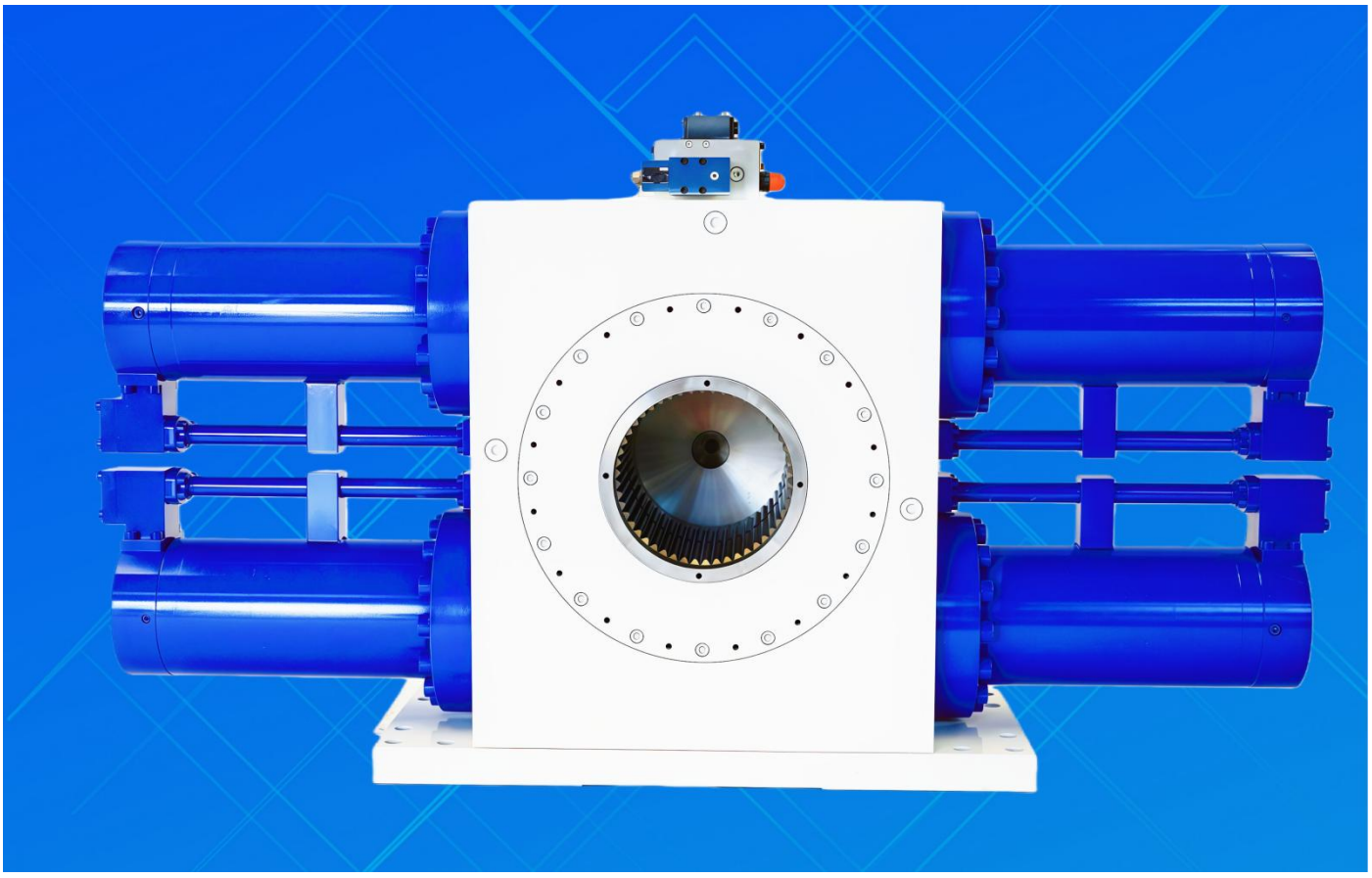
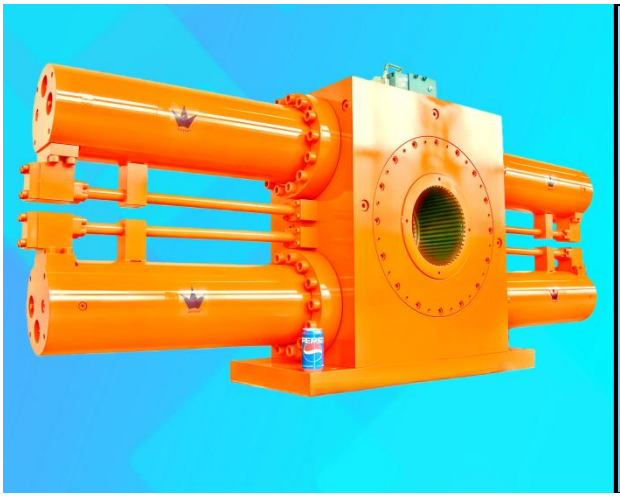
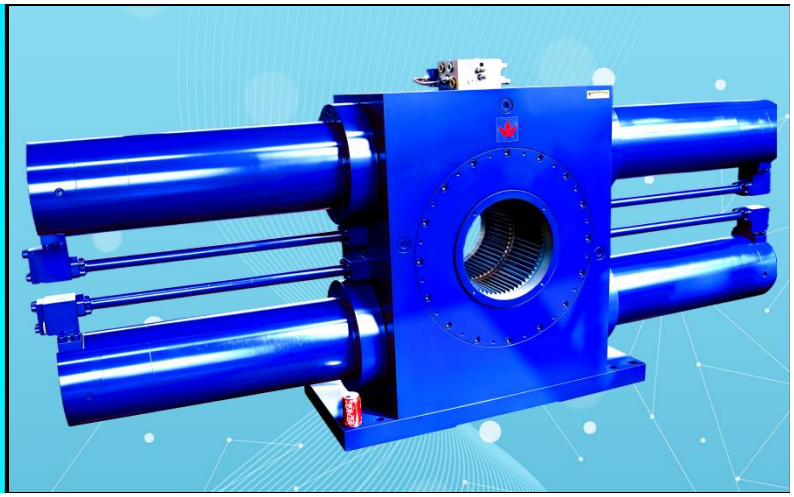
