AXP
AXIAL PISTON PUMP
FIXED DISPLACEMENT
SIZES 33, 63, 100

Rev. A, October 2025

PERFECT BALANCE. ZERO COMPROMISE.

MOOG | Shaping the way our world moves™

Whenever the highest levels of motion control performance and design flexibility are required, you'll find Moog expertise at work. Through collaboration, creativity and world-class technological solutions, we help you overcome your toughest engineering obstacles. Enhance your machine's performance. And help take your thinking further than you ever thought possible.

ORDERING CODE

Position:	1	2	3	4	5	6	7	8	9	10	11	12
Code:	**AXP**	**0**	**R**	___	**F1**	**N**	_	_	_	__	_	_

Position		Description		Sizes							Code
1	**Product division**	Axial piston pump									**AXP**
2	**Mode of operation**	SCP speed controlled									**0**
3	**Rotation**	Clockwise									**R**
				Size 33			Size 63			Size 100	
4	**Displacement (cm³)**			**020**	**025**	**033**	**040**	**050**	**063**	**080**	**100**
5	**Control option**	Fixed displacement		●			●			●	**F1**
6	**Sealing material**	HNBR O-rings, FKM shaft seal		●			●			●	**N**
7	**Mounting flange**	SAE 3019-1	101-2	●			–			–	**4**
			127-2	–			●			–	**6**
			152-2	–			–			●	**8**
8	**Drive shaft end**	Keyed shaft	25 mm	●			–			–	**D**
			32 mm	–			●			–	**E**
			40 mm	–			–			●	**F**
		Involute spline SAE 744 C ANSI B92.1, class 5 30° PA	15T 16/32DP	●			–			–	**L**
			14T 12/24DP	–			●			–	**M**
			17T 12/24DP	–			–			●	**N**
9	**Coupling**	Direct coupling		●			●			●	**D**
		Standard coupling		●			●			●	**S**
10	**Ports**	S: 1 1/2" - 3,000 psi; P: 1" - 3,000 psi		●			–			–	**1E**
		S: 1 1/2" - 3,000 psi; P: 1" - 6,000 psi		●			–			–	**1F**
		S: 2" - 3,000 psi; P: 1" - 3,000 psi		–			●			–	**1G**
		S: 2" - 3,000 psi; P: 1" - 6,000 psi		–			●			–	**1H**
		S: 2 1/2" - 3,000 psi; P: 1 1/2" - 6,000 psi		–			–			●	**1K**
11	**Through-drive flange**	Without		●			●			●	**0**
		82-2		●			●			●	**2**
		101-2		●			●			–	**4**
		127-2		–			●			●	**6**
12	**Through-drive hub**	Without		●			●			●	**0**
		9T 16/32DP		●			●			●	**R**
		11T 16/32DP		●			–			–	**H**
		15T 16/32DP		●			●			–	**L**
		14T 12/24DP		–			●			●	**M**
		17T 12/24DP		–			–			●	**N**

PRODUCT OVERVIEW

Perfect Balance. Zero Compromise.

Moog revolutionized machine design with the invention of the servo valve. Now, we're doing it again—with a new generation of pump technology set to transform the industry.

The new Moog AXP Axial Piston Pump Series delivers the ideal balance of performance, features, and cost-efficiency. Finally, a solution both engineering and purchasing can agree on.

By integrating the strengths of internal gear and piston pump designs, the AXP delivers high-speed, low-noise performance with exceptional cost-efficiency, while maintaining the reliability and precision expected from piston systems.

AXP size 33

Built To Last

Engineered for long life and high uptime, the AXP features:

- A patented slipper-free design, significantly reducing sensitivity to low suction pressures—a common vulnerability in conventional axial piston pumps.
- Exceptional resistance to cavitation and contamination, making it ideal for demanding applications such as test benches and endurance machines.
- Fewer components, a direct coupling, and an external drain for improved reliability.

Reduced Noise

- The innovative 15-piston configuration, combined with a sound-optimized case and flange, minimizes pulsation and noise. This ensures quiet operation without compromising performance—enhancing both workplace comfort and safety.

Versatile and Efficient

The AXP supports:

- Zero-speed operation with unlimited pressure holding.
- High maximum speeds with fully variable speed control across the entire range.
- Rapid acceleration and deceleration, enabling energy savings and productivity gains.
- Compact system design, allowing for smaller pump and motor sizes, reducing installation space and investment costs.
- For active pressure control, the AXP pump supports operation in the negative rotational direction.
- With 100% through-drive capability, the AXP allows for easy flow scalability by adding additional pumps as needed.

Smooth and Precise Motion

- The floating piston design reduces pressure pulsation, ensuring smooth, accurate motion—ideal for modern drive systems and precision machinery.

Superior Performance-to-price Ratio

- A perfectly balanced pump solution—designed to maximize equipment performance and profitability.

Applications

The AXP is well-suited for a wide range of demanding applications, including:

- Construction machinery
- Material handling
- Injection molding and die casting
- Metal forming and presses
- General industrial machinery
- Marine applications
- Test benches and endurance machines

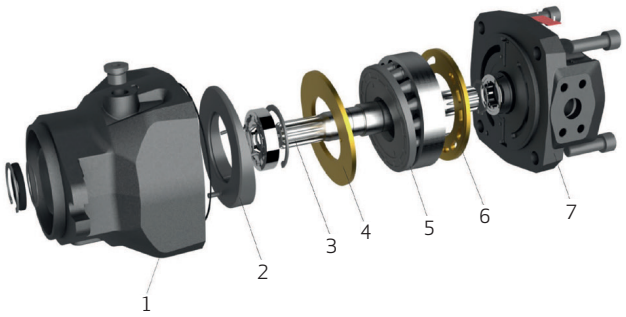
PRODUCT OVERVIEW

Function

The Moog AXP transforms mechanical power into hydraulic power via hydrostatic displacement and pressure. Its swash plate design aligns pistons axially along the drive shaft. Torque and speed from the motor rotate the rotary group, causing pistons to move in and out based on the swash plate angle.

