Axial Piston Variable Pump A10VSO (US-Version)

RA 92714-A/10.10 **1**/40
Replaces: 09.07

Data sheet

Series 32
Size 45 to 180
Nominal pressure 4000 psi (280 bar)
Maximum pressure 5100 psi (350 bar)
Open circuit

Contents

Features

- Variable axial piston pump in swash plate design for hydrostatic drives in open circuit systems
- The flow is proportional to the drive speed and the displacement
- The flow can be steplessly varied by adjustment of the swash plate angle.
- Hydrostatic unloading of the cradle bearings
- Port for pressure transducer in pump outlet
- Low noise level
- Low pressure pulsation
- High efficiency
- Highly resistant against cavitation, sudden drop in suction pressure and housing pressure spikes
- Universal through drive

Type code for standard program

A10VS	O			/	32		–	V		B			
01	02	03	04		05	06		07	08	09	10	11	12

Axial piston unit

01	Swash plate design, variable, nominal pressure 4000 psi (280 bar), maximum pressure 5100 psi (350 bar)	**A10VS**

Type of operation

02	Pump, open circuit	**O**

Size (NG)

						045	071	100	140	180	
03	Theoretical displacement $V_{g\ max}$ in (cm^3) (see table of values page 6)		cm^3			**2.75**	**4.34**	**6.10**	**8.54**	**10.98**	
			in^3								

Control device

						045	071	100	140	180	
04	Two point control, directly controlled					●	●	●	●	●	**DG**
	Pressure control					●	●	●	●	●	**DR**
		with flow control, hydraulic		X-T open		●	●	●	●	●	**DRF**
				X-T closed		●	●	●	●	●	**DRS**
		with flow control, electric				❍	●	●	●	❍	**DFE1[1)]**
		with pressure control, remotely operated		hydraulic		●	●	●	●	●	**DRG**
				electric		●	●	●	●	●	**ED.[2)]**
	Power control	with pressure cut off									
		Control begin	to	50 bar		●	●	●	●	●	**LA5D**
			from	51 to 90 bar		●	●	●	●	●	**LA6D**
				91 to 160 bar		●	●	●	●	●	**LA7D**
				160 to 240 bar		●	●	●	●	●	**LA8D**
			over	240 bar		●	●	●	●	●	**LA9D**
		with pressure cut off	remotely operated								
		Control begin	see above			●	●	●	●	●	**LA.DG**
		with pressure cut off, flow control, X-T closed									
		Control begin	see above			●	●	●	●	●	**LA.DS**
		with separate flow control, X-T closed									
		Control begin	see above			●	●	●	●	●	**LA.S**

Series

05	Series 3, Index 2	**32**

Direction of rotation

06	Viewed from drive shaft end	clockwise	**R**
		counter clockwise	**L**

Seals

07	FKM (Fluor-caoutchouc)	●	●	●	●	●	**V**
	for HFA, HFB and HFC-fluids (except Skydrol)	●	●	❍	❍	–	**C[3)]**

● = available ❍ = on request ▲ = not for new applications – = not available

1) See RE 30030, or http://www.boschrexroth.de/sydfe (not for HFx-fluids)
2) See RE 92707
3) See RE 90223

Type code for standard program

A10VS	O			/	32		–	V		B			
01	02	03	04		05	06		07	08	09	10	11	12

	Drive shaft	045	071	100	140	180	
08	Parallel keyed shaft to ISO 3019-1 (SAE J744)	●	●	●	●	❍	K
	Splined shaft to ISO 3019-1 (SAE J744)	●	●	●	●	●	S
	Splined shaft for higher torques to ISO 3019-1 (SAE J744)	●	●	–	–	–	R

	Mounting flange	
09	ISO 3019-1 - 4-bolt	D

	Ports for service lines[1]						
10	SAE-flange, on top and at the bottom , opposite sides, UNF connection threads, with universal through drive	●	●	●	●	●	72U
	Like 72U, with pulsation damping, not for High Speed	●	●	●	●	❍	82U

	Through drive							
11	Without through drive, with through drive shaft, without shaft coupler, without adapter flange, with cover properly closed		–	▲	▲	▲	–	99
	Without through drive, with through drive shaft, without shaft coupler, without adapter flange with cover properly closed (for new applications)		●	●	●	●	●	00
	Flange ISO 3019-1[2]	Coupler for splined shaft[3]						
	82-2 (A)	5/8 in 9T 16/32DP	●	●	●	●	●	01
	82-2 (A)	3/4 in 11T 16/32DP	●	●	●	●	●	52
	101-2 (B)	7/8 in 13T 16/32DP	●	●	●	●	●	68
	101-2 (B)	1 in 15T 16/32DP	●	●	●	●	●	04
	127-4 (C)	1 in 15T 16/32DP	●	●	●	●	●	E2
	127-4 (C)	1 1/4 in 14T 12/24DP	–	●	●	●	●	15
	127-2 (C)	1 1/2 in 17T 12/24DP	–	–	●	●	●	24
	152-4 (D)	1 1/2 in 17T 12/24DP	–	–	●	●	●	96
	152-4 (D)	1 3/4 in 13T 8/16DP	–	–	–	●	●	17

	Rotary group version						
12	Standard-rotary group (noise-optimized for n = 1500/1800 rpm)	●	●	●	●	●	E
	High Speed (only with port plate 72U)	●	●	●	●	❍	S

● = available ❍ = on request ▲ = not for new applications – = not available

1) See RE 95581 universal through drive
2) 2-bolt: mounting pump series 31; 4-bolt: mounting pump series 32. See page 35 Summary mounting options
3) Coupler for splined shaft to ANSI B92.1a (drive shaft allocation to SAE J744)

Technical data

Fluids

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

ν_{opt} = optimum 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 195 °F (90 °C).

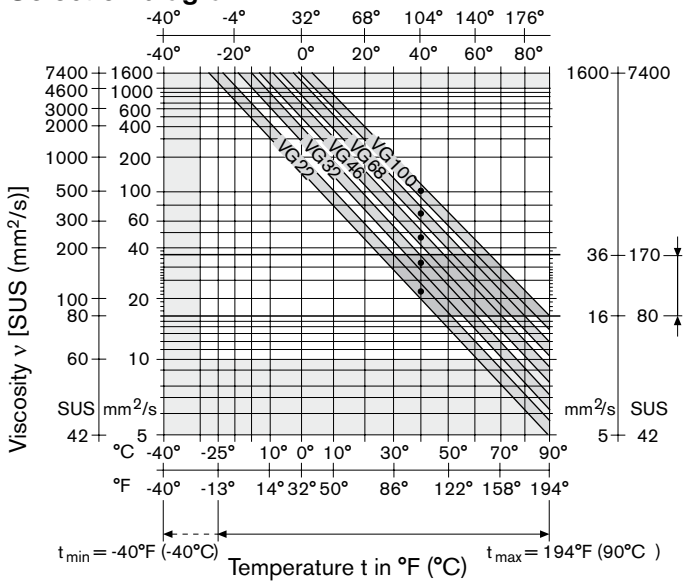
Please note that the max. leakage fluid temperature of 195 °F (90 °C) is also not exceeded in certain areas (for instance bearing area).The fluid temperature in the bearing area is approx. 7 °F (5 K) higher than the average leakage fluid temperature.

ν_{max} = 7500 SUS (1000 mm²/s)
for short periods (t ≤ 1 min)
on cold start
(p ≤ 435 psi (30 bar), n ≤ 1800 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.

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 witin 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 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 component may the temperature exceed 195 °F (90 °C).

If the above conditions cannot be met, due to extreme operating parameters please consult us.

Filtration of the fluid

The finer the filtration the better the fluid cleanliness class, and the longer the service life of the axial piston pump.

In order to guarantee the functional reliability of the axial piston unit it is necessary to carry out a gravimetric evaluation of the fluid to determine the particle contamination and the cleanliness class acc. to ISO 4406. A cleanliness class of at least is necessary 20/18/15.
At very high fluid temperatures (195 °F (90 °C) to max. 239 °F (115 °C)) a cleanliness class of at least 19/17/14 to ISO 4406 is necessary.

If above classes cannot be maintained, please consult us.

Technical data

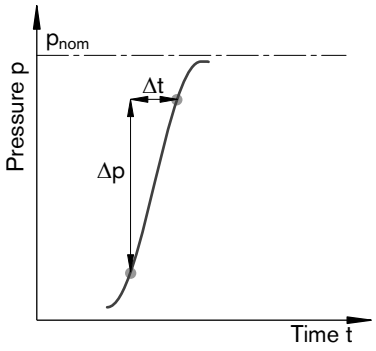
Operating pressure range

Pressure at outlet port (pressure port) B

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

Maximum pressure p_{max} _____ 5100 psi (350 bar) absolute
Individual operating period _____ 2.5 ms
Total operating period _____ 300 h
Minimum pressure**(high pressure side)** __ 145 psi (10 bar)[2)]

Rate of pressure change $R_{A\ max}$ 235000 psi/s (16000 bar/s)



To protect the pump from over pressurization, relief valve function has to be provided in the system. Relief safety blocks RE25880 and RE25890 for direct mounting onto the SAE flange ports can be ordered separately.

Pressure at inlet port S (inlet)

Inlet pressure

Size 45 to100 at 1800 rpm
Minimum inlet pressure $p_{abs\ min}$ _____ 12 psi (0.8 bar) absolute

Size 140 to180 at 1800 min^{-1}
Minimum inlet pressure $p_{abs\ min}$ _____ 15 psi (1 bar) absolute

Maximum inlet pressure $p_{abs\ max}$ _____ 145 psi (10 bar)[1)] absolute

Case drain pressure

Maximum permissible case drain pressure
(at port L, L_1):
Maximum 7 psi (0.5 bar) higher than the inlet pressure at port S, however not higher than 29 psi (2 bar) absolute.

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

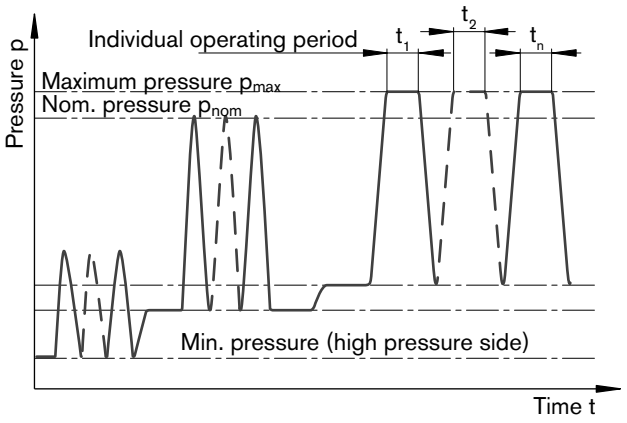
Definition

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

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

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

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



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

[1)] Other values on request

[2)] Lower pressure, depends on timeframe, please consult us.

Technical data – Standard rotary group – Version E

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

Size		NG		45	71	100	140	180
Displacement		$V_{g\ max}$	in^3 (cm^3)	2.75 (45)	4.34 (71)	6.10 (100)	8.54 (140)	10.98 (180)
Standard rotary group noise optimized								
Speed								
maximum at $V_{g\ max}$		n_{max}	rpm	1800[1)]	1800[1)]	1800[1)]	1800[2)]	1800[2)]
Flow								
at n_{nom} and $V_{g\ max}$		$q_{v\ max}$	gpm (L/min)	21.4 (81)	34 (128)	47.6 (180)	67 (252)	85.6 (324)
at n_E = 1500 rpm		$q_{vE\ max}$	gpm (L/min)	17.8 (67.5)	28.2 (106.7)	39.6 (150)	55.5 (210)	71.3 (270)
Power								
at n_{nom} and $V_{g\ max}$ and Δp = 4000 psi (280 bar)		P_{max}	HP (kW)	50 (38)	80 (59.7)	112 (84)	158 (118)	202.5 (151)
at n_E = 1500 rpm		$P_{E\ max}$	HP (kW)	41.5 (31)	67 (50)	93.5 (70)	131.4 (98)	167.5 (125)
Torque[1)]								
at $V_{g\ max}$ and	Δp = 4000 psi (280 bar)	T_{max}	lb-ft (Nm)	145 (200)	231 (317)	325 (446)	454 (624)	589 (802)
	Δp = 1450 psi (100 bar)	T	lb-ft (Nm)	51 (72)	83 (113)	117 (159)	164 (223)	208 (286)
Torsional stiffness	K	c	lb-ft/rad (Nm/rad)	25.509 (34587)	59.466 (80627)	97.603 (132335)	138.958 (188406)	157.113 (213022)
Shaft	S	c	lb-ft/rad (Nm/rad)	21.755 (29497)	53.017 (71884)	89.348 (121142)	125.042 (169537)	126.199 (171107)
	R	c	lb-ft/rad (Nm/rad)	30.256 (41025)	56.455 (76545)	–	–	–
Moment of inertia about drive axis		J_{TW}	$lb\text{-}ft^2$ (kgm^2)	0.0830 (0.0035)	0.2065 (0.0087)	0.4390 (0.0185)	0.6549 (0.0276)	0.7831 (0.033)
Case volume		V	gal (L)	0.3 (1.0)	0.4 (1.6)	0.6 (2.2)	0.8 (3.0)	0.7 (2.7)
Weight (without through drive) approx.		m	lbs (kg)	66 (30)	103 (47)	152 (69)	161 (73)	171 (78)

1) The values are applicable for a pressure of 12 psi (0,8 bar) at suction port S and mineral hydraulic fluid.
2) At pressure of 15 psi (1 bar) absolute at suction port S and mineral hydraulic fluid.

Important
Exceeding the maximum or falling below the minimum permissible values can lead to a loss of function, a reduction in operational-service life or total destruction of the axial piston unit. We recommend to check the loading through tests or calculation / simulation and comparison with the permissible data.

Determination of size

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

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

Power $P = \dfrac{2\pi \cdot T \cdot n}{33.000\ (60000)} = \dfrac{q_V \cdot \Delta p}{1.714\ (600) \cdot \eta_t}$ [HP (kW)]

V_g = Geometr. displacement per revolution in in^3 (cm^3)
Δp = Pressure differential in bar
n = Speed in rpm
η_V = Volumetric efficiency
η_{mh} = Mechanical-hydraulic efficiency
η_t = Overall efficiency ($\eta_t = \eta_V \cdot \eta_{mh}$)

Technical data – High Speed rotary group – Version S

Table of values (theoreticaal values, without efficiencies and tolerances: values rounded)

Size		NG		45	71	100	140
Displacement		$V_{g\ max}$	in^3 (cm^3)	2.75 (45)	4.34 (71)	6.10 (100)	8.54 (140)
High speed rotary group							
Speed							
maximum at $V_{g\ max}$		n_{max}	rpm	3000[1)]	2550[1)]	2300[1)]	2200[1)]
Flow							
at n_{nom} and $V_{g\ max}$		$q_{v\ max}$	gpm (L/min)	35.6 (135)	47.8 (181)	74 (280)	81.3 (308)
at n_E = 1800 rpm		$q_{vE\ max}$	gpm (L/min)	21.4 (81)	34 (128)	47.6 (180)	67 (252)
Power							
at n_{nom}, $V_{g\ max}$ and Δp = 4000 psi (280 bar)		P_{max}	HP (kW)	84 (62.8)	113 (85)	143 (107)	193 (144)
at n_E = 1800 rpm		$P_{E\ max}$	HP (kW)	50 (38)	80 (59.7)	112 (84)	158 (118)
Torque[1)]							
at $V_{g\ max}$ and	Δp = 4000 psi (280 bar)	T_{max}	lb-ft (Nm)	145 (200)	230 (317)	325 (446)	457 (624)
	Δp = 1450 psi (100 bar)	T	lb-ft (Nm)	50 (72)	80 (113)	115 (159)	162 (223)
Torsional stiffness	K	c	lb-ft/rad (Nm/rad)	25.509 (34587)	59.466 (80627)	97.603 (132335)	138.958 (188406)
Shaft	S	c	lb-ft/rad (Nm/rad)	21.755 (29497)	53.017 (71884)	89.348 (121142)	125.042 (169537)
	R	c	lb-ft/rad (Nm/rad)	30.256 (41025)	56.455 (76545)	–	–
Moment of inertia about drive axis		J_{TW}	$lb\text{-}ft^2$ (kgm^2)	0.0830 (0.0035)	0.2065 (0.0087)	0.4390 (0.0185)	0.6549 (0.0276)
Case volume		V	gal (L)	0.3 (1.0)	0.4 (1.6)	0.6 (2.2)	0.8 (3.0)
Weight (without through drive) approx.		m	lbs (kg)	66 (30)	103 (47)	152 (69)	161 (73)

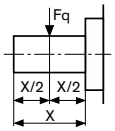
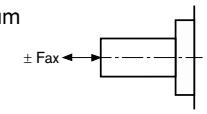
1) The values are applicable for an inlet pressure of 15 psi (1 bar) absolute at suction port S and mineral hydraulic fluid.