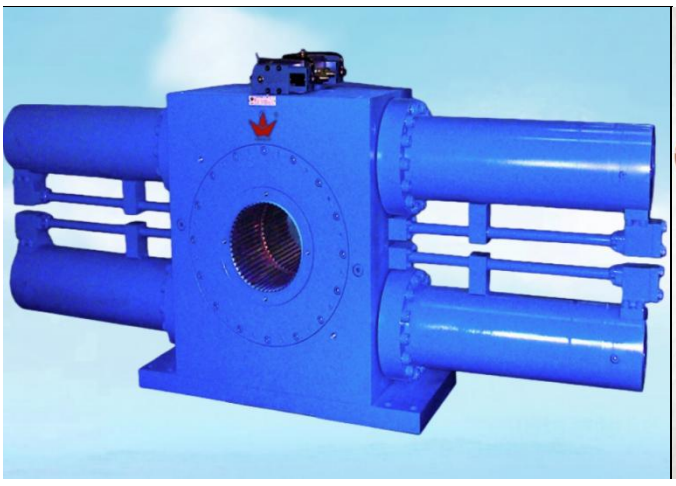
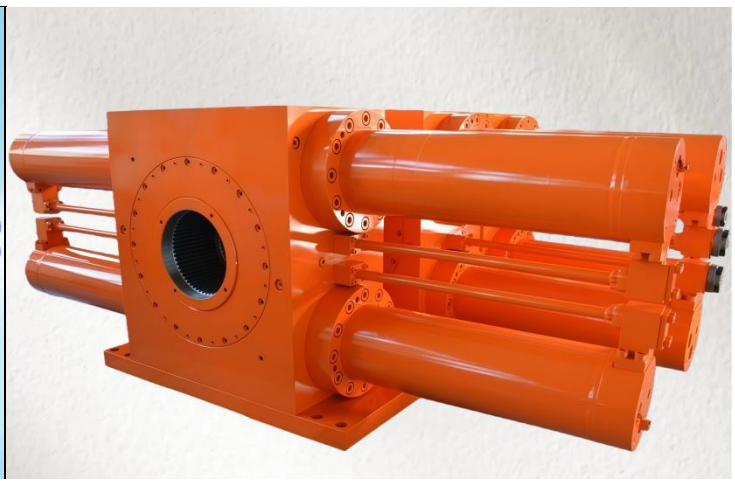
Photo of the Heavy-Duty Gear-Rack Oscillating Hydraulic Cylinder