A spring holds the rotary group against a bearing plate. As pistons pass two reversal points per turn, fluid enters the expanding chamber on the suction side and exits the contracting chamber on the pressure side.

The AXP supports variable-speed operation with synchronous or asynchronous motors in open-circuit systems. In open-circuit systems, fluid is drawn from a tank, powers hydraulic components, and returns to the tank. Directional valves control actuator movement.



1. Pump housing
2. Swash plate
3. Drive shaft
4. Bearing plate
5. Rotary group
6. Valve plate
7. Rear flange

Features	Benefits
Speed-controlled operation	Adaptable and efficient across varying load conditions.
15-piston turbine with new floating piston design	Low pulsation, reduced noise, smooth and stable operation, and extended service life.
Patented slipper-free design	Reduced sensitivity to low suction pressures.
Sound-optimized case and flange	Lower noise and pulsation.
High-speed capability	Enables smaller pump and motor sizes, reducing system footprint and cost.
Zero-speed pressure holding	Supports static pressure control without energy loss.
Direct coupling	Compact installation and reduced system complexity.
External drain	Enhanced cooling and hydraulic efficiency.
Modular and robust design	Simplified maintenance and increased robustness. Suitable for demanding operating conditions.
100% through-drive capability	Easy scalability for higher flow demands.
High power density	Compact yet powerful performance.
Negative rotation	Decompression and recuperation.
Best-in-class energy efficiency	Lower energy consumption and reduced cooling requirements.
Superior performance-to-price ratio.	A perfectly balanced pump solution—designed to maximize equipment performance and profitability.

TECHNICAL DATA

Size				**33**			**63**			**100**	
Displacement, geometric, per revolution			cm^3	20	25	33	40	50	63	80	100
Type of construction				Axial piston pump for open circuit and speed controlled operation[1], fixed displacement							
Type of mounting				SAE mounting flange to DIN 3019-1 (imperial dimensions)							
Mounting position				Any							
Weight	Single pump		kg (lb)	21.0 (46.3)			37.7 (83.1)			48.9 (107.8)	
	Single pump with through-drive			21.9 (48.3)			40.8 (89.9)			57.1 (125.9)	
	Double pump			43 (94.8)			79 (174.2)			103.2 (227.5)	
Inertia	Single pump		$kg\ cm^2$ ($lb\ in^2$)	35.7 (12.2)			107.5 (36.7)			235.2 (80.4)	
	Double pump			72.1 (24.6)			214.8 (73.4)			474.9 (162.3)	
Direction of rotation				Clockwise (viewed on drive shaft)							
Pressure port	Maximum operating pressure		bar (psi)	350 (5,000)							
	Peak operating pressure			380 (5,500)							
	Single operating period		ms	15							
	Maximum number of pressure peaks			1 million							
Suction port	Minimum inlet pressure permanent		bar abs (psi abs)	0.8 (12)							
	Minimum inlet pressure at acceleration			0.6 (9)							
	Maximum inlet pressure			25 (360)							
Drain port L	Maximum housing pressure			2 (29)							
Speed	Maximum speed at 1 bar (15 psi) inlet pressure [1]		rpm	4,400	4,150	3,700	3,650	3,375	3,000	[2]	2,600
	Minimum speed			0 (up to 350 bar)							
	Maximum angular acceleration		rad/s^2	[2]	[2]	8,300	[2]	[2]	7,400	[2]	[2]
Flow at maximum speed			l/min	88	104	122	146	169	189	[2]	260
Maximum permissible input torque on drive shaft	Keyed shaft	D	Nm (lbf in)	230 (2,035)			–			–	
		E		–			440 (3,894)			–	
		F		–			–			700 (6,196)	
	Involute spline	L		394 (3,487)			–			–	
		M		–			750 (6,638)			–	
		N		–			–			1,190 (10,532)	
Hydraulic fluid	Type			HLP mineral oil according to DIN 51524							
	Minimum temperature		°C (°F)	–15 (5)							
	Maximum temperature			80 (176)							
	Filtration			Class 20/18/15 according to ISO 4406							
Ambient temperature	Minimum		°C (°F)	–15 (5)							
	Maximum			80 (176)							

1) SCP version: time limited reverse operation for pressure reduction (for application limits please contact Moog).

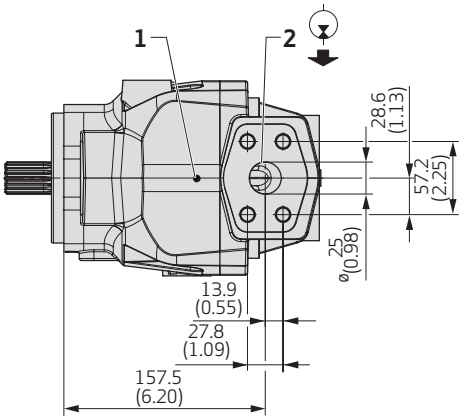
2) For further details, please contact Moog.

