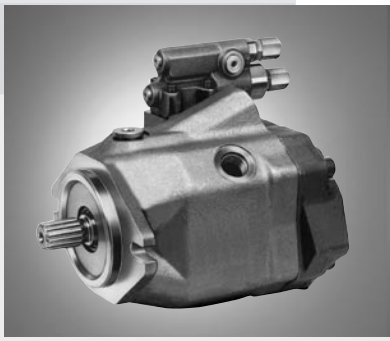
Rexroth
Bosch Group

Axial Piston Variable Pump A10VO

RA 92703/11.07 1/44
Replaces: 06.07

Data sheet

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



Series 52

Series 53

Contents

Features

- Variable axial piston pump in swash plate design for hydrostatic drives in open circuits
- Flow is proportional to drive speed and displacement. The flow is infinitely variable by adjustment of the swash plate.
- Strong bearings for long service life
- High permissible drive speeds
- High power to 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-proportional displacement control
- Short response times

Ordering code - standard program

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

Axial piston unit

		10	18	28	45	63	85	
01	Swash plate design, variable	●	–	–	–	–	–	**A10VS**
	Nom. pressure 3600 psi (250 bar), peak pressure 4600 psi (315 bar)	–	●	●	●	●	●	**A10V**

Operating mode

02	Pump, open circuit	**O**

Size

			10	18	28	45	63	85
03	~displacement $V_{g\ max}$ in	in^3	0.61	1.10	1.71	2.75	3.84	5.18
		(cm^3)	(10)	(18)	(28)	(45)	(63)	(85)

Control devices[1)]

04	Pressure control	DR								●	●	●	●	●	●	**DR**
	with hydraulic flow control															
	X-T open	D				F	R			●	–	●	●	●	●	**DFR**
	X-T open	DR				F				–	●	○	○	○	○	**DRF**
	X-T closed	DFR1								●	–	●	●	●	●	**DFR1**
	X-T closed	DR				S				–	●	○	○	○	○	**DRS**
	with flow control, electro-hydraulic adjustment of differential pressure (inverse proportional characteristic), (RA 92 709)															
		EF	.	D		.				–	○	○	○	●	●	**EF.D.**
	with remote pressure control															
	hydraulic	DR			G					●	●	●	●	●	●	**DRG**
	electric, inverse characteristic	ED	.							–	●	●	●	●	●	**ED.**
	Power control															
	with pressure control															
	minimum 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 controlol electr. adjustment of diff. press. (inverse prop. characteristic), X-T closed (RA 92 709)															
	min. start of control see above	LA	X			S		.		–	●	●	●	●	●	**LAXS.**
	Electro-proportional displacement control (RA 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.**

Series

05		**5**

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

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

	Index	10	18	28	45	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	right hand	**R**
		left hand	**L**

Seals

08	FKM (fluor-rubber)	**V**

	Shaft end	10	18	28	45	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**
	Parallel shaft SAE with 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 fixing thread(no through drive)	–	●	●	●	●	●	**61**
	SAE flange on side-opposite sides, UNC fixing thread (for through drive)	–	●	●	●	●	●	**62**
	Threaded ports at rear, UNC threads (no through drive)	●	–	●	●	–	–	**64**[2]

Through drive

12	Without through drive (standard for version 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 only series 53.
[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 is only possible after consultation with 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 ≤ 1 min)
at max. permissible leakage fluid temperature of 239 °F (115 °C).

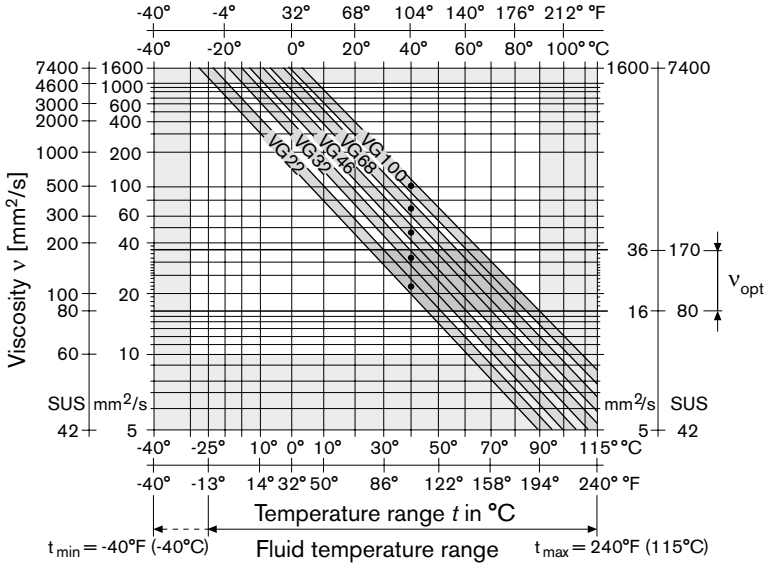
Please note, that the max fluid temperature of 239 °F (115 °C) is also not exceeded in certain areas (for instance bearing area) The fluid temperature in the bearing area is approx. 7 °F (5 K) higher than the average leakage fluid temperature.

ν_{max} = 7500 SUS (1600 mm²/s)
for short periods (t ≤ 1 min)
on cold start
(t_{min} = p ≤ 435 psi (30 bar), n ≤ 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 °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 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 239 °F (115 °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 hydraulic 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 operating temperatures (195 °F (90 °C) to max. 239 °F (115 °C)) a cleanliness of

19/17/14 to ISO 4406 is necessary.

If above mentioned grades cannot be maintained please consult us.

Technical data

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 at 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

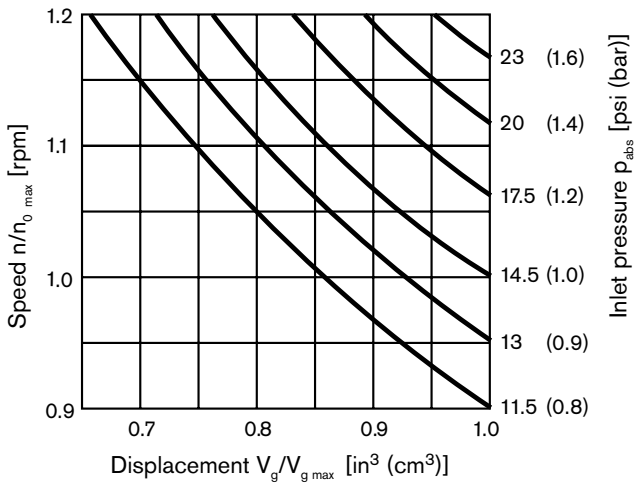
Maximum permissible case drain pressure (port L, $L_{1/2}$):

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)

Maximum permissible speed (Speed limit)

Permissible speed by increase of inlet pressure p_{abs} at the inlet port S or reduction of displacement ($V_g \leq V_{g\ max}$).



Technical data

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

Size		A10V(S)O		10	18	28	45	63	85
Displacement		$V_{g\ max}$	in^3	0.64	1.10	1.71	2.75	3.84	5.18
			(cm^3)	(10,5)	(18)	(28)	(45)	(63)	(85)
Speed[1]									
max. at $V_{g\ max}$		$n_{0\ max}$	rpm	3600	3300	3000	2600[2]	2600	2500
max. at $V_g < V_{g\ max}$		$n_{0\ max\ zul}$	rpm	4320	3960	3600	3120	3140	3000
Flow									
at $n_{0\ max}$		$q_{V0\ max}$	gpm	9.7	15.6	22	31	43	55
			(L/min)	(37)	(59)	(84)	(117)	(163)	(212)
at n_E=1500 min^{-1}		$q_{VE\ max}$	gpm	4	7.1	11.1	18	25.1	34
			(L/min)	(15)	(27)	(42)	(68)	(95)	(128)
Power	Δp = 3600 psi (250 bar)								
at $n_{0\ max}$		$P_{o\ max}$	HP (kW)	22 (16)	34 (25)	47 (35)	65 (49)	90 (68)	119 (89)
at n_E=1500 min^{-1}		$P_{E\ max}$	HP (kW)	9.4 (7)	15 (11)	24 (18)	38 (28)	52 (39)	71 (53)
Torque									
at $V_{g\ max}$	Δp = 3600 psi (250 bar)	T_{max}	lb-ft	31	52	82	132	184	247
			(Nm)	(42)	(71)	(111)	(179)	(250)	(338)
	Δp = 1440 psi (100 bar)	T	lb-ft	13	21	33	53	74	102
			(Nm)	(17)	(29)	(45)	(72)	(100)	(135)
Torsional stiffness	Shaft S	c	lb-ft/rad	6760	8082	16400	27560	48100	105100
			(Nm/rad)	(9200)	(11000)	(22300)	(37500)	(65500)	(143000)
	Shaft R	c	lb-ft/rad	–	10870	19400	30240	51200	–
			(Nm/rad)	–	(14800)	(26300)	(41000)	(69400)	–
	Shaft U	c	lb-ft/rad	5020	5870	–	22130	36290	75900
			(Nm/rad)	(6800)	(8000)	–	(30000)	(49200)	(102900)
	Shaft W	c	lb-ft/rad	–	–	–	25370	39830	86960
			(Nm/rad)	–	–	–	(34400)	(54000)	(117900)
	Shaft K/C	c	lb-ft/rad	7965	–	19770	32380	54506	–
			(Nm/rad)	(10800)	–	(26800)	(43900)	(73900)	–
Moment of inertia rotary group		J_{TW}	$lbs\text{-}ft^2$	0.0142	0.2207	0.0403	0.0783	0.1329	0.2848
			(kgm^2)	(0,0006)	(0,00093)	(0,0017)	(0,0033)	(0,0056)	(0,012)
Angular acceleration, max.[3]		α	rad/s^2	8000	6800	5500	4000	3300	2700
Fill volume		V	gal	0.05	0.06	0.08	0.13	0.21	0.26
			(L)	(0,2)	(0,25)	(0,3)	(0,5)	(0,8)	(1)
Weight approx. (without fluid)		m	lbs (kg)	17 (8)	25 (11,5)	31 (14)	40 (18)	48.5 (22)	75 (34)

[1] Values are valid with inlet pressure of 15 psi (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.

[2] For higher drive speeds please consult us.

[3] – These values are valid for conditions between the min. required and the max. permissible drive speeds. For external sources of excitation (eg. diesel engine 2-8 fold rotary frequency, cardan shaft 2 fold rotary frequency).
– The limit is valid for a single pump.
– The load carrying capacity of the connecting parts must be taken into consideration.

Caution: Exceeding these limits can lead to a loss of operability, reduction of service life or complete destruction of the axial piston unit. The permissible values can be calculated.

Technical Data

Determination of pump size

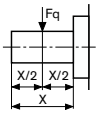
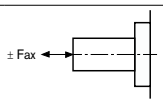
Flow $q_V = \frac{V_g \cdot n \cdot \eta_V}{231\ (1000)}$ [gpm (L/min)]

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

Power $P = \frac{2\pi \cdot T \cdot n}{33{,}000\ (60000)} = \frac{q_V \cdot p}{1{,}714\ (600) \cdot \eta_t}$ [HP (kW)]

V_g = geometr. displacement per revolution in in³ (cm³)
p = 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

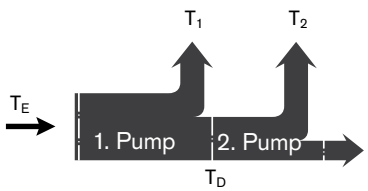
Size				10	18	28	45	63	85
Radial force, max.		at X/2	$F_{q\ max}$	lbf (N)	56 (250)	78 (350)	270 (1200)	337 (1500)	382 (1700)	450 (2000)
Axial force, max.			F_{ax}	N	90 (400)	157 (700)	225 (1000)	337 (1500)	450 (2000)	675 (3000)

Permissible input and through drive torques

Size			10	18	28	45	63	85
Torque, max. (at $V_{g\ max}$ and Δp = 3600 psi (250 bar[1]))	T_{max}	lb-ft (Nm)	31 (42)	52 (71)	82 (111)	132 (179)	184 (250)	249 (338)
Input torque, max.[2]								
for shaft end S	$T_{E\ zul}$	lb-ft (Nm)	93 (126)	91 (124)	146 (198)	235 (319)	465 (630)	851 (1157)
SAE J744 [3]		in	3/4	3/4	7/8	1	1 1/4	1 1/2
for shaft end R	$T_{E\ zul}$	lb-ft (Nm)	–	110 (150)	166 (225)	295 (400)	479 (650)	–
SAE J744 [3]		in	–	3/4	7/8	1	1 1/4	–
for shaft end U	$T_{E\ zul}$	lb-ft (Nm)	44 (60)	43 (59)	–	139 (188)	226 (306)	463 (628)
SAE J744 [3]		in	5/8	5/8	–	7/8	1	1 1/4
for shaft end W	$T_{E\ zul}$	lb-ft (Nm)	–	–	–	162 (220)	292 (396)	447 (650)
SAE J744 [3]		in	–	–	–	7/8	1	1 1/4
for shaft end K	$T_{E\ zul}$	lb-ft (Nm)	78 (106)	–	107 (145)	156 (212)	325 (441)	–
		in	0.750	–	0.8750	1.0000	1.2500	–
		(mm)	(19.05)	–	(22.225)	(25.4)	(31.75)	–
for shaft end C[4]	$T_{E\ zul}$	lb-ft (Nm)	–	–	107 (145)	156 (212)	325 (441)	–
Through drive torque, max.								
for shaft end S	$T_{D\ zul}$	lb-ft (Nm)	–	80 (108)	118 (160)	235 (319)	357 (484)	515 (698)
for shaft end R	$T_{D\ zul}$	lb-ft (Nm)	–	89 (120)	130 (176)	270 (365)	357 (484)	–

[1] without considering efficiency
[2] for shaft without side load
[3] (ANSI B92.1a-1996)
[4] only for series 52

Distribution of torques



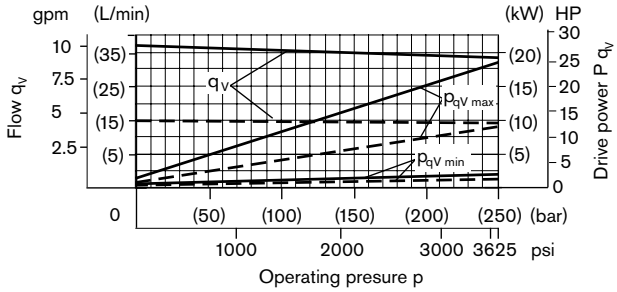
Operating curves for pumps with pressure control

Drive power and flow

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

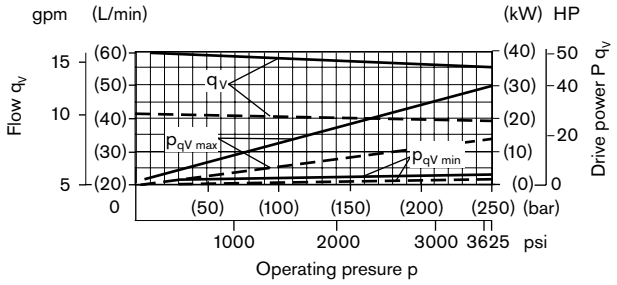
Size 10

– – – – n = 1500 rpm
——— n = 3600 rpm



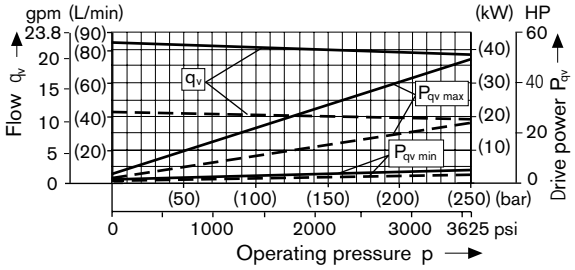
Size 18

– – – – n = 1500 rpm
n = 3600 rpm



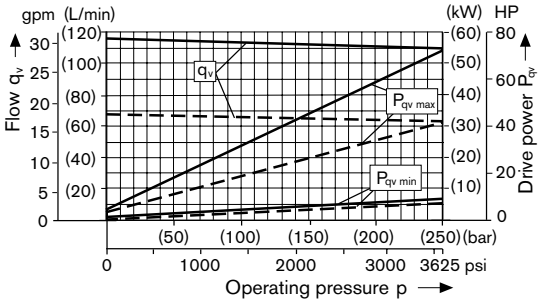
Size 28

– – – – n = 1500 rpm
n = 3000 rpm



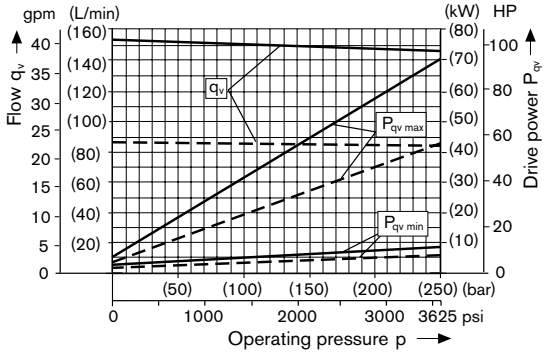
Size 45

– – – – n = 1500 rpm
——— n = 2600 rpm



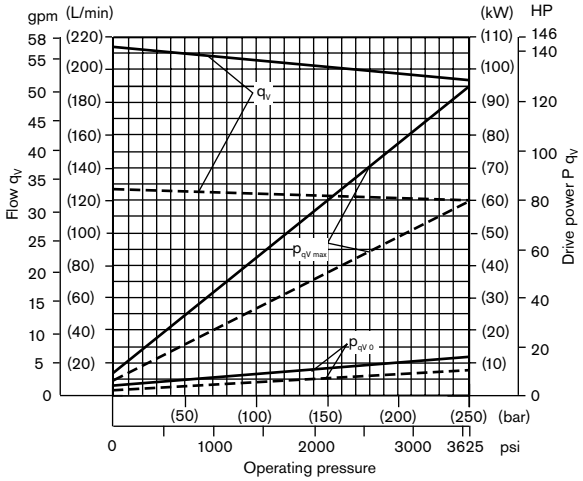
Size 63

– – – – n = 1500 rpm
——— n = 2700 rpm



Size 85

– – – – n = 1500 rpm
——— n = 2500 rpm



Overall efficiency

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

Volumetric efficiency

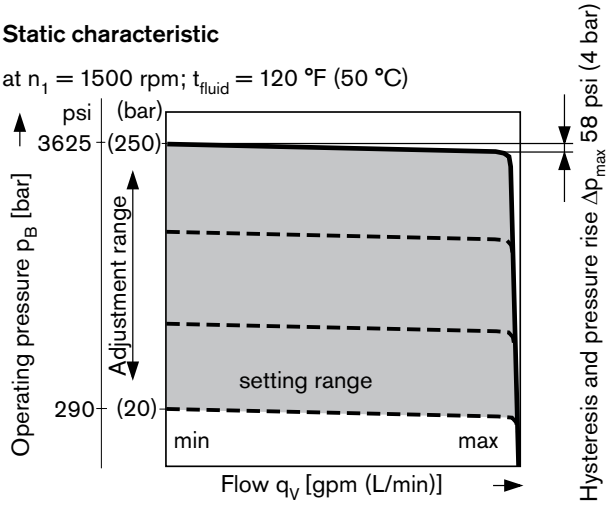
$$\eta_V = \frac{q_V}{q_{V\ theor}}$$

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)

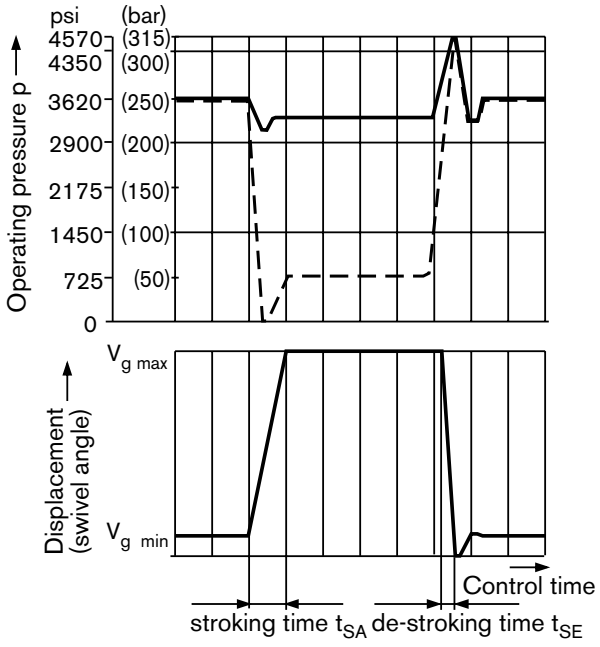


Dynamic characteristic

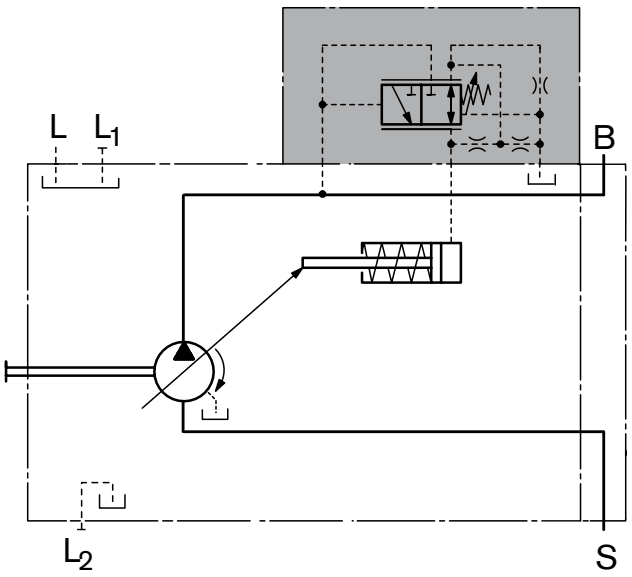
The curves show average measured values under test conditions.