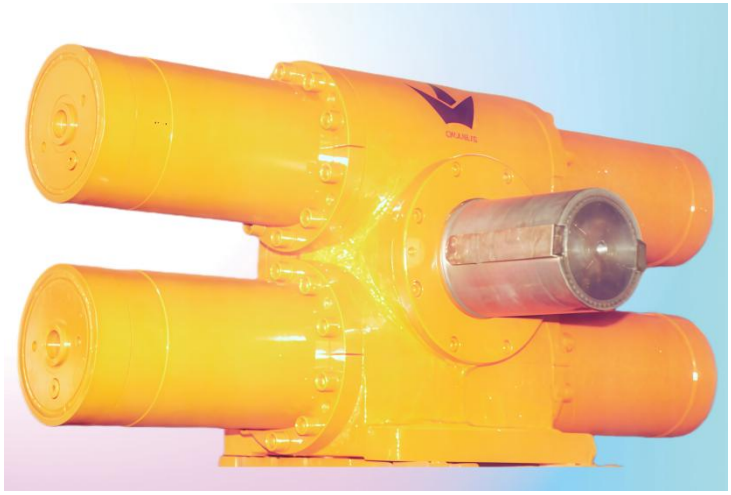


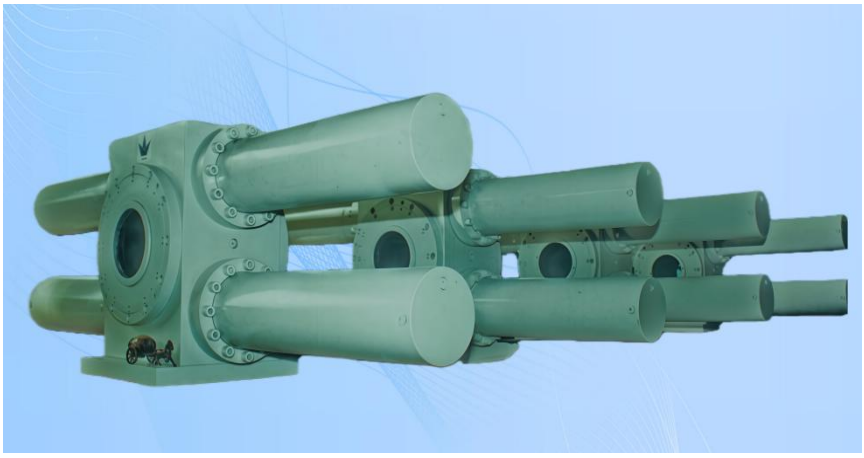


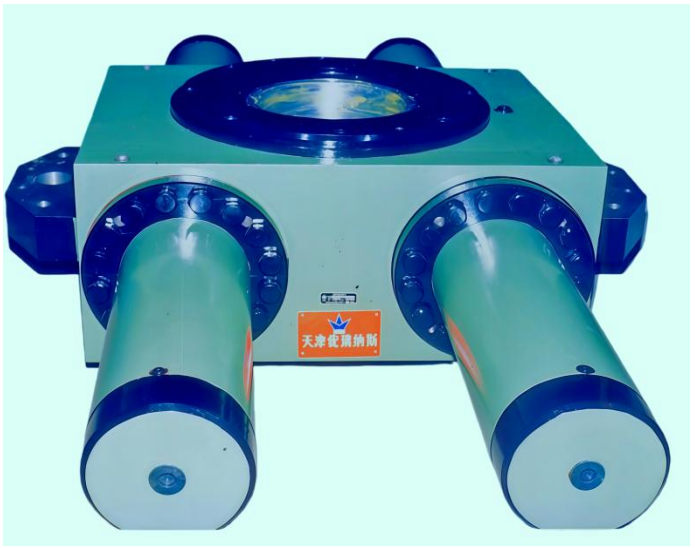












Heavy-Duty Gear-Rack Oscillating Hydraulic Cylinder

Overview

A gear-rack rotary hydraulic actuator converts hydraulic energy into oscillating or angular motion. The linear reciprocating motion of the hydraulic cylinder drives the rack, which engages with the pinion gear to generate bidirectional rotation. The cylinder force is mechanically amplified into torque through the rack-and-pinion transmission, and the swing angle is proportional to the rack stroke, achieving **0°–720°** rotation.