Important

Exceeding the maximum or falling below the minimum permissible values can lead to a loss of function, a reduction in operational service life or total destruction of the axial piston unit. We recommend to check the loading through tests or calculation / simulation and comparison with the permissible data.

Technical data

Permissible radial and axial forces on the drive shaft

Size	NG		45	71	100	140	180
Radial force maximum at X/2 	$F_{q\ max}$	lb (N)	337 (1500)	427 (1900)	517 (2300)	630 (2800)	517 (2300)
Axial force maximum 	$\pm F_{ax\ max}$	lb (N)	337 (1500)	540 (2400)	900 (4000)	1080 (4800)	180 (800)

Note

The direction of the permissible axial force:

+ $F_{ax\ max}$ = Increase of bearing service life

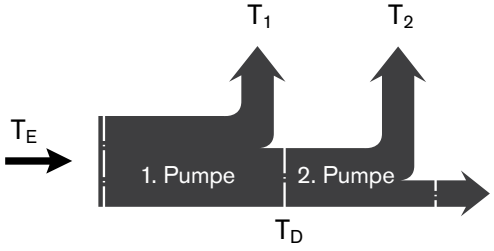
– $F_{ax\ max}$ = Reduction of bearing service life (avoid)

Permissible input and through drive torques

Size		NG		45	71	100	140	180
Torque at $V_{g\ max}$ and $\Delta p = 4000$ psi (280 bar[1])		T_{max}	lb-ft (Nm)	145 (200)	231 (317)	325 (446)	454 (624)	589 (802)
Input torque for drive shaft, maximum[2]								
ISO 3019-1	K	$T_{E\ max}$ Ø Drive shaft	lb-ft (Nm) in	156 (212) 1	319 (433) 1 1/4	553 (750) 1 1/2	875 (1186) 1 3/4	875 (1186) 1 3/4
SAE J744 (ANSI B92.1a-1996)	S	$T_{E\ max}$ Ø Drive shaft	lb-ft (Nm) in	235 319 1	462 (626) 1 1/4	814 (1104) 1 1/2	1195 (1620) 1 3/4	1195 (1620) 1 3/4
SAE J744 (ANSI B92.1a-1996)	R	$T_{E\ max}$ Ø Drive shaft	lb-ft (Nm) in	295 (400) 1	475 (644) 1 1/4	– –	– –	– –
Through drive torque for drive shaft, maximum								
	S	$T_{D\ max}$	lb-ft (Nm)	235 (319)	363 (492)	574 (778)	934 (1266)	934 (1266)
	R	$T_{D\ max}$	lb-ft (Nm)	269 (365)	404 (548)	–	–	–

1) Without considering efficiency
2) For drive shafts free of radial load

Distribution of torques



Technical data

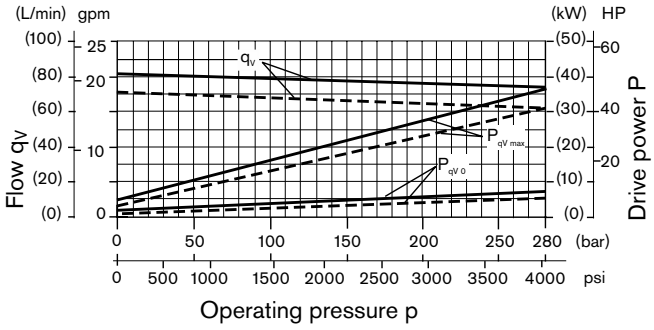
Drive power and flow

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

Size 45

_ _ _ _ n = 1500 rpm

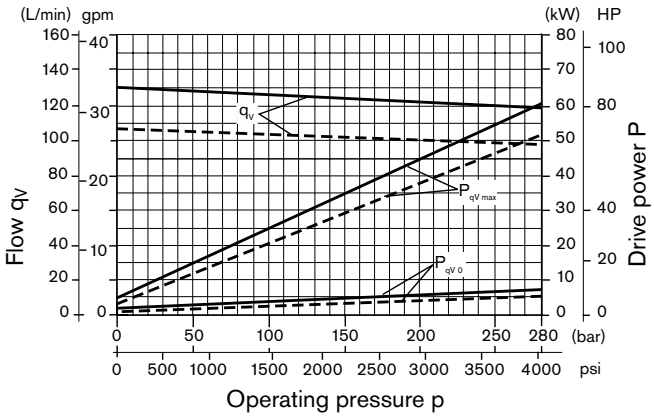
_____ n = 1800 rpm



Size 71

_ _ _ _ n = 1500 rpm

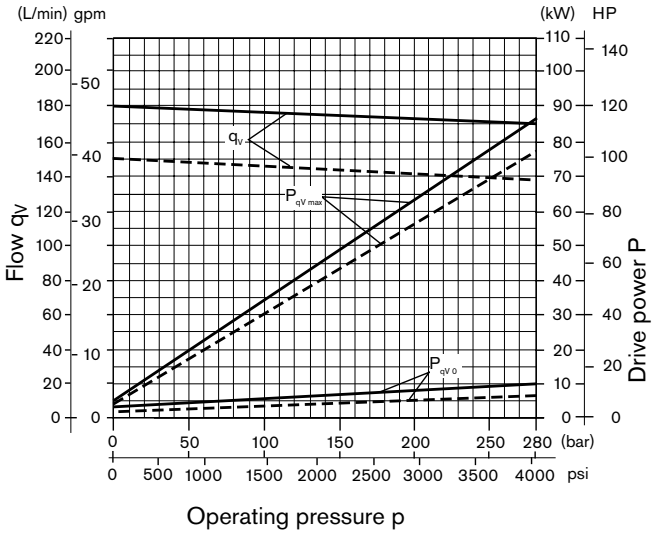
_____ n = 1800 rpm



Size 100

_ _ _ _ n = 1500 rpm

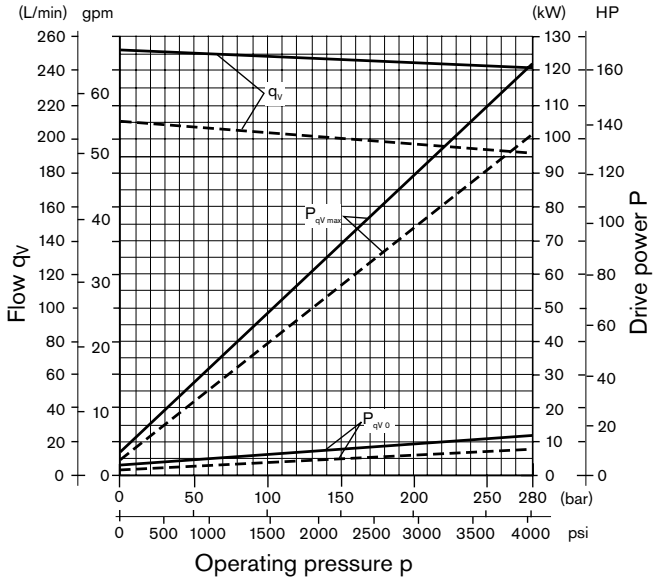
_____ n = 1800 rpm



Size 140

_ _ _ _ n = 1500 rpm

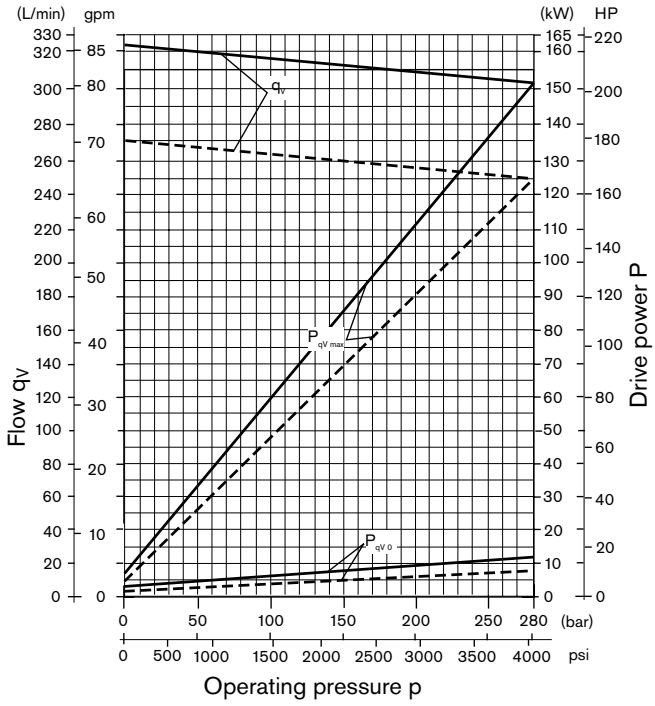
_____ n = 1800 rpm



Size 180

_ _ _ _ n = 1500 rpm

_____ n = 1800 rpm



DG – Two point control, directly operated

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

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

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

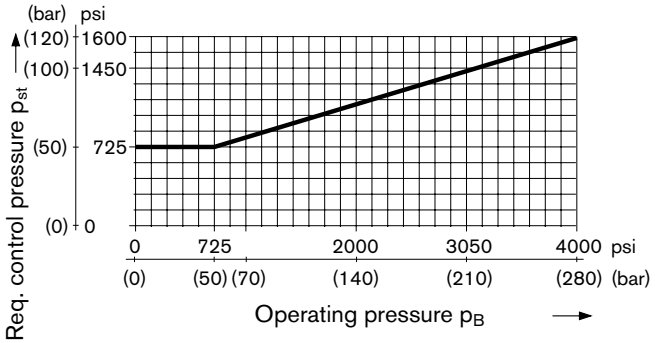
Please note, that the required control pressure at port X is directly dependent on the actual operating pressure p_B in port B. (see control pressure diagram).

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

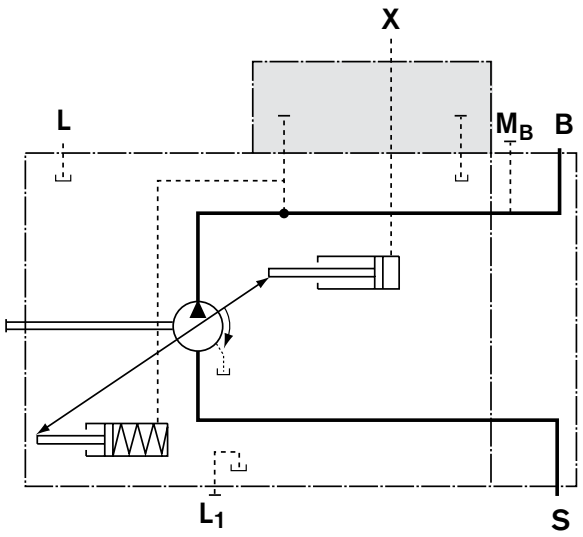
Control pressure p_{st} in X ≥ 725 psi (50 bar) $\triangleq V_{g\,min}$

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

Control pressure diagram



Schematic



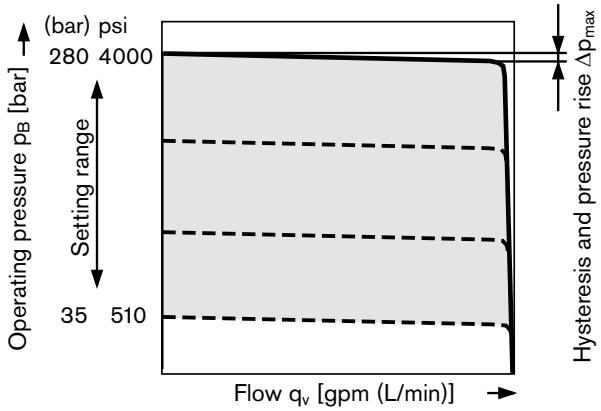
	Port for
B	Service line
S	Inlet
L, L_1	Case drain (L_1 plugged)
X	Control pressure
M_B	Measuring operating pressure

DR – Pressure control

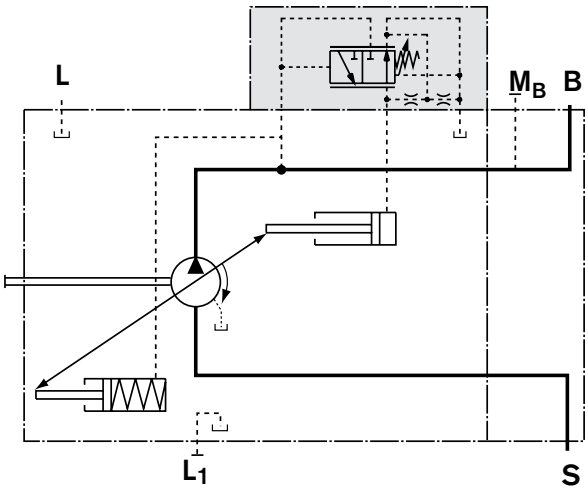
The DR-pressure control limits the maximum pressure at the pump outlet within the pump control range. The pump therefore supplies only the amount of fluid as required by the actuators. This maximum pressure level can be set steplessly at the control valve.

Static characteristic

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



Schematic



	Port for
B	Service line
S	Inlet
L, L_1	Case drain (L_1 plugged)
M_B	Measuring operating pressure

Controller data

Hysteresis and repeatibility _____ Δp max. 45 psi (3 bar)

Pressure rise, max

NG		45	71	100	140	180
Δp	psi	90	115	145	175	200
	(bar)	(6)	(8)	(10)	(12)	(14)

Control fluid consumption_____max. approx. 0.8 gpm (3 L/min)

Flow losses at q_{Vmax} see page 9.

DRG – Pressure control remotely operated

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

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

The differential pressure at the DRG-control spool is set as standard to 290 psi (20 bar). This results in a pilot oil flow to the relief valve of approx. 0.4 gpm (1,5 L/min). If another setting is required (range from 145 - 319 bar (10-22 bar)) please state in clear text.