TECHNICAL DATA

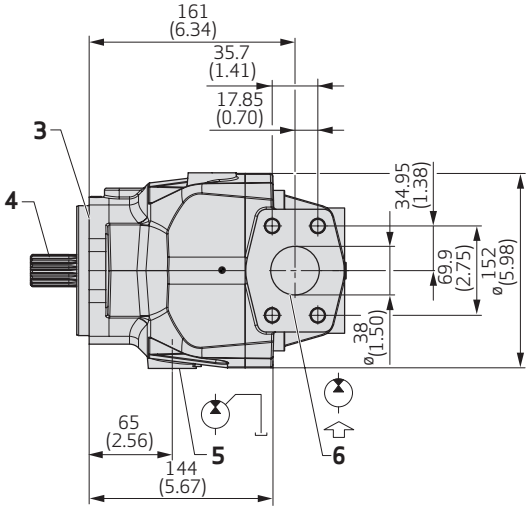
Viscosity

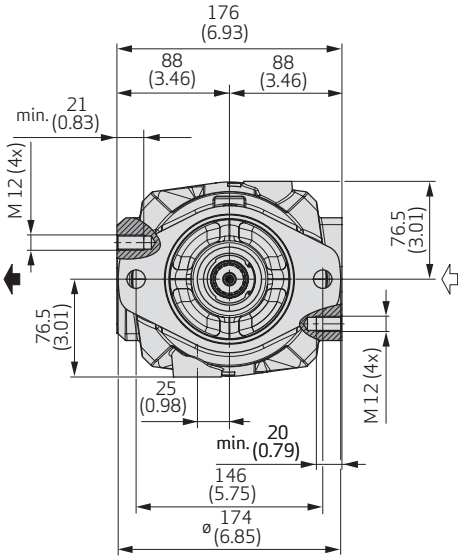
	Viscosity [mm²/s]	Temperature [°C (°F)]	Pressure [bar (psi)]	Rotational speed [rpm]
Cold start and warm-up phase I	1,600 to 1,000	≥ –15 (5)	≤ 30 (435)	≤ 1,000
Warm-up phase II	1,000 to 400		≤ 80 (1,160)	≤ 1,500
Permissible operating range	10 to 400	–15 to +80 (5 to 176)	≤ 350 (5,000)	2,000
Optimal viscosity range	35 to 130			≤ Maximum speed

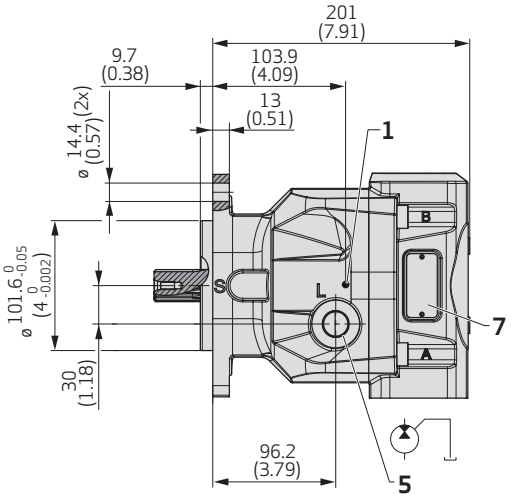
DIMENSIONS SIZE 33



1. Center of gravity
2. Pressure port SAE 1”; 6,000 psi
3. SAE mounting flange to DIN 3019-1 (imperial dimensions)
4. Drive shaft
5. Drain port G1/2 - 14 (0.55) deep
6. Suction port SAE 1 1/2”; 3,000 psi
7. Nameplate