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, $L_{1/2}$	Case drain port ($L_{1/2}$ plugged)

Control data

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

Control times

Size	t_{SA} [ms] against 725 psi (50 bar)	t_{SA} [ms] against 3200 psi (220 bar)	t_{SE} [ms] standby - 3600 psi (250 bar)
10	70	50	15
18	70	70	30
28	70	65	20
45	85	75	25
63	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 necesary to pipe an external relief valve to port X. This valve is not included in the supply of the 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 and 320 psi (10 and 22 bar)), please state in clear text.

As a separate pressure relief valve we can recommend:

– DBDH 6 (hydraulic) to RE 25 402 or

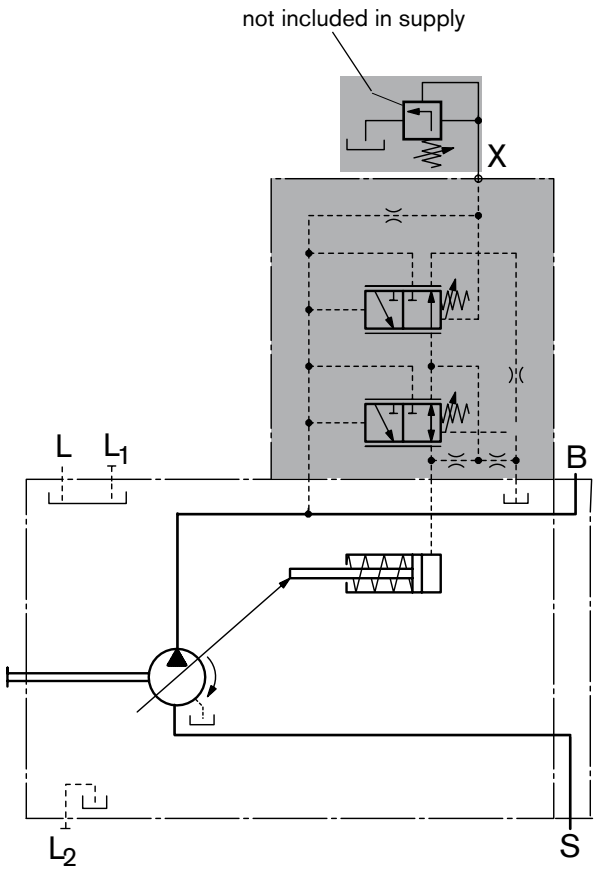
– DBETR -SO381 with orifice dia. 0.03 inch (0,8mm) in P (electric) to RE 29 166

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, $L_{1/2}$	Case drain ports ($L_{1/2}$ 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.

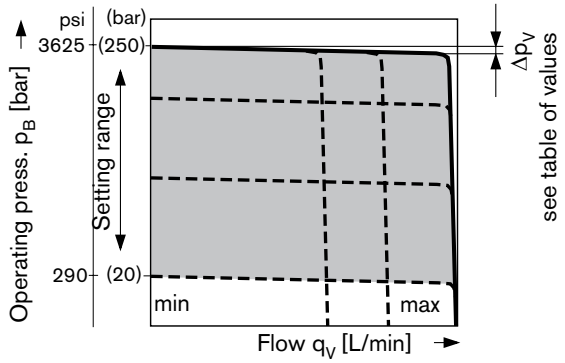
In addition to the pressure control function, the pump flow to the actuator may be varied by means of a differential pressure (eg. over an orifice or a directional valve). The pump supplies only the amount of fluid as required by the actuator.

The pressure control overrides the flow control function.

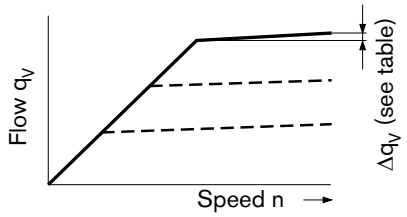
The DRS (DFR1) has no connection between X-port and Tank.

Static characteristic

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

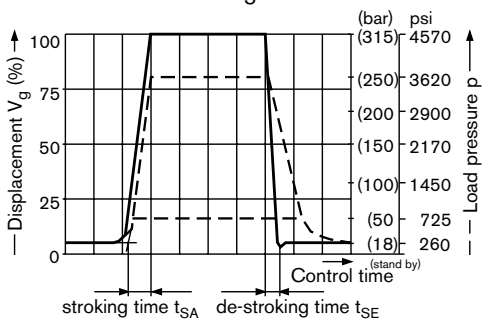


Static characteristic at variable speed



Dynamic characteristic of flow control

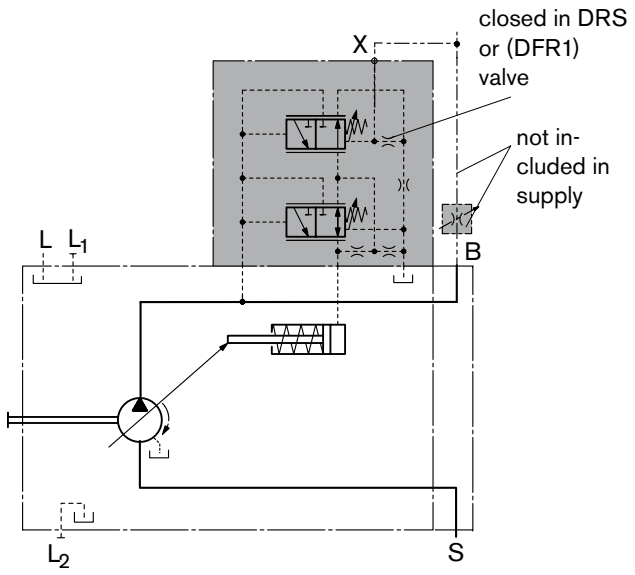
The curves are measured average values under test conditions



Control times

Size	t_{SA} [ms] stand by - 3600 psi (250 bar)	t_{SE} [ms] 3600 psi (250 bar) - stand by	t_{SE} [ms] 725 psi (50 bar) - stand by
10	60	15	40
18	65	18	45
28	70	20	50
45	85	25	60
63	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 ("standby") of p = 260 ± 30 psi (18 ± 2 bar) results (depends on Δp-setting).

Control data

For pressure control see page 9.

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

Size	10	18	28	45	63	85
Δqv_{max} gpm (L/min)	0.13 (0,5)	0.24 (0,9)	0.26 (1,0)	0.48 (1,8)	0.66 (2,5)	0.83 (3,1)

Pilot fluid consumption DRF (DFR) max. approx. 0.8...1.2 gpm (3...4,5 L/min)
Pilot fluid consumption DRS (DFR1) max. approx. 0.8 gpm (3 L/min)
Flow loss at q_{Vmax} see page 8

Possible control valves to be used on B
(not included in 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 pages 9/10.
Execution of pressure and flow control like DRS, see page 11.

In order to achieve a **constant 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 limit of the power curve.

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

Control data

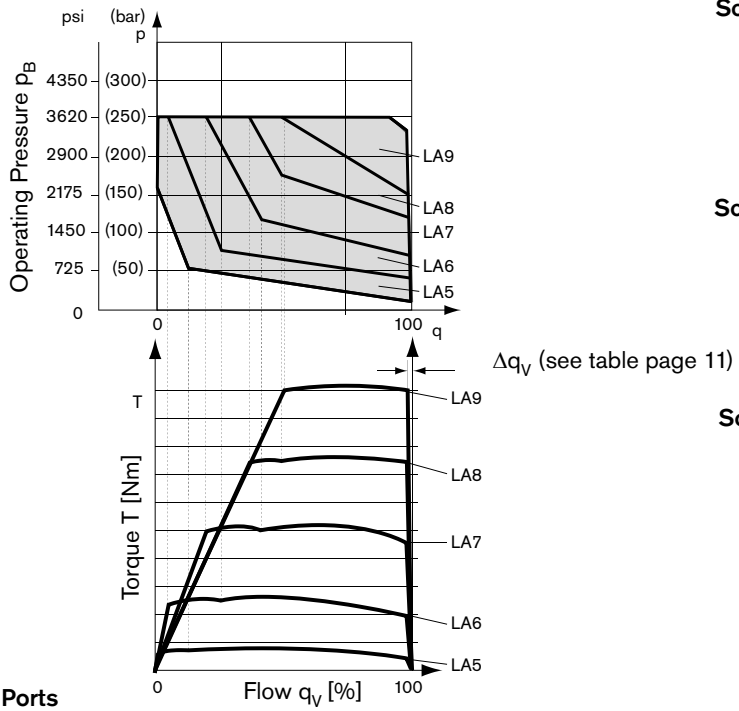
For technical data of pressure control see page 9.

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

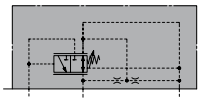
Pilot fluid consumption max. approx. 0.8 gpm (3,0 L/min)
Flow loss at $q_{V\,max}$ see page 8

Start of control (psi (bar))	TorqueT [lb-ft (Nm)]					ordering code
Size	**18**	**28**	**45**	**63**	**85**	
145 to 510	2.80 - 8.92	4.4 - 14	7.4 - 22.1	11 - 32	15 - 42	LA5
(10 to 35)	(3,8 - 12,1)	(6 - 19)	(10 - 30)	(15 - 43)	(20 - 57)	
520 to 1015	8.92 - 17.2	14 - 26.5	22.2 - 43.5	32 - 61	42 - 83	LA6
(36 to 70)	(12,2 - 23,3)	(19,1 - 36)	(30,1 - 59)	(43,1 - 83)	(57,1 - 112)	
1030 to 1520	17.2 - 24.86	26.6 - 38.4	43.6 - 62	61 - 88	83 - 118	LA7
(71 to 105)	(23,4 - 33,7)	(36,1 - 52)	(59,1 - 84)	(83,1 - 119)	(112,1 - 160)	
1535 to 2030	24.86 - 33.19	38.4 - 51.6	62 - 83	88 - 116	118 - 156	LA8
(106 to 140)	(33,8 - 45)	(52,1 - 70)	(84,1 - 112)	(119,1 - 157)	(160,1 - 212)	
2045 to 3335	33.19 - 55.17	51.7 - 86.3	83 - 139	116 - 195	156 - 263	LA9
(141 to 230)	(45,1 - 74,8)	(70,1 - 117)	(112,1 - 189)	(157,1 - 264)	(212,1 - 357)	

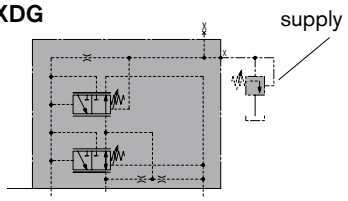
Static characteristic and torque curves



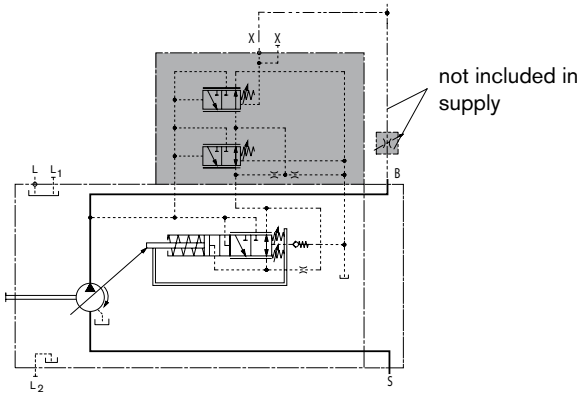
Schematic: LAXD



Schematic: LAXDG



Schematic: LAXDS



Ports

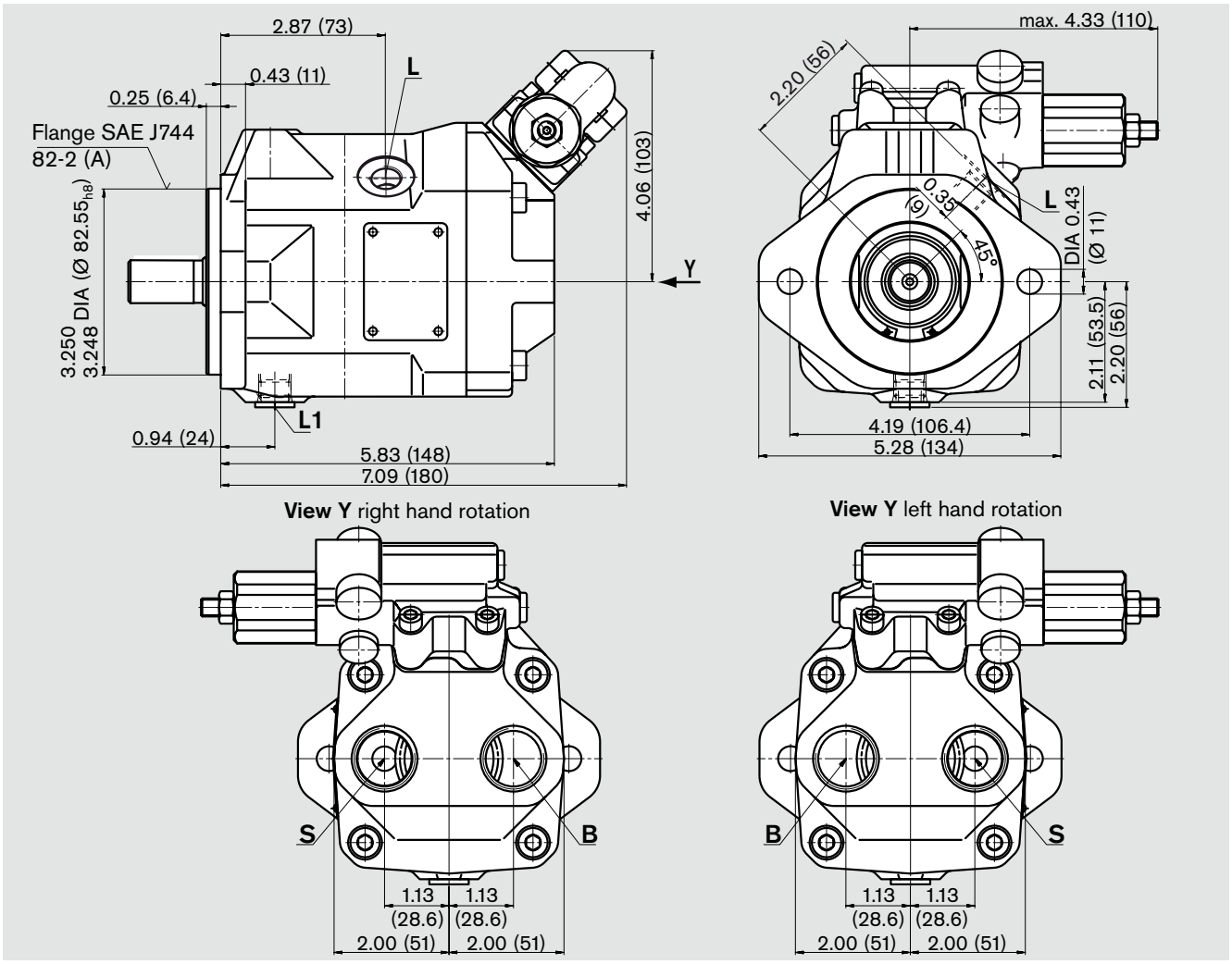
B	Outlet port
S	Inlet port
L, L_1 ,L_2	Case drain ports (L_1 ,L_2 plugged)
X	pilot pressure port

Notes

Unit dimensions, size 10

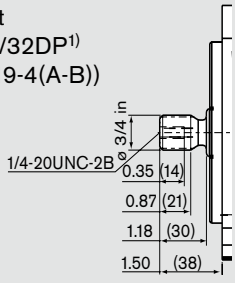
Before finalizing your design please request a certified installation drawing. Dimensions in inches and (mm)

A10VSO10 DR/52R(L)-VXC64N00

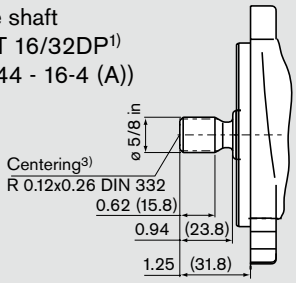


Shaft ends

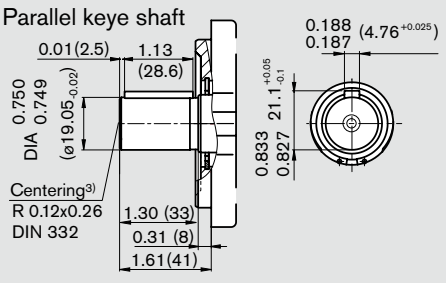
S Spline shaft
3/4 in 11T 16/32DP[1)]
(SAE J744 - 19-4(A-B))