As a separate relief valve we can recommend:

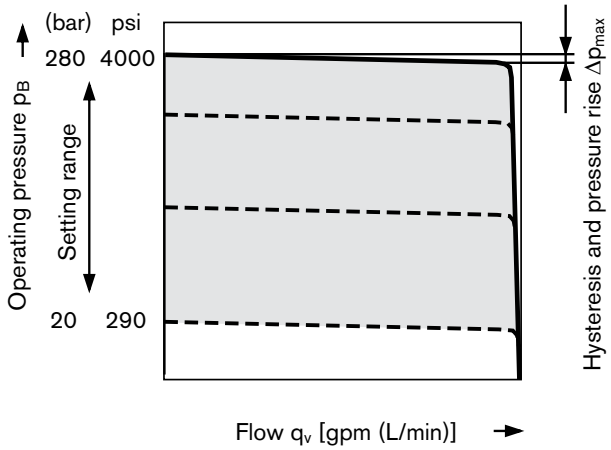
DBDH 6 (hydraulic) to RA 25402 or

DBETR-SO 381 with orifice dia. 0.03 in (0.8 mm) in P (electric) to RA 29166.

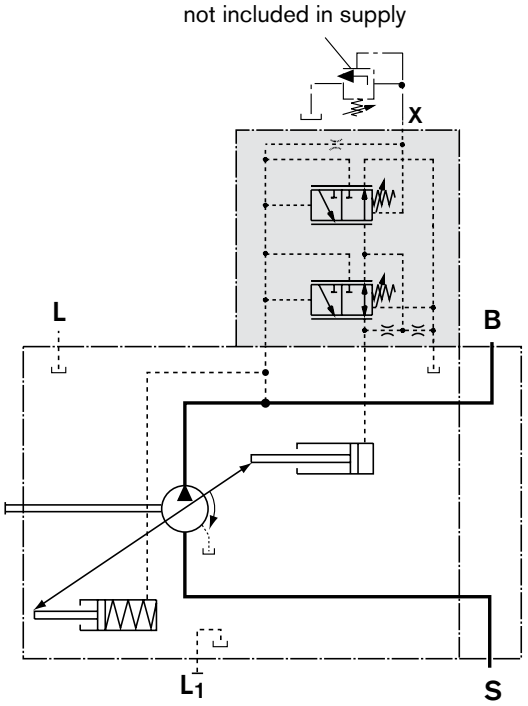
The max. lenght of piping should not exceed 6.5 ft (2 m).

Static characteristic

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



Schematic



	Port for
B	Service line
S	Inlet
L, L_1	Case drain(L_1 verschlossen)
X	Control pressure
M_B	Measuring operating pressure

Controller data

Hysteresis and repeatability _____ Δp max. 45 psi (3 bar)

Pressure rise, max

NG		45	71	100	140	180
Δp	psi	90	115	145	175	200
	(bar)	(6)	(8)	(10)	(12)	(14)

Control fluid consumption__ max.approx. 1.22 gpm (4.5 L/min)

Flow losses at q_{Vmax} see page 9.

DRF/DRS – Pressure and flow control

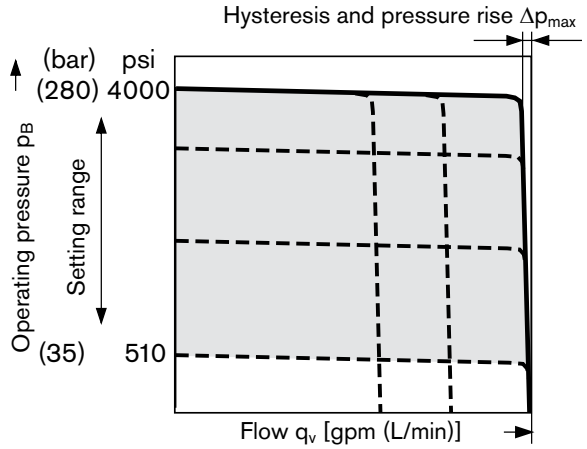
In additon to the pressure control function, the pump flow may be varied by means of a differential pressure over an orifice or valve spool installed in the service line to the actuator. The pump flow is equal to the actual required flow by the actuator, regardless of changing pressure levels.

The pressure control overrides the flow control function.

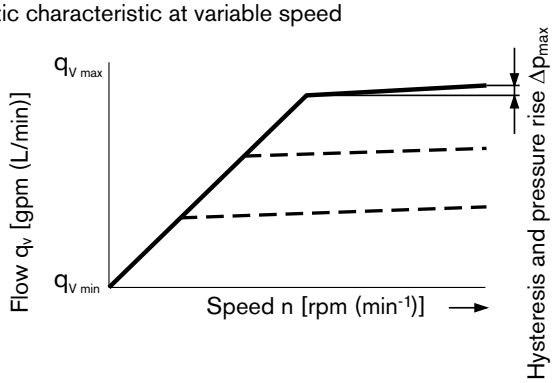
Note
The DRS-valve version has no connection between X and the tank (pump housing).
Unloading the LS-pilot line must be possible in the valve system.
Because of the flushing function sufficient unloading of the X-line must also be provided.

Static characteristic

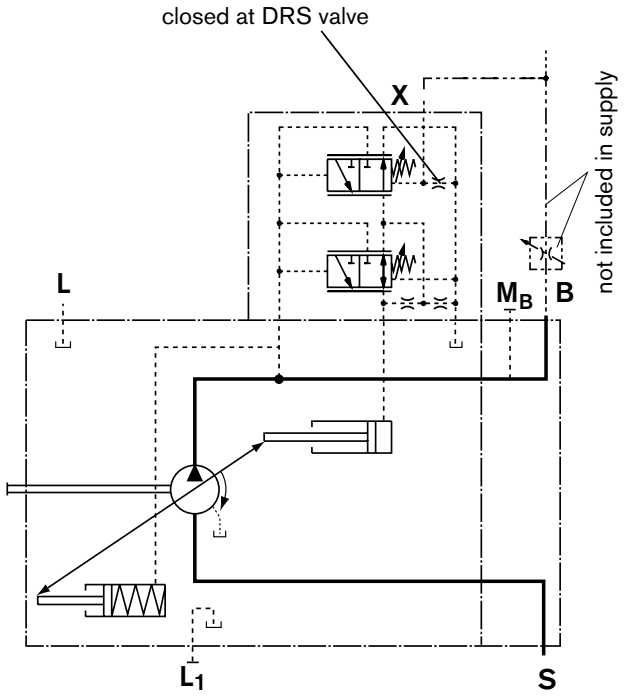
Flow control at n_1 = 1500 rpm; t_{fluid} = 122 °F (50°C))



Static characteristic at variable speed



Schematic DRF



	Port for
B	Service line
S	Inlet
L, L1	Case drain (L_1 plugged)
X	Control pressure
M B	Measuring operating pressure

Differential pressure Δp:

Standard setting: 200 to 319 psi (14 to 22 bar).

If another setting is required, please state in clear text.
Unloading port X to tank (with outlet port B closed) results in a zero stroke (standby) pressure which lies about 15 to 30 psi (1 to 2 bar) higher than the Δp setting).

Controller data

Data pressure control DR see page 11.
Maximum flow deviation measured with drive speed n = 1500 rpm.

Size		45	71	100	140	180
$\Delta q_{v\,max}$	gpm	0.5	0.7	1.0	1.6	2.1
	L/min	(1.8)	(2.8)	(4.0)	(6.0)	(8.0)

Control fluid consumption DRF __ max. approx.0.8 to 1.22 gpm (3 to 4.5 L/min)

Control fluid consumption DRS max. approx. 0.8 gpm (3 L/min)

LA... – Pressure, flow and power control

Execution of the pressure control like DR(G), see page 11 (12).
Execution of the flow control like DRS, see page 13.

In order to achieve a constant drive torque with varying operating pressures, the swivel angle and with it the output flow from the axial piston unit is varied so that the product of flow and pressure remains constant.
Flow control is possible below the power control curve.

When ordering please state the max. input torque in clear text, e.g. 27 HP (20 kW) at 1500 rpm.

Control data

For technical Data of pressure control DR see page 11.
For technical Data of flow control FR see page 13.

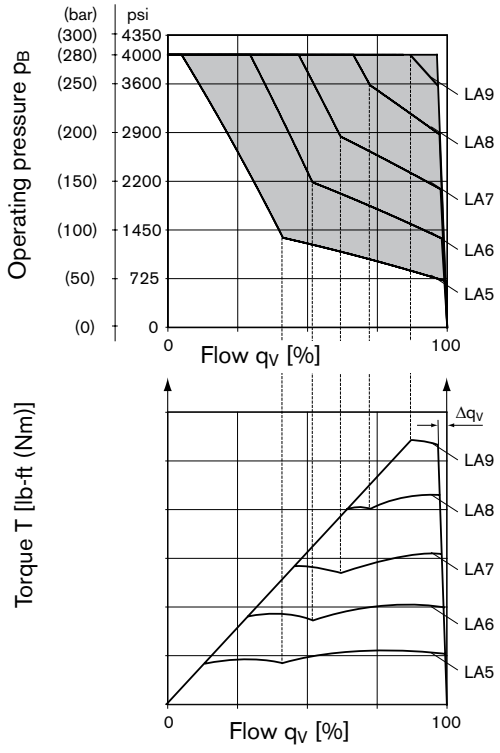
Controller data:
Control fluid consumption max. approx. 1.4 gpm (5.5 L/min)

Control begin [psi (bar)]	Torque T [lb-ft (Nm)] for size 45	71	100	140	180	Ordering code
to 725 (50)	to 29 (42.0)	to 47 (67.0)	to 67 (94.0)	to 95 (132.0)	to 121 (167.0)	**LA5**
726 (51) to 1300 (90)	29.1 (42.1) - 54 (76.0)	47.1 (67.1) - 87 (121.0)	67.1 (94.1) - 122 (169.0)	95.1 (132.1) - 172 (237.0)	121.1 (167.1) - 220 (302.0)	**LA6**
1301 (91) to 2300 (160)	54.1 (76.1) - 96 (134.0)	87.1 (121.1) - 155 (213.0)	122.1 (169.1) - 218 (299.0)	172.1 (237.1) - 306 (418.0)	220.1 (302.1) - 396 (540.0)	**LA7**
2301 (161) to 3400 (240)	96.1 (134.1) - 147 (202.0)	155.1 (213.1) - 233 (319.0)	218.1 (299.1) - 329 (449.0)	306.1 (418.1) - 461 (629.0)	396.1 (540.1) - 595 (810.0)	**LA8**
over 3400 (240)	over 147.1 (202.1)	over 233.1 (319.1)	over 329.1 (449.1)	over 461.1 (629.1)	over 595.1 (810.1)	**LA9**

Conversion of the torque values in power [HP (kW)] :

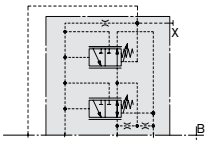
$$P = \frac{2\pi \bullet T \bullet n}{33{,}000\ (60000)}$$ [HP (kW)] (speeds see tables on page 6 and 7)

Static curves and torque characteristic

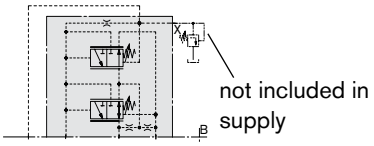


	Port for
B	Service line
S	Inlet
L, L_1	Case drain fluid (L_1 plugged)
X	Control pressure

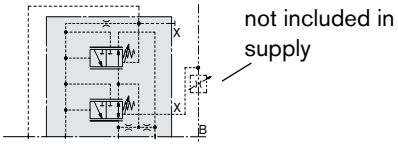
Schematic (LAXD) with pressure cut off



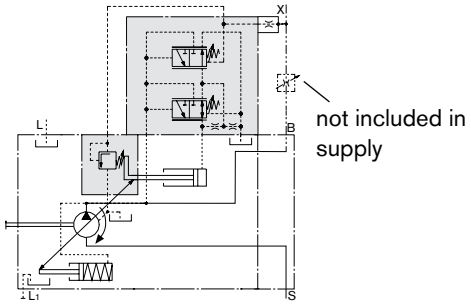
Schematic (LAXDG) with pressure cut off, remotely operated



Schematic (LAXS) with separate flow control



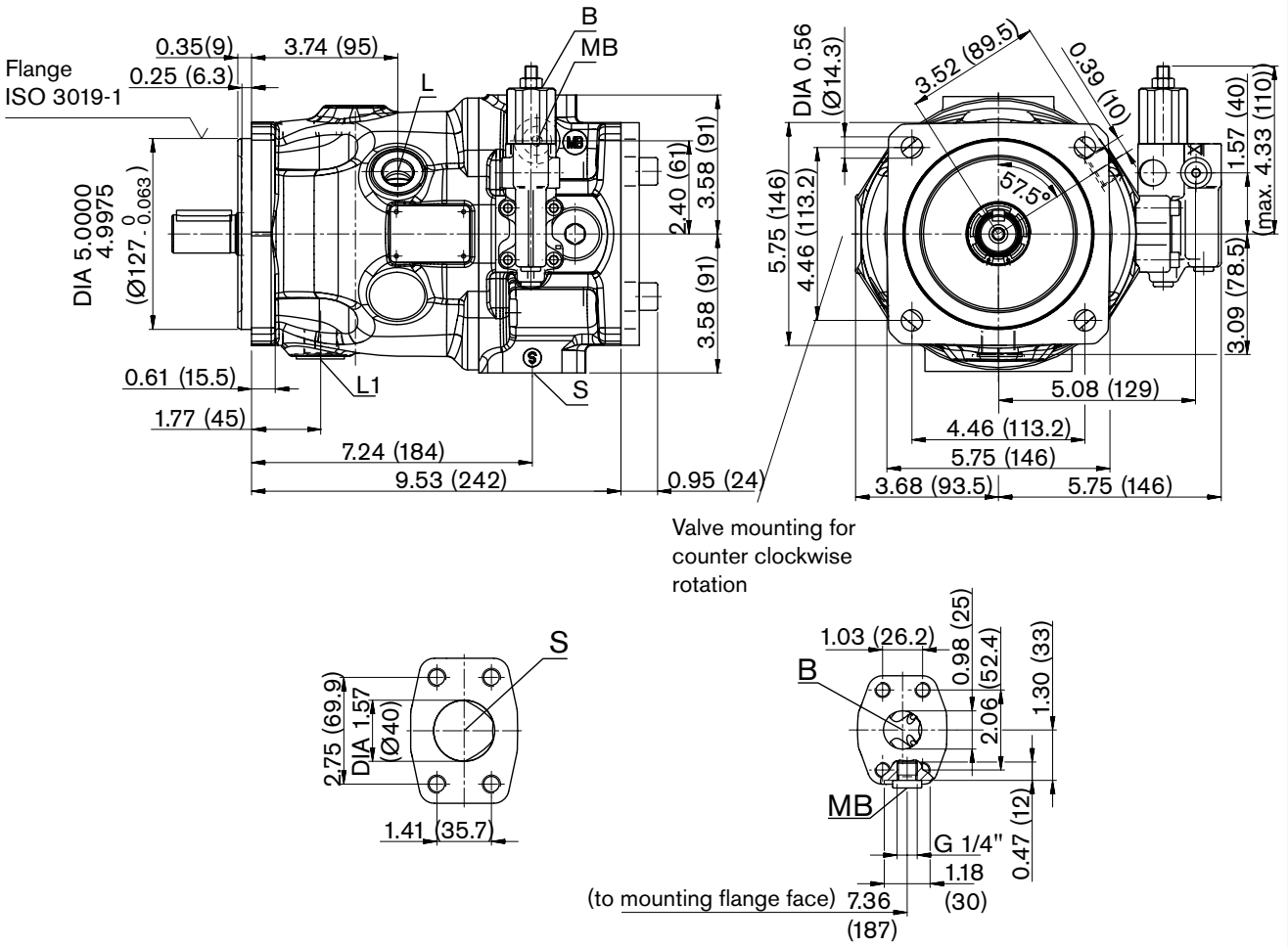
Schematic (LAXDS) with pressure and flow control

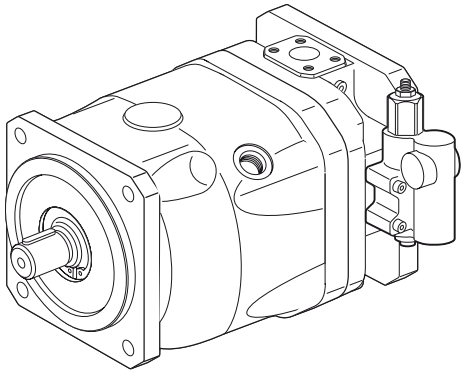


Dimensions size 45

Before finalizing your design request a binding installation drawing. Dimensions in in (mm).