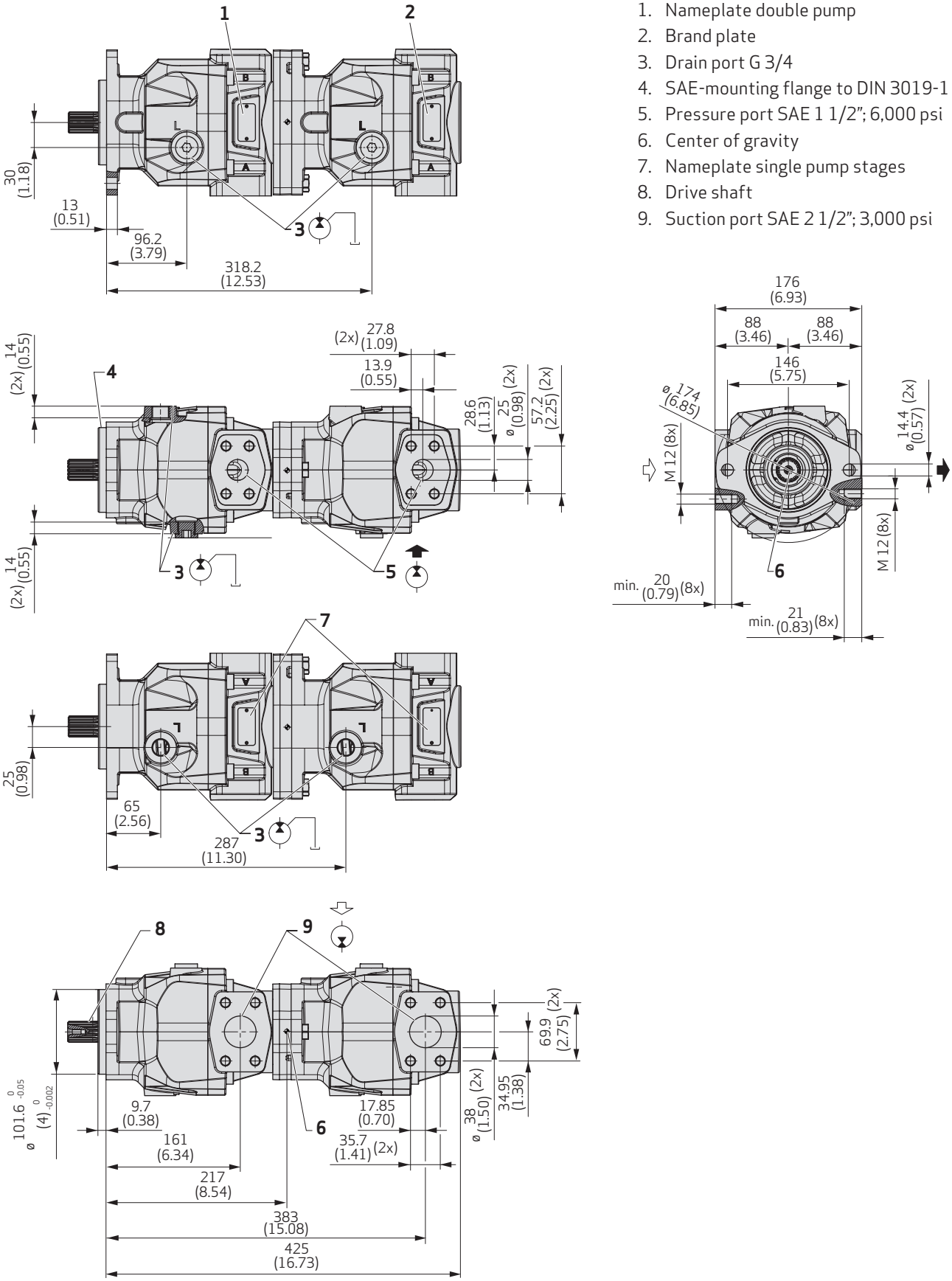






DIMENSIONS SIZE 33

Double Pump

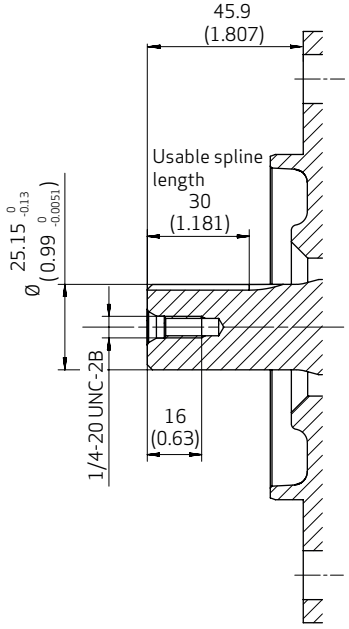


1. Nameplate double pump
2. Brand plate
3. Drain port G 3/4
4. SAE-mounting flange to DIN 3019-1
5. Pressure port SAE 1 1/2"; 6,000 psi
6. Center of gravity
7. Nameplate single pump stages
8. Drive shaft
9. Suction port SAE 2 1/2"; 3,000 psi

DIMENSIONS SIZE 33

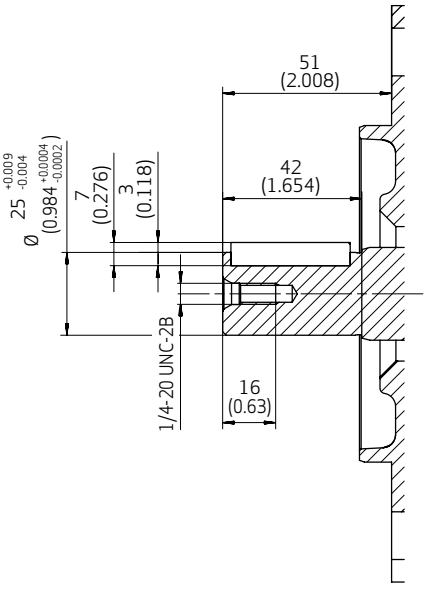
Splined Shaft 15T 16/32DP (Ordering Code L)

Involute spline to SAE J744, ANSI B92.1, tolerance class 5, 30 degree pressure angle, flat root side fit. Spline runout deviates from standard ISO 3019-1.

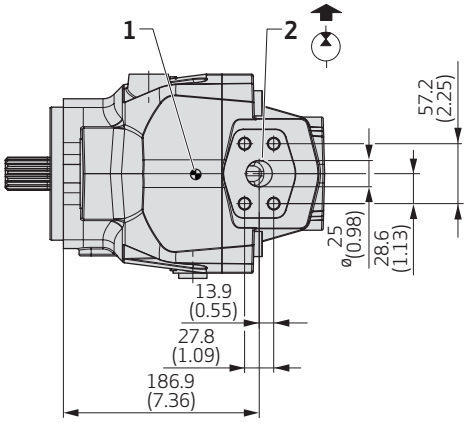


Keyed Shaft 25 mm (Ordering Code D)

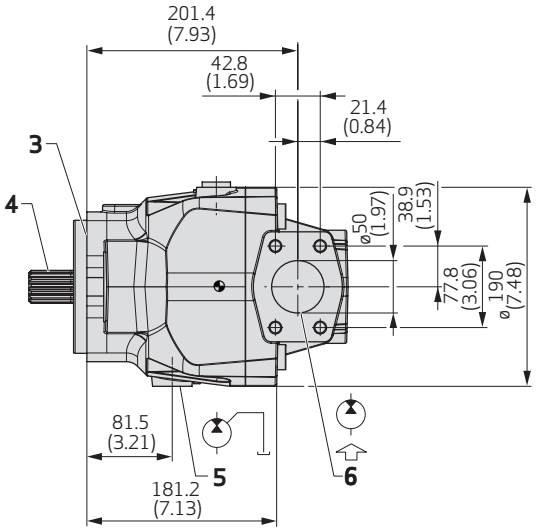
Key A8x7x36 according to ISO 3019-2.

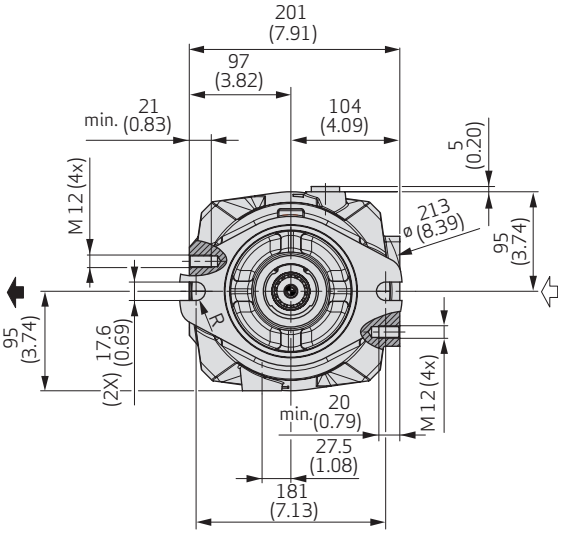


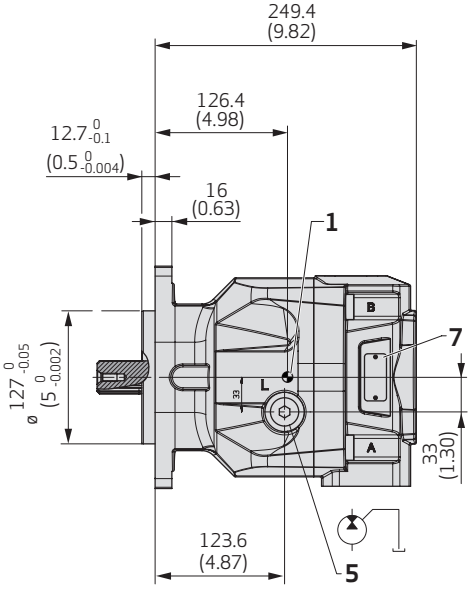
DIMENSIONS SIZE 63



1. Center of gravity
2. Pressure port SAE 1”; 6,000 psi
3. SAE mounting flange to DIN 3019-1
4. Drive shaft
5. Drain port G1/2; 18.5 deep
6. Suction port SAE 2”; 3,000 psi
7. Nameplate