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



K Parallel keye shaft



Ports

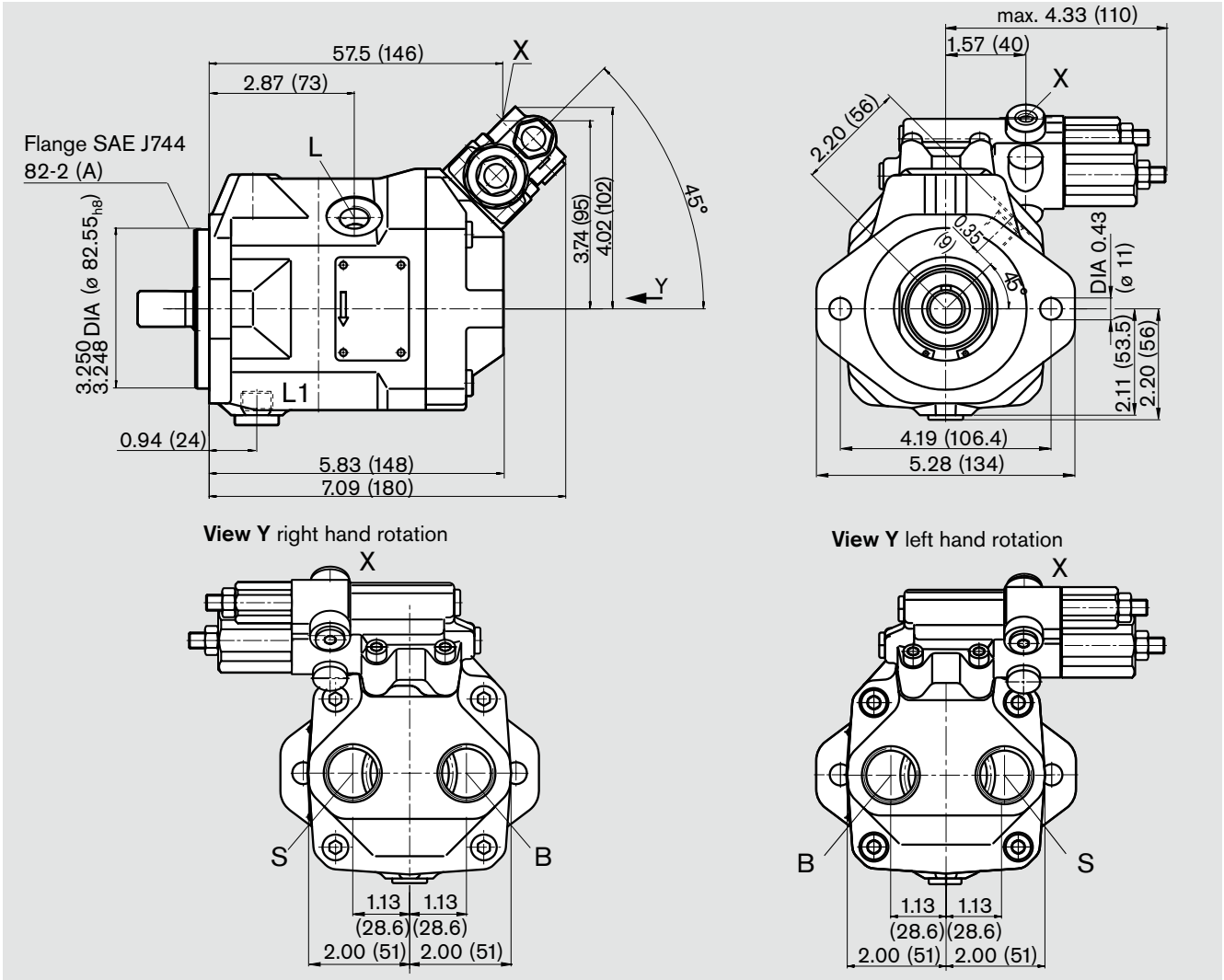
				Tightening torque, max.[2)]
B	Outlet port	ISO 11926	1 1/16-12UNF-2B; 0.79 (20) deep	261 lb-ft (360 Nm)
S	Inlet port	ISO 11926	1 1/16-12UNF-2B; 0.79 (20) deep	261 lb-ft (360 Nm)
L/L_1	Case drain port (L_1 plugged)	ISO 11926	9/16-18UNF-2B; 0.47 (12) deep	58 lb-ft (80 Nm)

[1)] ANSI B92.1a-1996, 30° pressure angle, flat root, side fit, tolerance 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(DFR, DRG)/52R(L)-VXA64N00



Shaft ends see page 14

Ports

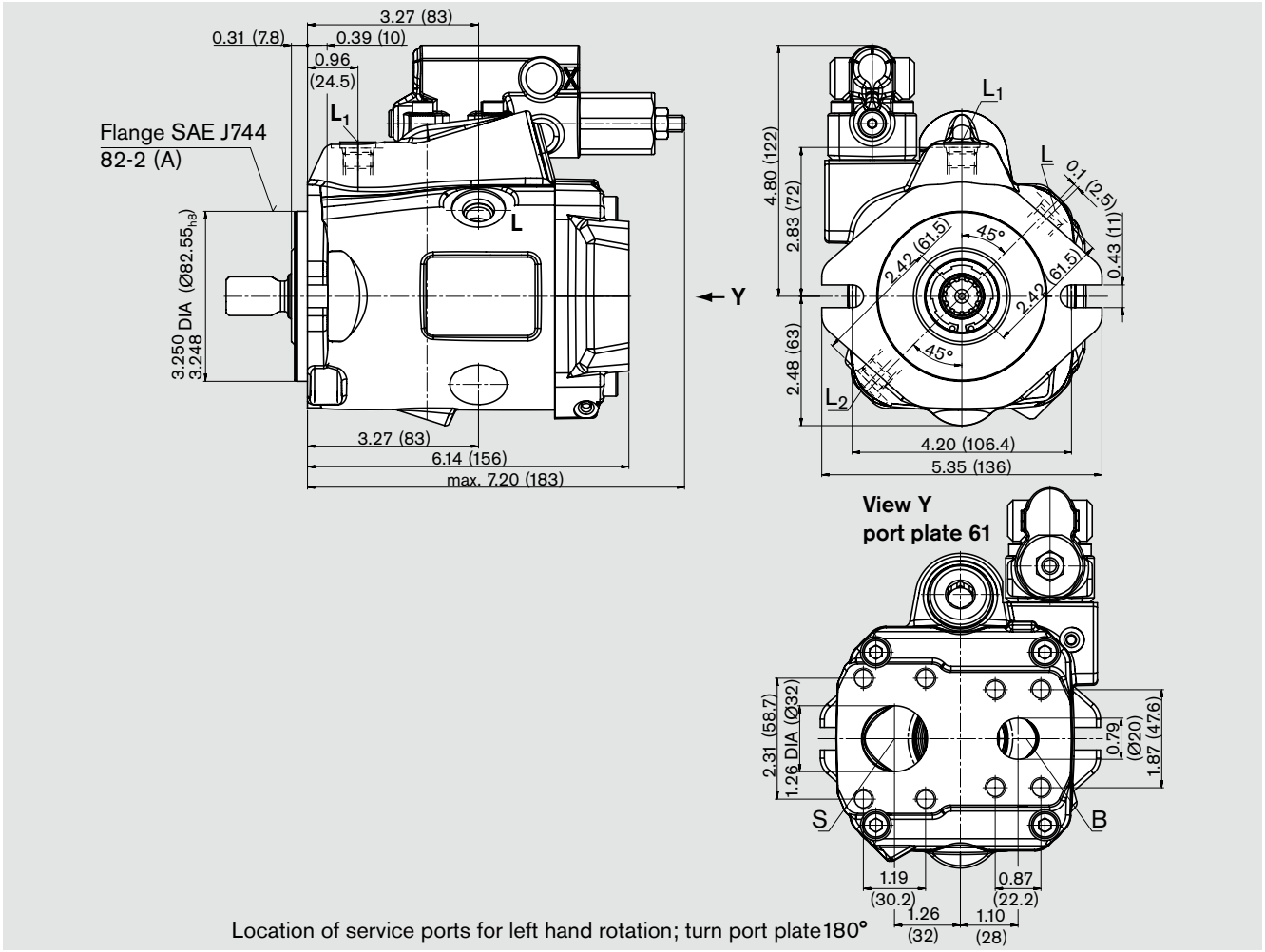
				Tightening torque, max.[1]
B	Outlet port	ISO 11926	1 1/16-12UNF-2B; 0.79 (20) deep	261 lb-ft (360 Nm)
S	Inlet port	ISO 11926	1 1/16-12UNF-2B; 0.79 (20) deep	261 lb-ft (360 Nm)
L/L_1	Case drain port (L_1 plugged)	ISO 11926	9/16-18UNF-2B; 0.47 (12) deep	58 lb-ft (80 Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B; (11.5) deep	29 lb-ft (40 Nm)

[1] see general information

Unit dimensions, size 18

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

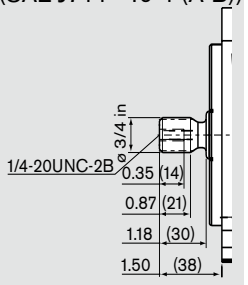
A10VO18 DR/53R(L)-VXC61N00



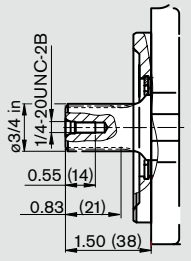
Location of service ports for left hand rotation; turn port plate180°

Shaft ends

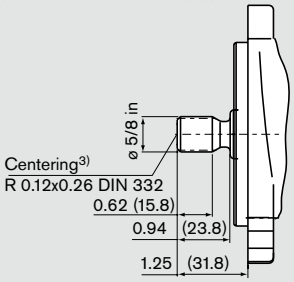
S Spline shaft
3/4 in 11T 16/32DP[1)]
(SAE J744 - 19-4 (A-B))



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



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



Ports

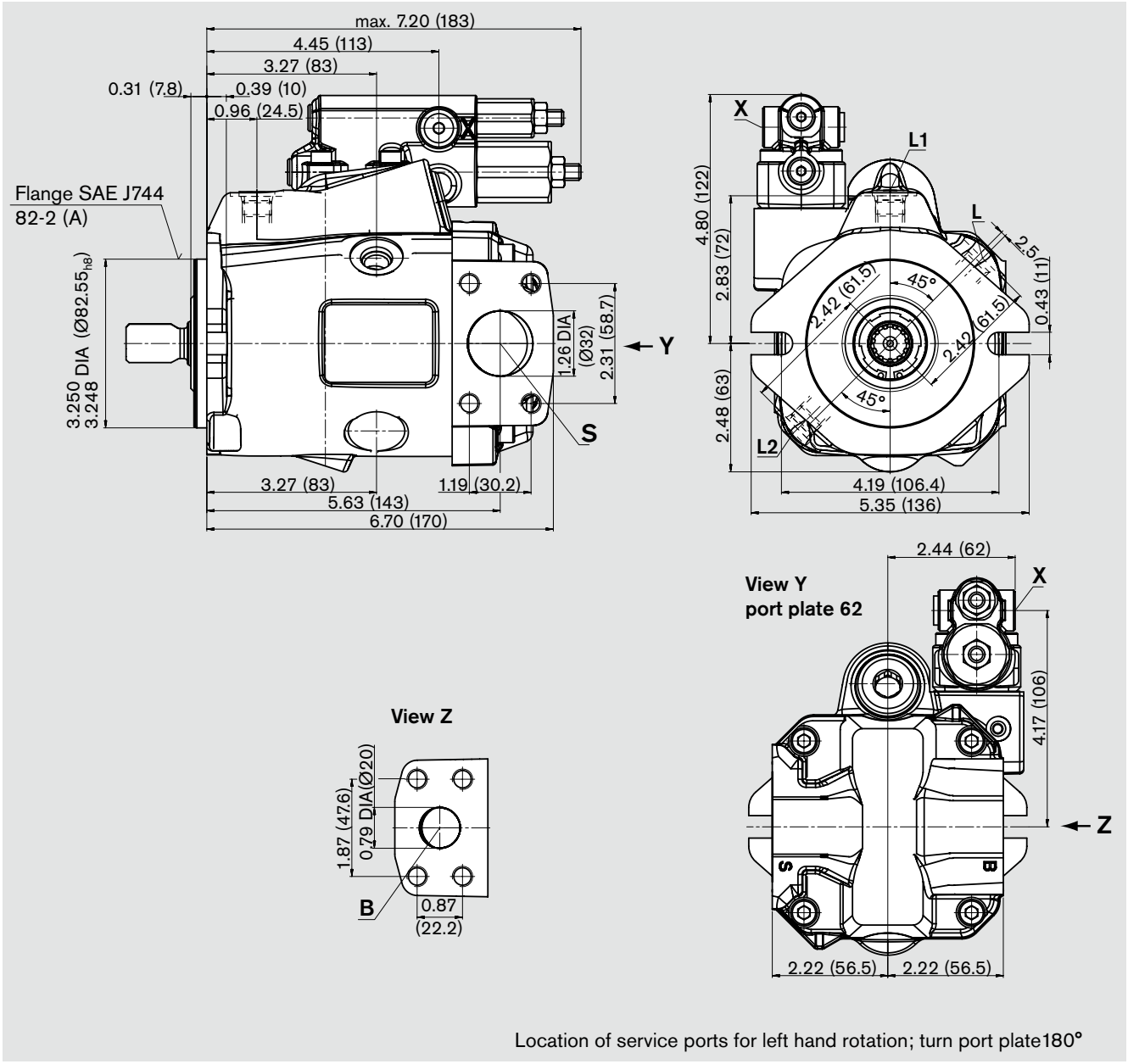
				Tightening torque, max.[2)]
B	Outlet port, SAE flange (code 61)	SAE J518c	3/4in	
	Fixing thread	ISO 68	3/8-16UNC-2B; 0.75 (19) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61)	SAE J518c	1 1/4in	
	Fixing thread	DIN 13	7/16-14UNC-2B; 0.79 (20) deep	48 lb-ft (66 Nm)
$L/L_{1,2}$	Case drain ports ($L_{1,2}$ plugged)	ISO 11926	3/4-16UNF-2B	116 lb-ft (160 Nm)

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

Unit dimensions, size 18

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

A10VO18 DRS (DRG, DRF)/53R(L)-VXC62N00



Location of service ports for left hand rotation; turn port plate180°

Shaft ends see page 16

Ports

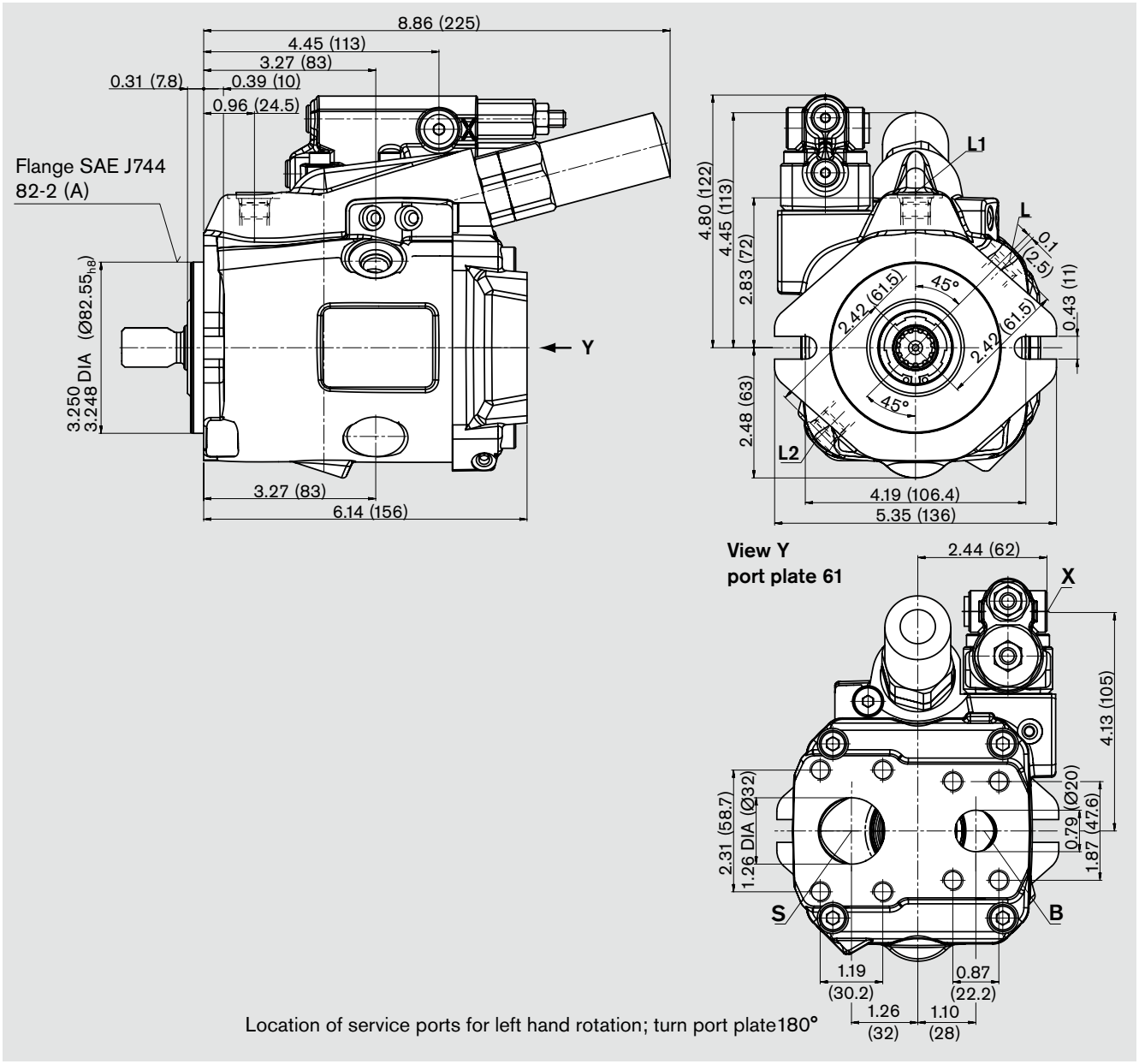
				Tightening torque, max.[1]
B	Outlet port, SAE flange (code 61)	SAE J518c	3/4in	
	Fixing thread	ISO 68	3/8-16UNC-2B; 0.75 (19) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61)	SAE J518c	1 1/4in	
	Fixing thread	DIN 13	7/16-14UNC-2B; 0.79 (20) deep	48 lb-ft (66 Nm)
$L/L_{1,2}$	Case drain ports ($L_{1,2}$ plugged)	ISO 11926	3/4-16UNF-2B	116 lb-ft (160 Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B; 0.45 (11.5) deep	29 lb-ft (40 Nm)

[1] see general information

Unit dimensions, size 18

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

A10VO18 LAXDX/53R(L)-VXC61N00



Location of service ports for left hand rotation; turn port plate180°

Shaft ends see page 16

Ports

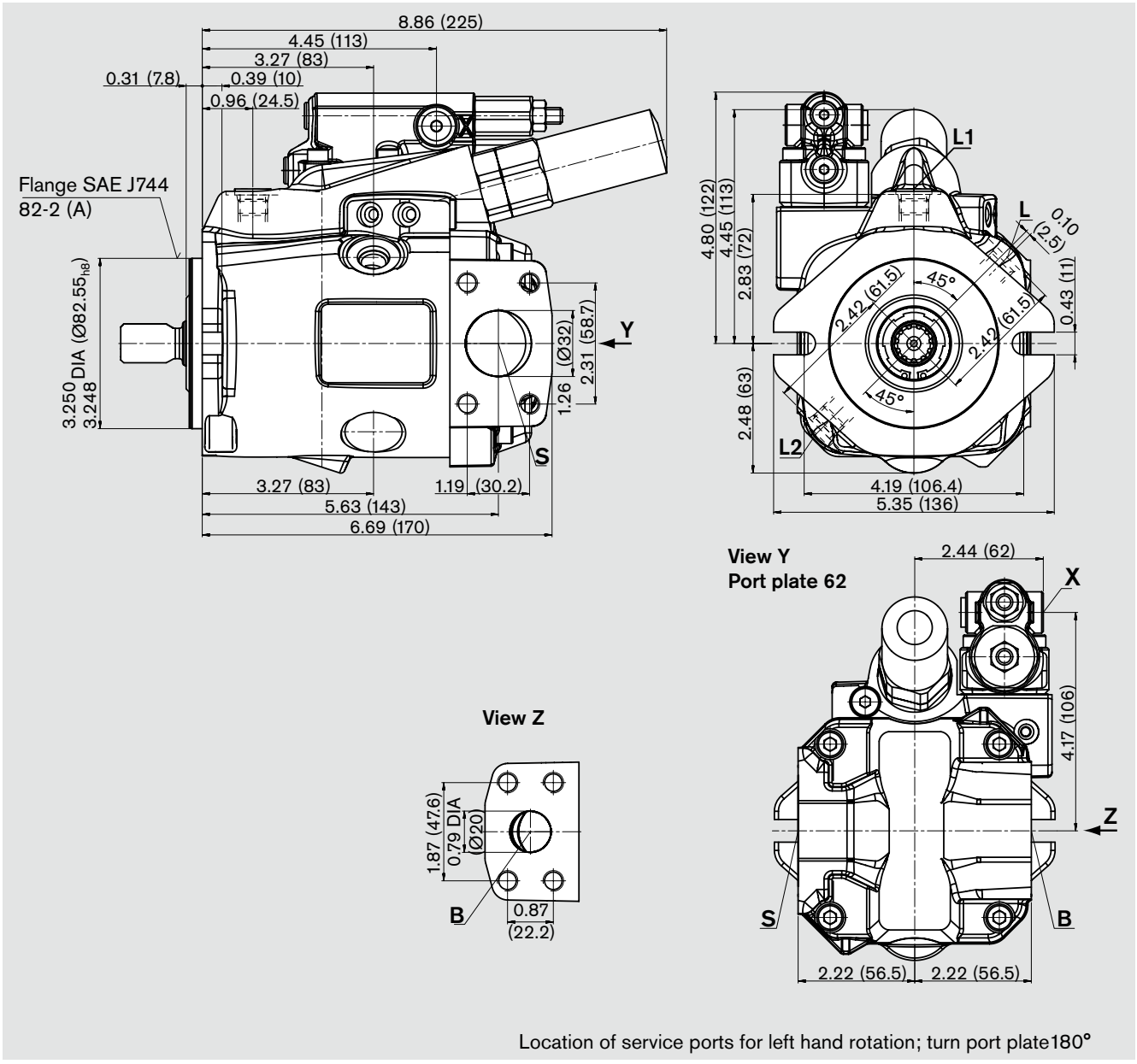
				Tightening torque, max.[1]
B	Outlet port, SAE flange (code 61)	SAE J518c	3/4in	
	Fixing thread	ISO 68	3/8-16UNC-2B; 0.75 (19) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61)	SAE J518c	1 1/4in	
	Fixing thread	DIN 13	7/16-14UNC-2B; 0.79 (20) deep	48 lb-ft (66 Nm)
$L/L_{1,2}$	Case drain ports ($L_{1,2}$ plugged)	ISO 11926	3/4-16UNF-2B	116 lb-ft (160 Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B; 0.45 (11.5 deep)	29 lb-ft (40 Nm)