DR – Pressure control



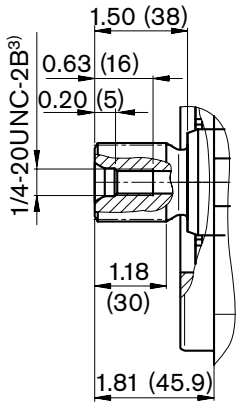


Dimensions size 45

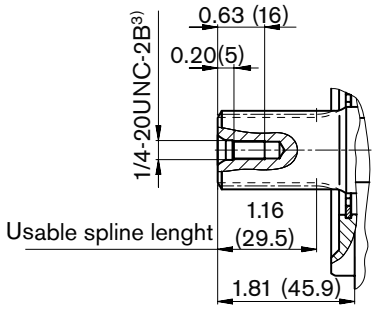
Before finalizing your design request a binding installation drawing. Dimensions in in (mm).

Drive shaft

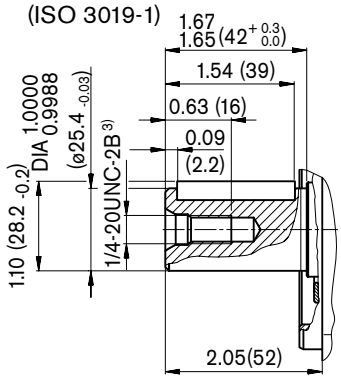
S Splined shaft 1 in 15T 16/32DP[1] (SAE J744 - 25-4 (B-B))



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



K Parallel keyed shaft (ISO 3019-1)



Ports

Designation	Port for	Standard	Size[2]	Maximum pressure [psi (bar)][3]	State
B	Service line	SAE J518	1 in	5100 (350)	O
	Connection threads	ISO 68	3/8-16UNC-2B; 0.71 (18) deep		
S	Inlet	SAE J518	1 1/2 in	145 (10)	O
	Connection threads	ISO 68	1/2-13UNC-2B; 0.87 (22) deep		
L	Case drain fluid	ISO 11926[5]	7/8-14UNF-2B; 0.51 (13) deep	30 (2)	O[4]
L_1	Case drain fluid	ISO 11926[5]	7/8-14UNF-2B; 0.51 (13) deep	30 (2)	X[4]
X	Load-Sensing pressure	ISO 11926	7/16-20 UNF-2A; 12 deep	5100 (350)	O
X	Control press. DG control	DIN 3852	G 1/4 in ; 12 deep	1600 (120)	O
M_B	Measuring pressure in B	DIN 3852[5]	G 1/4; 12 deep	5100 (350)	X

1) ANSI B92.1a-1976, 30° pressure angle, flat base, flank centering, tolerance class 5
2) For the maximum tightening torques the general information on page 40 must be observed.
3) Depending on the application, momentary pressure spikes can occur. Consider this when selecting measuring devices and fittings.
4) Depending on the installation postion, L or L_1 must be connected (see also page 38, 39).
5) The spot face can be deeper than as specified in the standard.

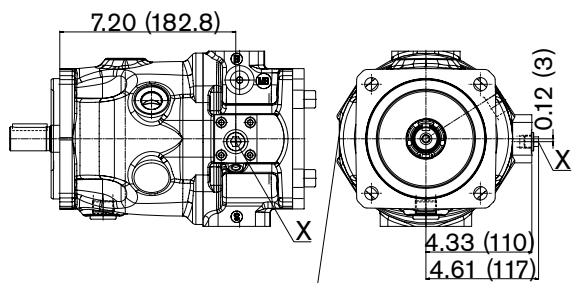
O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions size 45

Before finalizing your design request a binding installation drawing. Dimensions in in (mm).

DG

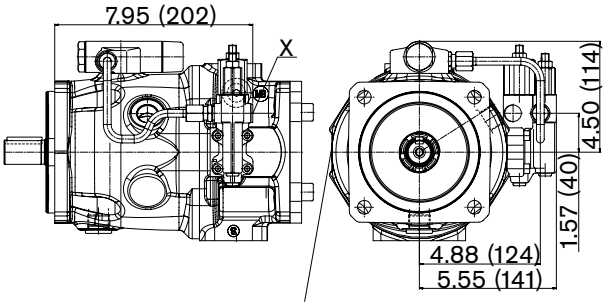
Two point control, directly operated



Valve mounting for counter clockwise rotation

LA.D

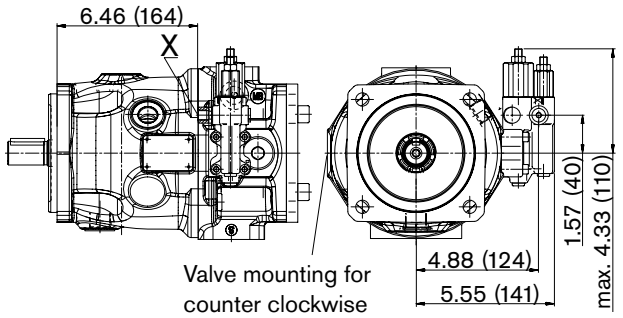
Pressure, flow and power control



Valve mounting for counter clockwise rotation

DRG

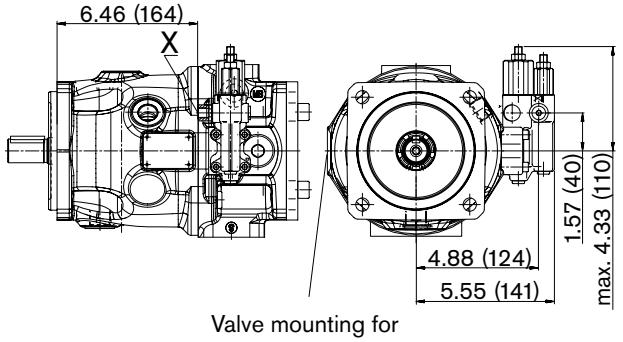
Pressure control, remotely operated



Valve mounting for counter clockwise rotation

DRF/DRS

Pressure and flow control

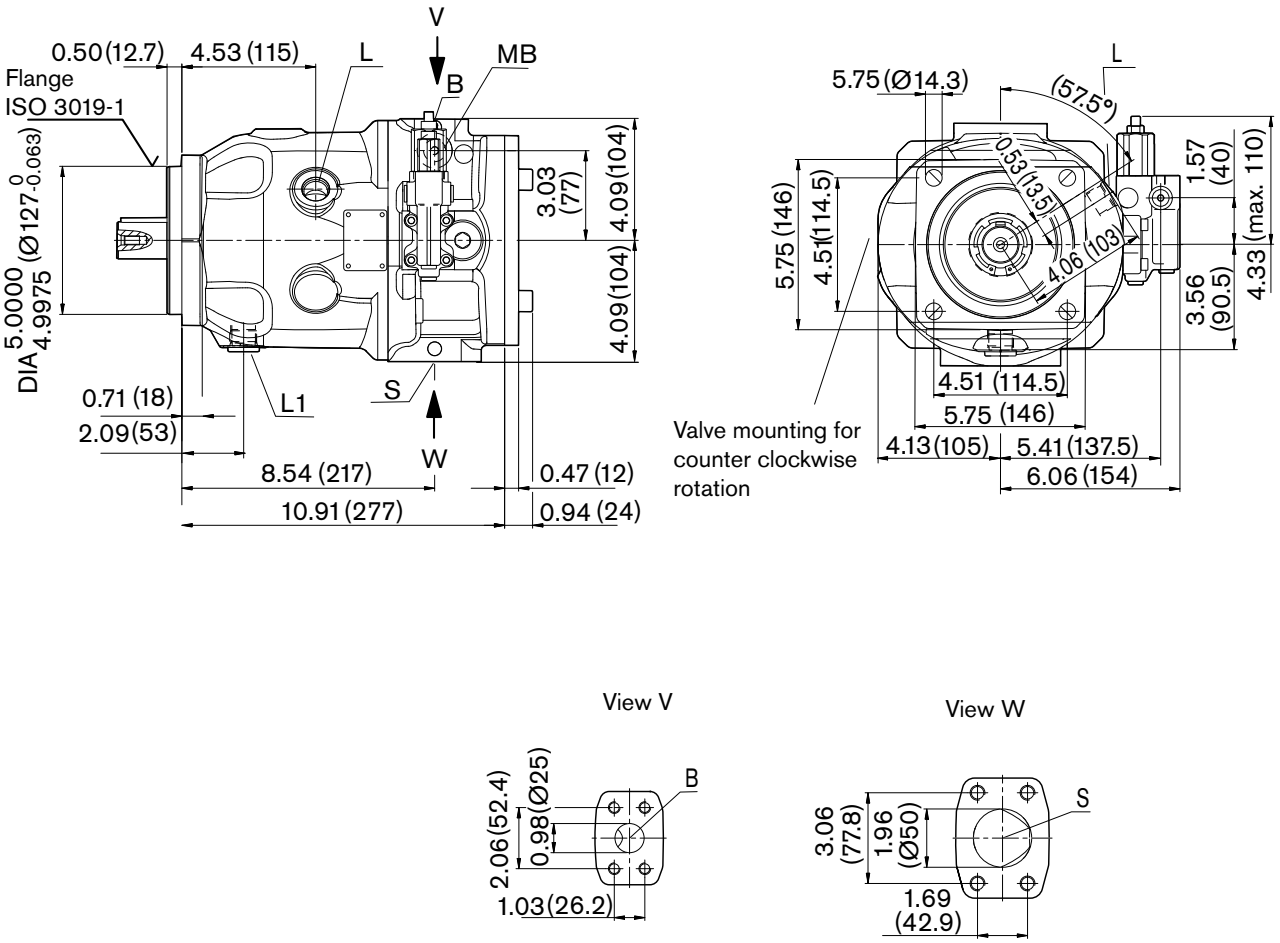


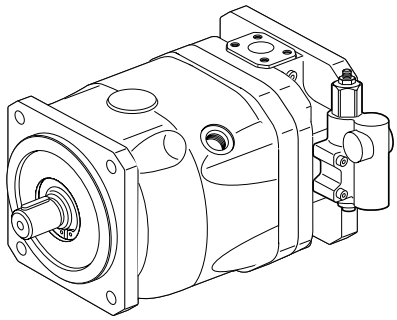
Valve mounting for counter clockwise rotation

Dimensions size 71

Before finalizing your design request a binding installation drawing. Dimensions in in (mm).

DR – Pressure control



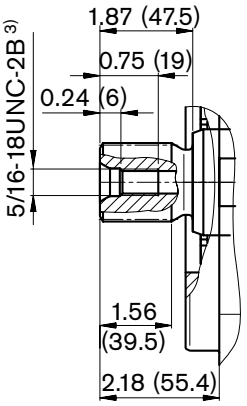


Dimensions size 71

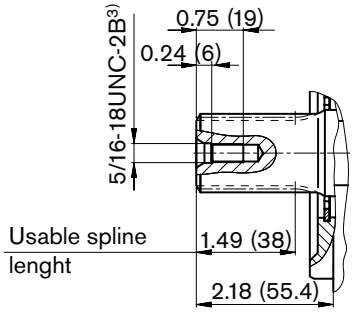
Before finalizing your design request a binding installation drawing. Dimensions in in (mm).

Drive shaft

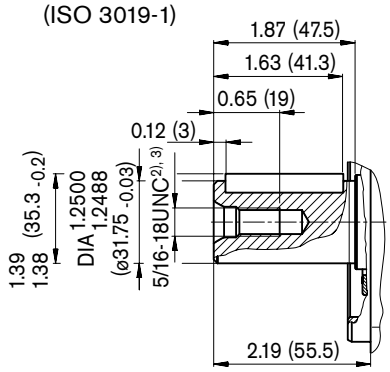
S Splined shaft 1 1/4 in 14T 12/24DP[1] (SAE J744 - 32-4 (C))



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



K Parallel keyed shaft (ISO 3019-1)



Ports

Designation	Port for	Standard	Size[3)]	Maximum pressure [psi (bar)][4)]	State
B	Service line	SAE J518	1 in	4000 (350)	O
	Connection threads	ISO 68	3/8-16UNC2-B; 0.71 (18) deep		
S	Inlet	SAE J518	2 in	145 (10)	O
	Connection threads	ISO 68	1/2-13UNC-2B; 0.79 (20) deep		
L	Case drain fluid	ISO 11926[6)]	7/8-14UNF-2B ; 0.47 (12) deep	30 (2)	O[5)]
L_1	Case drain fluid	ISO 11926[6)]	7/8-14UNF-2B ; 0.47 (12) deep	30 (2)	X[5)]
X	Load-Sensing pressure	ISO 11926	7/16-20 UNF-2A; 0.47 (12) deep	4000 (350)	O
X	Control pressure DG-control	DIN 3852	G 1/4 in ; 0.47 (12) deep	1800 (120)	O
M_B	Measuring pressure in B	DIN 3852[6)]	G 1/4; 0.47 (12) deep	4000 (350)	X

1) ANSI B92.1a-1976, 30° pressure angle, flat base, flank centering, tolerance class 5
2) Thread in drive shaft „P“ to DIN 332.
3) For the maximum tightening torques the general information on page 40 must be observed.
4) Depending on the application, momentary pressure spikes can occur. Consider this when selecting measuring devices and fittings.
5) Depending on the installation postion, L or L_1 must be connected (see also page 38, 39).
6) The spot face can be deeper than as specified in the standard.

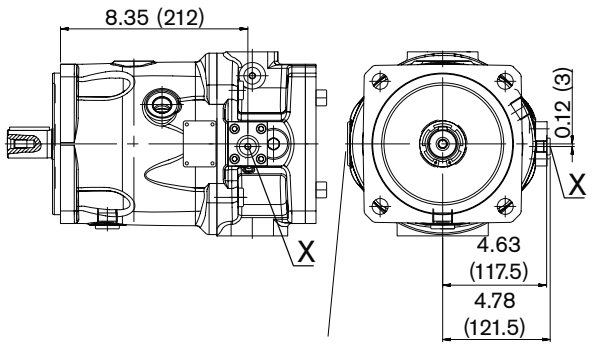
O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions size 71

Before finalizing your design request a binding installation drawing. Dimensions in in (mm).