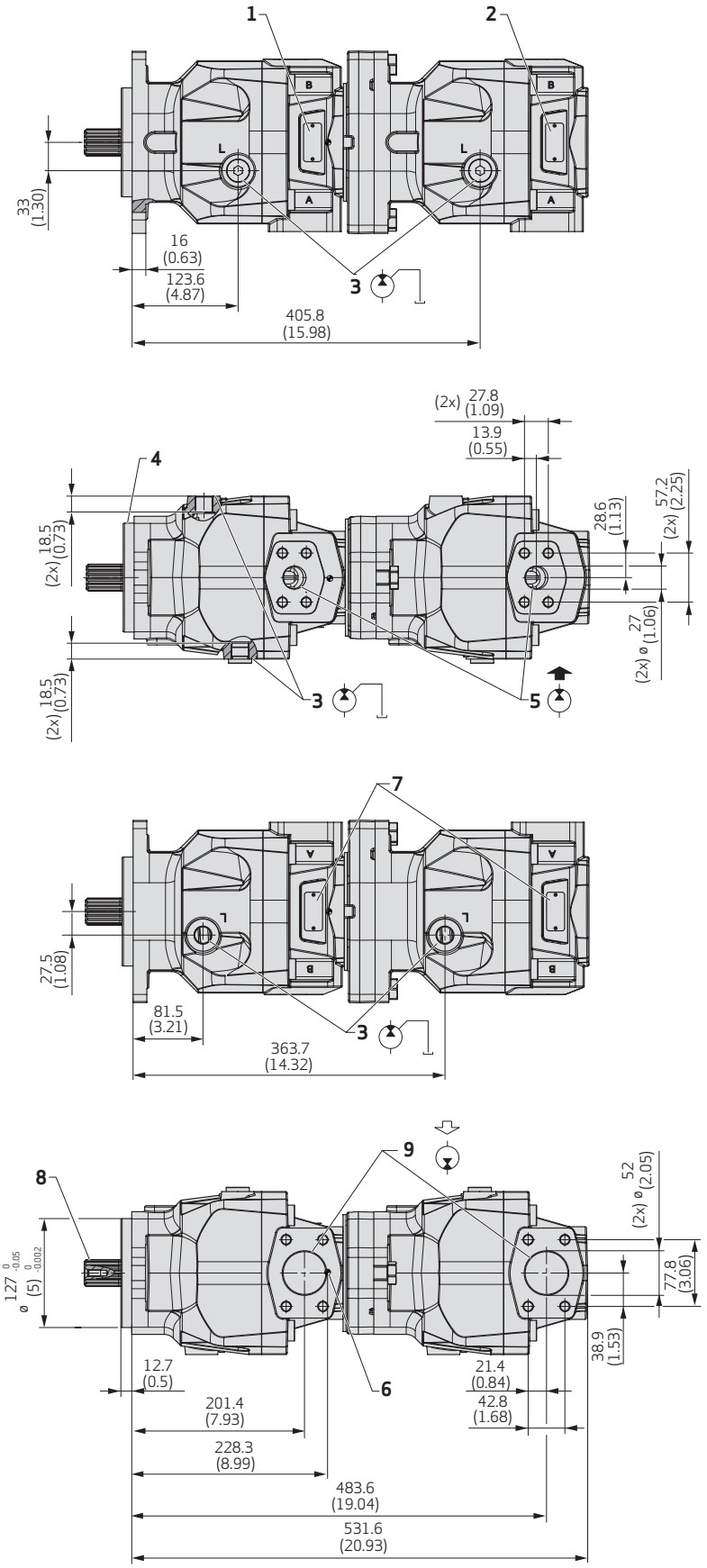




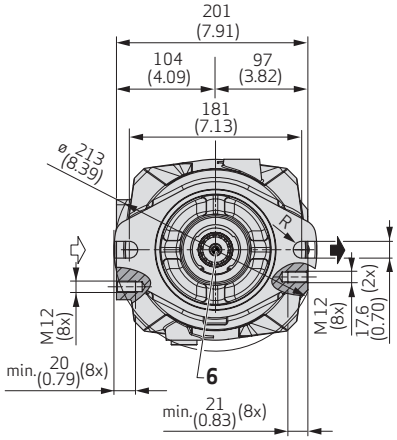


DIMENSIONS SIZE 63

Double Pump



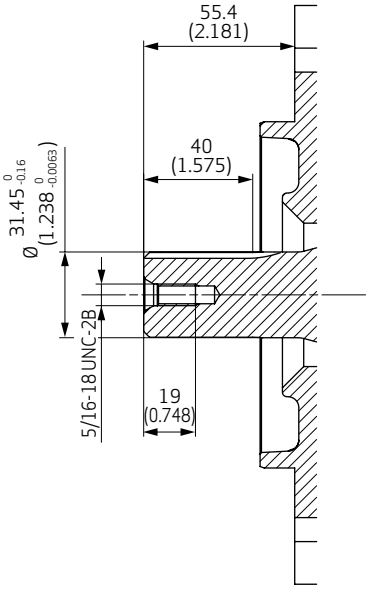
1. Nameplate double pump
2. Brand plate
3. Drain port G 1/2
4. SAE-mounting flange to DIN 3019-1
5. Pressure port SAE 1”; 6,000 psi
6. Center of gravity
7. Nameplate single pump stages
8. Drive shaft
9. Suction port SAE 2”; 3,000 psi