[1] see general information

Unit dimensions, size 18

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

A10VO18 LAXDX/53R(L)-VXC62N00



Location of service ports for left hand rotation; turn port plate180°

Shaft ends see page 16

Ports

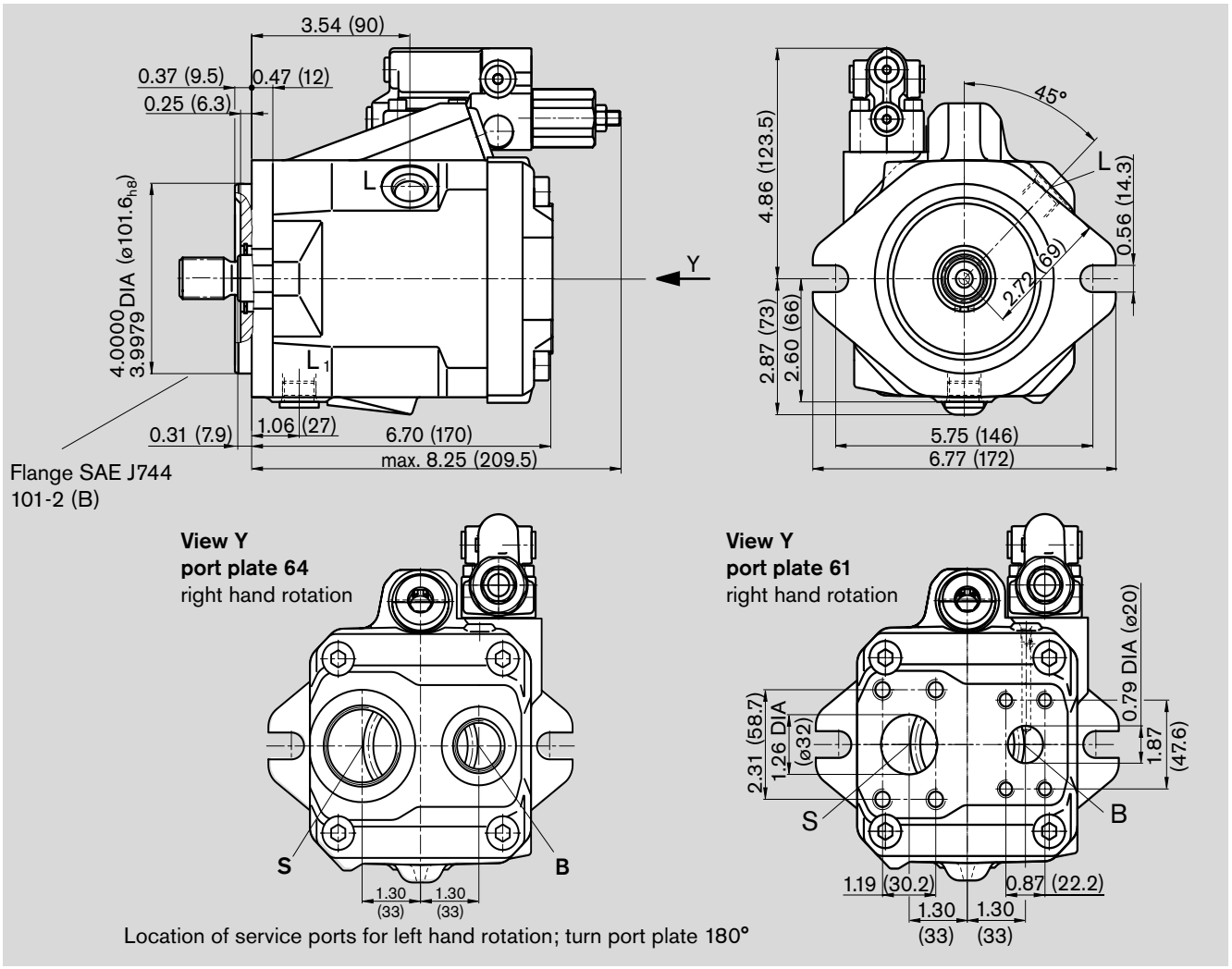
				Tightening torque, max.[1]
B	Outlet port, SAE flange (code 61) Fixing thread	SAE J518c ISO 68	3/4in 3/8-16UNC-2B; 0.75 (19) deep	 31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61) Fixing thread	SAE J518c DIN 13	1 1/4in 7/16-14UNC-2B; 0.79 (20) deep	 48 lb-ft (66 Nm)
$L/L_{1,2}$	Case drain ports ($L_{1,2}$ plugged)	ISO 11926	3/4-16UNF-2B	116 lb-ft (160 Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B; 0.45 (11.5 deep)	29 lb-ft (40 Nm)

[1] see general information

Unit dimensions, size 28

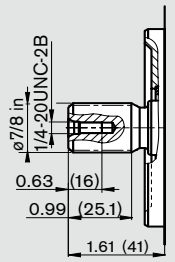
Before finalizing your design please request a certified installation drawing. Dimensions in inches and (mm)

A10VO28 DR/52R(L)-VXC61(64) N00

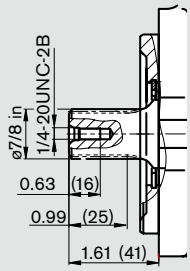


Shaft ends

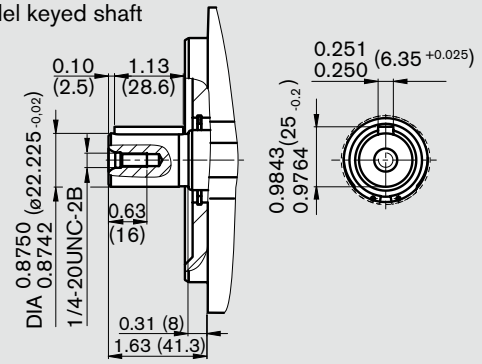
S Spline shaft
7/8 in 13T 16/32DP[1)]
(SAE J744 - 22-4 (B))



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



K Parallel keyed shaft



Ports Plate 64, ports plate 61 see page 21

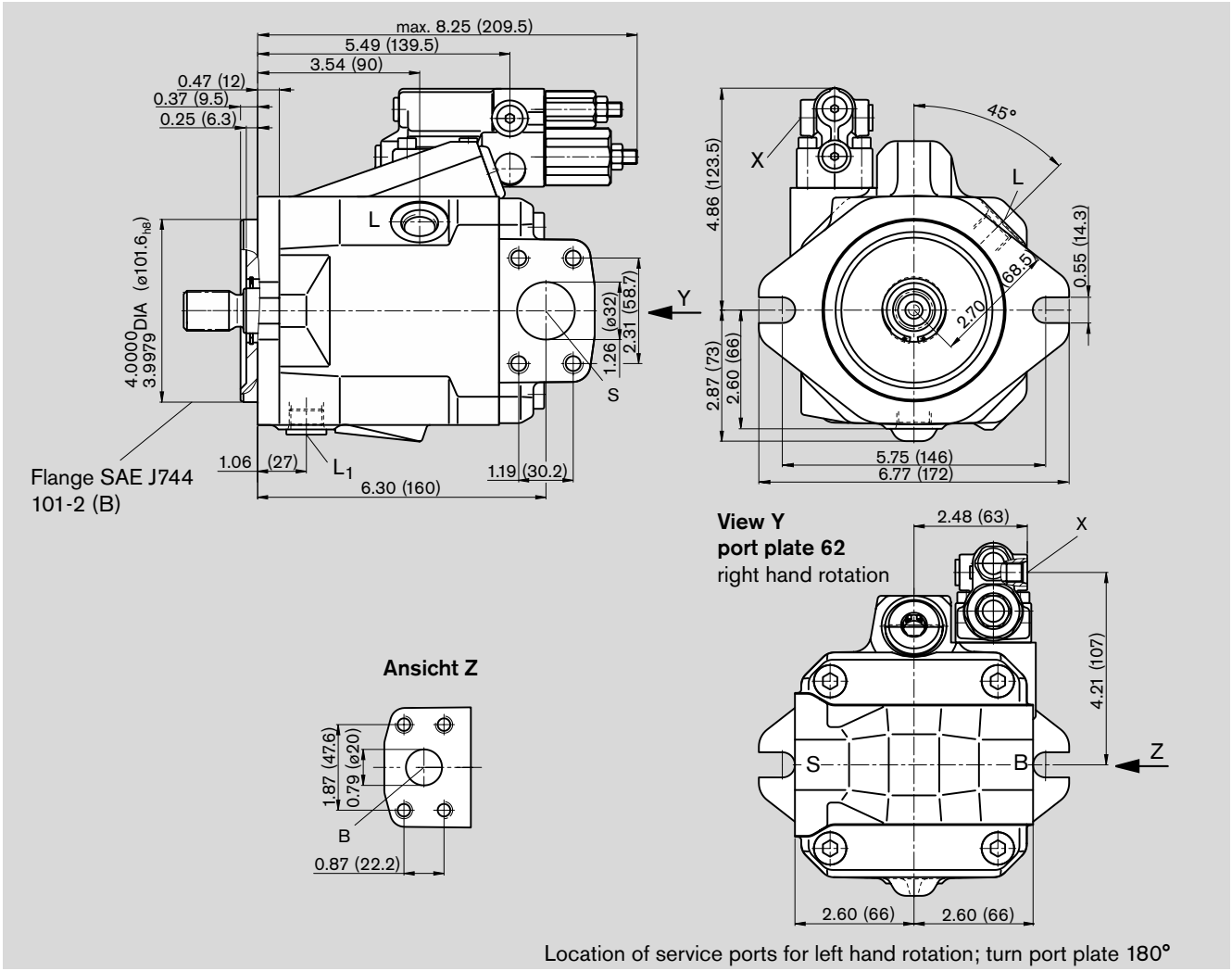
				Tightening torque, max.[2)]
B	Outlet port, threaded	ISO 11926	1 1/16-12UNF-2B; 0.79(20) deep	261 lb-ft (360 Nm)
S	Inlet port, threaded	ISO 11926	1 5/8-12UN-2B; 0.79(20) deep	696 lb-ft (960 Nm)
L/L_1	Case drain ports (L_1 plugged)	ISO 11926	3/4-16UNF-2B	116 lb-ft (160 Nm)

[1)] ANSI B92.1a-1996, 30° pressure angle, flat root, side fit, tolerance class 5
[2)] see general information

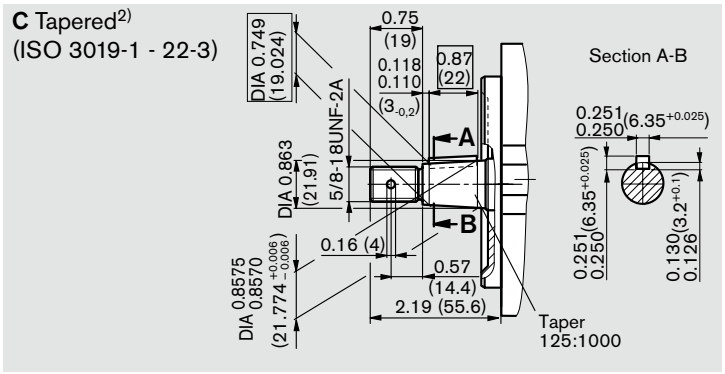
Unit dimensions, size 28

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

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



Shaft ends



Ports Plate 62 (61) (Dimensions of port plate 61 see page 20)

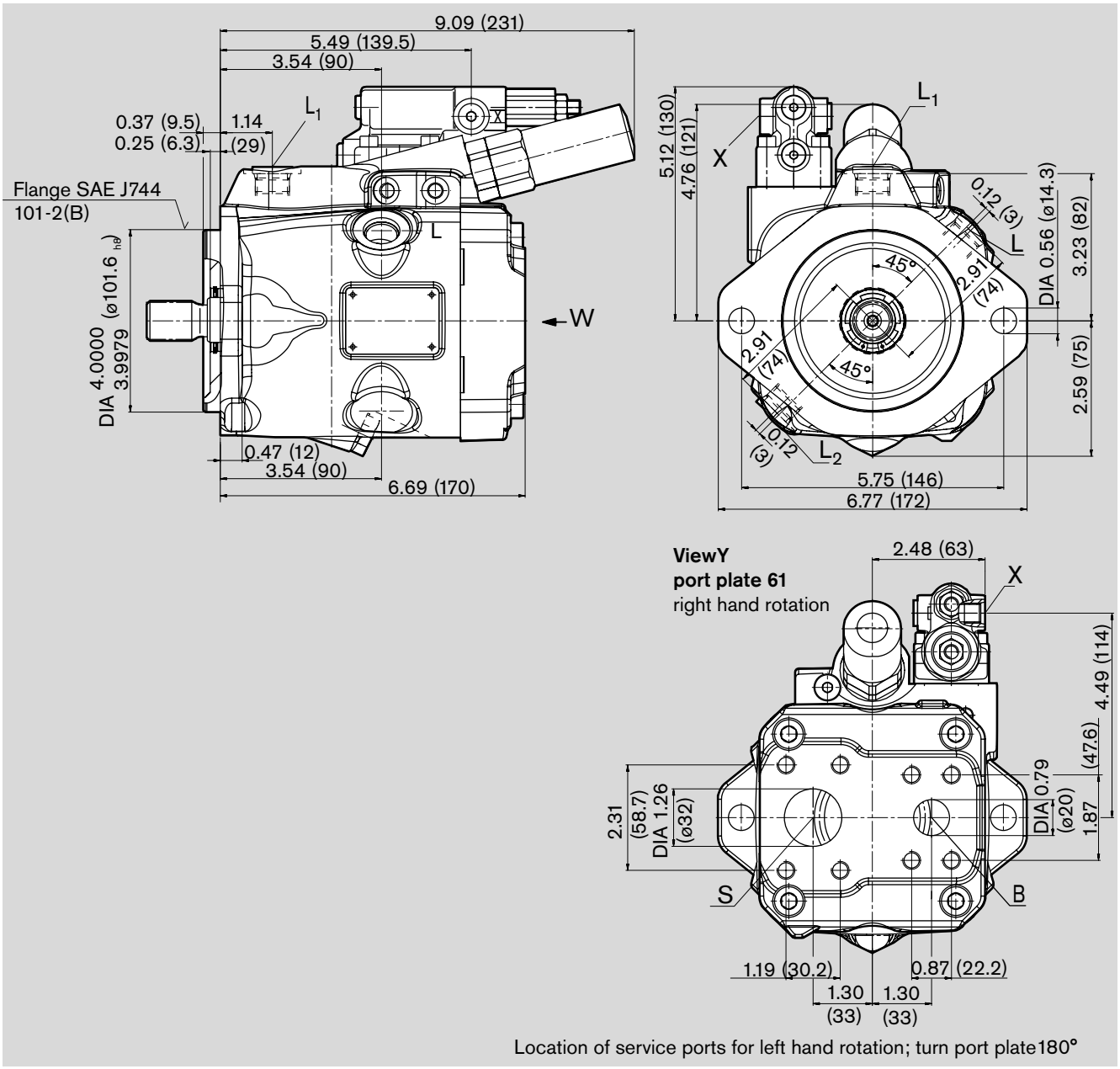
				Tightening torque, max.[1]
B	Outlet port, SAE flange (code 61)	SAE J518c	3/4in	
	Fixing thread	ISO 68	3/8-16UNC-2B; 0.75 (19) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61)	SAE J518c	1 1/4in	
	Fixing thread	ISO 68	7/16-14UNC-2B; 0.79 (20) deep	48 lb-ft (66 Nm)
L/L_1	Case drain ports (L_1 plugged)	ISO 11926	3/4-16UNF-2B	116 lb-ft (160 Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B; 0.45 (11.5) deep	29 lb-ft (40 Nm)