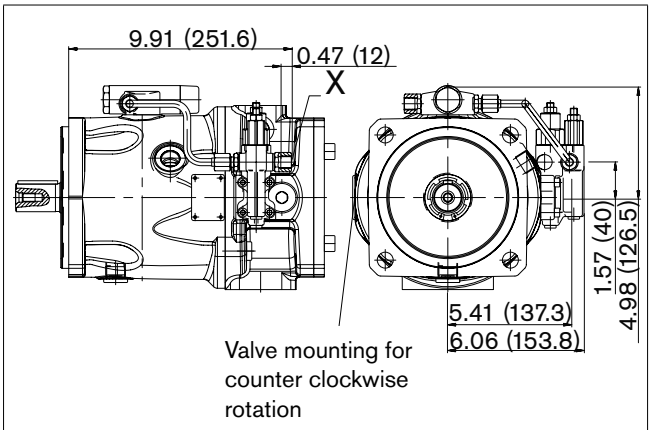
DG

Two point control, directly operated



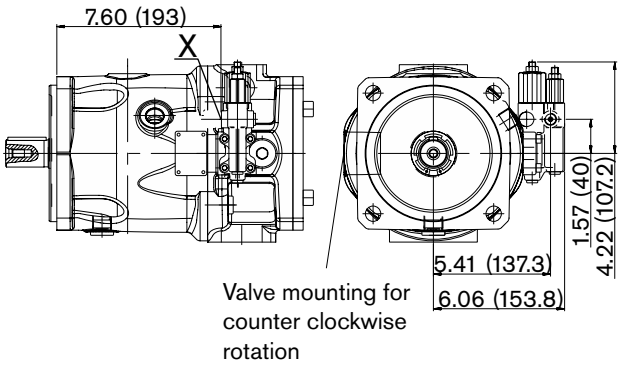
LA.D

Pressure, flow and power control



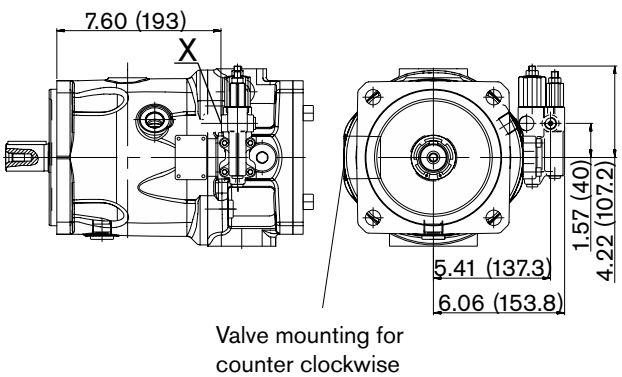
DRG

Pressure control, remotely operated



DRF/DRS

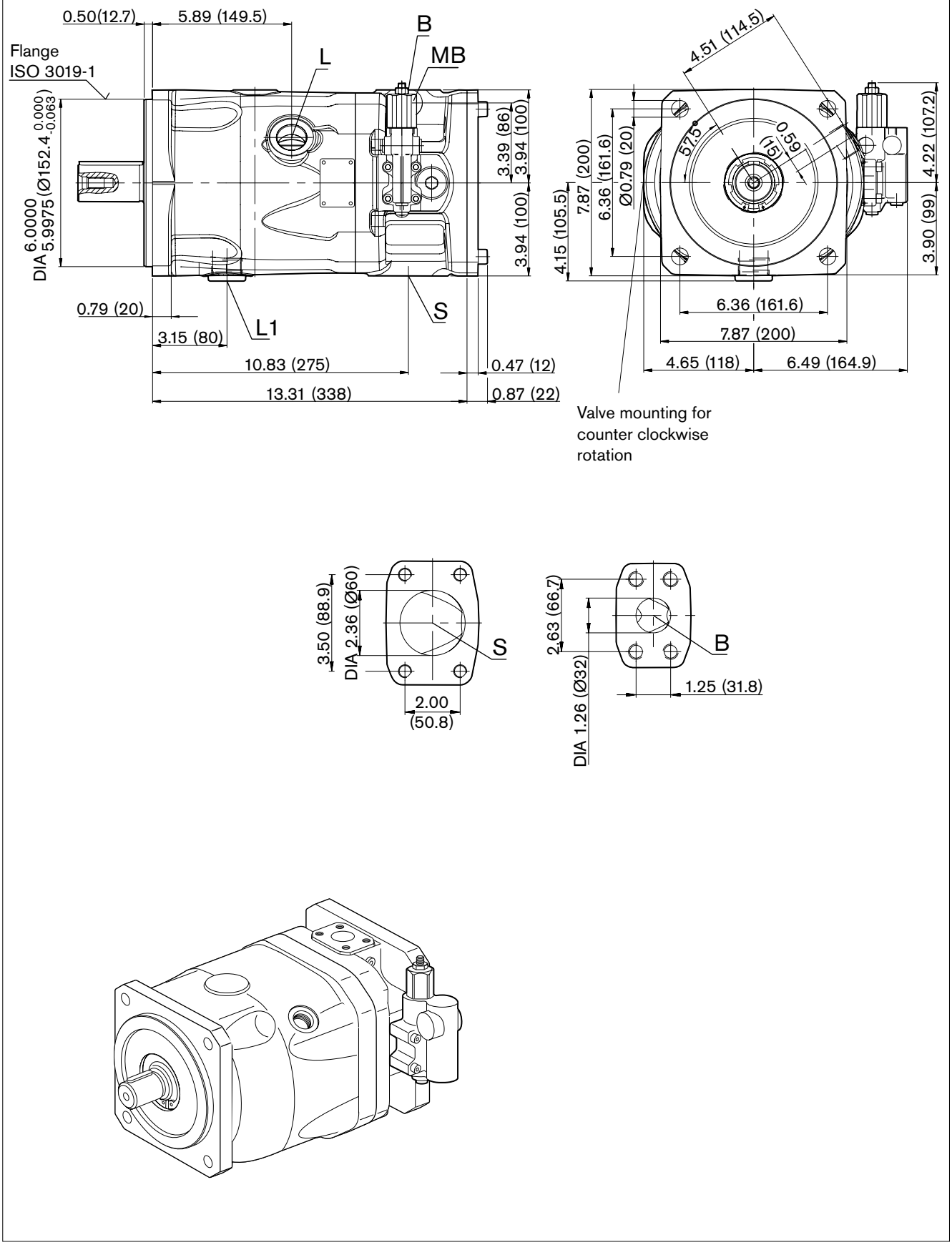
Pressure and flow control



Dimensions size 100

Before finalizing your design request a binding installation drawing. Dimensions in in (mm).

DR – Pressure control

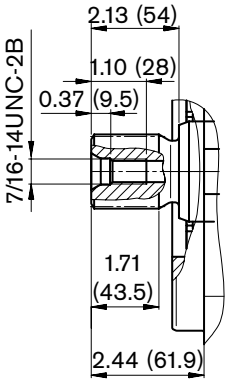


Dimensions size 100

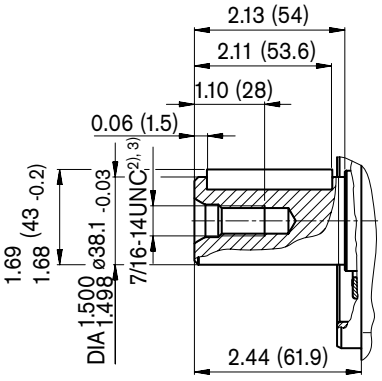
Before finalizing your design request a binding installation drawing. Dimensions in in (mm).

Drive shaft

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



K Parallel keyed shaft (ISO 3019-1)



Ports

Designation	Port for	Standard	Size[3)]	Maximum pressure [psi (bar)][4)]	State
B	Service line	SAE J518	1 1/4 in	4000 (350)	O
	Connection threads	DIN 68	1/2-13UNC-2B; 0.75 (19) deep		
S	Inlet	SAE J518	2 1/2 in	145 (10)	O
	Connection threads	DIN 68	1/2-13UNC-2B; 0.94 (24) deep		
L	Case drain fluid	ISO 11926[6)]	1 1/16-12UNF-2B; 0.63 (16) deep	30 (2)	O[5)]
L_1	Case drain fluid	ISO 11926[6)]	1 1/16-12UNF-2B; 0.63 (16) deep	30 (2)	X[5)]
X	Load-Sensing pressure	ISO 11926	7/16-20 UNF-2A; 12 deep	4000 (350)	O
X	Control pressure DG-control	DIN 3852	G 1/4 in; 12 deep	1800 (120)	O
M_B	Measuring pressure in B	DIN 3852[6)]	G 1/4 in; 12 deep	4000 (350)	X

1) ANSI B92.1a-1976, 30° pressure angle, flat base, flank centering, tolerance class 5
2) Thread in drive shaft „P“ to DIN 332.
3) For the maximum tightening torques the general information on page 40 must be observed.
4) Depending on the application, momentary pressure spikes can occur. Consider this when selecting measuring devices and fittings.
5) Depending on the installation postion, L or L_1 must be connected (see also page 38, 39).
6) The spot face can be deeper than as specified in the standard.

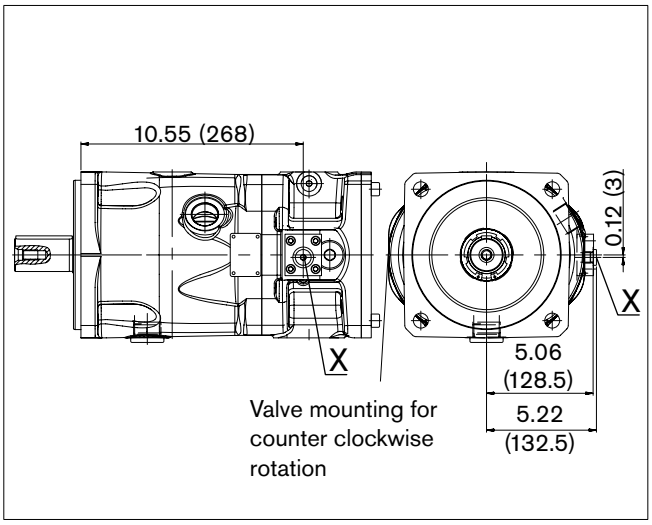
O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions size 100

Before finalizing your design request a binding installation drawing. Dimensions in in (mm).

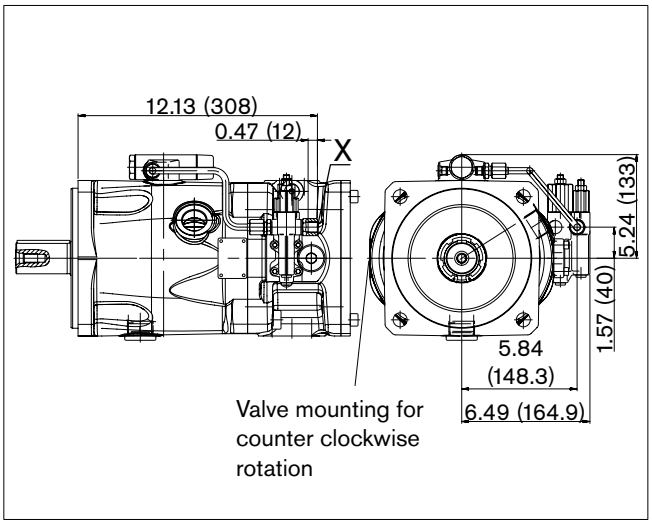
DG

Two point control, directly operated



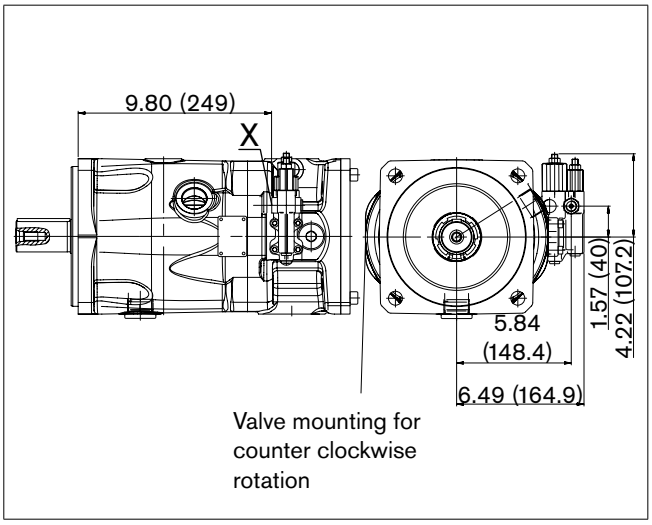
LA.D

Pressure, flow and power control



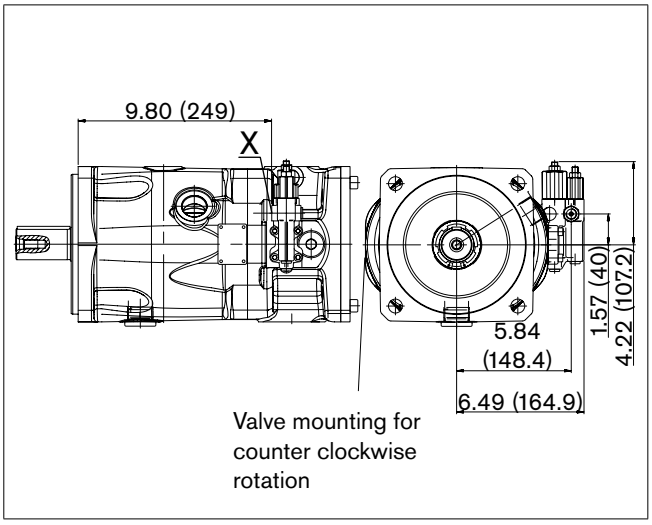
DRG

Pressure control, remotely operated



DRF/DRS

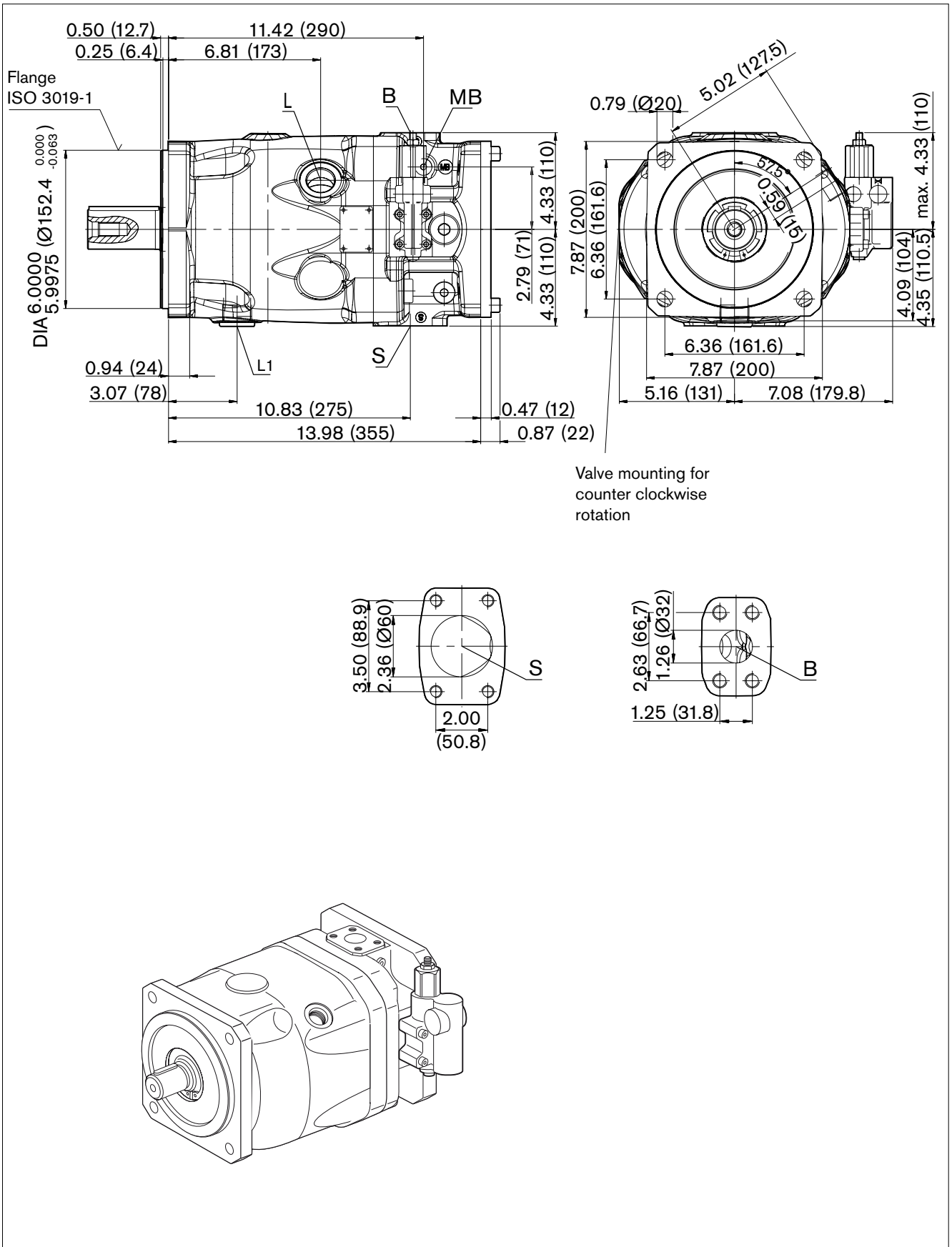
Pressure and flow control



Dimensions size 140

Before finalizing your design request a binding installation drawing. Dimensions in in (mm).