DIMENSIONS SIZE 63

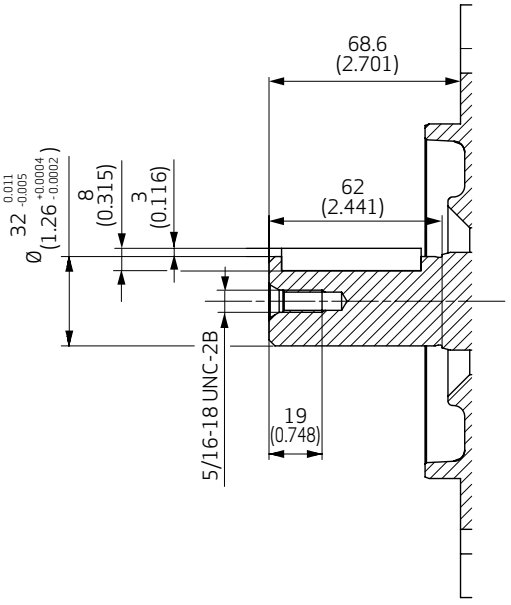
Splined Shaft 15T 16/32DP (Ordering Code M)

Involute spline SAE 744 C ANSI B92.1, class 5 30° PA 14T 12/24DP, flat root side fit. Spline runout deviates from standard ISO 3019-1.

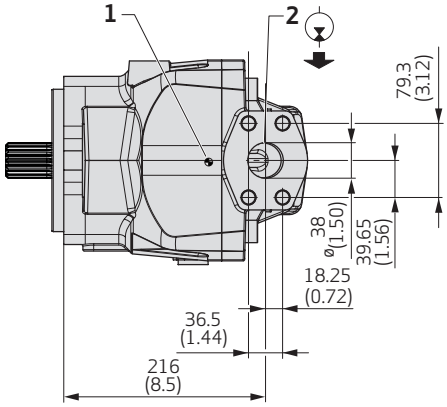


Keyed Shaft 32 mm (Ordering Code E)

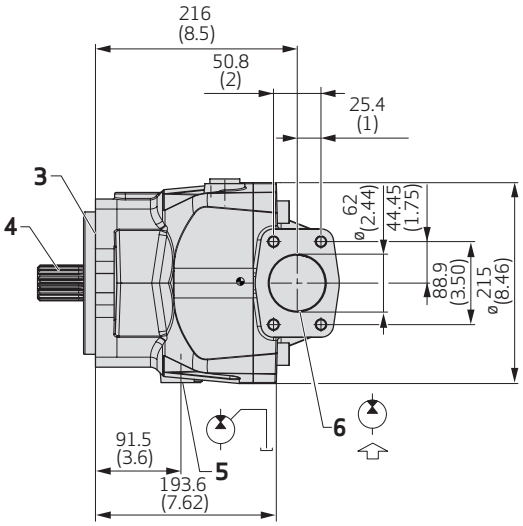
Key A10x8x50 according to ISO 3019-2.

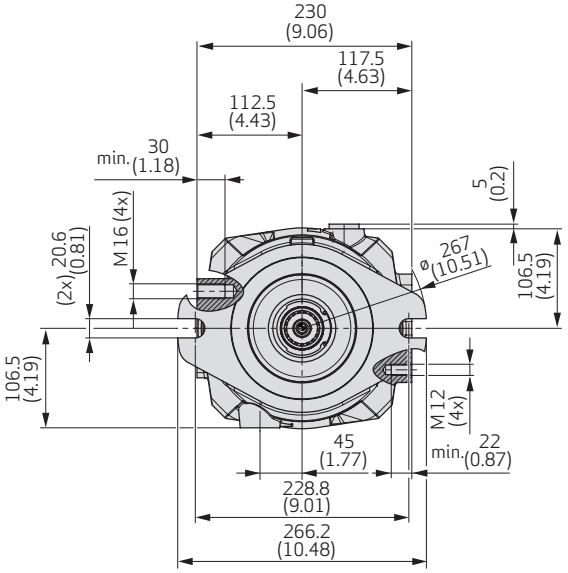


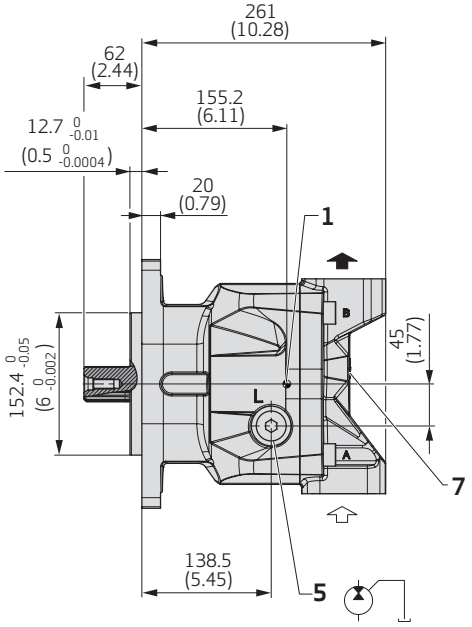
DIMENSIONS SIZE 100



1. Center of gravity
2. Pressure port SAE 1 1/2"; 6,000 psi
3. SAE mounting flange to DIN 3019-1
4. Drive shaft
5. Drain port G3/4; 18.5 deep
6. Suction port SAE 2 1/2"; 3,000 psi
7. Nameplate