[1] see general information [2] only series 52

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 port plate180°

Shaft ends see page 20,21

Ports

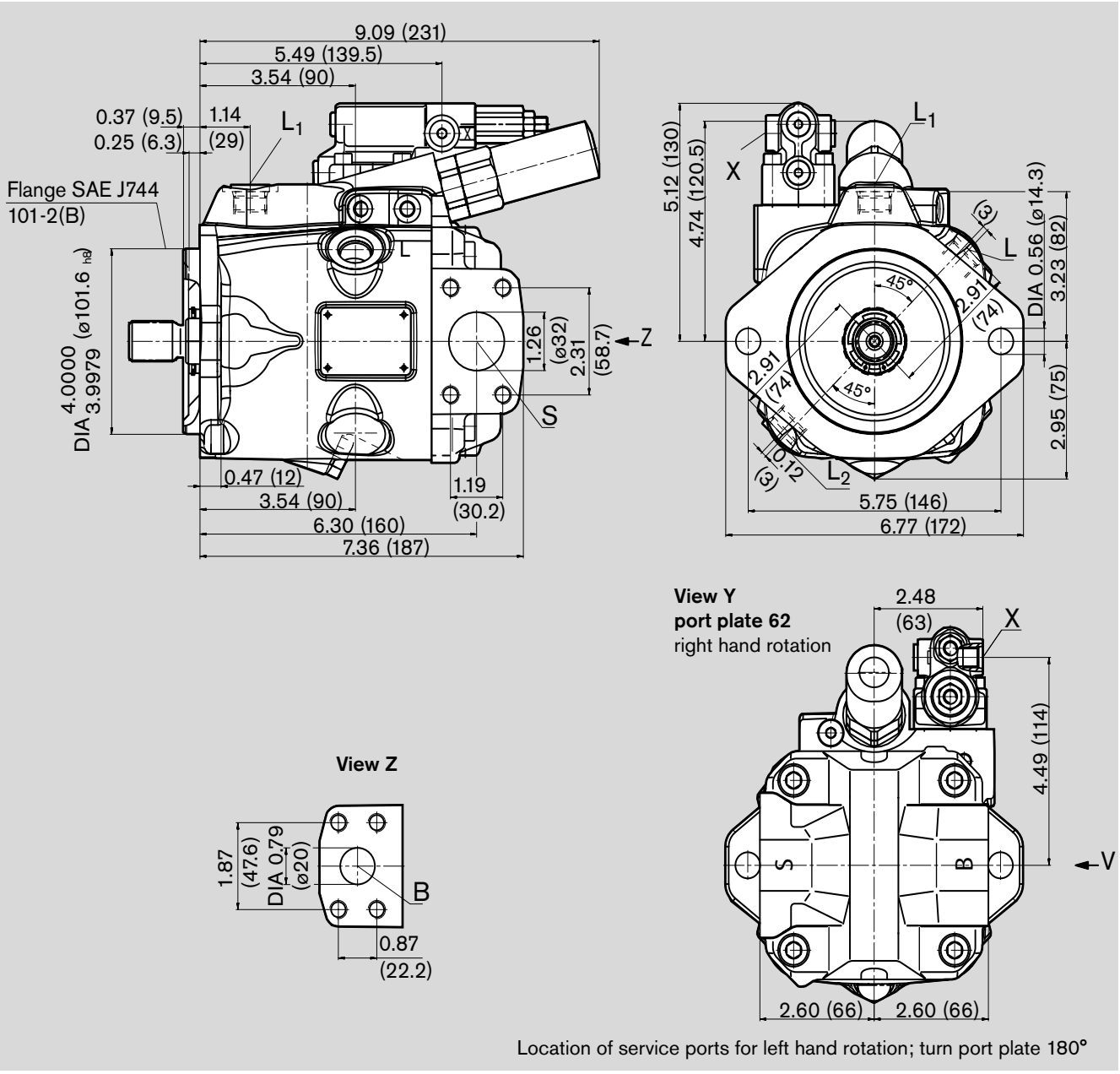
				Tightening torque, max.[1]
B	Outlet port, SAE flange (code 61) Fixing thread	SAE J518c ISO 68	3/4in 3/8-16UNC-2B; 0.75 (19) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61) Fixing thread	SAE J518c ISO 68	1 1/4in 7/16-14UNC-2B; 0.79 (20) deep	48 lb-ft (66 Nm)
L/L_1	Case drain ports (L_1 plugged)	ISO 11926	3/4-16UNF-2B	116 lb-ft (160 Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B; 0.45 (11.5) deep	29 lb-ft (40 Nm)

[1] 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 port plate 180°

Shaft ends see page 20,21

Ports

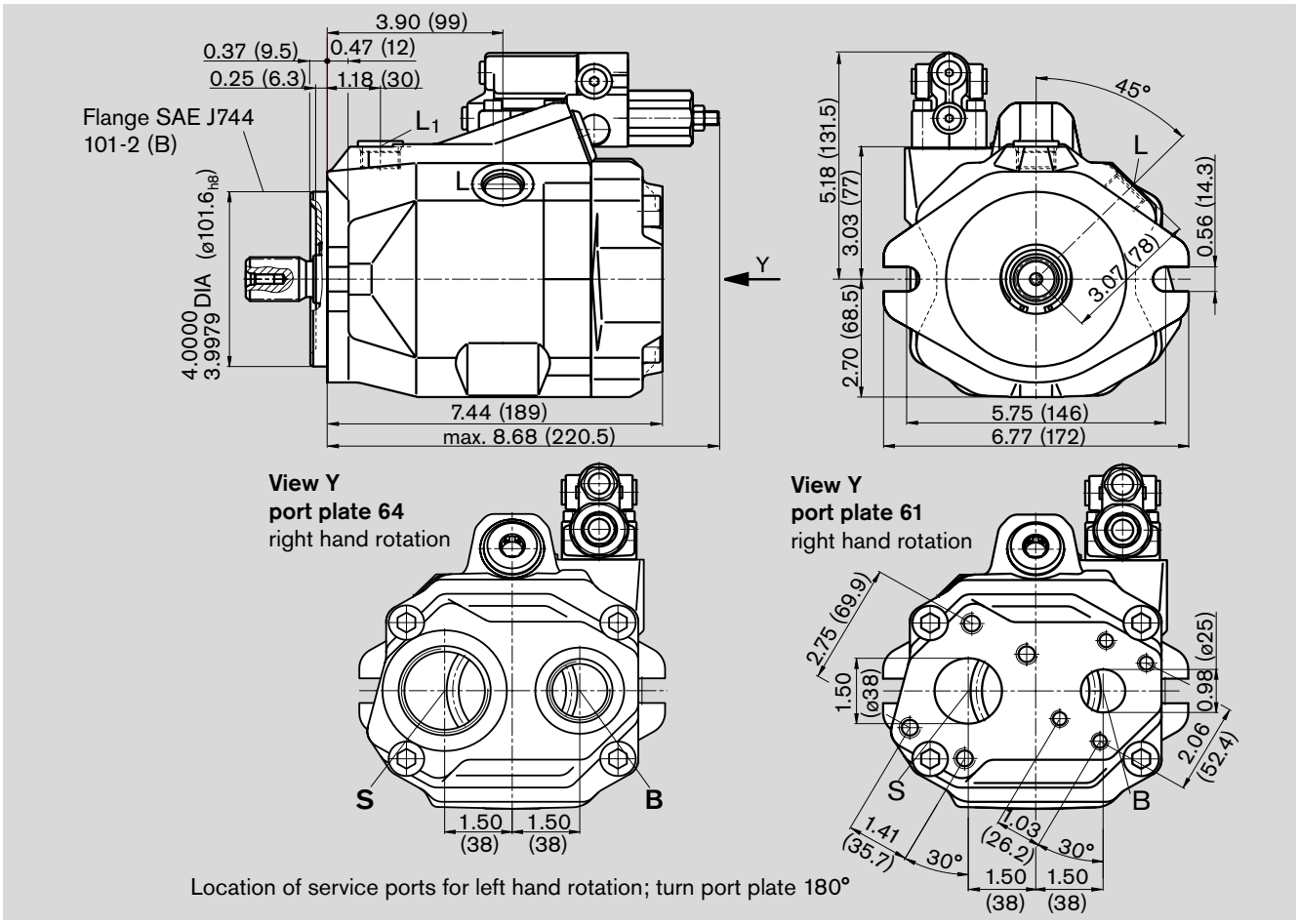
				Tightening torque, max.[1]
B	Outlet port, SAE flange (code 61) Fixing thread	SAE J518c ISO 68	3/4in 3/8-16UNC-2B; 0.75 (19) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61) Fixing thread	SAE J518c ISO 68	1 1/4in 7/16-14UNC-2B; 0.79 (20) deep	48 lb-ft (66 Nm)
L/L_1	Case drain ports (L_1 plugged)	ISO 11926	3/4-16UNF-2B	116 lb-ft (160 Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B; 0.45 (11.5) deep	29 lb-ft (40 Nm)

[1] see general information

Unit dimensions, size 45

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

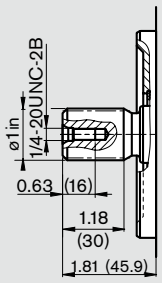
A10VO45 DR/52R(L)-VXC61(64)N00



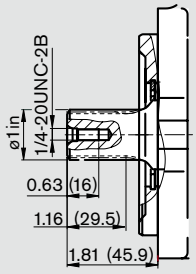
Location of service ports for left hand rotation; turn port plate 180°

Shaft ends

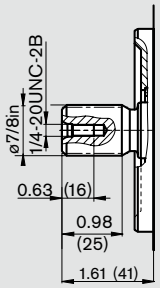
S Spline shaft
1 in 15T 16/32DP[1)]
(SAE J744 - 25-4 (B-B))



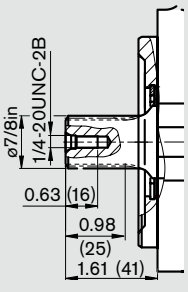
R Spline shaft
1in 15T 16/32DP[1)]
(SAE J744 - 25-4 (B-B))



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



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



Ports 64 (ports plate 61 see page 25)

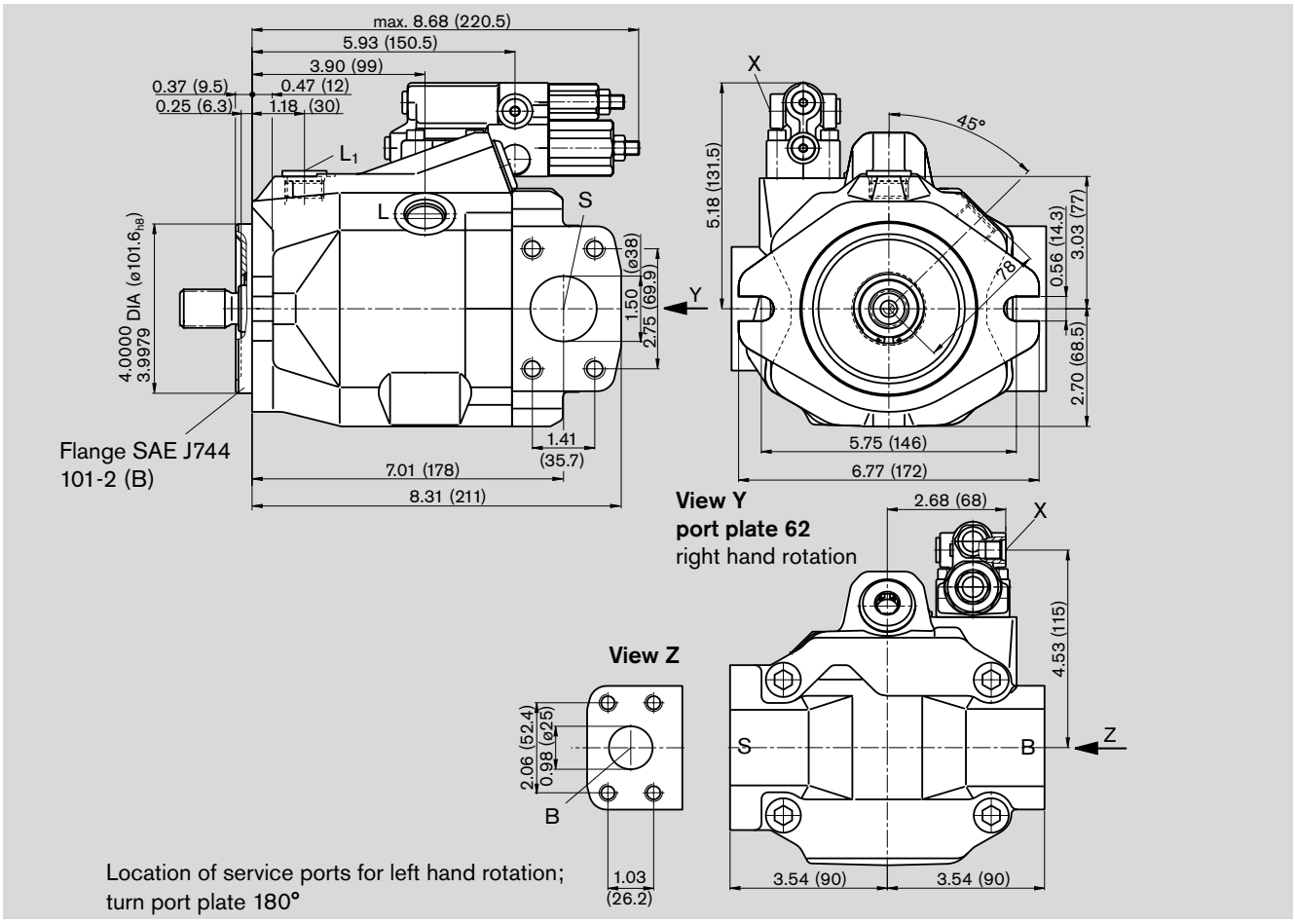
				Tightening torque, max.[2)]
B	Outlet port	ISO 11926	1 5/16-12UN-2B; 0.79 (20) deep	390 lb-ft (540 Nm)
S	Inlet port	ISO 11926	1 7/8-12UN-2B; 0.79 (20) deep	696 lb-ft (960 Nm)
L/L_1	Case drain ports (L_1 plugged)	ISO 11926	7/8-14UNF-2B	174 lb-ft (240 Nm)

[1)] ANSI B92.1a-1996, 30° pressure angle, flat root, side fit, tolerance class 5
[2)] see general information

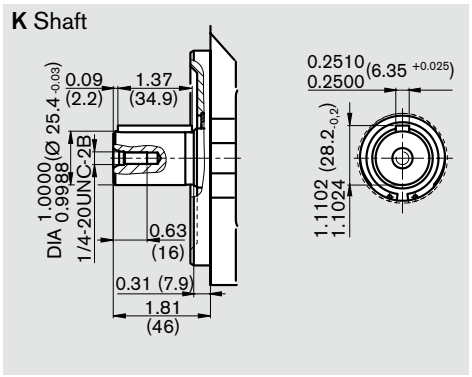
Unit dimensions, size 45

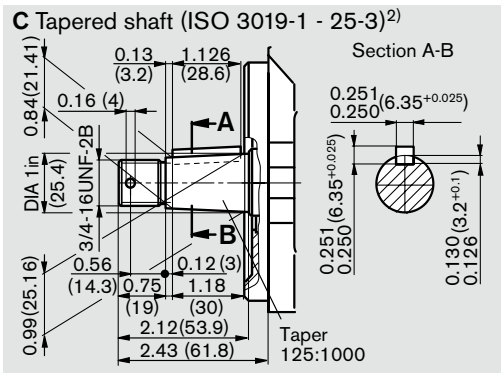
Before finalizing your design please request a certified installation drawing. Dimensions in inches and (mm)

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



Shaft ends





Ports 62 (ports plate 61 see also page 24)

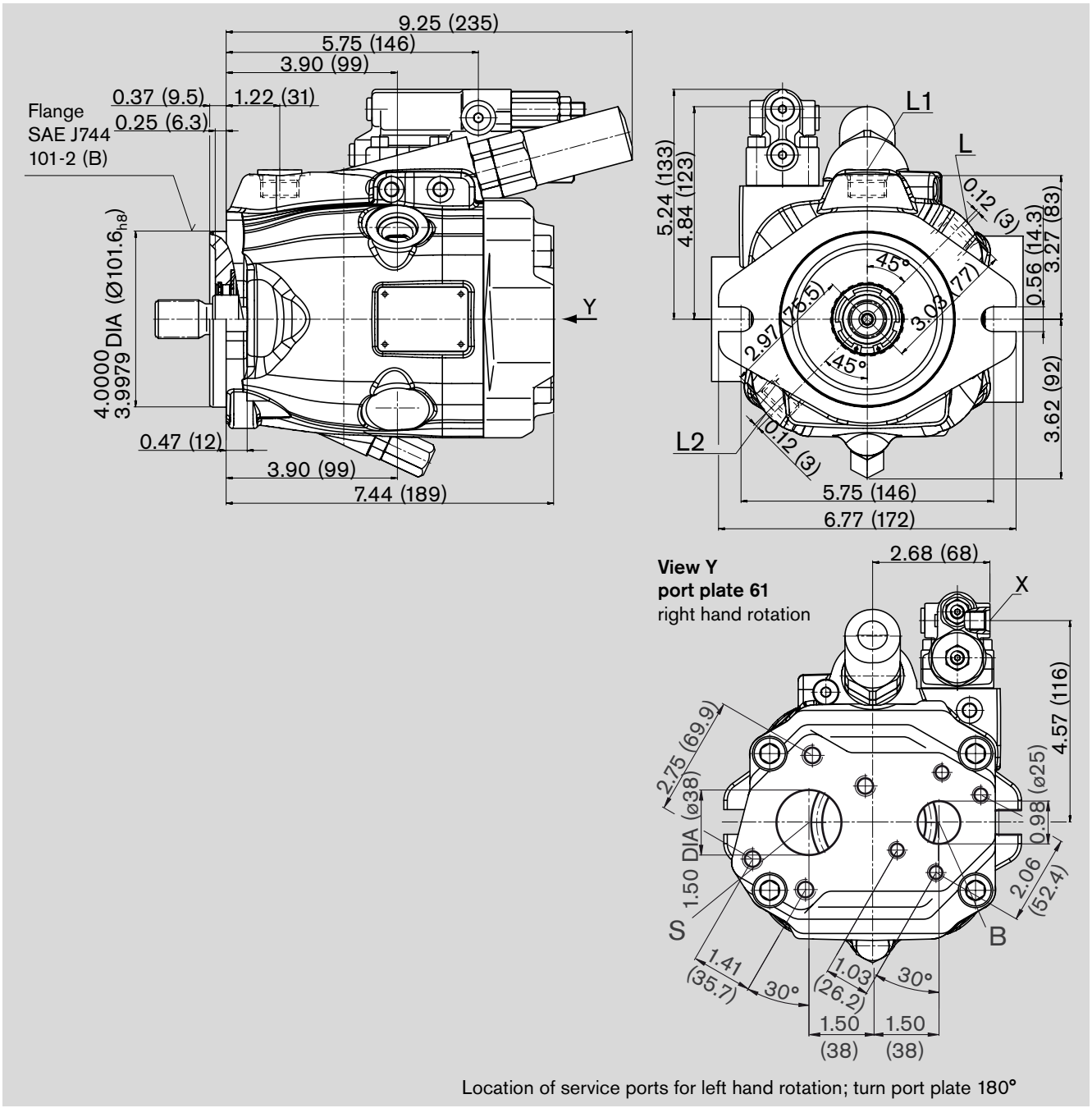
				Tightening torque, max.[1]
B	Outlet port, SAE flange (code 61) Fixing thread	SAE J518c ISO 68	1in 3/8-16UNC-2B; 0.71 (18) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61) Fixing thread	SAE J518c ISO 68	1 1/2in 1/2-13UNC-2B; 0.87 (22) deep	65 lb-ft (90 Nm)
L/L_1	Case drain ports (L_1 plugged)	ISO 11926	7/8-14UNF-2B	174 lb-ft (240 Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B; 0.45 (11.5) deep	29 lb-ft (40 Nm)