DR – Pressure control

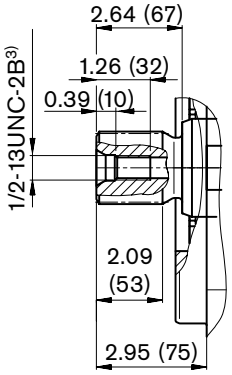


Dimensions size 140

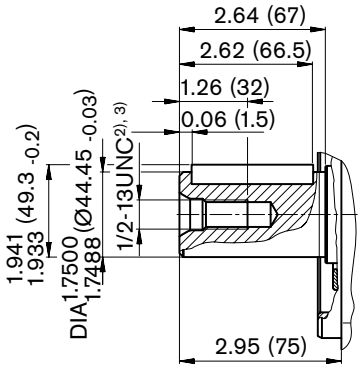
Before finalizing your design request a binding installation drawing. Dimensions in in (mm).

Drive shaft

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



K Parallel keyed shaft (ISO 3019-1)



Ports

Designation	Port for	Standard	Size[3]	Maximum pressure [bar][4]	State
B	Service line	SAE J518	1 1/4 in	350	O
	Connection threads	ISO 68	1/2-13UNC-2B; 0.75 (19) deep		
S	Inlet	SAE J518	2 1/2 in	10	O
	Connection threads	ISO 68	1/2-13UNC-2B; 0.94 (17) deep		
L	Case drain fluid	DIN 3852[6]	1 1/16-12UN-2B; 0.59 (15) deep	2	O[5]
L_1	Case drain fluid	DIN 3852[6]	1 1/16-12UN-2B; 0.59 (15) deep	2	X[5]
X	Load-Sensing pressure	ISO 11926	7/16-20 UNF-2B; 0.47 (12) deep	350	O
X	Control pressure DG-control	DIN 3852	G 1/4 in ; 0.47 (12) deep	120	O
M_B	Measuring pressure in B	DIN 3852[6]	G 1/4; 0.47 (12) deep	350	X

1) ANSI B92.1a-1976, 30° pressure angle, flat base, flank centering, tolerance class 5
2) Thread in drive shaft „P“ to DIN 332.
3) For the maximum tightening torques the general information on page 40 must be observed.
4) Depending on the application, momentary pressure spikes can occur. Consider this when selecting measuring devices and fittings.
5) Depending on the installation postion, L or L_1 must be connected (see also page 38, 39).
6) The spot face can be deeper than as specified in the standard.

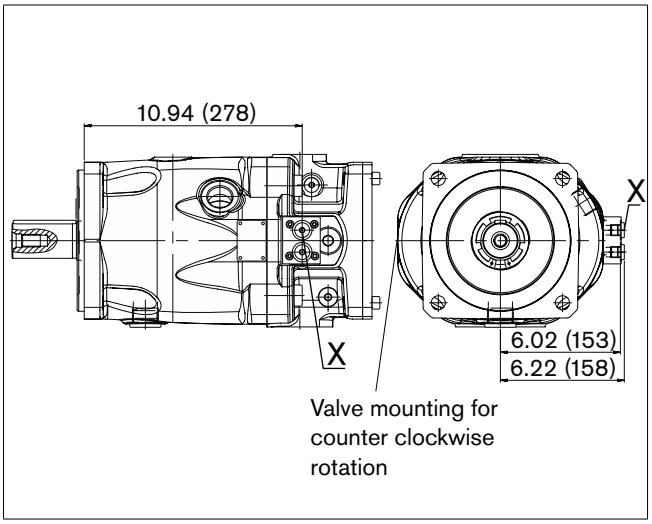
O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions size 140

Before finalizing your design request a binding installation drawing. Dimensions in in (mm).

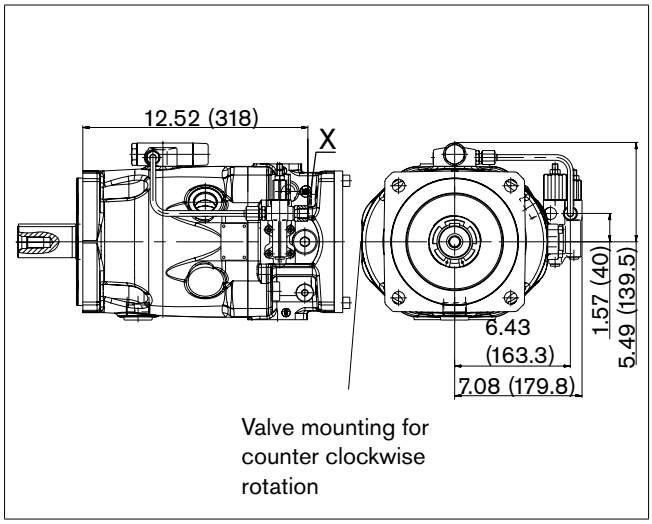
DG

Two point control, directly operated



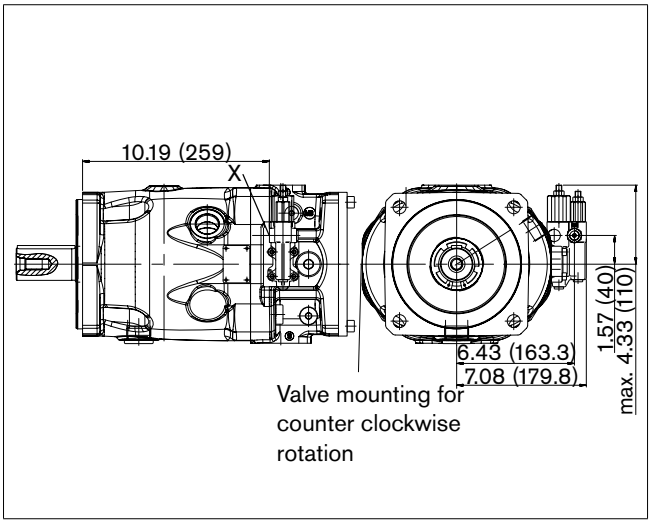
LA.D

Pressure, flow and power control



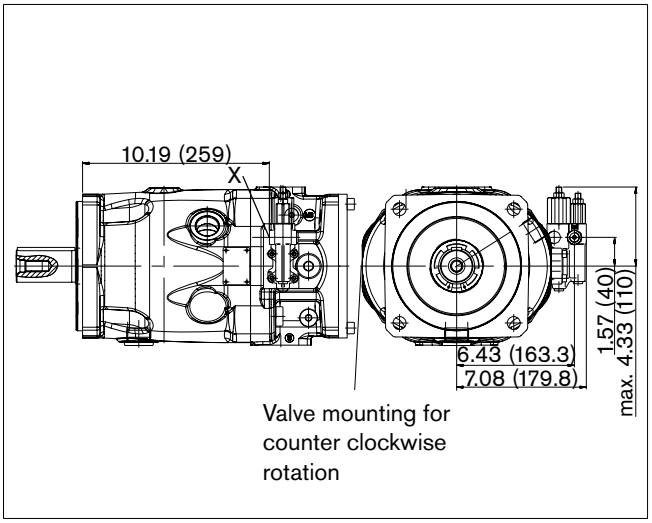
DRG

Pressure control, remotely operated



DRF/DRS

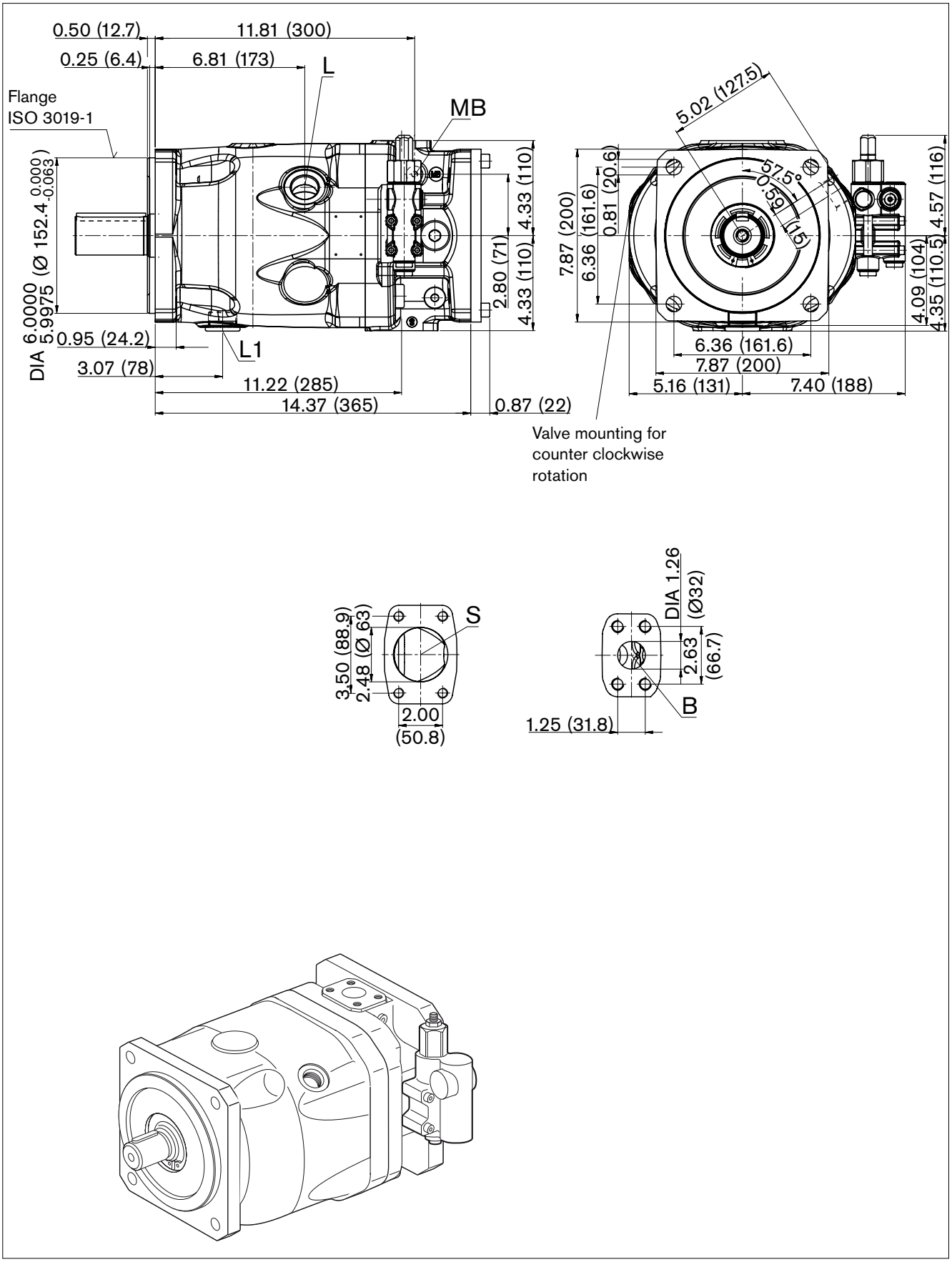
Pressure and flow control



Dimensions size 180

Before finalizing your design request a binding installation drawing. Dimensions in in (mm).

DR – Pressure control

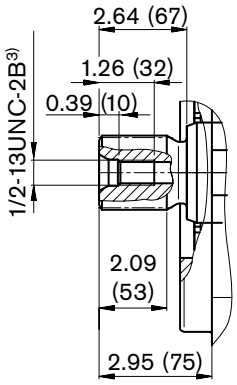


Dimensions size 180

Before finalizing your design request a binding installation drawing. Dimensions in in (mm).

Drive shaft

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



Ports

Designation	Port for	Standard	Size[3]	Maximum pressure [psi (bar)][4]	State
B	Service line	SAE J518	1 1/4 in	350	O
	Connection threads	ISO 68	1/2-13UNC-2B; 0.75 (19) deep		
S	Inlet	SAE J518	2 1/2 in	10	O
	Connection threads	ISO 68	1/2-13UNC-2B; 0.94 (17) deep		
L	Case drain fluid	ISO 11926[6]	1 5/16-12UNF-2B; 0.59 (15) deep	2	O[5]
L_1	Case drain fluid	ISO 11926[6]	1 5/16-12UNF-2B; 0.59 (15) deep	2	X[5]
X	Load-Sensing pressure	ISO 11926	7/16-20 UNF-2B; 0.47 (12) deep	350	O
X	Control pressure DG-control	DIN 3852	G 1/4 in ; 0.47 (12) deep	120	O
M_B	Measuring pressure in B	DIN 3852[6]	G 1/4; 0.47 (12) deep	350	X

1) ANSI B92.1a-1976, 30° pressure angle, flat base, flank centering, tolerance class 5
2) Thread in drive shaft „P“ to DIN 332.
3) For the maximum tightening torques the general information on page 40 must be observed.
4) Depending on the application, momentary pressure spikes can occur. Consider this when selecting measuring devices and fittings.
5) Depending on the installation postion, L or L_1 must be connected (see also page 38, 39).
6) The spot face can be deeper than as specified in the standard.