The actuator consists of a pinion shaft, rack piston, cylinder body, and sealing system. Common mounting types include flange and foot mounting. Structural types include single-rack and double-rack designs, available in multiple series and sizes to meet different torque requirements. End-of-stroke cushioning (**approx. 15° per end**) ensures smooth operation.

Key Performance Advantages

1. High Torque Output

Torque is proportional to working pressure, and with the mechanical amplification of the rack-and-pinion system, the actuator can deliver up to **1,150,000 Nm** (e.g., UBZ320). Suitable for heavy-duty industrial applications.

2. Precision Control

With optional rotary encoders or displacement sensors, the actuator forms a closed-loop servo system:

- Backlash ≤ **10 arc-minutes**
- Position repeatability ≤ **0.05°**
  Ideal for automation and high-precision positioning.

3. Compact Design & Easy Maintenance

Optional integrated hydraulic power pack allows plug-and-play installation, remote control, and PLC/PC operation.

Applications

Steel & Metallurgy

- Ladle tilting
- Wire-rod mill swing arms
- Coil flippers and turnover machinery

Marine & Energy

- Naval fin stabilizers
- Steering mechanisms
- Subsea valve actuators (up to **2300 m** depth)

Special Equipment

- Torque loading test rigs
- Sweeper truck tilting mechanisms
- Garbage compactor drives

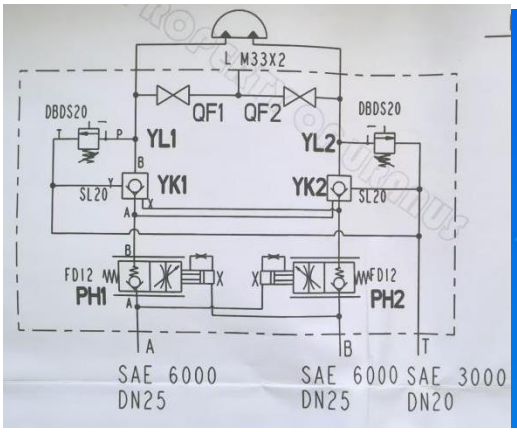
Automation

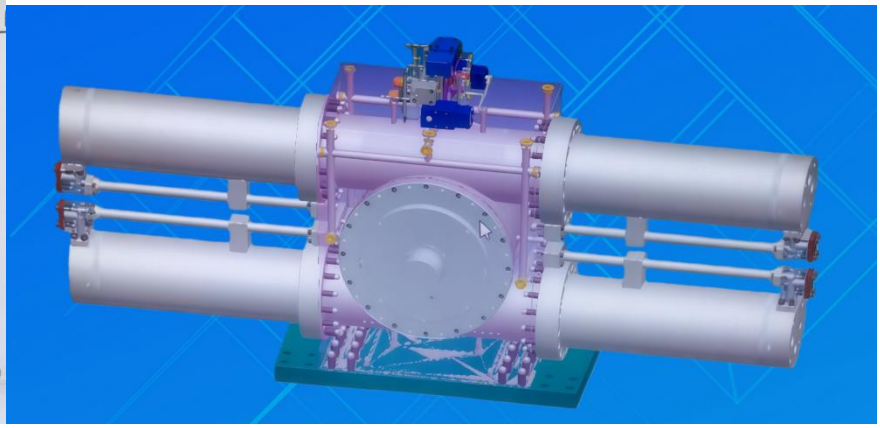
- Rotary indexing tables
- Robotic rotary joints
- Automated production lines

Product Examples:

