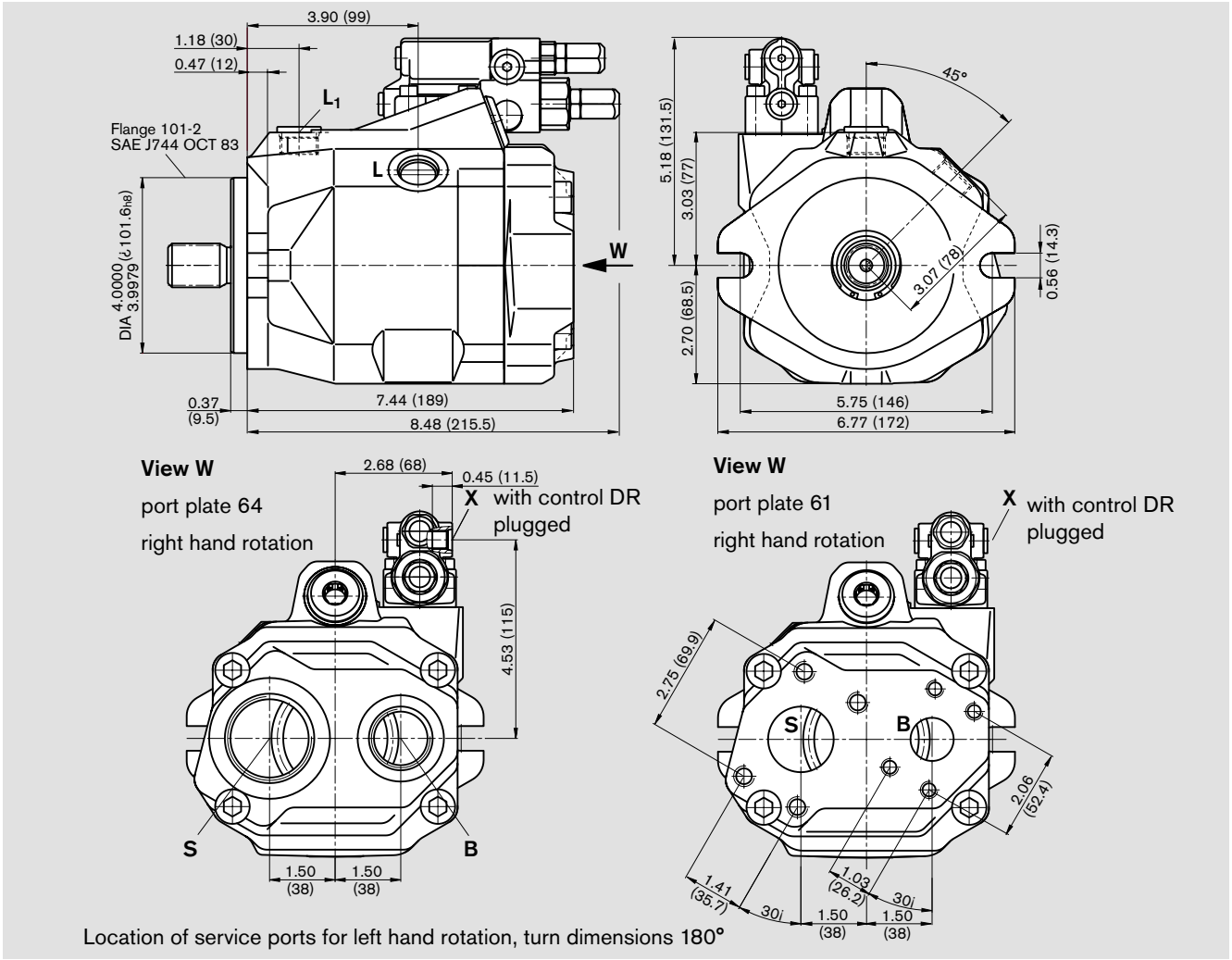
				Tightening torque, max. [2]
B	Outlet port, SAE flange(code 61)	SAE J518	3/4in	
	Fixing thread	ISO 68	3/8-16UNC-2B; 0.75 (19) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61)	SAE J518	1 1/4in	
	Fixing thread	ISO 68	7/16-14UNC-2B; 0.79 (20) deep	48 lb-ft (66 Nm)
$L/L_{1/2}$	Case drain port ($L_{1/2}$ plugged)	ISO 11926	3/4-16UNF-2B	116 lb-ft (160Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B	29 lb-ft (40Nm)

[1] ANSI B92.1a-1996, 30° pressure angle, flat base, flank centering, fit class 5
[2] see general information

Unit dimensions, size 45

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

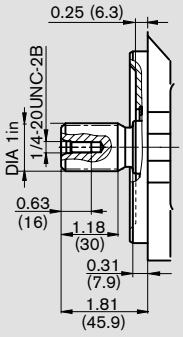
A10VO45 DR(DRG, DFR, DFR1)/52R(L)-VXC61(64)N00



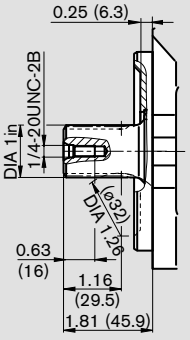
Location of service ports for left hand rotation, turn dimensions 180°

Shaft ends

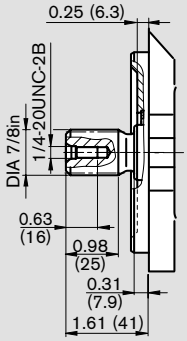
S Splined
1 in 15T 16/32DP[1)]
(SAE J744 - 25-4)



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



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



Ports- Port Plate 64 (port plate 61 see page 21)

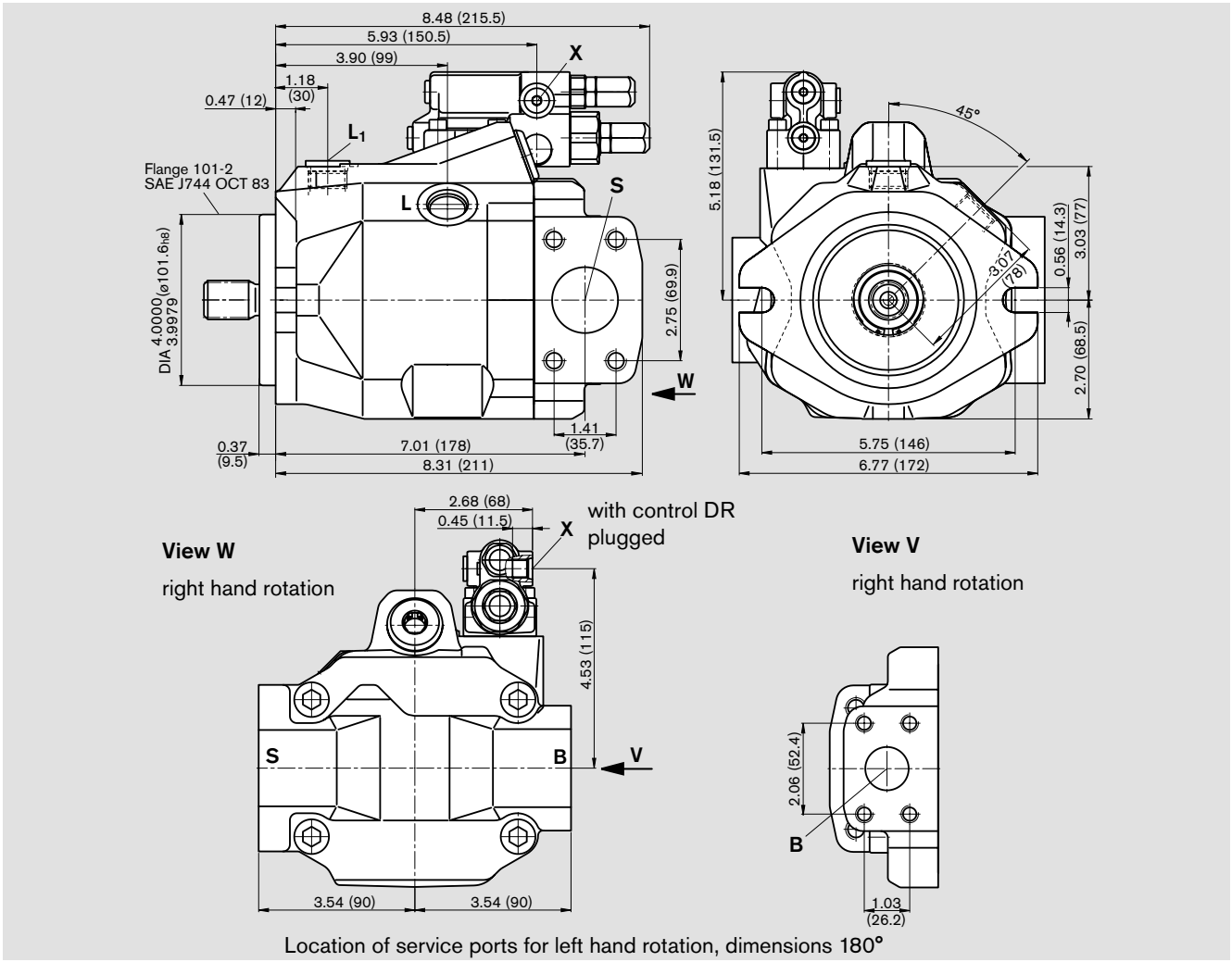
				Tightening torque, max. [2)]
B	Outlet port, threaded	ISO 11926	1 5/16-12UN-2B 0.79 (20) deep	390 lb-ft (540 Nm)
S	Inlet port, threaded	ISO 11926	1 7/8-12UN-2B 0.79 (20) deep	696 lb-ft (960 Nm)
L/L_1	Case drain port (L_1plugged)	ISO 11926	7/8-14UNF-2B	174 lb-ft (240Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B	29 lb-ft (40Nm)