[1] see general information
[2] only series 52

Unit dimensions. size 45

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

A10VO45 LAXDS/53R(L)-VXC61N00



Location of service ports for left hand rotation; turn port plate 180°

Shaft ends see page 24, 25

Ports

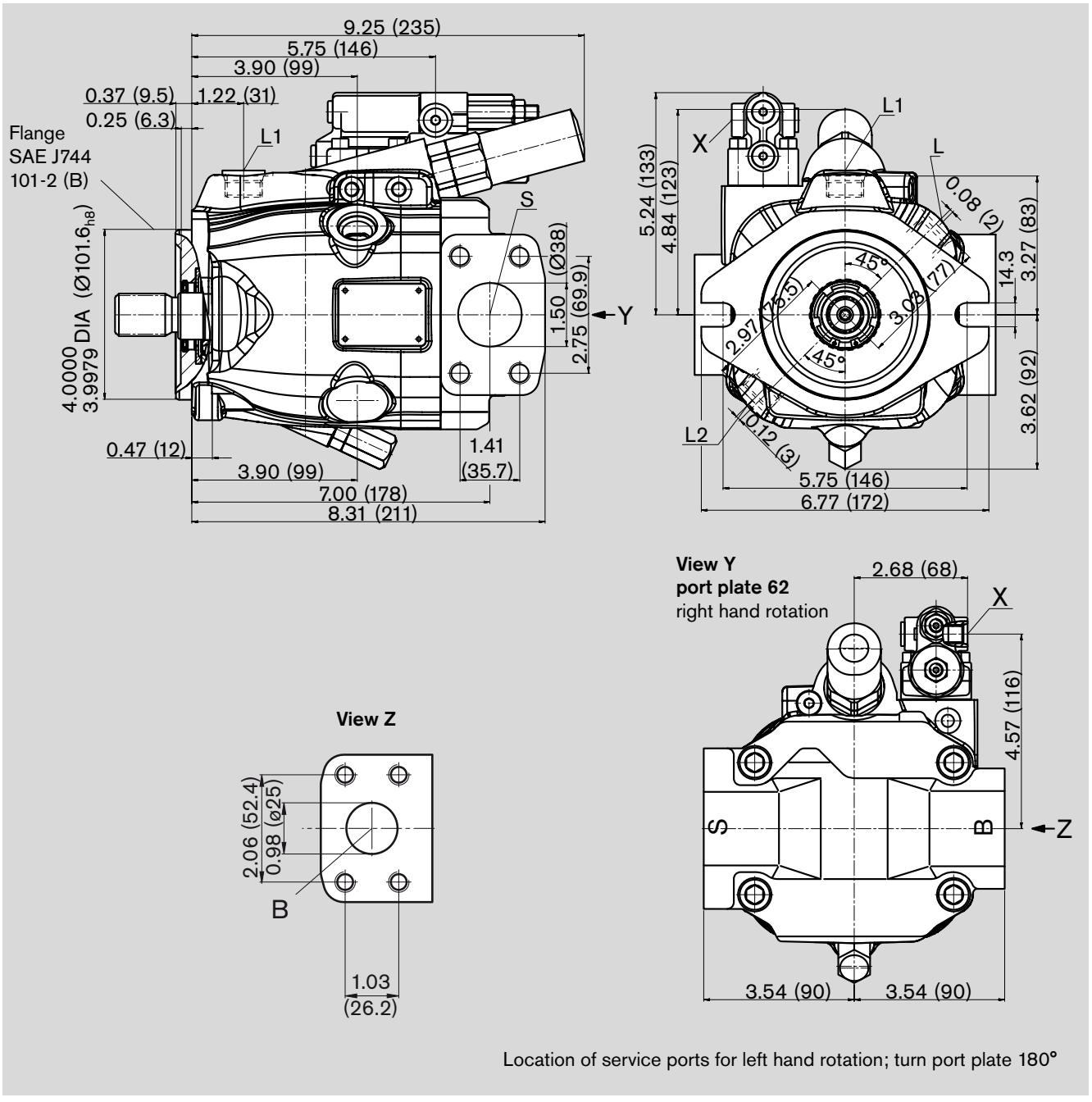
				Tightening torque, max.[1]
B	Outlet port, SAE flange (code 61) Fixing thread	SAE J518c ISO 68	1in 3/8-16UNC-2B; 0.71 (18) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61) Fixing thread	SAE J518c ISO 68	1 1/2in 1/2-13UNC-2B; 0.87 (22) deep	65 lb-ft (90 Nm)
L/L_1	Case drain ports (L_1 plugged)	ISO 11926	7/8-14UNF-2B	174 lb-ft (240 Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B; 0.45 (11.5) deep	29 lb-ft (40 Nm)

[1] see general information

Unit dimensions, size 45

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

A10VO45 LAXDS/53R(L)-VXC62N00



Location of service ports for left hand rotation; turn port plate 180°

Shaft ends see page 24, 25

Ports

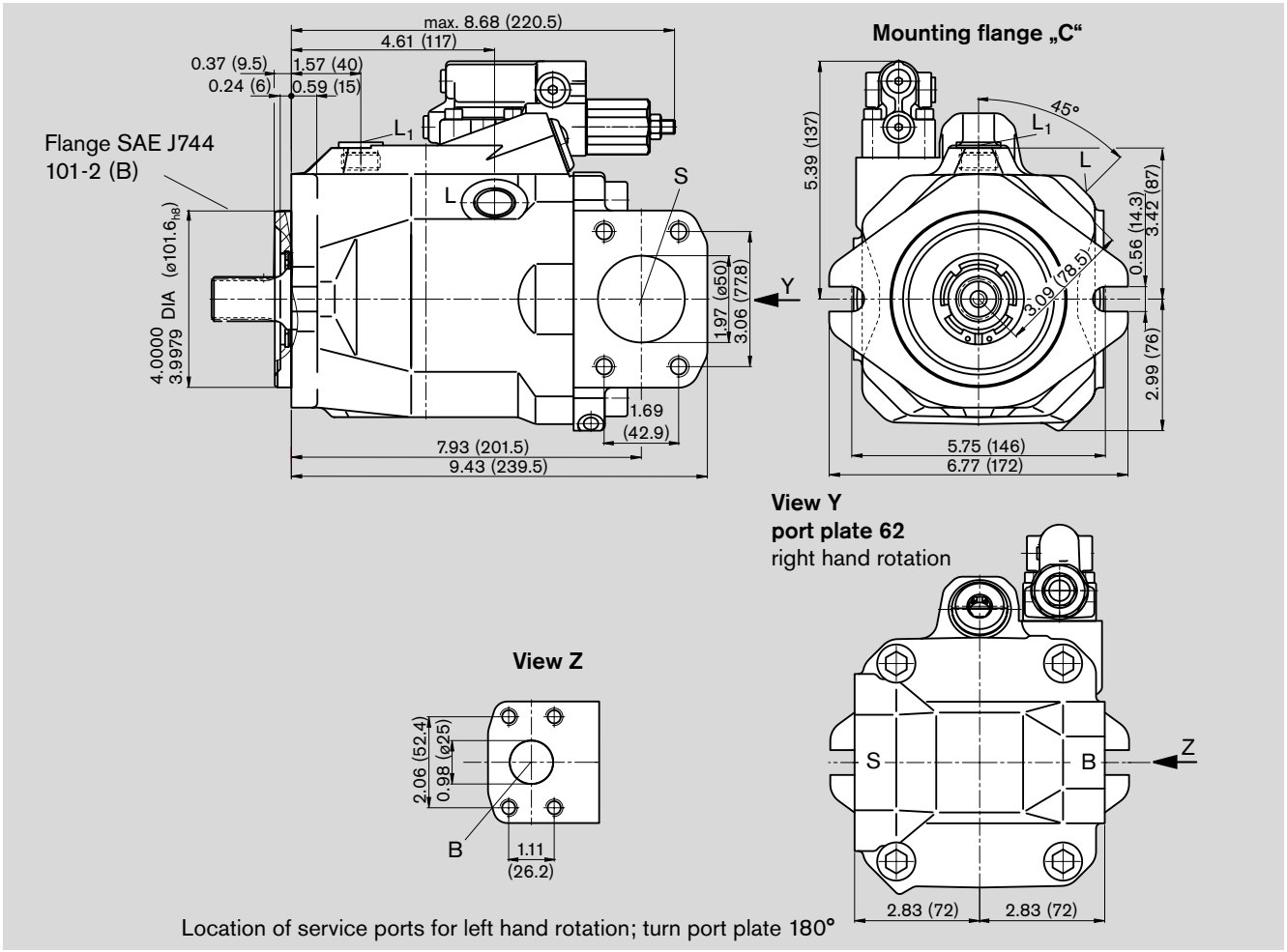
				Tightening torque, max.[1]
B	Outlet port, SAE flange (code 61) Fixing thread	SAE J518c ISO 68	1in 3/8-16UNC-2B; 0.71 (18) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61) Fixing thread	SAE J518c ISO 68	1 1/2in 1/2-13UNC-2B; 0.87 (22) deep	65 lb-ft (90 Nm)
L/L_1	Case drain ports (L_1 plugged)	ISO 11926	7/8-14UNF-2B	174 lb-ft (240 Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B; 0.45 (11.5) deep	29 lb-ft (40 Nm)

[1] see general information

Unit dimensions, size 63

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

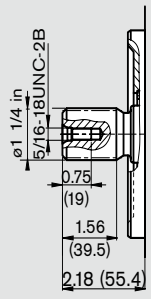
A10VO63 DR/52R(L)-VXC62N00



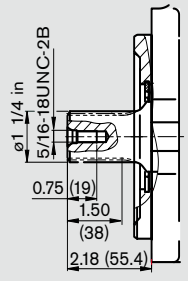
Location of service ports for left hand rotation; turn port plate 180°

Shaft ends

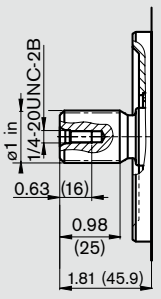
S Spline shaft
1 1/4 in 14T 12/24DP[1)]
(SAE J744 - 32-4 (C))



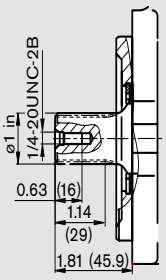
R Spline shaft
1 1/4 in 14T 12/24DP[1)]
(SAE J744 - 32-4 (C))



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



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



Ports

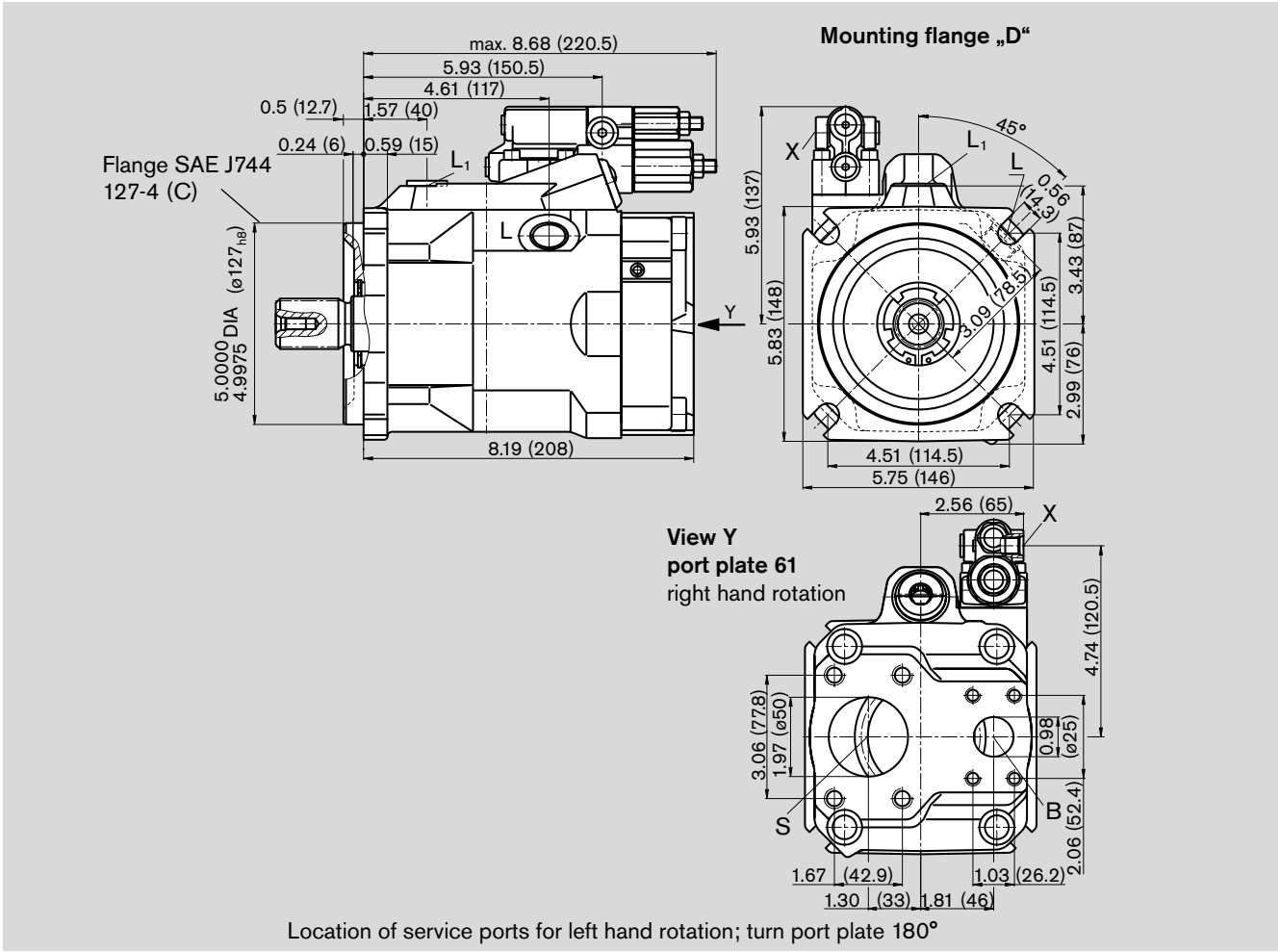
				Tightening torque, max.[2)]
B	Outlet port, SAE flange (code 61) Fixing thread	SAE J518c ISO 68	1in 3/8-16UNC-2B; 0.71 (18) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61) Fixing thread	SAE J518c ISO 68	2in 1/2-13UNC-2B; 0.87 (22) deep	65 lb-ft (90 Nm)
L/L_1	Case drain ports (L_1 plugged)	ISO 11926	7/8-14UNF-2B	174 lb-ft (240 Nm)

[1)] ANSI B92.1a-1996, 30° pressure angle, flat root, side fit, tolerance class 5
[2)] see general information

Unit dimensions, size 63

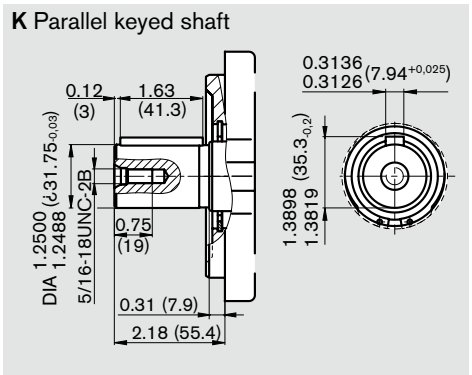
Before finalizing your design please request a certified installation drawing. Dimensions in inches and (mm)

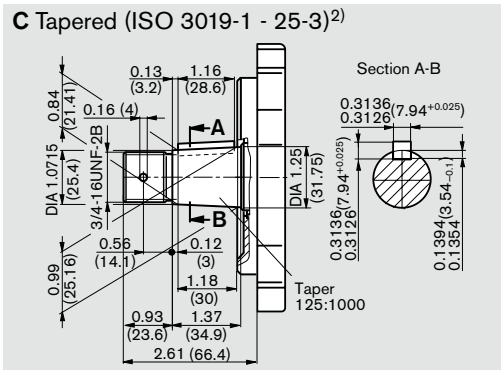
A10VO63 DFR1 (DFR, DRG)/52R(L)-VXD61N00



Location of service ports for left hand rotation; turn port plate 180°

Shaft ends





Ports

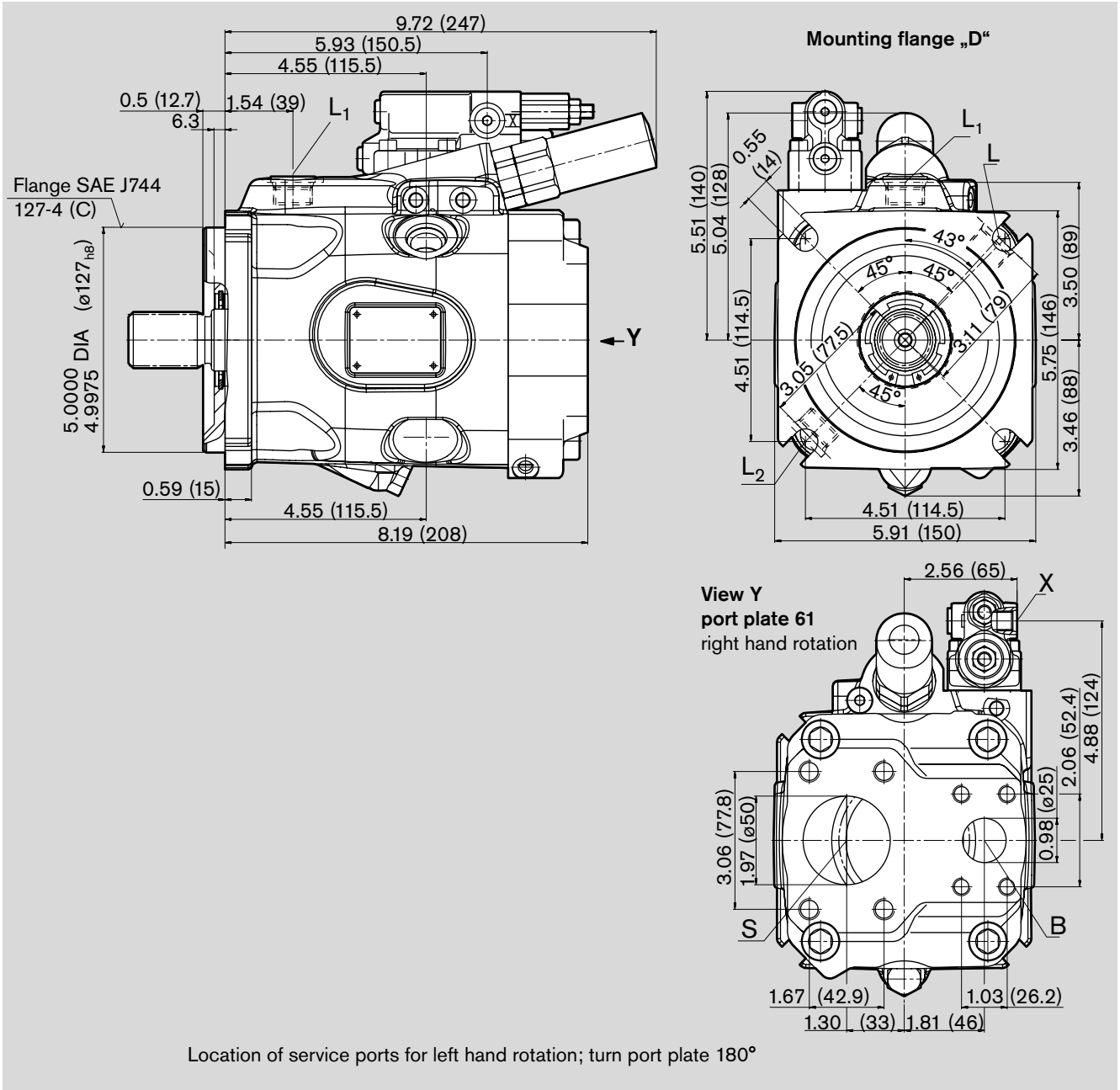
				Tightening torques, max.[1]
B	Outlet port, SAE flange (code 61) Fixing thread	SAE J518c ISO 68	1in 3/8-16UNC-2B; 0.71 (18) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61) Fixing thread	SAE J518c ISO 68	2in 1/2-13UNC-2B; 0.87 (22) deep	65 lb-ft (90 Nm)
L/L_1	Case drain ports (L_1 plugged)	ISO 11926	7/8-14UNF-2B	174 lb-ft (240 Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B; 0.45 (11.5) deep	29 lb-ft (40 Nm)