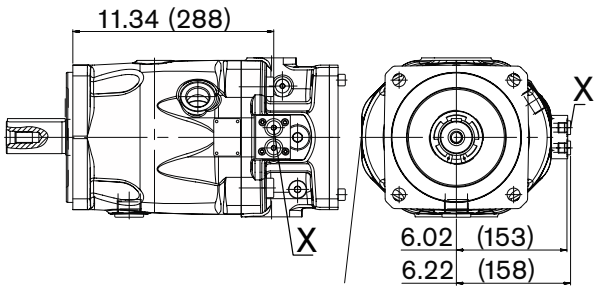
O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions size 180

Before finalizing your design request a binding installation drawing. Dimensions in in (mm).

DG

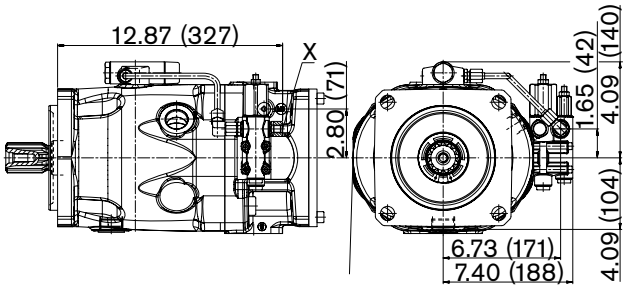
Two point control, directly operated



Valve mounting for counter clockwise rotation

LA.DS

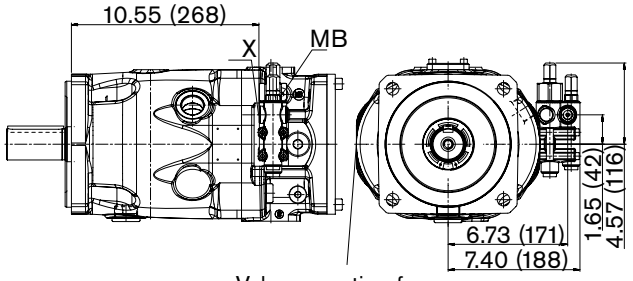
Pressure, flow and power control



Valve mounting for counter clockwise rotation

DRG

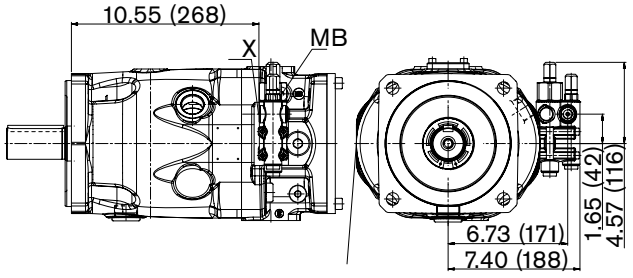
Pressure control, remotely operated



Valve mounting for counter clockwise rotation

DRF/DRS

Pressure and flow control

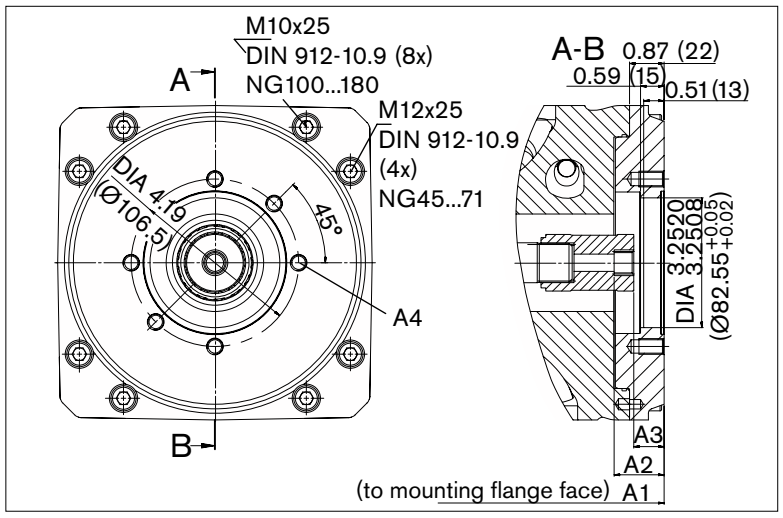


Valve mounting for counter clockwise rotation

Dimensions through drive

Before finalizing your design request a binding installation drawing. Dimensions in in (mm).

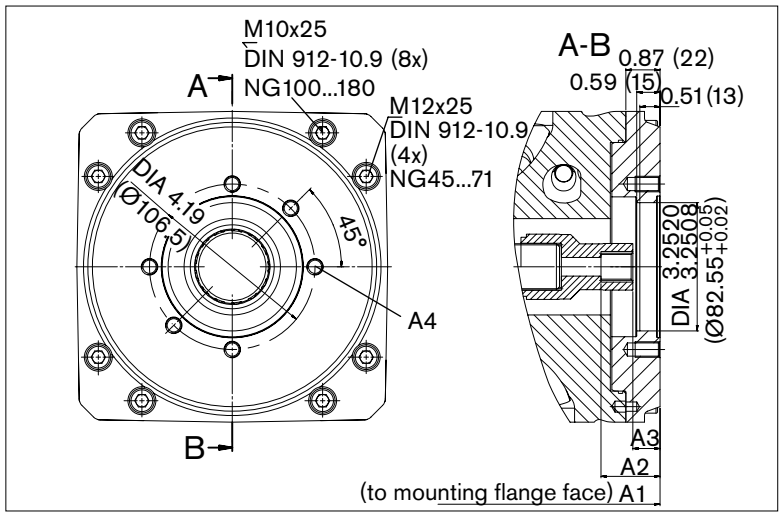
01 **Flange** ISO 3019-1 - 82-2 (A)
Coupler for splined shaft to ANSI B92.1a-1996



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

Size	A_1	A_2	A_3	A_4
45	10.39 (264)	1.25 (31.8)	0.76 (19.3)	M10; 0.63 (16)deep
71	11.77 (299)	1.25 (31.8)	0.76 (19.3)	M10; 0.63 (16) deep
100	14.17 (360)	1.25 (31.8)	On request	M10; 0.63 (16) deep
140	14.84 (377)	1.25 (31.8)	On request	M10; 0.63 (16) deep
180	15.24 (387)	1.25 (31.8)	On request	M10; 0.63 (16) deep

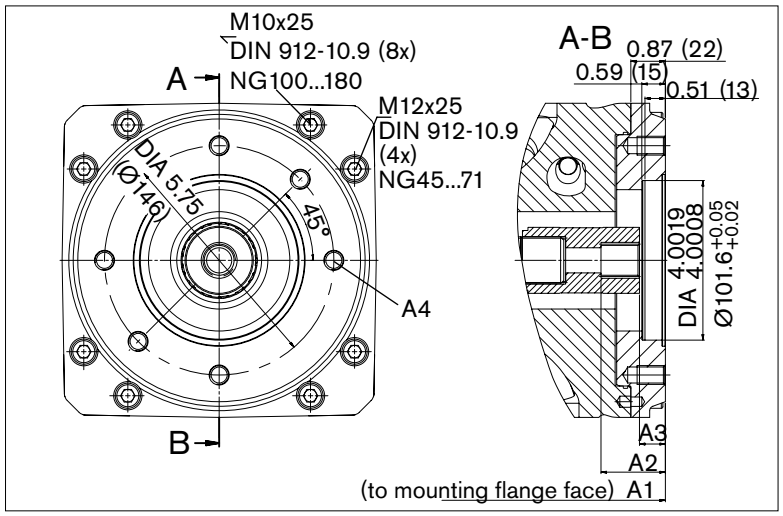
52 **Flange** ISO 3019-1 - 82-2 (A)
Coupler for splined shaft to ANSI B92.1a-1996



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

Size	A_1	A_2	A_3	A_4
45	10.39 (264)	1.50 (38)	0.69 (17.5)	M10; 0.63 (16) deep
71	11.77 (299)	1.50 (38)	0.69 (17.5)	M10; 0.63 (16) deep
100	14.17 (360)	1.50 (38)	0.69 (17.5)	M10; 0.63 (16) deep
140	14.84 (377)	1.50 (38)	0.69 (17.5)	M10; 0.63 (16) deep
180	15.24 (387)	1.50 (38)	0.69 (17.5)	M10; 0.63 (16) deep

68 **Flange** ISO 3019-1 - 101-2 (B)
Coupler for splined shaft to ANSI B92.1a-1996



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

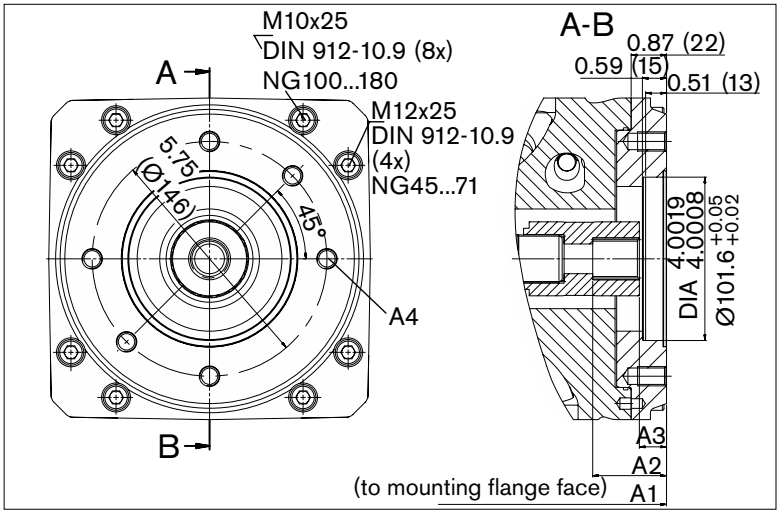
size	A_1	A_2	A_3	A_4
45	10.39 (264)	1.61 (41)	0.65 (16.5)	M12; 0.71 (18) deep
71	11.77 (299)	1.61 (41)	0.65 (16.5)	M12; 0.71 (18) deep
100	14.17 (360)	1.61 (41)	0.65 (16.5)	M12; 0.71 (18) deep
140	14.84 (377)	1.61 (41)	0.65 (16.5)	M12; 0.71 (18) deep
180	15.24 (387)	1.61 (41)	0.65 (16.5)	M12; 0.71 (18) deep

1) 30° pressure angle, flat base, flank centering, tolerance class 5

Dimensions through drive

Before finalizing your design request a binding installation drawing. Dimensions in in (mm).

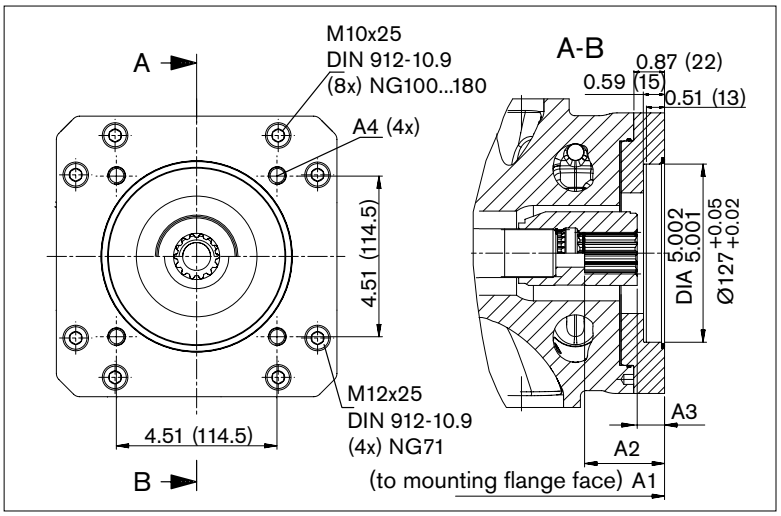
04 **Flange** ISO 3019-1 - 101-2 (B)
Coupler for splined shaft to ANSI B92.1a-1996



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

Size	A_1	A_2	A_3	A_4
45	10.39 (264)	1.81 (45.9)	0.67 (16.9)	M12; 0.71 (18) deep
71	11.77 (299)	1.81 (45.9)	0.67 (16.9)	M12; 0.71 (18) deep
100	14.17 (360)	1.81 (45.9)	0.67 (16.9)	M12; 0.71 (18) deep
140	14.84 (377)	1.81 (45.9)	0.67 (16.9)	M12; 0.71 (18) deep
180	15.24 (387)	1.81 (45.9)	0.67 (16.9)	M12; 0.71 (18) deep

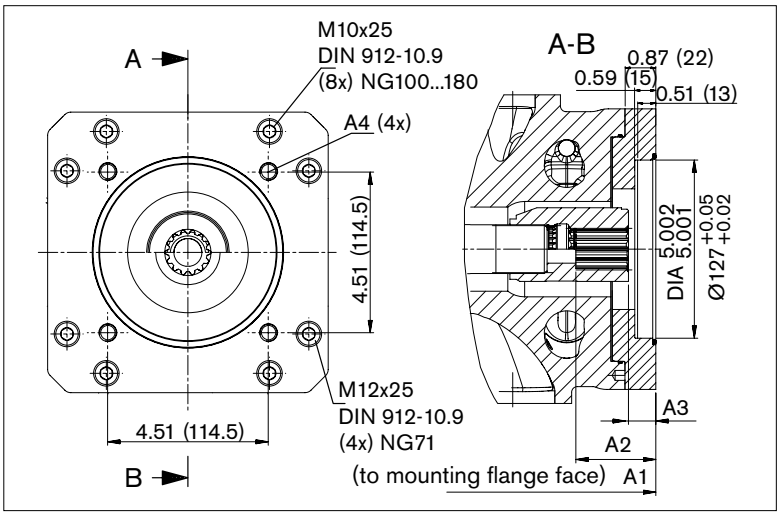
E2 **Flange** ISO 3019-1 - 127-4 (C)
Coupler for splined shaft to ANSI B92.1a-1996



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

Size	A_1	A_2	A_3	A_4
45	10.39 (264)	1.81 (45.9)	0.67 (16.9)	M12; 0.71 (18) deep
71	11.77 (299)	1.81 (45.9)	0.67 (16.9)	M12; 0.71 (18) deep
100	14.17 (360)	1.81 (45.9)	0.67 (16.9)	M12; 0.71 (18) deep
140	14.84 (377)	1.81 (45.9)	0.67 (16.9)	M12; 0.71 (18) deep
180	15.24 (387)	1.81 (45.9)	0.67 (16.9)	M12; 0.71 (18) deep

15 **Flange** ISO 3019-1 - 127-4 (C)
Coupler for splined shaft to ANSI B92.1a-1996



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

Size	A_1	A_2	A_3	A_4
71	11.77 (299)	2.18 (55.4)	0.70 (17.9)	M12; 0.71 (18) deep
100	14.17 (360)	2.18 (55.4)	0.70 (17.9)	M12; 0.71 (18) deep
140	14.84 (377)	2.18 (55.4)	0.70 (17.9)	M12; 0.71 (18) deep
180	15.24 (387)	2.18 (55.4)	0.70 (17.9)	M12; 0.71 (18) deep

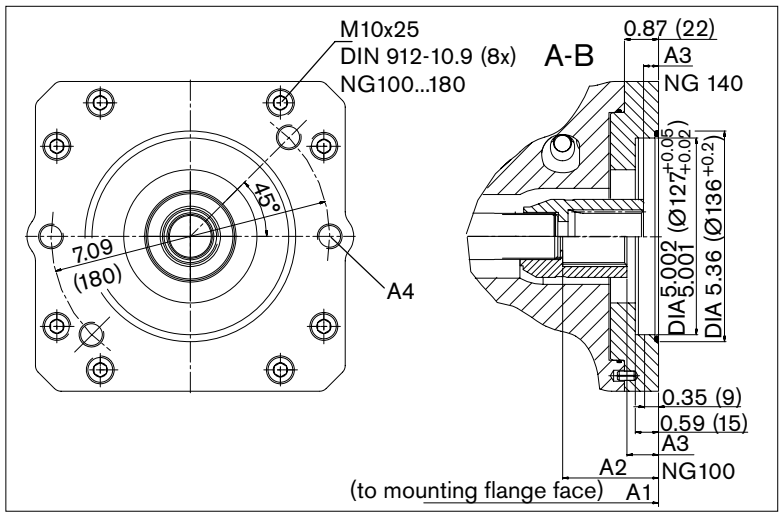
1) 30° pressure angle, flat base, flank centering, tolerance class 5

Dimensions through drive

Before finalizing your design request a binding installation drawing. Dimensions in in (mm).