[1)] ANSI B92.1a-1996, 30° pressure angle, flat base, flank centering, fit class 5
[2)] see general information

Unit dimensions, size 45

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

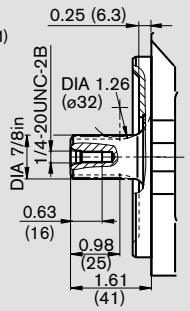
A10VO45 DR(DRG, DFR, DFR1)/52R(L)-VXC62N00



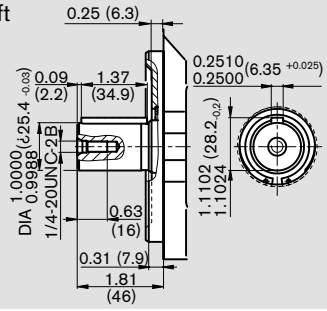
Location of service ports for left hand rotation, dimensions 180°

Shaft ends

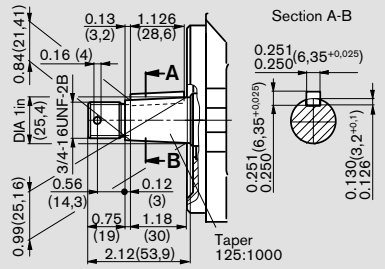
W Splined
7/8 in 13T 16/32DP[1)]
(SAE J744 -
22-4 (B))



K Shaft



C Tapered Shaft (ISO 3019-1 – 25-3)[3)]



Ports plate 62 (port plate 61 see also page 20)

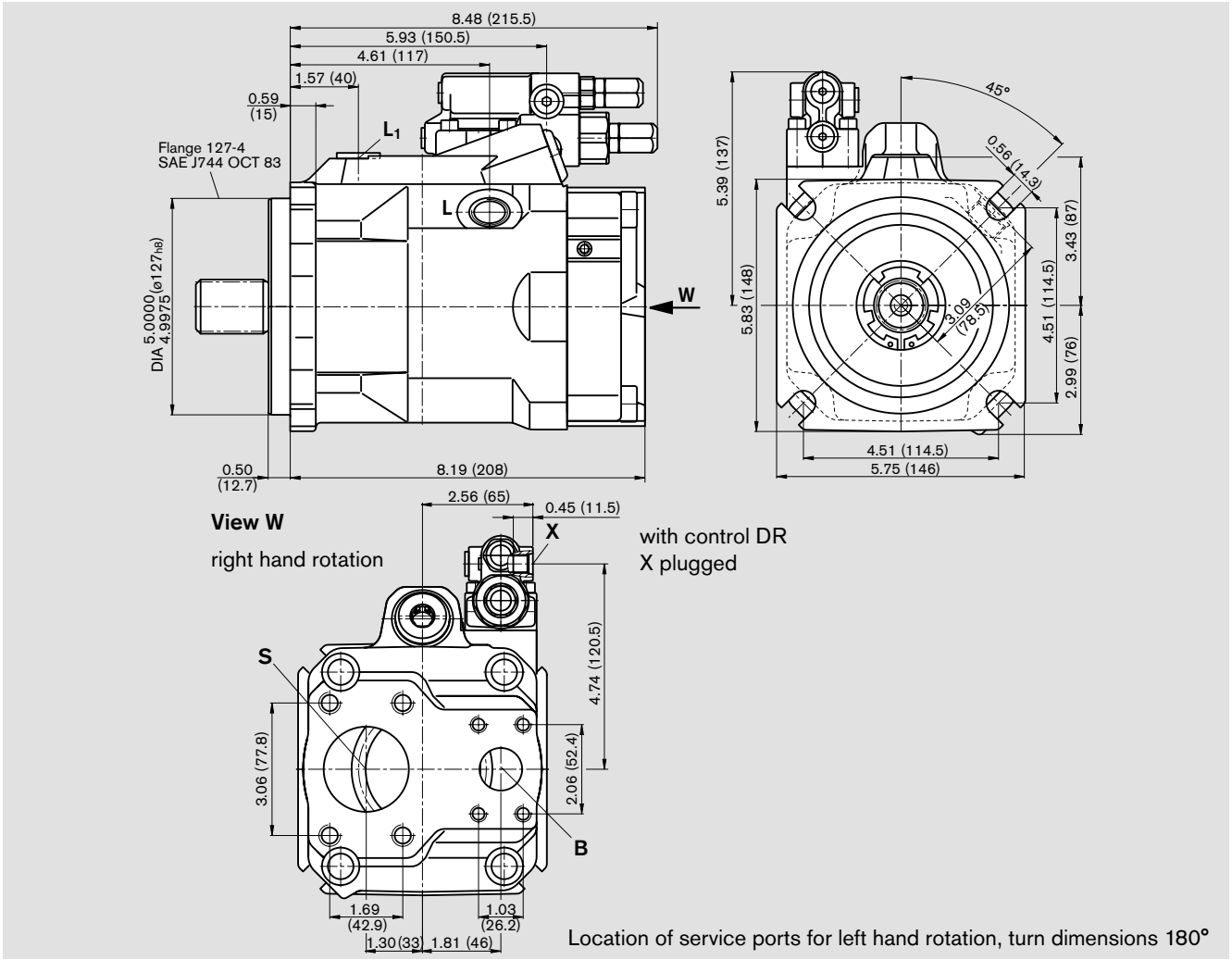
				Tightening torque, max. [2)]
B	Outlet port, SAE flange (code 61)	SAE J518	1 in	
	Fixing thread	ISO 68	3/8-16UNC-2B; 0.71 (18) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61)	SAE J518	1 1/2 in	
	Fixing thread	ISO 68	1/2-13UNC-2B; 0.87 (22) deep	65 lb-ft (90 Nm)
L/L_1	Case drain port (L_1 plugged)	ISO 11926	7/8-14UNF-2B	174 lb-ft (240Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B	29 lb-ft (40Nm)

[1)] ANSI B92.1a-1996, 30° pressure angle, flat base, flank centering, fit class 5
[2)] see general information
[3)] for series 52 only

Unit dimensions, size 60

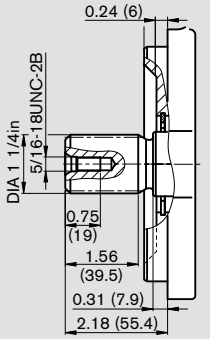
Before finalizing your design please request a certified installation drawing. Dimensions in inches and (mm)

A10VO60 DR(DRG, DFR, DFR1)/52R(L)-VXC61N00

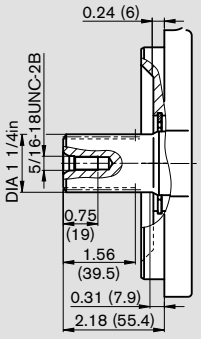


Shaft ends

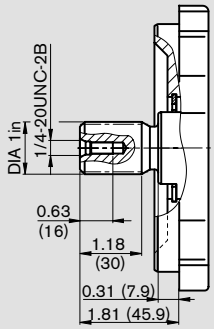
S Splined
1 in 15T 16/32DP[1)]
(SAE J744 - 25-4)