[1] see general information [2] only series 52

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 port plate 180°

Shaft ends see page 28/29

Ports

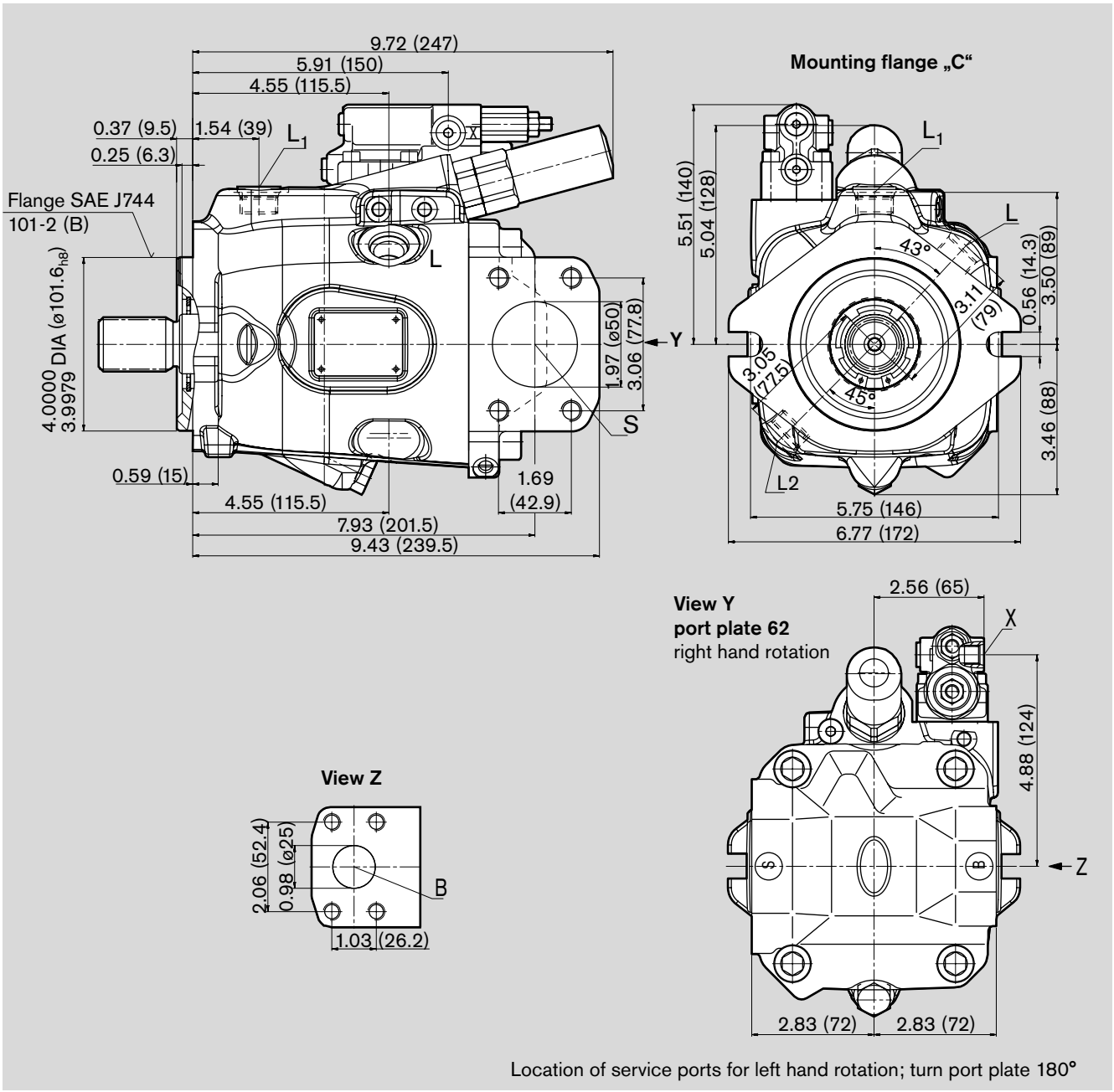
				Tightening torque, max.[1]
B	Outlet port, SAE flange (code 61) Fixing thread	SAE J518c ISO 68	1in 3/8-16UNC-2B; 0.71 (18) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61) Fixing thread	SAE J518c ISO 68	2in 1/2-13UNC-2B; 0.87 (22) deep	65 lb-ft (90 Nm)
L/L_1	Case drain ports (L_1 plugged)	ISO 11926	7/8-14UNF-2B	174 lb-ft (240 Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B; 0.45 (11.5) deep	29 lb-ft (40 Nm)

[1] see general information

Unit dimensions, size 63

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

A10VO63 LAXDX/53R(L)-VXC62N00



Location of service ports for left hand rotation; turn port plate 180°

Shaft ends see page 28/29

Ports

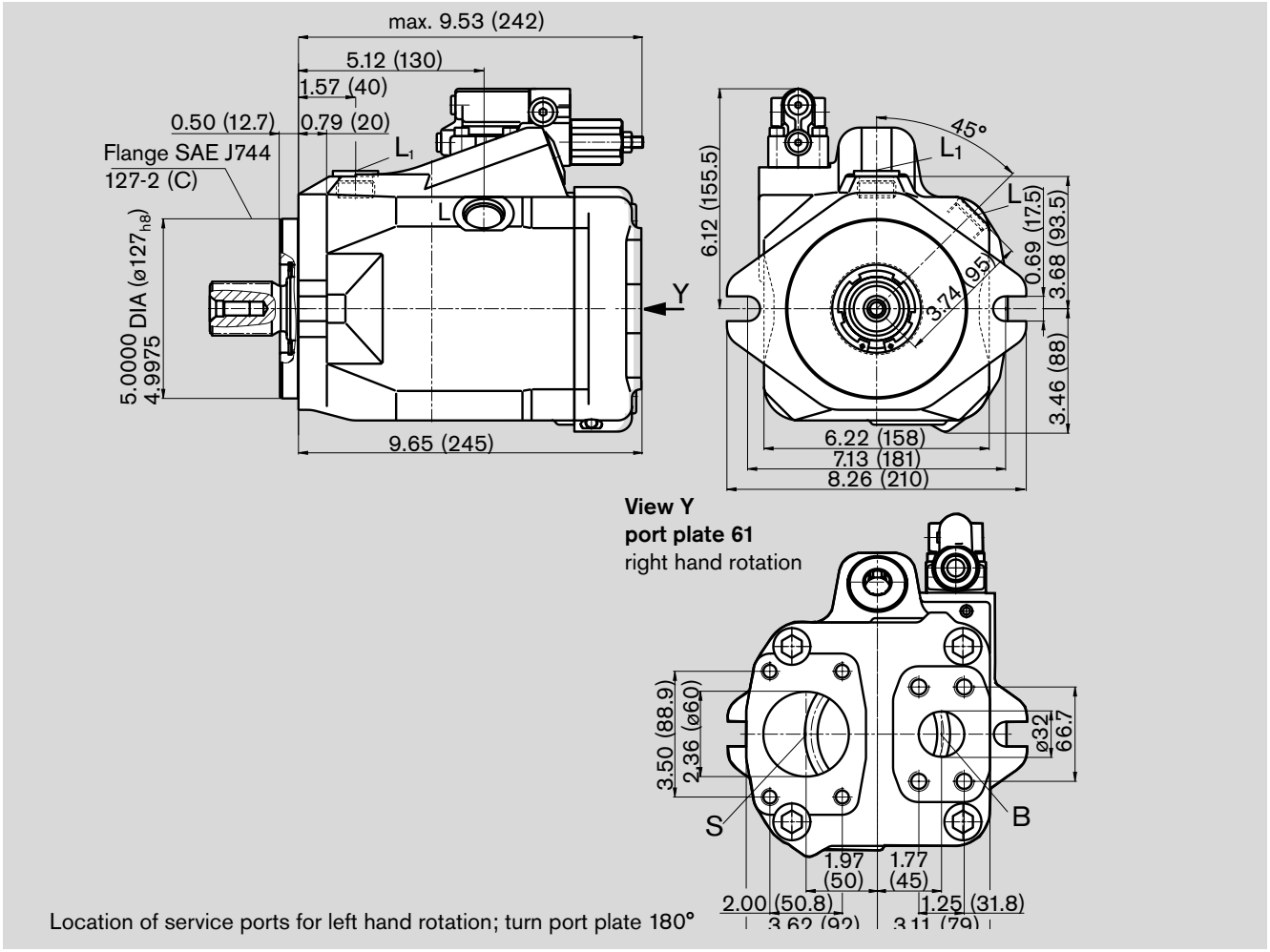
				Tightening torque, max.[1]
B	Outlet port, SAE flange (code 61)	SAE J518c	1in	
	Fixing thread	ISO 68	3/8-16UNC-2B; 0.71 (18) deep	31 lb-ft (42 Nm)
S	Inlet port, SAE flange (code 61)	SAE J518c	2in	
	Fixing thread	ISO 68	1/2-13UNC-2B; 0.87 (22) deep	65 lb-ft (90 Nm)
L/L_1	Case drain ports (L_1 plugged)	ISO 11926	7/8-14UNF-2B	174 lb-ft (240 Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B; 0.45 (11.5) deep	29 lb-ft (40 Nm)

[1] see general information

Unit dimensions, size 85

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

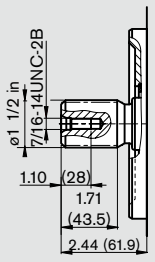
A10VO85 DR/52R(L)-VXD61N00



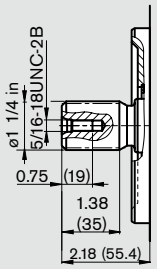
Location of service ports for left hand rotation; turn port plate 180°

Shaft ends

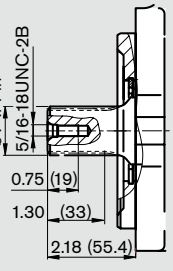
S Spline shaft
1 1/2 in 17T 12/24DP [1]
(SAE J744 - 38-4 (C-C))



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



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



Ports

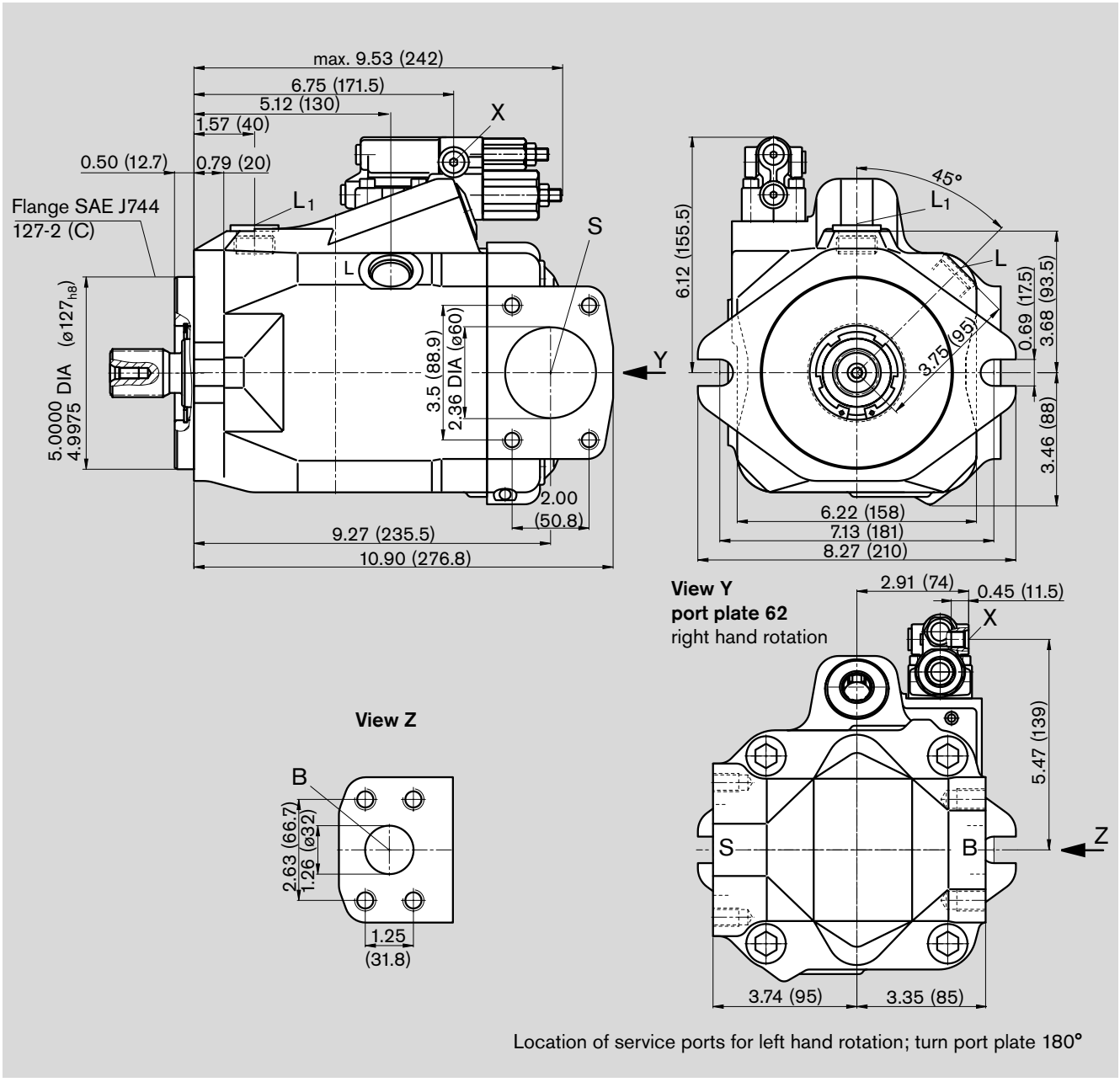
				Tightening torque, max.[2]
B	Outlet port, SAE flange (code 62) Fixing thread	SAE J518c ISO 68	1 1/4in 1/2-13UNC-2B; 0.75 (19) deep	65 lb-ft (90 Nm)
S	Inlet port, SAE flange (code 61) Fixing thread	SAE J518c ISO 68	2 1/2in 1/2-13UNC-2B; 1.07 (27) deep	65 lb-ft (90) Nm
L/L_1	Case drain ports (L_1 plugged)	ISO 11926	1 1/16-12UN-2B	260 lb-ft (360 Nm)

[1] ANSI B92.1a-1996, 30° pressure angle, flat root, side fit, tolerance 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 DFR1(DFR, DRG)/52R(L)-VXC62N00



Location of service ports for left hand rotation; turn port plate 180°

Shaft ends see page 32

Ports

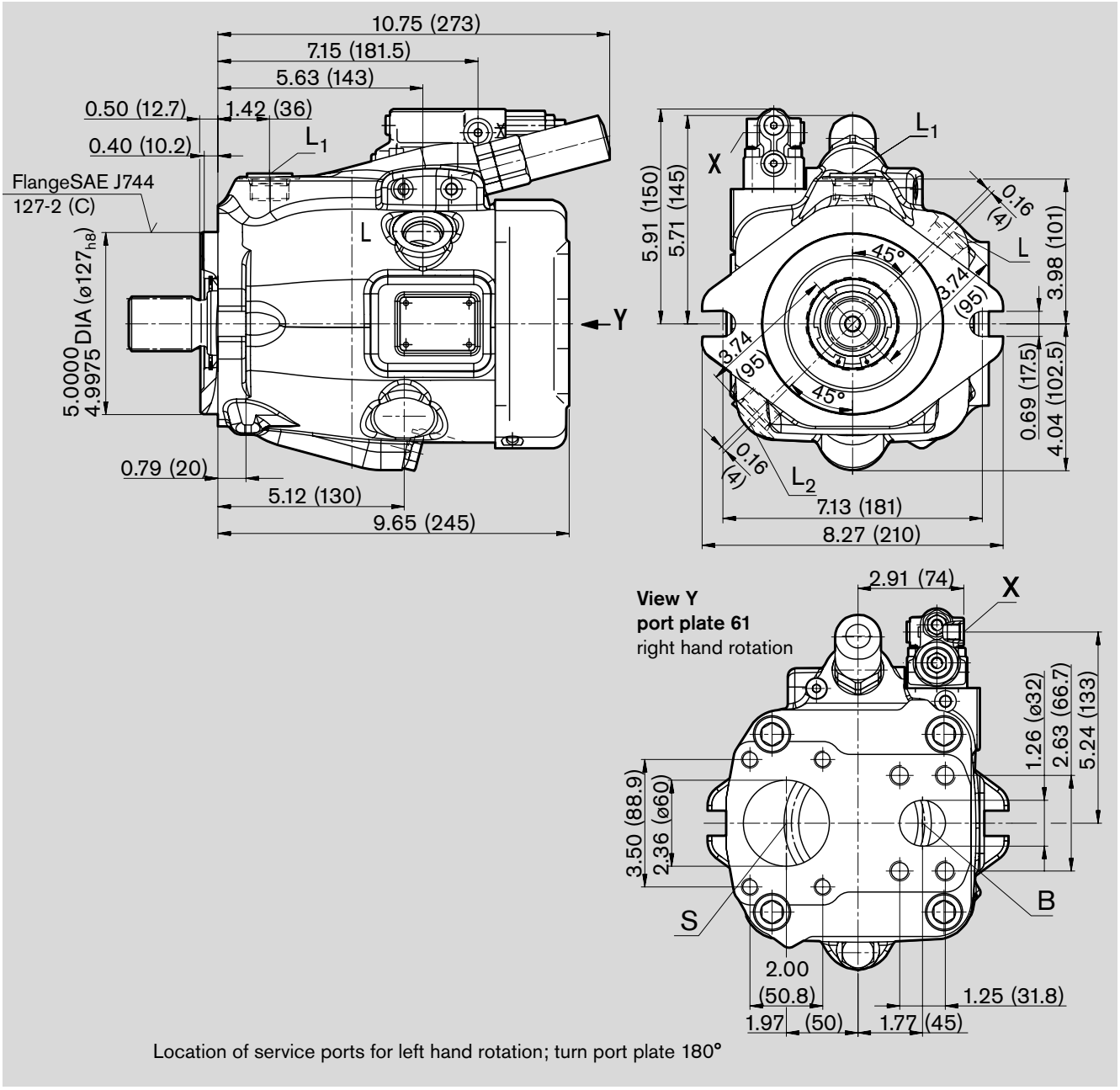
				Tightening torque, max.[1]
B	Outlet port, SAE flange (code 62) Fixing thread	SAE J518c ISO 68	1 1/4in 1/2-13UNC-2B; 0.75 (19) deep	65 lb-ft (90 Nm)
S	Inlet port, SAE flange (code 61) Fixing thread	SAE J518c ISO 68	2 1/2in 1/2-13UNC-2B; 1.07 (27) deep	65 lb-ft (90) Nm
L/L_1	Case drain ports (L_1 plugged)	ISO 11926	1 1/16-12UN-2B	260 lb-ft (360 Nm)
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B 0.45 (11,5) deep	29 lb-ft (40) Nm