24 Flange ISO 3019-1 - 127-2 (C)
Coupler for splined shaft to ANSI B92.1a-1996

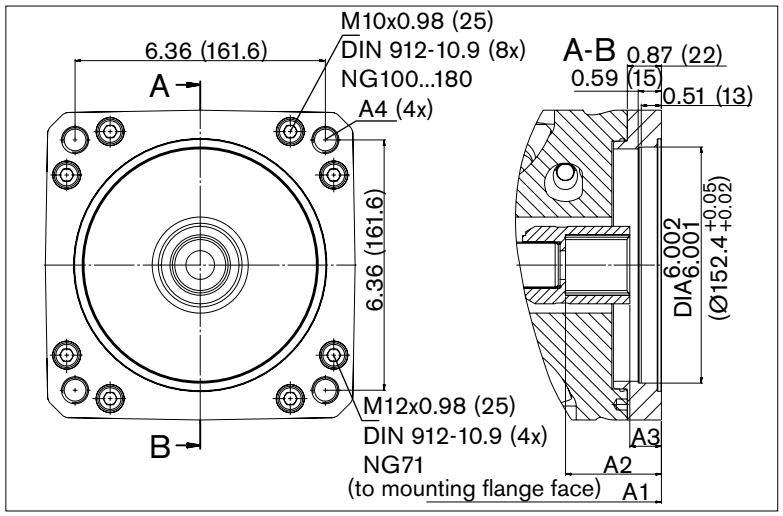
1 1/2in 17T 12/24 DP[1] (SAE J744 - 38-4 (C-C))



Size	A_1	A_2	A_3	A_4
100	14.17 (360)	2.44 (61.9)	0.80 (20.4)	M16; 0.87 (22) deep
140	14.84 (377)	2.44 (61.9)	0.80 (20.4)	M16; 0.87 (22) deep
180	15.24 (387)	2.44 (61.9)	0.80 (20.4)	M16; 0.87 (22) deep

96 Flange ISO 3019-1 - 152-4 (D)
Coupler for splined shaft to ANSI B92.1a-1996

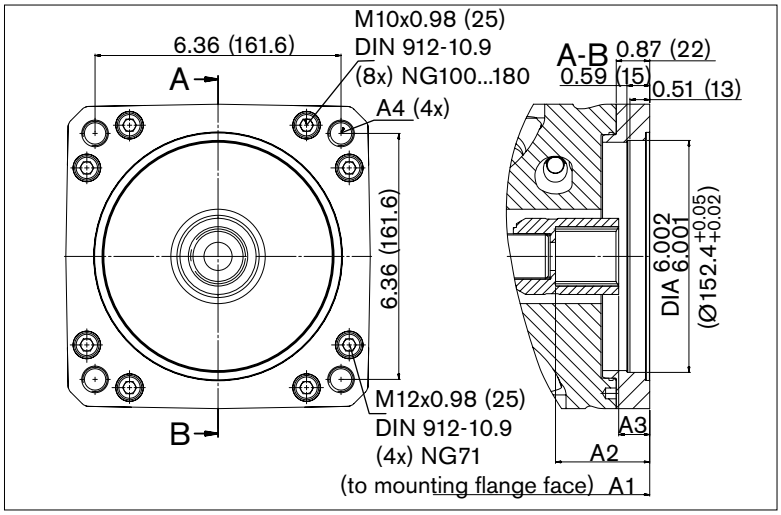
1 1/2in 17T 12/24 DP[1] (SAE J744 - 38-4 (C-C))



Size	A_1	A_2	A_3	A_4
100	14.17 (360)	2.44 (61.9)	0.80 (20.4)	M16; 0.87 (22) deep
140	14.84 (377)	2.44 (61.9)	0.80 (20.4)	M16; 0.87 (22) deep
180	15.24 (387)	2.44 (61.9)	0.80 (20.4)	M16; 0.87 (22) deep

17 Flange ISO 3019-1 - 152-4 (D)
Coupler for splined shaft to ANSI B92.1a-1996

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



Size	A_1	A_2	A_3	A_4
140	14.84 (377)	2.95 (75)	On request	M16; 0.87 (22) deep
180	15.24 (387)	2.95 (75)	On request	M16; 0.87 (22) deep

1) 30° pressure angle, flat base, flank centering, tolerance class 5

Summary mounting options

The A10VSO is equipped with a flexible universal through drive. This enables the utilization of various through drive options without any machining of the port plate. Details of the necessary adapter parts can be found in data sheet RE 95581.

Through drive - A10VSO			**Mounting option 2nd pump**			Through drive
Flange **ISO 3019-1**	Coupler for splined shaft	Code	A10VSO Size (shaft)	A10VO Size (shaft)	External gear pump Series (size)	available for size
82-2(A)	5/8 in	**01**			F (5...22)	45...180
	3/4 in	**52**	10, 18 series 52/31 (S)			45...180
101-2(B)	7/8 in	**68**		28 series 31 (S, R)	N/G (26...49)	45...180
	1 in	**04**		45 series 31 (S, R)		45...180
127-4(C)	1 in	**E2**		45 (S, R)		45...180
127-4(C)	1 1/4 in	**15**		71 (S)		71...180
127-2(C)	1 1/2 in	**24**		100 (S)	PGH	100...180
152-4(D)	1 1/2 in	**96**		100 (S)		100...180
	1 3/4 in	**17**		140 (S)		140...180

Combination pumps A10VSO + A10VSO

When using combination pumps it is possible to have multiple, mutually independent hydraulic circuits without the need for a splitter gearbox.

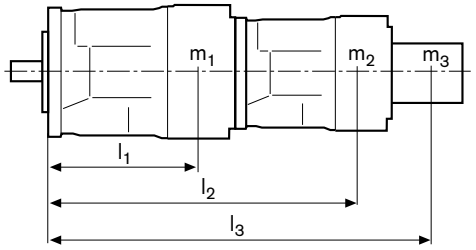
When ordering combination pumps the model codes for the first and the second pump must be joined by a „+“.

Ordering example: A10VSO100DR/32R-VPB82**UB8** + A10VSO71DRF/32R-VSB72N00

Permissible mass moment of inertia

It is permissible to use a combination of two single pumps of the same size (tandempump), considering a mass acceleration force of 10 g (98,1 m/s^2) without an additional support bracket.

Size			45	**71**	**100**	**140**	180
Perm. mass moment of inertia							
static	T_m	lb-ft (Nm)	1010 (1370)	2213 (3000)	3319 (4500)	3319 (4500)	3319 (4500)
dynamic at 10 g (98,1m/s^2)	T_m	lb-ft (Nm)	101 (137)	221 (300)	332 (450)	332 (450)	332 (450)
Weight	m	lbs (kg)	66 (30)	103 (47)	152 (69)	161 (73)	172 (78)
Distance center of gravity	l	in (mm)	5.12 (130)	5.59 142	6.65 (169)	6.77 (172)	7.72 (196)



m_1, m_2, m_3	Weight of pumps	[lbs (kg)]
l_1, l_2, l_3	Distance center of gravity	[in (mm)]

$$T_m = (m_1 \cdot l_1 + m_2 \cdot l_2 + m_3 \cdot l_3) \cdot \frac{1}{12\ (102)}\ \text{[lb-ft (Nm)]}$$

Notes

Installation notes

General

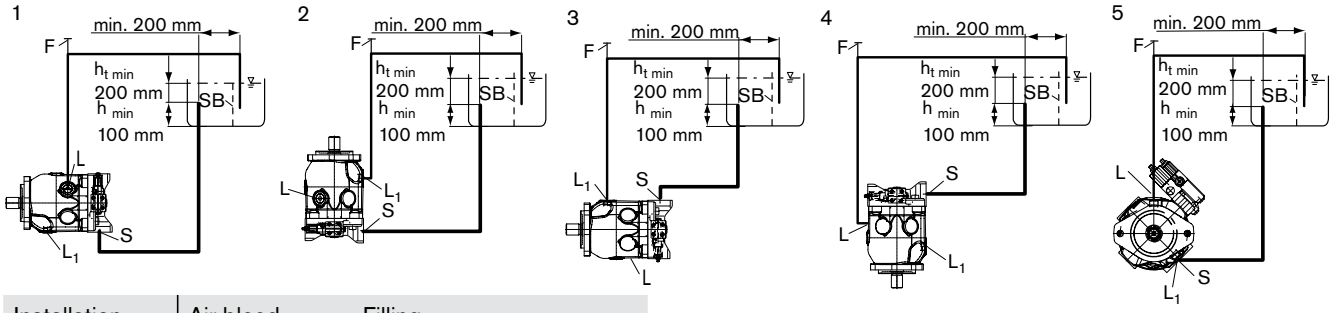
The pump housing must be filled with fluid and air bleeded during commissioning and operation. This is also to be observed, following a longer standstill period as the system may empty via the hydraulic lines.
Especially with the installation position „drive shaft upwards or drive shaft downwards“ attention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

Installation position

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

Mounting below the reservoir (standard)

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

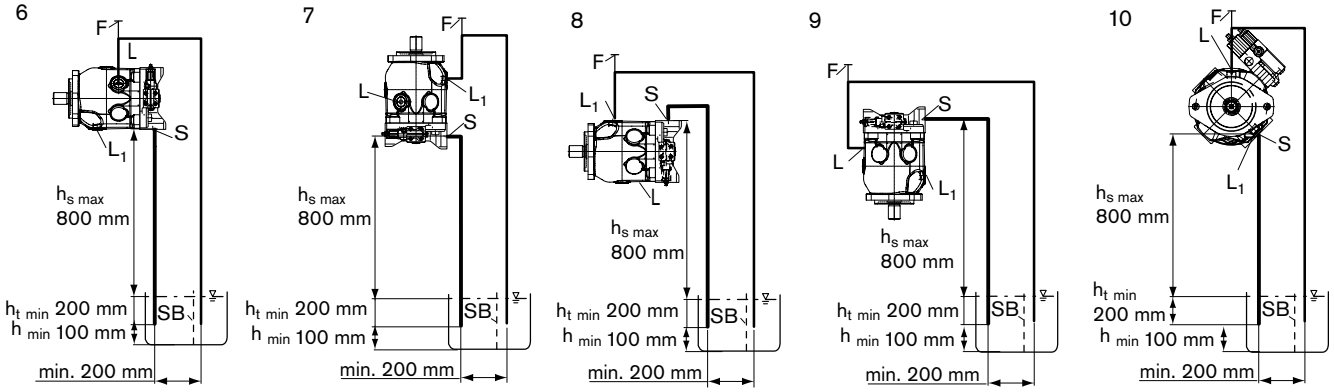


Installation position	Air bleed	Filling
1, 3 and 5	F	S + L, L_1 (F)
2 and 4	F	S + L, L_1 (F)

200 mm = 7.87 in
100 mm = 3.94 in

Installation above the reservoir

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



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

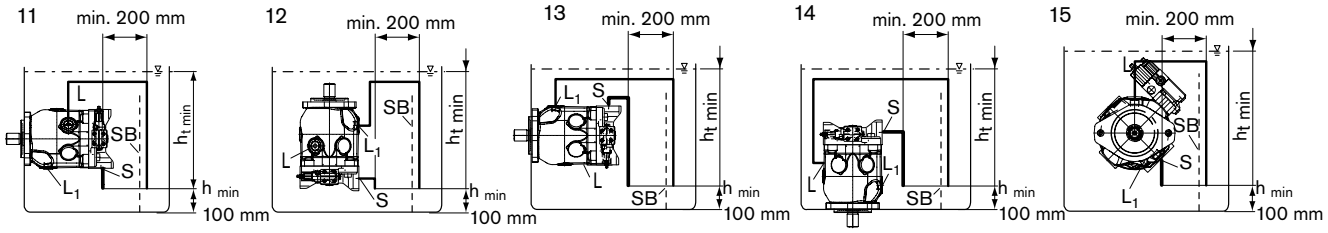
200 mm = 7.87 in
100 mm = 3.94 in

L/L_1 = case drain port, F = air bleed or filling port, S = suction port, SB = Baffle, $h_{t\ min}$ = minimum permissible immersion depth, $h_{S\ max}$ = maximum permissible suction height

Installation notes

Mounting inside the reservoir

Mounting inside the reservoir means, that the pump is mounted within the minimum fluid level.



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

200 mm = 7.87 in

100 mm = 3.94 in

L/L_1 = case drain port, F = air bleed or filling port, S = suction port, SB = baffle, $h_{t\,min}$ = minimum permissible immersion depth, $h_{t\,max}$ = maximum permissible suction height

Notes

Notes

General information

- The A10VSO pump is designed to be used in open circuit.
- Project planning, assembly and commissioning of the axial piston unit requires the involvement of qualified personnel
- Before operating the axial piston unit, read the appropriate operating instructions thoroughly and completely. If needed, request these from Rexroth.
- 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 axial piston unit and especially on the solenoids. Take appropriate safety measures (e. g. by wearing protective clothing).
- Depending on the operating conditions of the axial piston unit (operating pressure, fluid temperature), the characteristics may shift.
- Pressure ports:
  The ports and connection threads are designed for the specified maximum pressure. The machine or system manufacturer must ensure that the connecting elements and lines correspond to the specified operating conditions (pressure, flow, hydraulic fluid, temperature) with the necessary safety factors.
- The data and notes contained herein must be adhered to.
- The product is not approved as a component for the safety concept of a general machine according to DIN EN ISO 13849
- The following tightening torques apply:
  - Fittings:
    Observe the manufacturer‘s instructions regarding the tightening torques of the used fittings.
  - Connection screws:
    For fixing screws according to DIN 13, ISO 68, we recommend checking the tightening torque individually according to VDI 2230.
  - Female threads in axial piston unit:
    The maximum permissible tightening torques $M_{G\ max}$ are maximum values for the female threads and must not be exceeded. For values, see the following table.
  - Plugs:
    For the metal plugs, supplied with the axial piston unit, the required tightening torques of plugs M_V apply. For values, see the following table.

Thread size of ports		Maximum permissible tightening torque for female threads $M_{G\ max}$	Required tightening torque for the plugs M_V	WAF hexagon socket of the plugs
G 1/4 in	DIN 3852	70 Nm	–	–
7/16-20 UNF-2B	ISO 11926	40 Nm	15 Nm	3/16 in
7/8-14 UNF-2B	ISO 11926	240 Nm	127 Nm	3/8 in
1 1/16-12 UNF-2B	ISO 11926	360 Nm	147 Nm	9/16 in
1 5/16-12 UNF-2B	ISO 11926	540 Nm	198 Nm	5/8 in

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