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



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



Ports

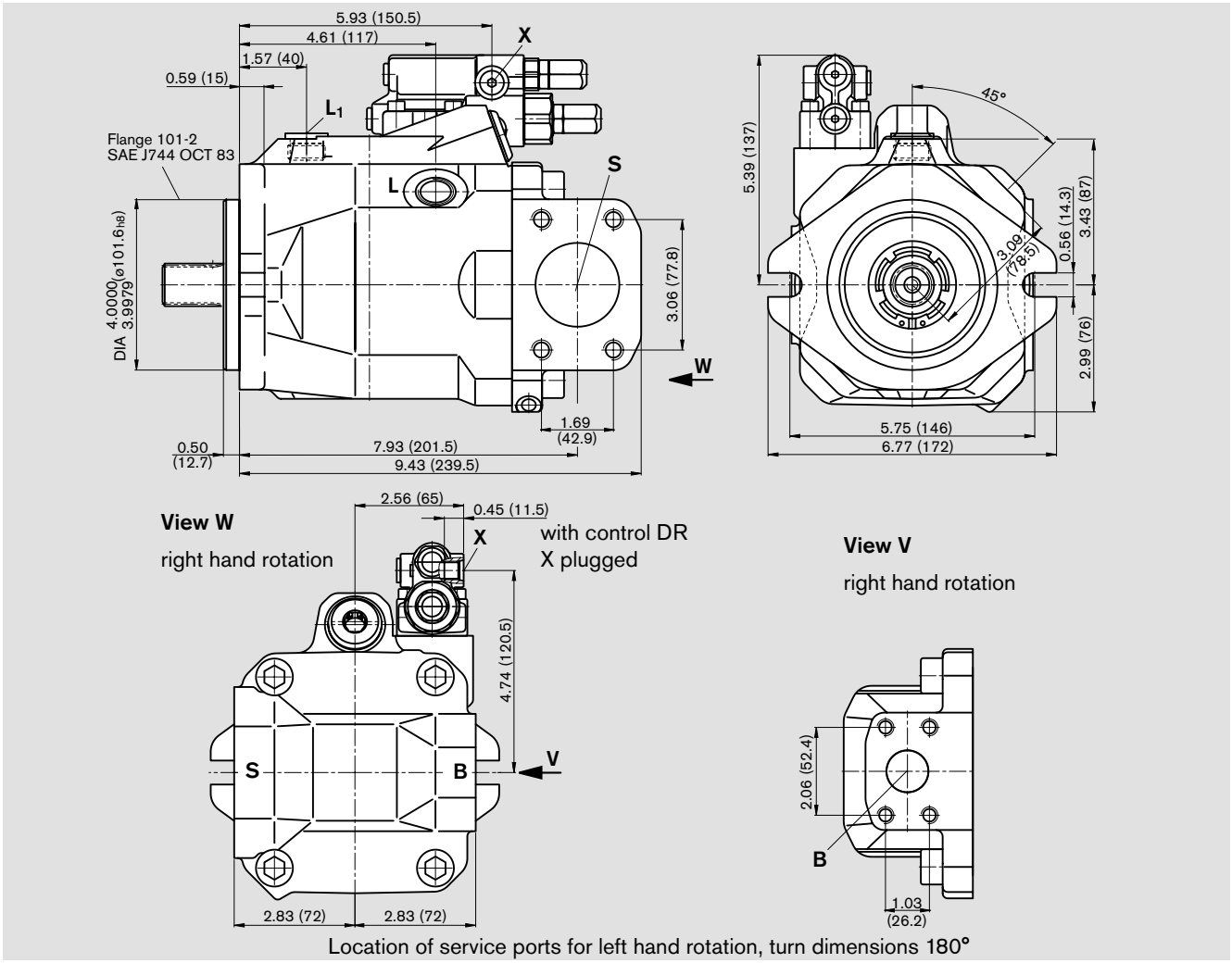
				Tightening torque, max. [2)]
B	Outlet port, SAE flange(code 61) Fixing thread	SAE J518 ISO 68	1 in 3/8-16UNC-2B; 0.71 (18) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61) Fixing thread	SAE J518 ISO 68	2 in 1/2-13UNC-2B; 0.87 (22) deep	65 lb-ft (90 Nm)
L/L_1	Case drain port (L_1plugged)	ISO 11926	7/8-14UNF-2B	174 lb-ft (240Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B	29 lb-ft (40Nm)

[1)] ANSI B92.1a-1996, 30° pressure angle, flat base, flank centering, fit class 5
[2)] see general information

Unit dimensions, size 60

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

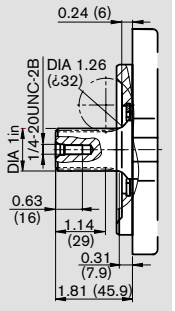
A10VO60 DR(DRG, DFR, DFR1)/52R(L)-VXC62N00



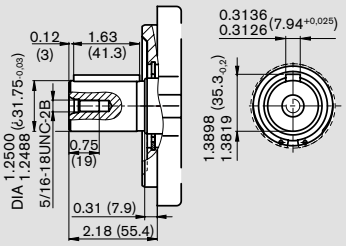
Location of service ports for left hand rotation, turn dimensions 180°

Shaft ends

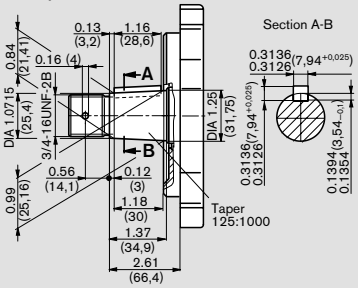
W Splined
7/8 in 13T 16/32DP[1)]
(SAE J744 -
22-4 (B))



K Shaft



C Tapered Shaft (ISO 3019-1 – 25-3)[3)]



Ports

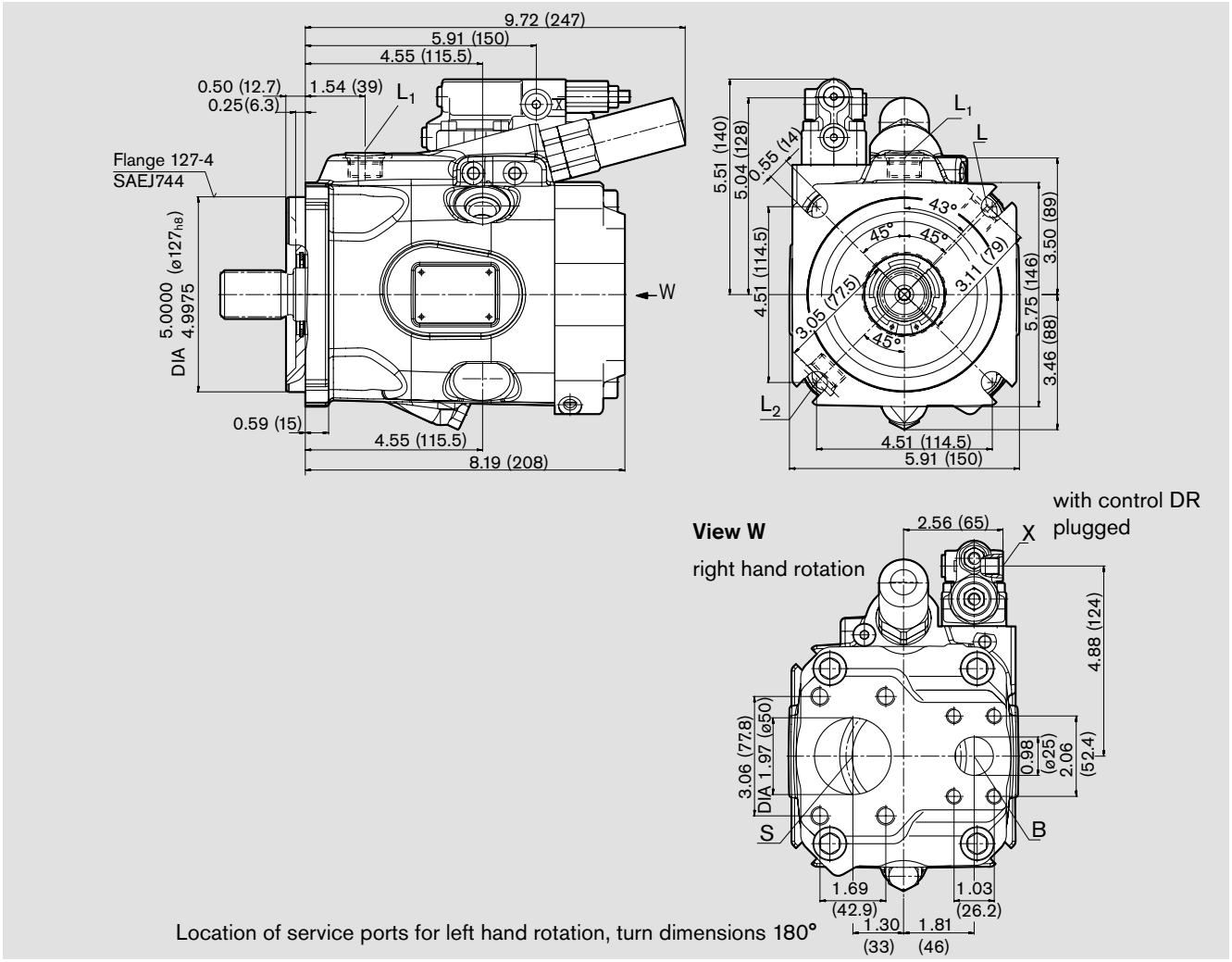
				Tightening torque, max. [2)]
B	Outlet port, SAE flange(code 61) Fixing thread	SAE J518 ISO 68	1 in 3/8-16UNC-2B; 0.71 (18) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61) Fixing thread	SAE J518 ISO 68	2 in 1/2-13UNC-2B; 0.87 (22) deep	65 lb-ft (90 Nm)
L/L_1	Case drain port (L_1 plugged)	ISO 11926	7/8-14UNF-2B	174 lb-ft (240Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B	29 lb-ft (40Nm)

[1)] ANSI B92.1a-1996, 30° pressure angle, flat base, flank centering, fit class 5
[2)] see general information
[3)] for series 52 only

Unit dimensions, size 63

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

A10VO63 LAXDX/53R(L)-VXD61N00



Location of service ports for left hand rotation, turn dimensions 180°

Shaft Ends see page 22 and 23[1)]

Ports

				Tightening torque, max. [2)]
B	Outlet port, SAE flange(code 61) Fixing thread	SAE J518 ISO 68	1 in 3/8-16UNC-2B; 0.71 (18) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61) Fixing thread	SAE J518 ISO 68	2 in 1/2-13UNC-2B; 0.87 (22) deep	65 lb-ft (90 Nm)
$L/L_{1/2}$	Case drain port ($L_{1/2}$ plugged)	ISO 11926	7/8-14UNF-2B	174 lb-ft (240Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B	29 lb-ft (40Nm)