[1] 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 port plate 180°

Shaft ends see page 32

Ports

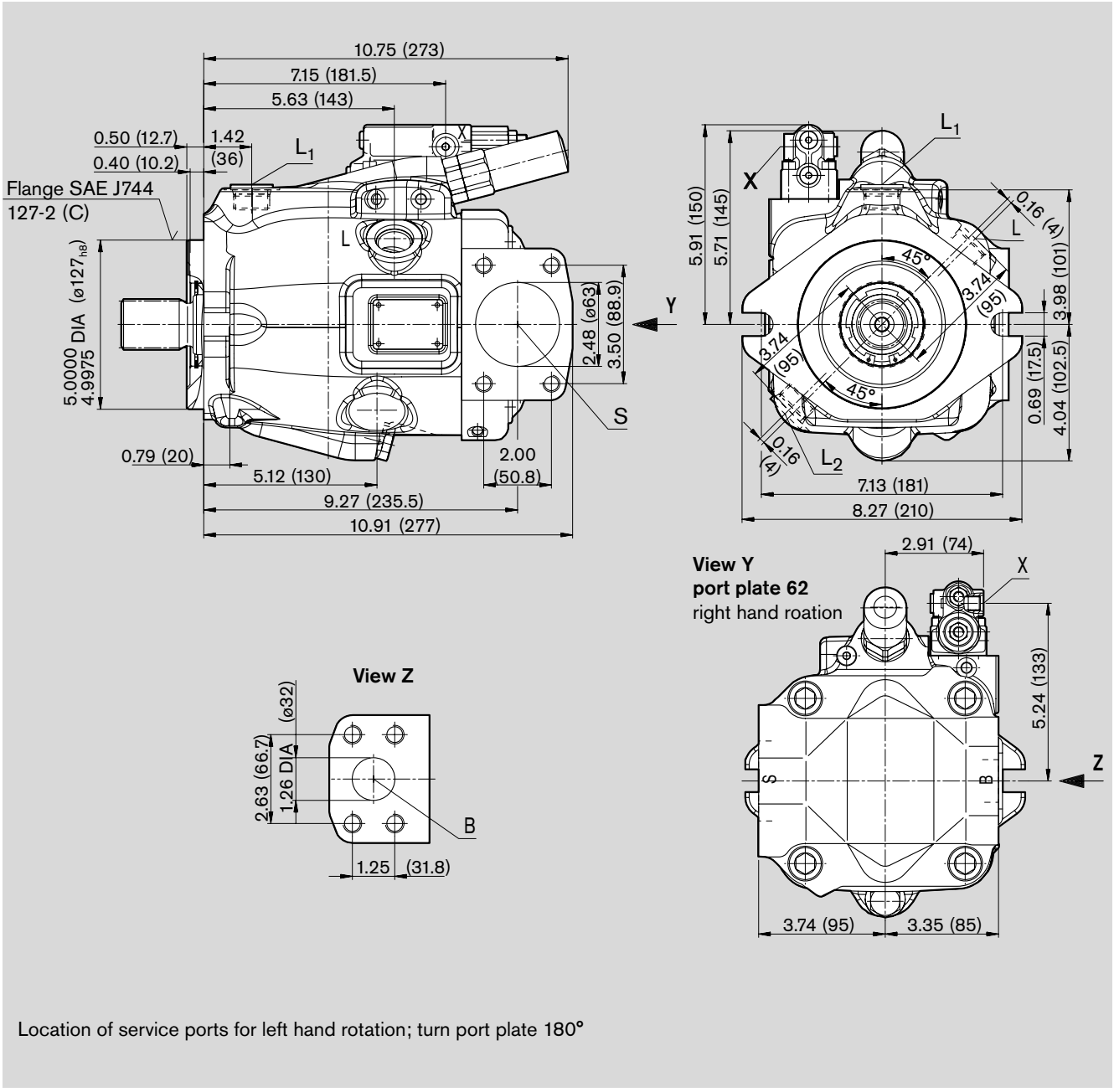
				Tightening torque, max.[1]
B	Outlet port, SAE flange (code 62)	SAE J518c	1 1/4in	
	Fixing thread	ISO 68	1/2-13UNC-2B; 0.75 (19) deep	65 lb-ft (90 Nm)
S	Inlet port, SAE flange (code 61)	SAE J518c	2 1/2in	
	Fixing thread	ISO 68	1/2-13UNC-2B; 1.07 (27) deep	65 lb-ft (90 Nm)
$L/L_{1/2}$	Case drain ports ($L_{1/2}$ plugged)	ISO 11926	1 1/16-12UN-2B	360 Nm
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B; 0.45 (11.5) deep	29 lb-ft (40 Nm)

[1] 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



Location of service ports for left hand rotation; turn port plate 180°

Shaft ends see page 32

Ports

				Tightening torque, max.[1]
B	Outlet port, SAE flange (code 62)	SAE J518c	1 1/4in	
	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 J518c	2 1/2in	
	Fixing thread	ISO 68	1/2-13UNC-2B; 1.07 (27) deep	65 lb-ft (90 Nm)
$L/L_{1/2}$	Case drain ports ($L_{1/2}$ plugged)	ISO 11926	1 1/16-12UN-2B	360 Nm
X	Pilot pressure port	ISO 11926	7/16-20UNF-2B; 0.45 (11.5) deep	29 lb-ft (40 Nm)

[1] 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.

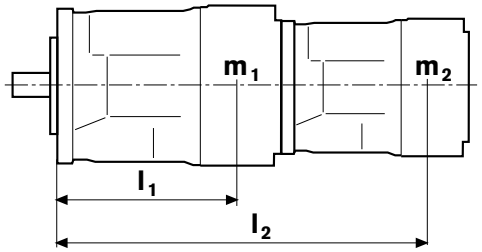
Permissible overhang moment

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**	**18**	**28**	**45**	**63**	**85**
Permissible overhang moment								
static	T_m	lb-ft (Nm)	–	–	656 (890)	664 (900)	1010 (1370)	2270 (3080)
dynamic at 10 g (322 ft/sec^2(9,81 m/s^2))	T_m	lb-ft (Nm)		–	65 (89)	66 (90)	101 (137)	227 (308)
Weight	m_1	lbs (kg)	18 (8)	25 11,5	31 (14)	40 (18)	48.5 (22)	75 (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 gravity [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 second 2. pump**			**Through drive**
Flange **SAE J744**	Coupler for splined shaft	Code	A10V(S)O../5x... Size (shaft)	A10VO../31... Size (shaft)	Gear pump Series (Size)	available on 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
			63 (U, W)[2]	–	–	
127-4 (C)	1 1/4 in	K15	63 (S, R)	–	–	63
				–	–	
127-2 (C)	1 1/4 in	K07	85 (U, W)	71 (S, R)	–	85
	1 1/2 in	K24	85 (S)	–	–	85

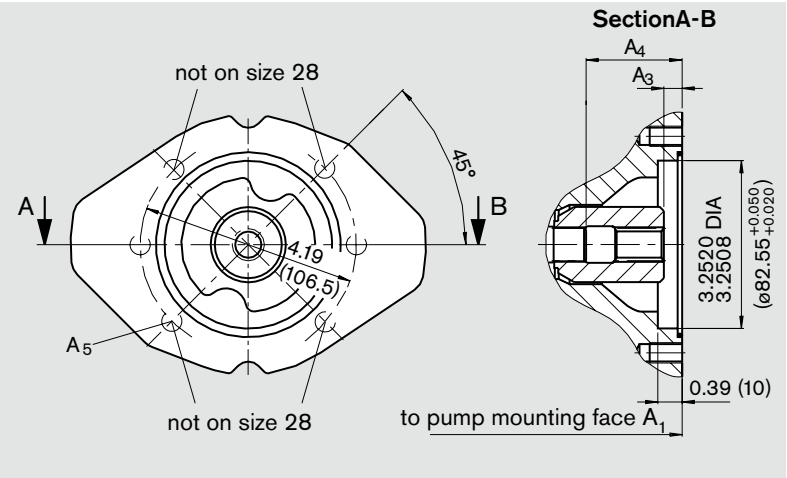
[1] not on size 28 and 45 with K68

[2] not on size 45 with K04

Dimensions through drives

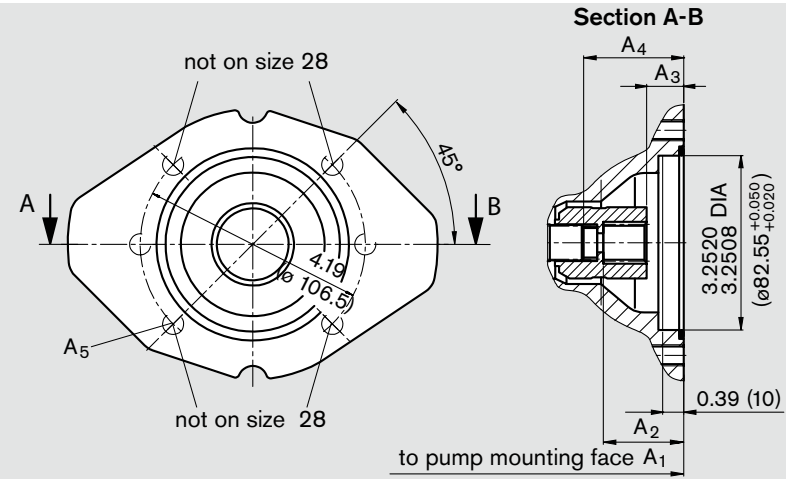
Before finalizing your design please request a certified installation drawing.
Dimensions in inches and (mm)

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



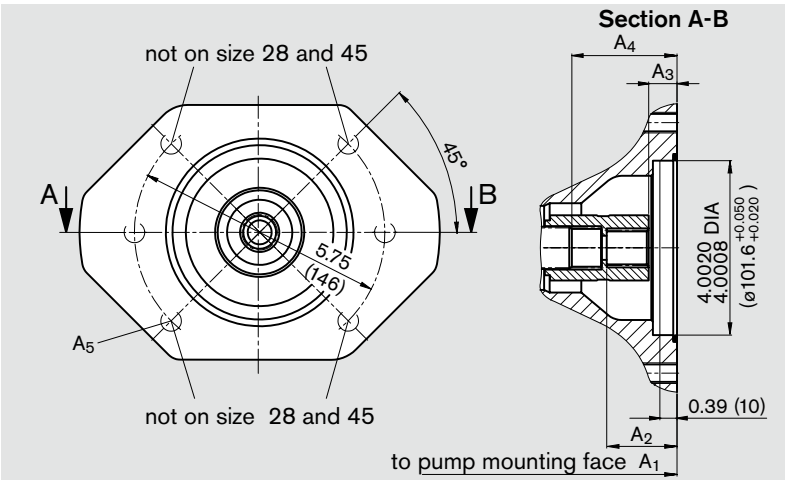
Size	A_1	A_3	A_4	A_5
28	8.03	0.39	1.85	M10; 0.63
	(204)	(9.9)	(47)	(16) deep
45	9.02	0.42	2.09	M10; 0.63
	(229)	(10.7)	(53)	(16) deep
63	10.04	0.37	2.32	M10; 0.63
	(255)	(9.5)	(59)	(16) deep
85	11.89	0.53	2.68	M10; 0.63
	(302)	(13.4)	(68)	(16) deep

K52 **Flange** SAE J744 - 82-2 (A)
Coupler for splined shaft 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; 0.63
	(204)	(39.3)	(18.8)	(47)	(16) deep
45	9.02	1.55	0.74	2.09	M10; 0.63
	(229)	(39.4)	(18.9)	(53)	(16) deep
63	10.04	1.55	0.74	2.40	M10; 0.63
	(255)	(39.4)	(18.9)	(61)	(16) deep
85	11.89	1.74	0.93	2.56	M10; 0.63
	(302)	(44.1)	(23.6)	(65)	(16) deep

K68 **Flange** SAE J744 - 101-2 (B)
Coupler for splined shaft 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; 0.71
	(204)	(42.3)	(17.8)	(47)	(18) deep
45	9.02	1.67	0.7	2.09	M12; 0.71
	(229)	(42.4)	(17.9)	(53)	(18) deep
63	10.04	1.67	0.7	2.32	M12; 0.71
	(255)	(42.4)	(17.9)	(59)	(18) deep
85	11.89	1.83	0.87	2.71	M12; 0.79
	(302)	(46.5)	(22)	(69)	(20) deep

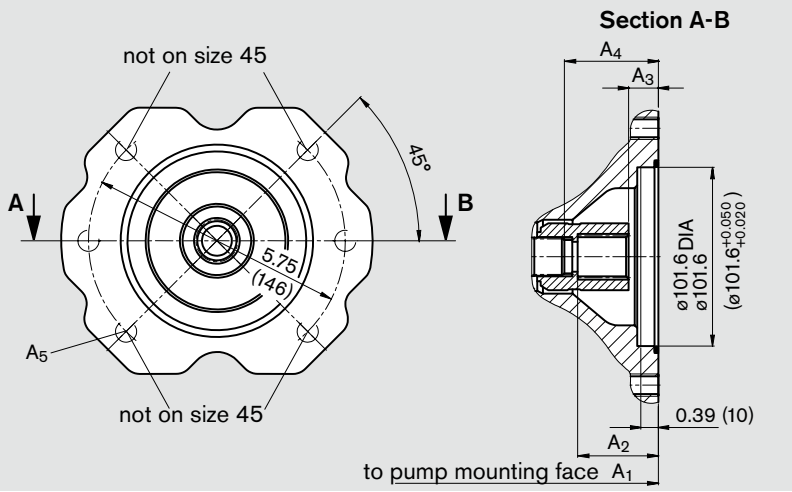
[1] 30° pressure angle, flat root, side fit, tolerance class 5

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)

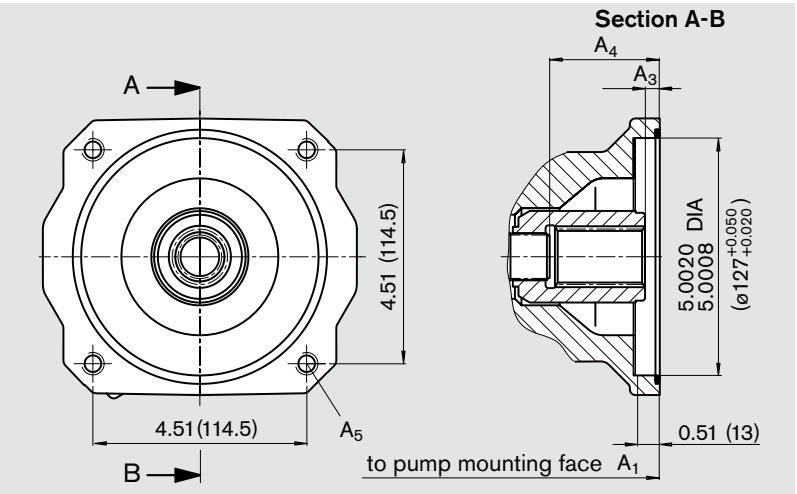
Coupler for splined shaft to ANSI B92.1a-1996 1 in 15T 16/32 DP[1] (SAE J744 - 25-4 (B-B))



Size	A_1	A_2	A_3	A_4	A_5
45	9.02	1.88	0.74	2.10	M12; 0.71
	(229)	(47.9)	(18.9)	(53.4)	(18) deep
63	10.04	1.86	0.72	2.32	M12; 071
	(255)	(47.4)	(18.4)	(58.9)	(18) deep
85	11.89	2.01	0.87	2.71	M12; 0.79
	(302)	(51.2)	(22.2)	(69)	(20) deep

K15 **Flange** SAE J744 - 127-4 (C)

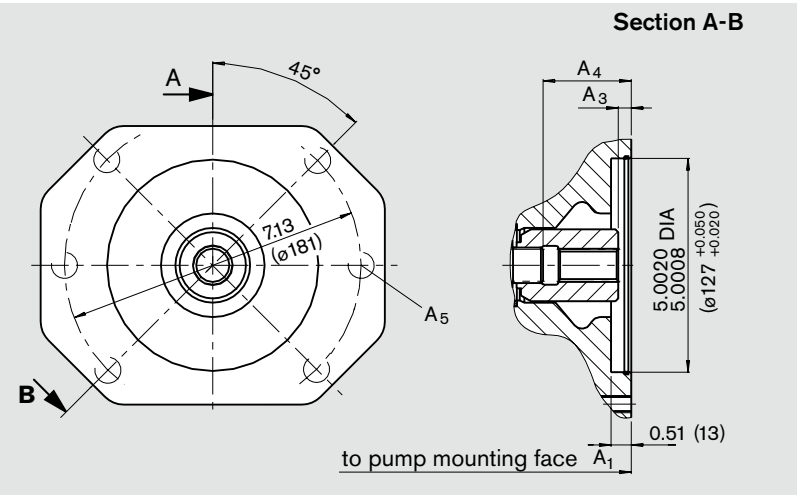
Coupler for splined shaft to ANSI B92.1a-1996 1 1/4 in 14T 12/24 DP[1] (SAE J744 - 32-4 (C))



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

K07 **Flange** SAE J744 - 127-2 (C)

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



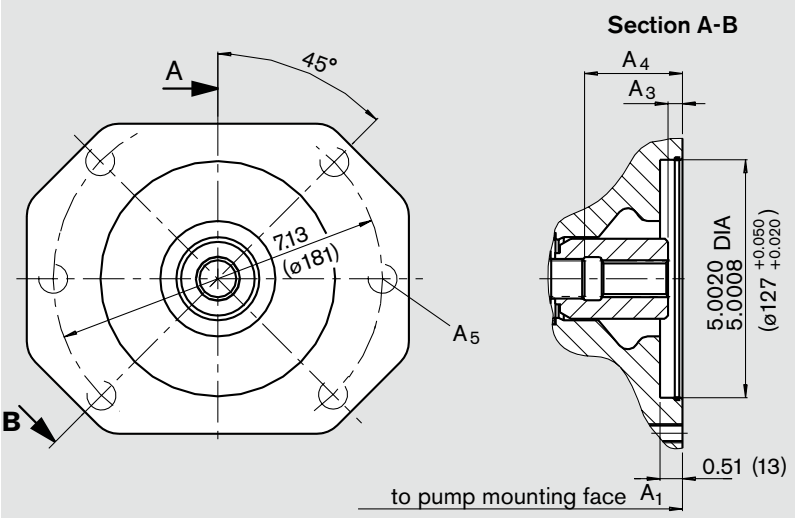
Size	A_1	A_2	A_3	A_4	A_5
85	11.89	2.36	0.88	2.67	M16; 0.94
	(302)	(59.9)	(22.4)	(67.9)	(24) deep

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

Dimensions through drive

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

K24 **Flange** SAE J744 - 127-2 (C)
Coupler for splined shaft 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; 0.94
	(302)	(8)	(68)	(24) deep

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

Installation notes

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

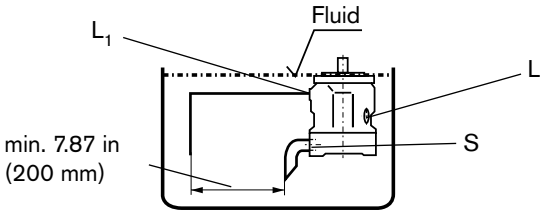


Fig. 1

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 may not exceed h_{max} = 32 in (800 mm) (immersion depth $h_{t\ min}$ = 7.87 in (200 mm)).

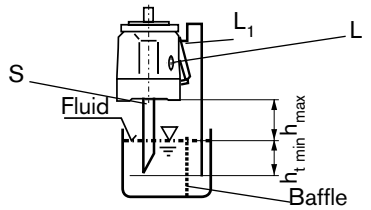


Fig. 2

Overall pressure loss

$\Delta p_{tot} = \Delta p_1 + \Delta p_2 + \Delta p_3 \leq (1 - p_{abs\ min})$ = 3 psi (0,2 bar)

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

ρ = density [kg/m³]

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

l = pipe lenght [m]

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

Δp_2: Pressure loss due to static head

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

h = height [m]

ρ = density [kg/m³]

g = gravity acceleration = 9,81 m/s²

Δp_3 = Line losses (elbows etc.)

Horizontal installation

The pump must be installed 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 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.

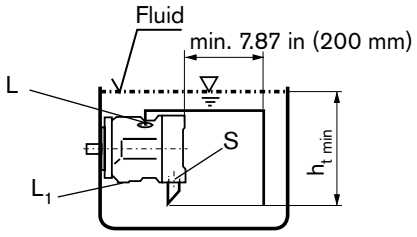


Fig. 3

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")

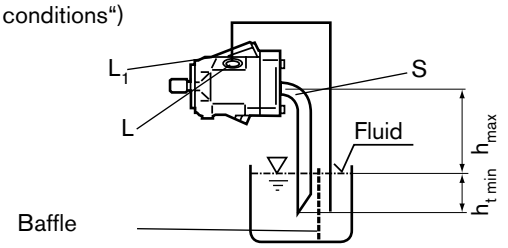


Fig. 4

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

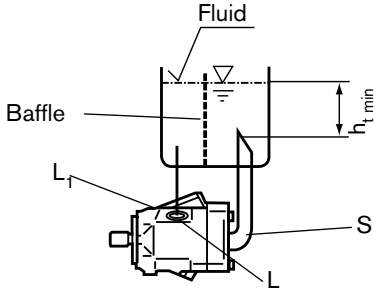


Fig. 5

Notes

Notes

Notes

General information

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

– Project planning, assembly and commissioning of the pump require the involvement of qualified personnel.

– The service line ports and function ports are only designed to accommodate hydraulic lines.

– During and shortly after operation, there is a risk of burns on the pump and especially on the solenoids. Take suitable safety precautions, e.g. wear protective clothing

– There may be shifts in the characteristic depending on the operating state of the pump (operating pressure, fluid temperature).

– Tightening torques:
  - The tightening torques specified in this data sheet are maximum values and must not be exceeded (maximum values for screw thread).
    Manufacturer´s instruction for the max. permissible tightening torques of the used fittings must be observed!
  - For DIN 13 fixing screws, we recommend checking the tightening torque individually according to VDI 2230 Edition 2003.

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

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