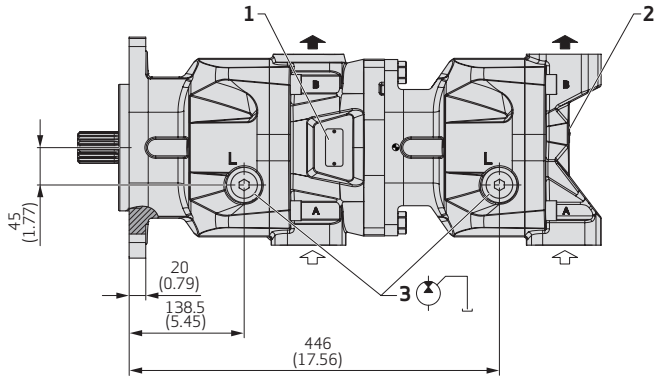




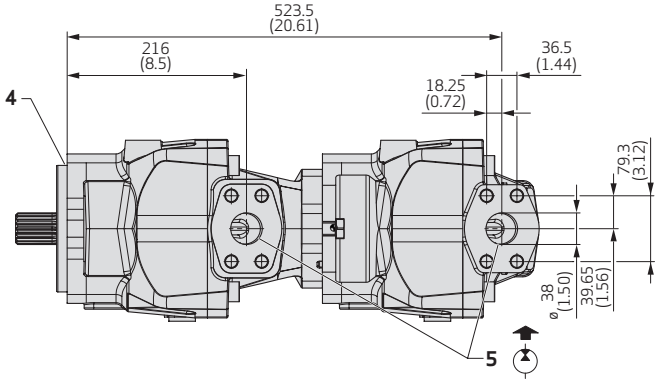


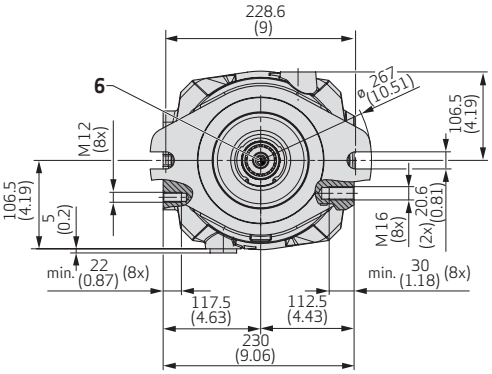
DIMENSIONS SIZE 100

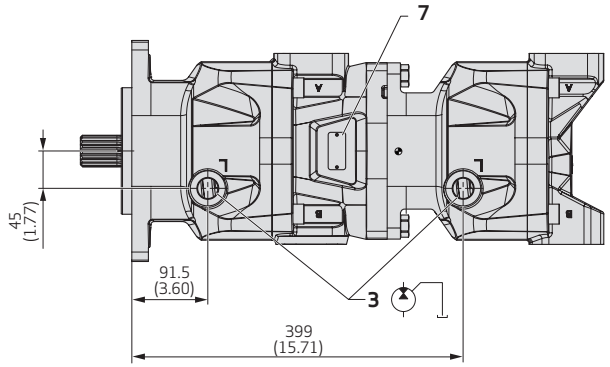
Double Pump

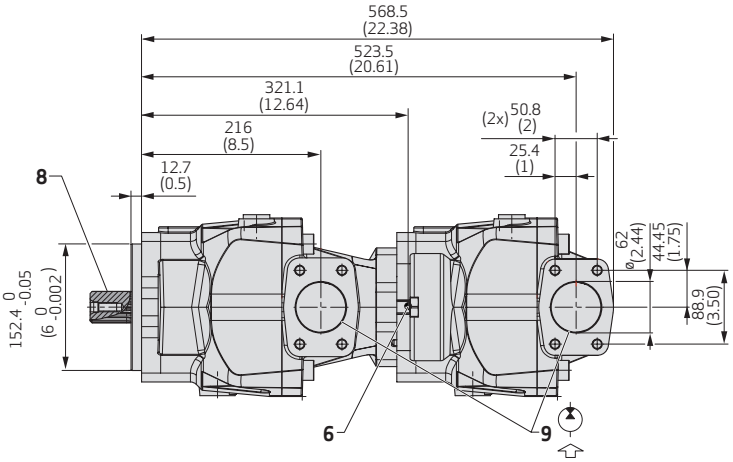


1. Nameplate single pump 1
2. Nameplate single pump 2
3. Drain port G 3/4 x 18.5 deep
4. SAE-mounting flange to DIN 3019-1
5. Pressure port SAE 1 1/2"; 6,000 psi
6. Center of gravity
7. Nameplate double pump
8. Drive shaft
9. Suction port SAE 2 1/2"; 3,000 psi





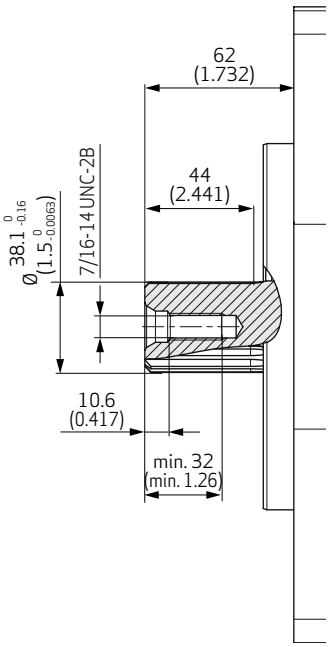




DIMENSIONS SIZE 100

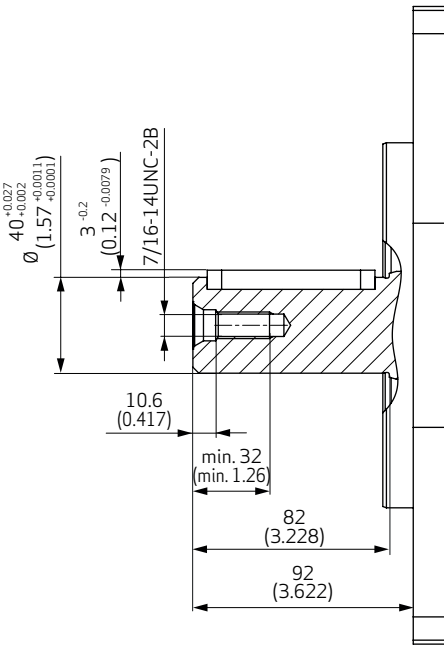
Splined Shaft 17T 12/24DP (Ordering Code N)

Involute spline SAE 744 C ANSI B92.1, class 5 30° PA 17T 12/24DP, flat root side fit.