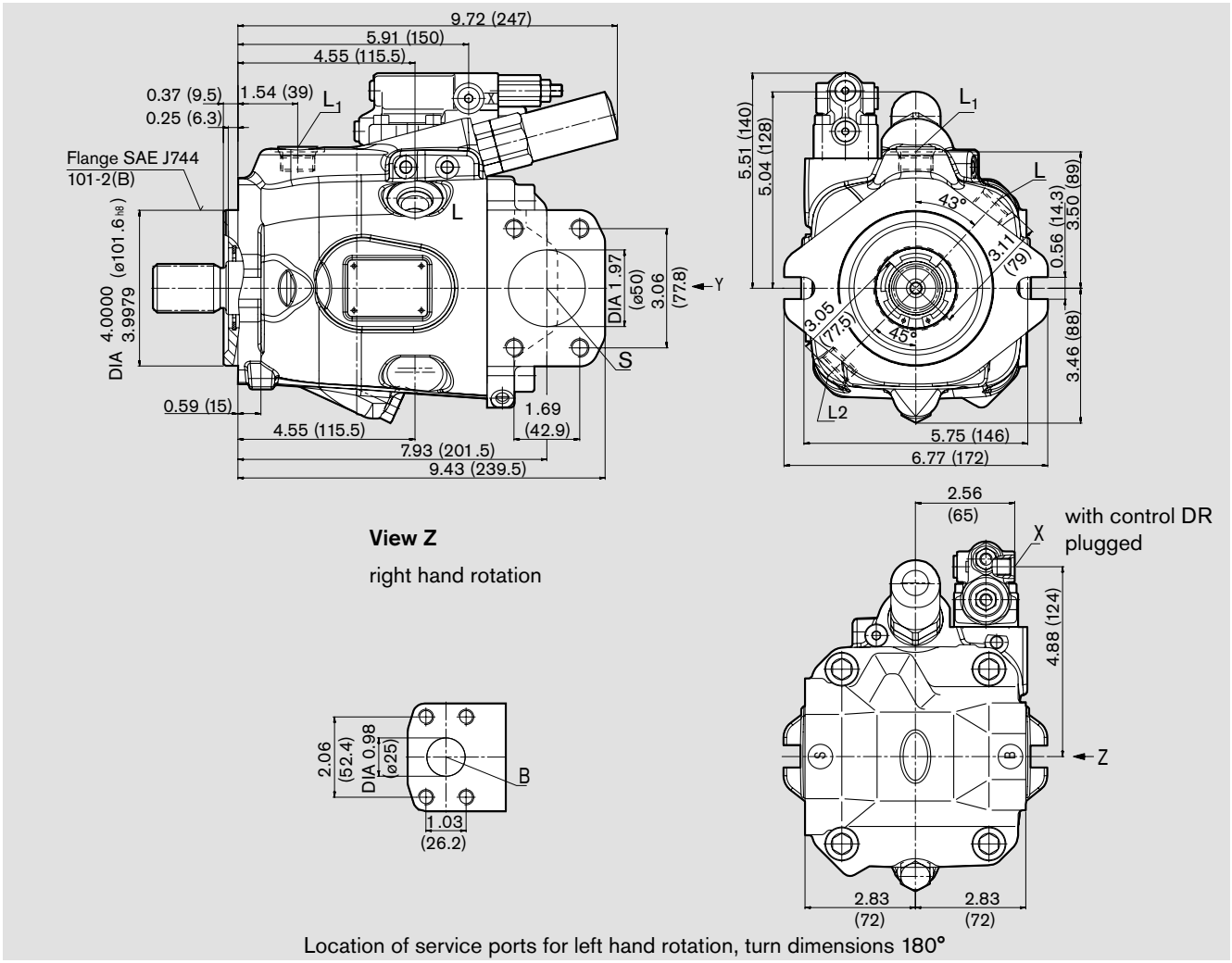
[1)] ANSI B92.1a-1996, 30° pressure angle, flat base, flank centering, fit class 5

[2)] see general information

Unit dimensions, size 63

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

A10VO63LAXDX/53R(L)-VXC62N00



Location of service ports for left hand rotation, turn dimensions 180°

Shaft Ends see page 22 and 23[1)]

Ports

				Tightening torque, max. [2)]
B	Outlet port, SAE flange(code 61)	SAE J518	1 in	
	Fixing thread	ISO 68	3/8-16UNC-2B; 0.71 (18) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61)	SAE J518	2 in	
	Fixing thread	ISO 68	1/2-13UNC-2B; 0.87 (22) deep	65 lb-ft (90 Nm)
$L/L_{1/2}$	Case drain port ($L_{1/2}$ plugged)	ISO 11926	7/8-14UNF-2B	174 lb-ft (240Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B	29 lb-ft (40Nm)

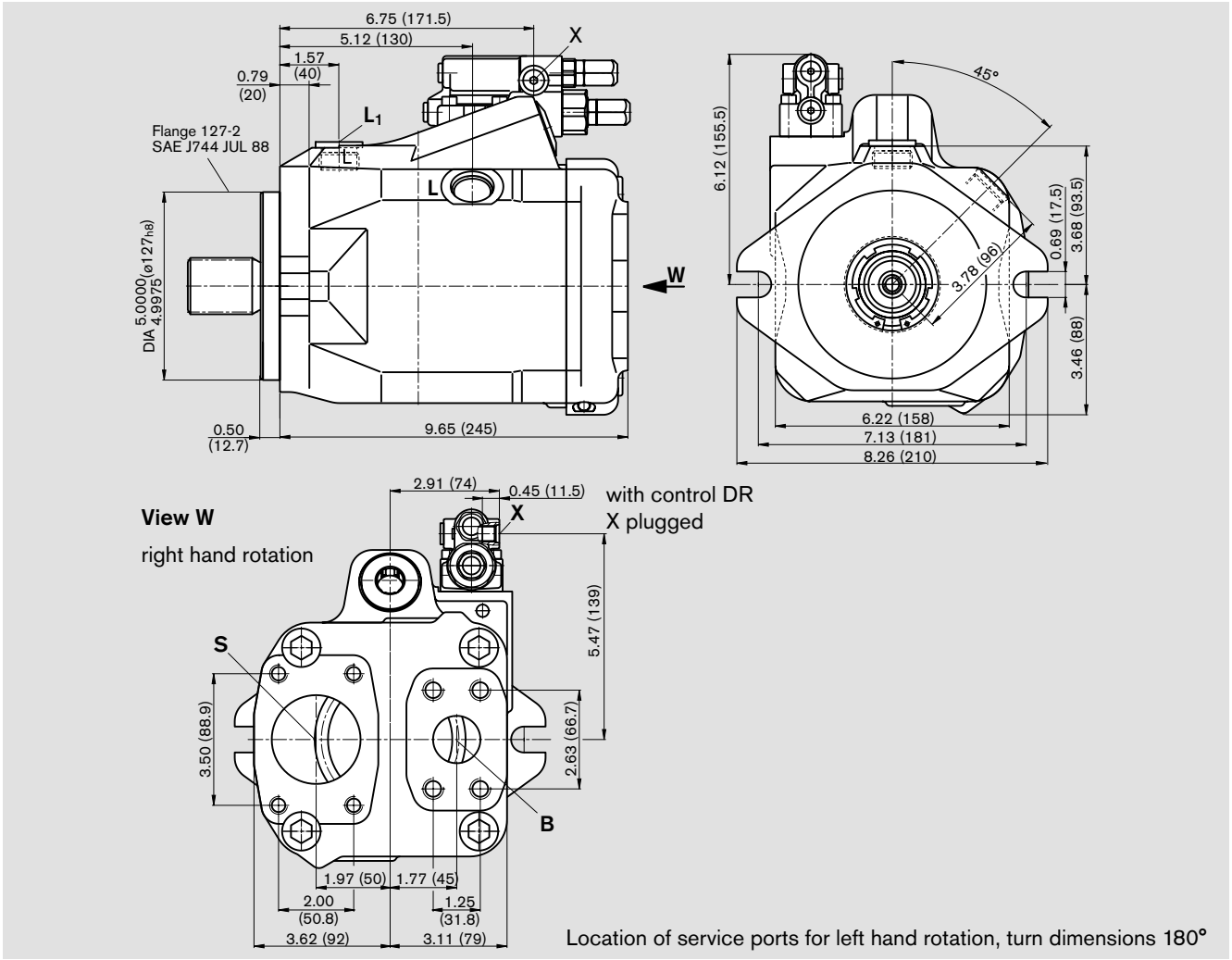
[1)] ANSI B92.1a-1996, 30° pressure angle, flat base, flank centering, fit class 5

[2)] see general information

Unit dimensions, size 85

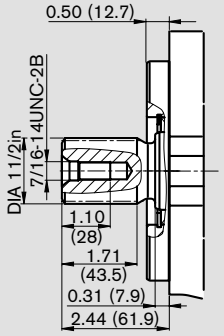
Before finalizing your design please request a certified installation drawing.
Dimensions in inches and (mm)

A10VO85 DR(DRG, DFR, DFR1)/52R(L)-VXC61N00

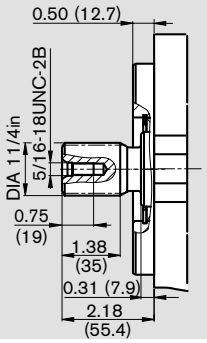


Shaft ends

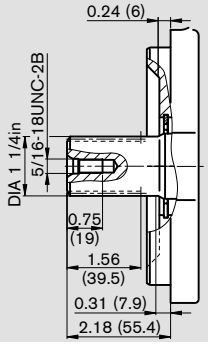
S Splined
1 1/2 in 17T
12/24DP[1)]
(SAE J744 - 38-4 (C-C))



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



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



Ports

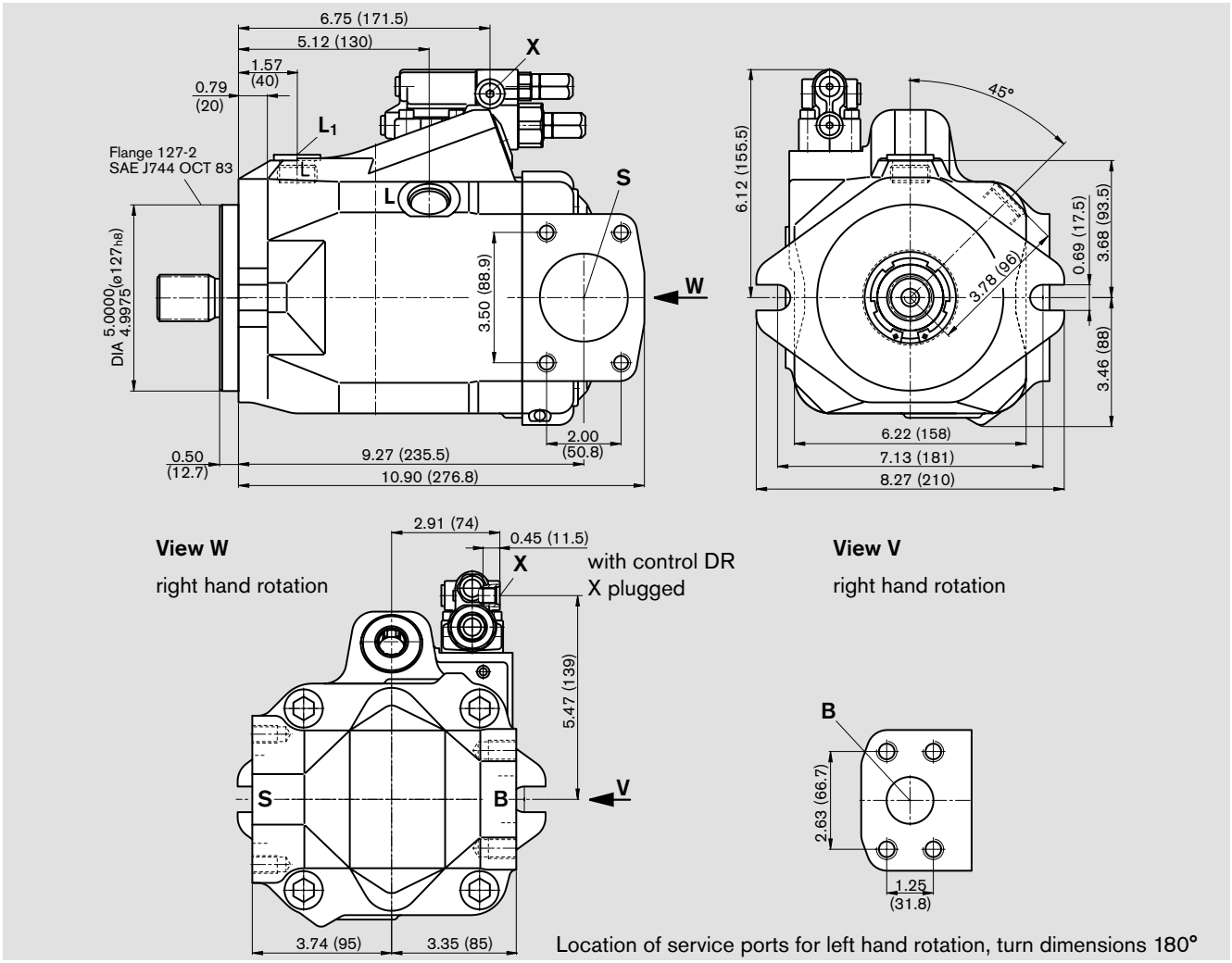
				Tightening torque, max. [2)]
B	Outlet port, SAE flange(code 61) Fixing thread	SAE J518 ISO 68	1 1/4 in 1/2-13UNC-2B; 0.75 (19) deep	65 lb-ft (90 Nm)
S	Inlet port, SAE flange (code 61) Fixing thread	SAE J518 ISO 68	2 1/2 in 1/2-13UNC-2B; 1.07 (27) deep	65 lb-ft (90 Nm)
L/L_1	Case drain port (L_1plugged)	ISO 11926	1 1/16-12UN-2B	260 lb-ft (360Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B	29 lb-ft (40Nm)

[1)] ANSI B92.1a-1996, 30° pressure angle, flat base, flank centering, fit class 5
[2)] see general information

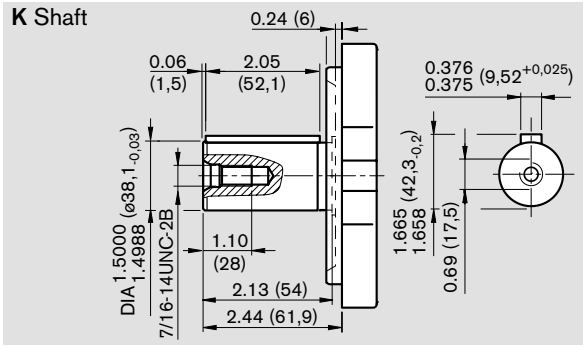
Unit dimensions, size 85

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

A10VO85 DR(DRG, DFR, DFR1)/52R(L)-VXC62N00



Shaft ends



Ports

				Tightening torque, max. [2]
B	Outlet port, SAE flange(code 61) Fixing thread	SAE J518 ISO 68	1 1/4 in 1/2-13UNC-2B; 0.75 (19) deep	 65 lb-ft (90 Nm)
S	Inlet port, SAE flange (code 61) Fixing thread	SAE J518 ISO 68	2 1/2 in 1/2-13UNC-2B; 1.07 (27) deep	 65 lb-ft (90 Nm)
L/L_1	Case drain port (L_1plugged)	ISO 11926	1 1/16-12UN-2B	260 lb-ft (360Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B	29 lb-ft (40Nm)

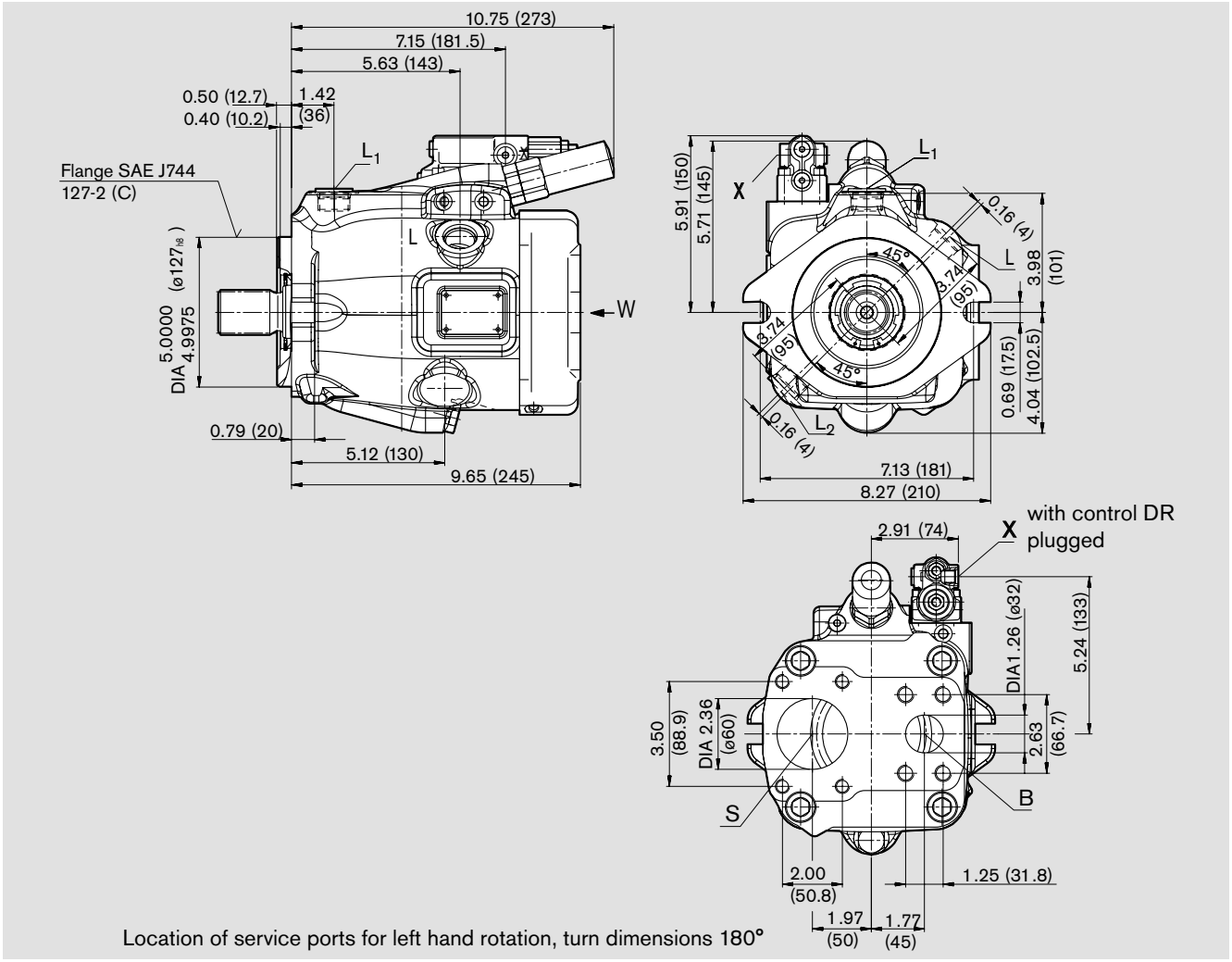
[1] ANSI B92.1a-1996, 30° pressure angle, flat base, flank centering, fit class 5