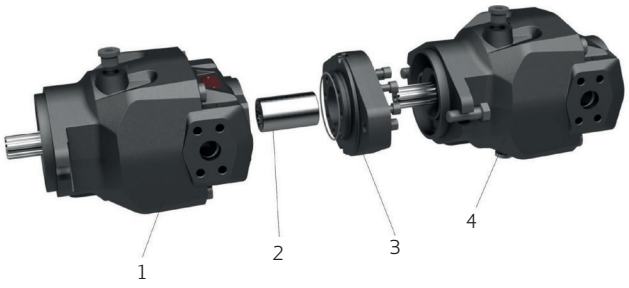
Keyed Shaft 40 mm (Ordering Code F)

Key 12x 8x70 according to ISO 3019-2.



MULTIPLE ARRANGEMENTS

Additional pumps can be tandem mounted on the AXP, so that all pump stages can be driven by the same shaft. AXP (the same size or smaller than the first pump stage) can be mounted directly. Other pumps may be added on using adapter flanges.



1. Pump stage 1
2. Through-drive hub
3. Adapter flange
4. Pump stage 2

For the maximum permitted through-drive torque for driving add-on pumps, please refer to the table below.

Permissible Through-drive Torques [Nm (lbf in)]

AXP stage 1	AXP stage 2		
Size	**33**	**63**	**100**
33	197 (1,743)	–	–
63	375 (3,319)		–
100	595 (5,266)		

The through-drive torque required to drive add-on pumps is determined by reference to the following variables:

V [cm³/rev]	Displacement
p [bar]	Pressure
ηhm [%]	Hydro-mechanical efficiency
T [Nm]	Through-drive torque

Through-drive torque from pump stage 1 to 2:

$$T_1 = 1.59 \cdot \sum_{i=2}^{n} \frac{V_i \cdot p_i}{\eta_{hmi}}$$

Example

If we take the following pump combination AXP100 + AXP 63 + AXP 33 (350 bar (5,000 psi), 210 bar (3,000 psi), 150 bar (2,200 psi)), the following considerations apply:

Design of 1st through-drive torque:

The pressure and flow of the 1st pump stage are irrelevant to the torque transferred by the through-drive. This torque can be calculated using the above formula.

$$T_1 = 1.59 \cdot \frac{V_2 \cdot p_2}{\eta_{hm2}} + \frac{V_3 \cdot p_3}{\eta_{hm2}}$$

$T_1 = 1.59 \cdot 63 \cdot 210/95 + 33 \cdot 150/95$ Nm

$T_1 = 304.3$ Nm

The value 304.3 Nm (2692.1 lbf in) is below the threshold value specified in the above table.

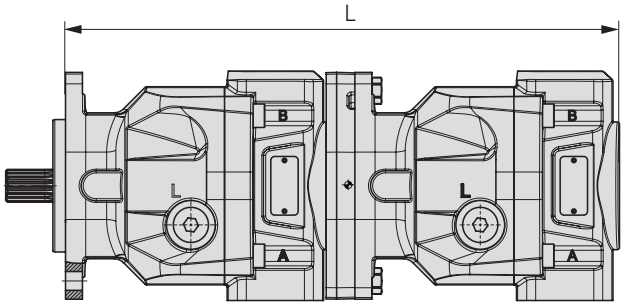
Design of 2nd through-drive torque:

$$T_2 = 1.59 \cdot \frac{V_3 \cdot p_3}{\eta_{hm2}}$$

$T_2 = 1.59 \cdot 33 \cdot 150/95 = 82.8$ Nm

Likewise, the value 82.8 Nm (732.7 lbf in) lies below the relevant threshold value specified in the above table for the through-drive from AXP63 to an AXP33.

Total Length L [mm (in)]



AXP stage 1	AXP stage 2		
Size	**33**	**63**	**100**
33	425 (16.7)	–	–
63	485.2 (19.1)	532 (20.9)	–
100	510.5 (20.1)	556.9 (21.9)	568.5 (22.4)

NOTES FOR PROJECT PLANNING

- Before using the AXP, it is important to thoroughly read the corresponding User Manual AXP (CDS68793).
- The AXP axial piston pump is designed for use in an open circuit.
- Planning, installation, and commissioning of this axial piston unit require skilled personnel.
- All specified data and information provided here must be followed.
- Depending on the operating conditions, such as working pressure and fluid temperature, the characteristic curve may vary.
- Not all pump configurations are approved for use in safety functions according to ISO 13849. For reliability parameters related to functional safety (e.g., $MTTF_d$), consult the appropriate Moog contact.
- When drives operate for extended periods at a constant rotational speed, the pump's excitation frequency (rotational speed frequency×15) can resonate with the hydraulic system's natural frequency. This resonance can be prevented by designing the hydraulic lines appropriately.
- Please refer to the manual for information about the tightening torques of connection threads and other screw connections.
- Ports and fastening threads are crafted for the maximum permissible pressures of their respective ports, as outlined in the connection tables. The manufacturer of the machine or system must ensure that connecting elements and lines meet the specified application conditions (pressure, flow, hydraulic fluid, temperature) with appropriate safety factors.
- Moog offers suitable servomotors and drives. For system dimensioning in such a setup, Moog can offer the "ServoSoft" tool
- The AXP pump features a low primary noise level. However, the overall hydraulic noise of the unit can vary depending on factors such as pump mounting and piping layout. Measures to reduce transmitted noise are described in the User Manual.

DOCUMENTS

Title	Description	Remark	Part Number
User Manual AXP	User manual	Visit www.moog.com to download a document using the part number in a search	CDS68793-001
Mounting and Installation Notes for RKP-II Radial Piston Pump and AXP-Axial Piston Pump	Mounting and installation notes		CA57130

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