[2] see general information

Unit dimensions, size 85

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

A10VO85 LAXDX/53R(L)-VXC61N00



Location of service ports for left hand rotation, turn dimensions 180°

Shaft Ends see page 26 and 27[1)]

Ports

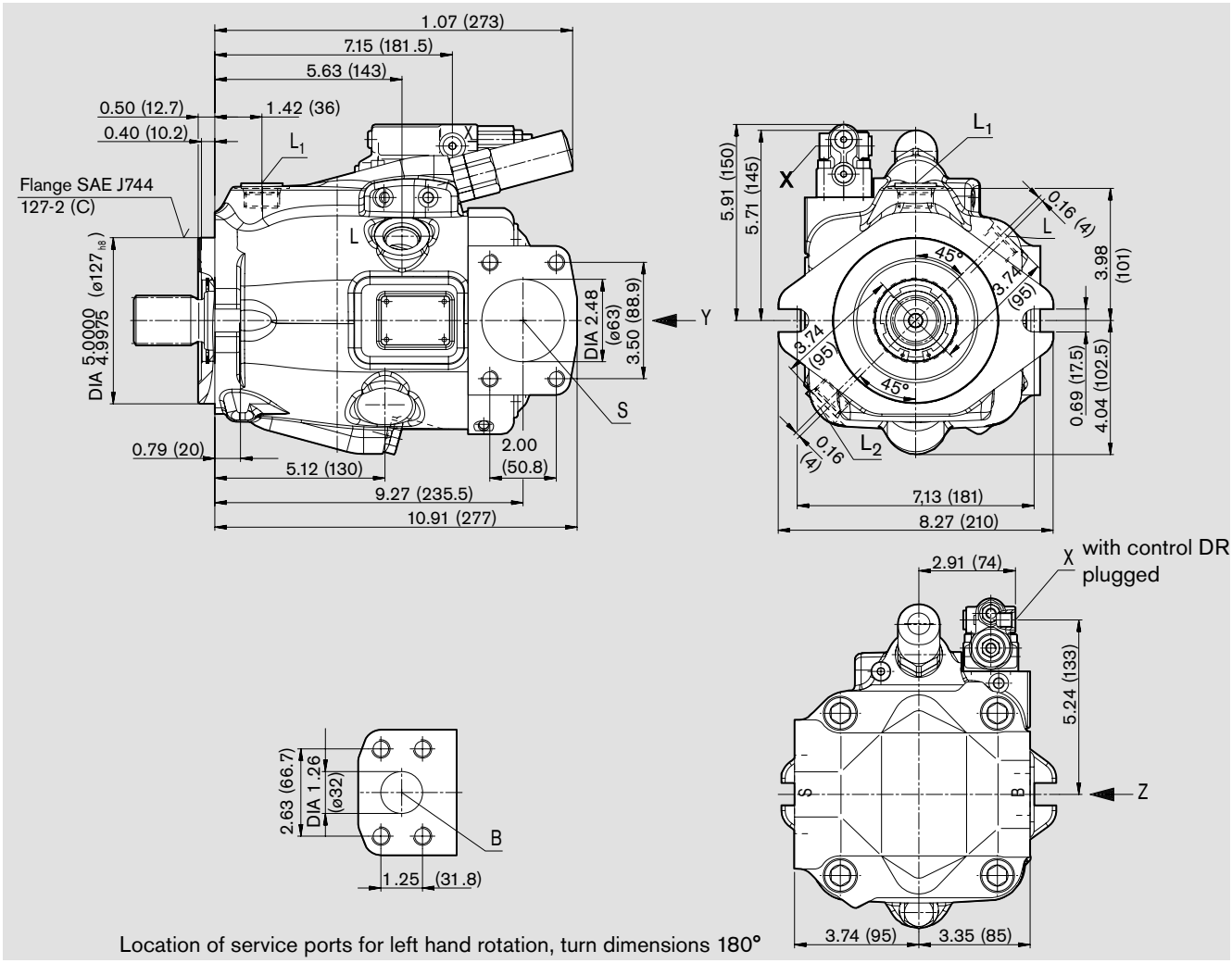
				Tightening torque, max. [2)]
B	Outlet port, SAE flange(code 61) Fixing thread	SAE J518 ISO 68	1 1/4 in 1/2-13UNC-2B; 0.75 (19) deep	 65 lb-ft (90 Nm)
S	Inlet port, SAE flange (code 61) Fixing thread	SAE J518 ISO 68	2 1/2 in 1/2-13UNC-2B; 1.07 (27) deep	 65 lb-ft (90 Nm)
$L/L_{1/2}$	Case drain port ($L_{1/2}$ plugged)	ISO 11926	1 1/16-12UN-2B	260 lb-ft (360Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B	29 lb-ft (40Nm)

[1)] ANSI B92.1a-1996, 30° pressure angle, flat base, flank centering, fit class 5
[2)] see general information

Unit dimensions, size 85

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

A10VO85 LAXDX/53R(L)-VXC62N00



Shaft Ends see page 26 and 27[1)]

Ports

				Tightening torque, max. [2)]
B	Outlet port, SAE flange(code 61)	SAE J518	1 1/4 in	
	Fixing thread	ISO 68	1/2-13UNC-2B; 0.75 (19) deep	65 lb-ft (90 Nm)
S	Inlet port, SAE flange (code 61)	SAE J518	2 1/2 in	
	Fixing thread	ISO 68	1/2-13UNC-2B; 1.07 (27) deep	65 lb-ft (90 Nm)
$L/L_{1/2}$	Case drain port ($L_{1/2}$ plugged)	ISO 11926	1 1/16-12UN-2B	260 lb-ft (360Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B	29 lb-ft (40Nm)

[1)] ANSI B92.1a-1996, 30° pressure angle, flat base, flank centering, fit class 5

[2)] see general information

Combination pumps A10VO + A10V(S)O

Combination pumps offer the possibility to obtain mutually independent hydraulic circuits without the use of a splitter gearbox.

When ordering combination pumps the model codes for the first and the second pump must be joined by a "+".

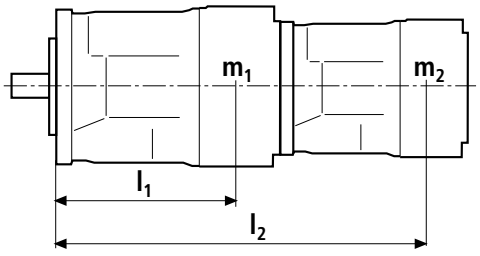
Ordering example: A10VO85DFR1/52R-VSC12**K04** + A10VO45DR/52R-VSC11N00

If the second pump is not factory mounted, the simple type designation is sufficient. In this case the delivery of the pump with through drive will include:a shaft coupler and a plastic cover to prevent dirt from entering the through drive opening.

Permissible overhang moment

It is permissible to use a combination of two single pumps of the same size (tandem pump) considering a mass acceleration force of max. 10 g (322 ft/sec^2 (9,81 m/s^2)) without an additional support bracket.

Size			**10**	**28**	**45**	**60/63**	**85**
Permissible overhang moment							
static	T_m	lb-ft (Nm)	–	656 (890)	664 (900)	1010 (1370)	2270 (3080)
dynamc at 10 g (322 ft/sec^2 (9,81m/s^2))	T_m	lb-ft (Nm)		65 (89)	66 (90)	101 (137)	227 (308)
Weight	m_1	lbs (kg)	18 (8)	31 (14)	40 (18)	48.5 (22)	74.95 (34)
Distance to center of gravity	l_1	in (mm)	–	3.19 (81)	3.74 (95)	3.94 (100)	4.8 (122)



m_1, m_2 Weight of pumps [lbs (kg)]

l_1, l_2 Dist. to center of grav. [in (mm)]

$$T_m = (m_1 \bullet l_1 + m_2 \bullet l_2) \bullet \frac{1}{12\ (102)} \quad \text{[lb-ft (Nm)]}$$

Overview of through drive mounting options

Through drive - A10VO/5x			**Mounting option 2. pump**			**Through drive**
Flange	Coupler for	Code	A10V(S)O../5x...	A10VO../31 ...	Gear pump	available on Size
SAE J744	Splined shaft		Size (shaft)	Size (shaft)	Series (size)	
82-2 (A)	5/8 in	K01	10 (U)	18 (U)	F (5...22)	28...85
	3/4 in	K52	10 (S)	18 (S, R)	–	28...85
101-2 (B)	7/8 in	K68	28 (S, R)	28 (S, R)	N/G (26...49)	28...85
			45 (U, W)[1]	45 (U, W)[1]	–	
	1 in	K04	45 (S, R)	45 (S, R)	–	45...85
			60/63 (U, W)[2]	–	–	
127-4 (C)	1 1/4 in	K15	60/63 (S, R)	–	–	60/63
				–	–	
127-2 (C)	1 1/4 in	K07	85 (U, W)	71 (S, R)	–	85
	1 1/2 in	K24	85 (S)	–	–	85

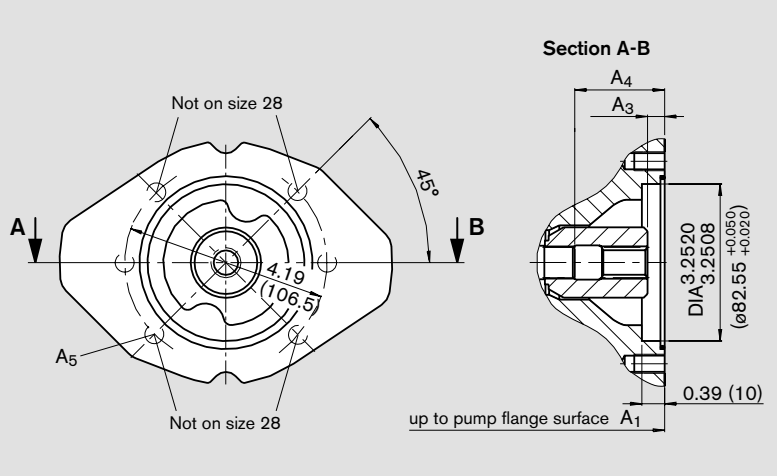
[1] not on size28 with K68

[2] not on size 45 with K04

Dimensions through drives

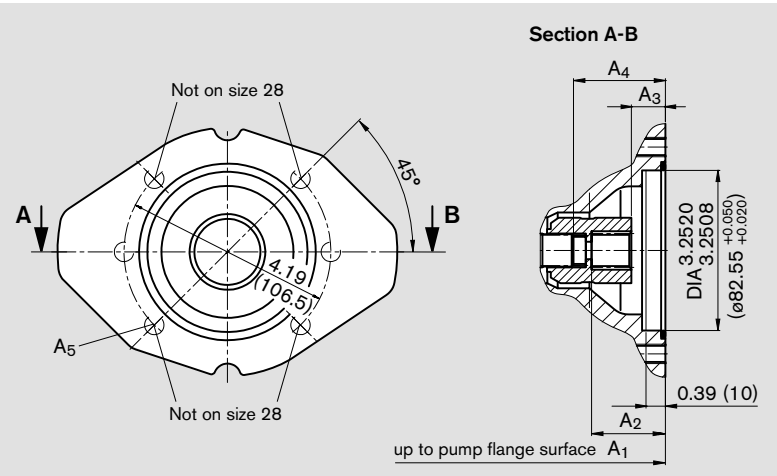
Before finalizing your design please request a certified installation drawing. Dimensions in inches and (mm)

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



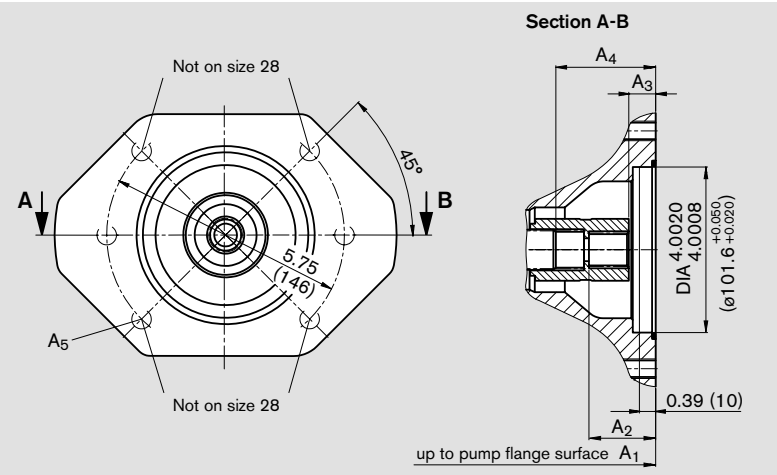
Size	A_1	A_3	A_4	A_5
28	8.03	0.39	1.85	M10;
	(204)	(9.9)	(47)	0.63 (16) deep
45	9.02	0.42	2.09	M10;
	(229)	(10.7)	(53)	0.63 (16) deep
60 63	10.04	0.37	2.32	M10;
	(255)	(9.5)	(59)	0.63 (16) deep
85	11.89	0.53	2.68	M10;
	(302)	(13.4)	(68)	0.79 (20) deep

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



Size	A_1	A_2	A_3	A_4	A_5
28	8.03	1.54	0.74	1.85	M10;
	(204)	(39.3)	(18.8)	(47)	0.63 (16) deep
45	9.02	1.55	0.74	2.09	M10;
	(229)	(39.4)	(18.9)	(53)	0.63 (16) deep
60 63	10.04	1.55	0.74	2.40	M10;
	(255)	(39.4)	(18.9)	(61)	0.63 (16) deep
85	11.89	1.74	0.93	2.56	M10;
	(302)	(44.1)	(23.6)	(65)	0.79 (20) deep

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



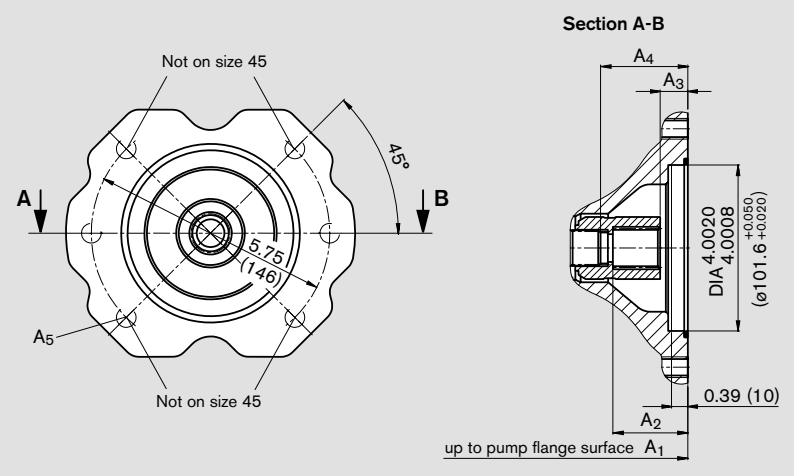
Size	A_1	A_2	A_3	A_4	A_5
28	8.03	1.66	0.7	1.85	M12;
	(204)	(42.3)	(17.8)	(47)	0.71 (18) deep
45	9.02	1.67	0.7	2.09	M12;
	(229)	(42.4)	(17.9)	(53)	0.71 (18) deep
60 63	10.04	1.67	0.7	2.32	M12;
	(255)	(42.4)	(17.9)	(59)	0.71 (18) deep
85	11.89	1.83	0.87	2.71	M12;
	(302)	(46.5)	(22)	(69)	0.79 (20) deep

[1] 30° pressure angle, flat base, flank centering, fit class 5

Dimensions through drives

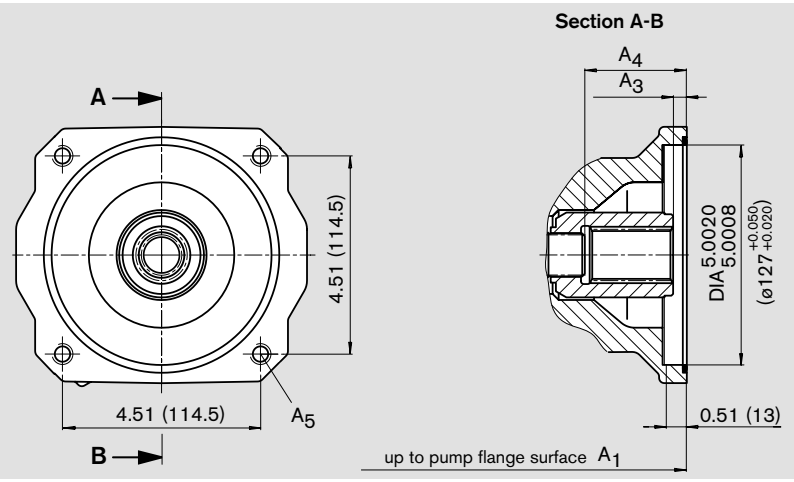
Before finalizing your design please request a certified installation drawing. Dimensions in inches and (mm)

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



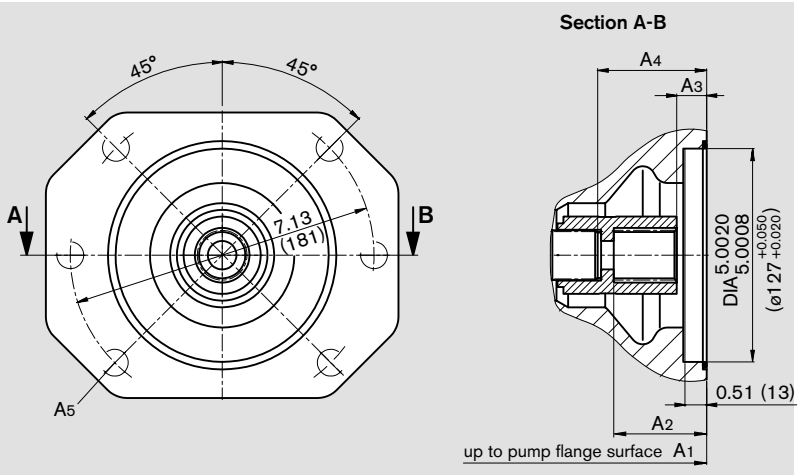
Size	A_1	A_2	A_3	A_4	A_5
45	9.02	1.88	0.74	2.10	M12;
	(229)	(47.9)	(18.9)	(53.4)	0.71 (18) deep
60 63	10.04	1.86	0.72	2.32	M12;
	(255)	(47.4)	(18.4)	(58.9)	0.71 (18) deep
85	11.89	2.01	0.87	2.71	M12;
	(302)	(51.2)	(22.2)	(69)	0.79 (20) deep

K15 **Flange** SAE J744 - 127-4 (C)
Shaft coupler to ANSI B92.1a-1996 1 1/4 in 14T 12/24 DP[1] (SAE J744 - 32-4 (C))



Size	A_1	A_3	A_4	A_5
60 63	10.04	0.31	2.32	M12;
	(255)	(8)	(59)	0.63 (16) deep

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



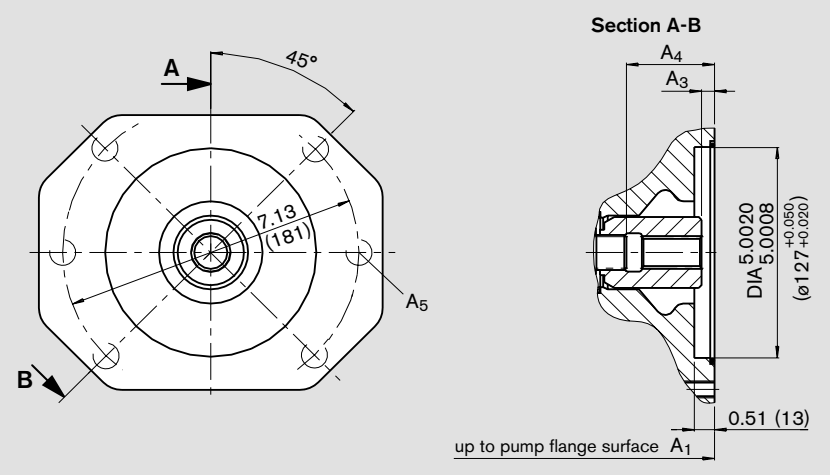
Size	A_1	A_2	A_3	A_4	A_5
85	11.89	2.36	0.88	2.67	M16;
	(302)	(59.9)	(22.4)	(67.9)	0.94 (24) deep

[1] 30° pressure angle, flat base, flank centering, fit class 5

Dimensions through drives

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

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



Size	A_1	A_3	A_4	A_5
85	11.89	0.31	2.68	M16;
	(302)	(8)	(68)	0.94 (24) deep

[1] 30° pressure angle, flat base, flank centering, fit class 5

Installation notes

Optional installation position.The pump housing must be filled with fluid during commissioning and operation.
In order to obtain a low noise level, all connections (inlet, outlet, pilot pressure and case drain lines) must be linked by flexible members to tank.
Avoid placing a check valve in the case drain line.

The highest of the case drain ports (L; L_1 or L_2) must be connected to tank with piping material for standard pressure rating suitable for the port sizes.

Vertical installation (Shaft end upwards)

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 face: plug port "L", "L_1" and "S" open; it is recommended to pipe "L_1" and connect a suction pipe to "S" (see fig. 1).

b) If the min fluid level is below the pump mounting face: pipe ports "L_1" and "S" acc. to fig. 2 "L" plugged. (see also limit of conditions)

Note: to avoid pump damage, remove all protective parts (dust covers, plastic plugs etc.) before installation.

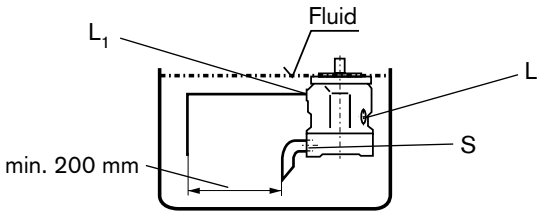


Fig. 1

Arrangement outside the reservoir

Above the reservoir as in fig. 2. Before installation fill pump housing, keeping it in a horizontal position.

Limit of conditions

Min. pump inlet pressure $p_{abs\ min}$ = 12 psi (0,8 bar) under static and dynamic conditions.
Note:try to avoid mounting above tank in order to obtain a low noise level.
The permissible suction height is a result of the overall pressure loss but my not exceed h_{max} = 32 in (800 mm) (immersion depth $h_{t\ min}$ = 8 in (200 mm)).

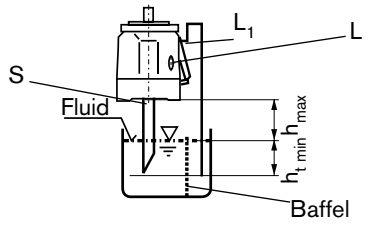


Bild 2

Overall pressure loss

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

Δp_1: press. loss in pipe due to acceleration of fluid column

ρ = density [kg/m³]

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

l = pipe lenght [m]

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

Δp_2: Pressure loss due to static head

h = height [m]

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

ρ = density [kg/m³]

g = acc. due to gravity. = 9,81 m/s²

Δp_3 = Line losses (elbows etc.)

Horizontal installation

The pump must be installaed in such a manner, that either "L"; "L_1" or "L_2" is at the top.

Arrangement inside the reservoir

a) If the min. fluid level is above the top of the pump: plug port "L_1", "L" and "S" open; it is recommended to pipe "L" and connect a suction pipe to "S" (see fig. 3)

b) If the min. fluid level is even with or below the top of the pump: pipe "L" and "S" acc. to fig. 4, "L_1" plugged. (see also limit of conditions)

Note: to avoid pump damage, remove all protective parts (dust covers, plastic plugs, etc), before installation.

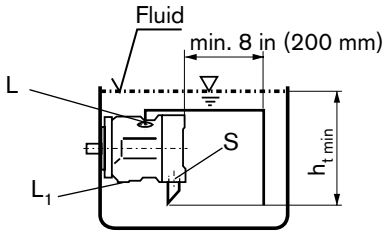


Fig. 3

Arrangement outside the reservoir

Fill pump housing before commissioning.

Pipe port "S" and the highest of the case drain ports "L", "L_1" or "L_2" .

a) Mounting above the tank: see fig. 4. (see also „Limit of conditions")

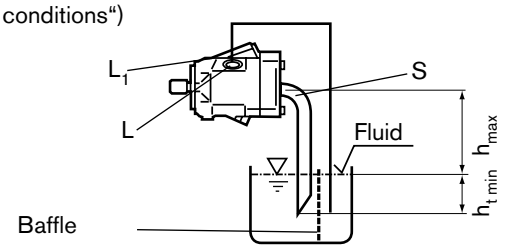


Fig. 4

b) Mounting below the tank: pipe ports "L_1" and "S" acc. to fig. 5 , plug port "L" .

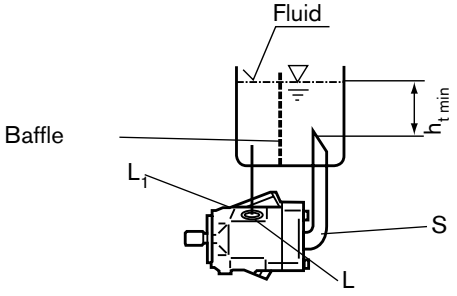


Fig. 5

Notes

General Notes

– The A10VO pump is designed to be used in open loop circuits.

– Project planning, assembly, and startup of the pump require the involvement of trained personnel.

– The working and functional ports are only designed to accommodate hydraulic piping.

– Tightening torques: The tightening torques specified in this data sheet are maximum values and may not be exceeded (maximum value for screw thread). Manufacturer specifications for the max. permissible tightening torques of the used fittings must be observed!
For ISO 68/DIN 13 fastening screws we recommend checking the tightening torque individually according to VDI 2230 Edition 2003.

– The housing temperature rises during and shortly after operation. Take suitable safety precautions (e.g. wear protective clothing).

– The data and information contained herein must be adhered to.

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