1. **Heavy-Duty Swing Cylinder UBZJK250/185HBM

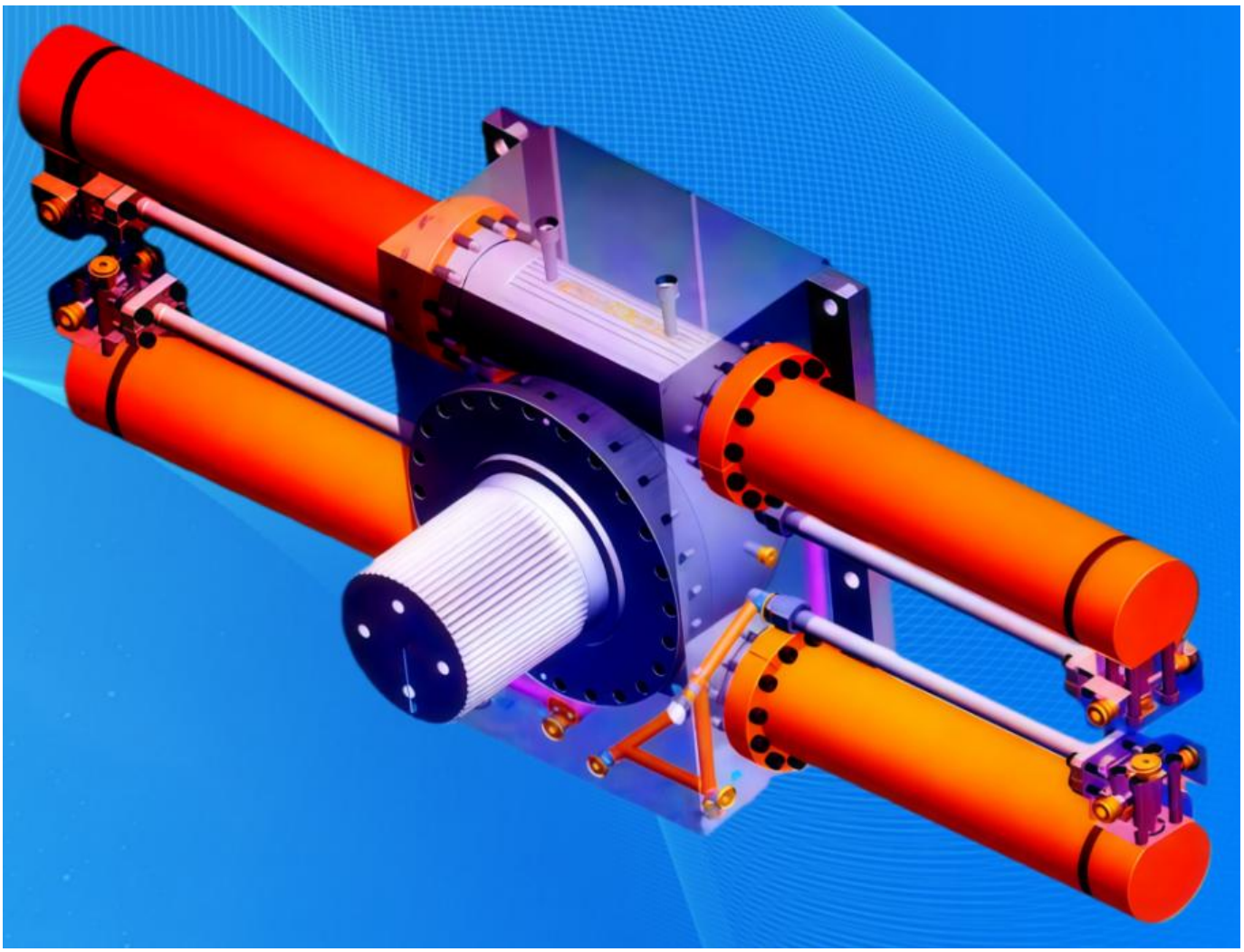
- Bore : 250 mm - Angle: 185 - Mounting Method: Foot Bracket
- Type: Double Rack - Output : Splined Bore INT60zX6mX30PX6H
- End Cushioning Angle: 12° - Torque: 40,996 Nm
- Rated Pressure: 25 MPa - Test Pressure: 31.5 MPa - Working Fluid: Water-Glycol





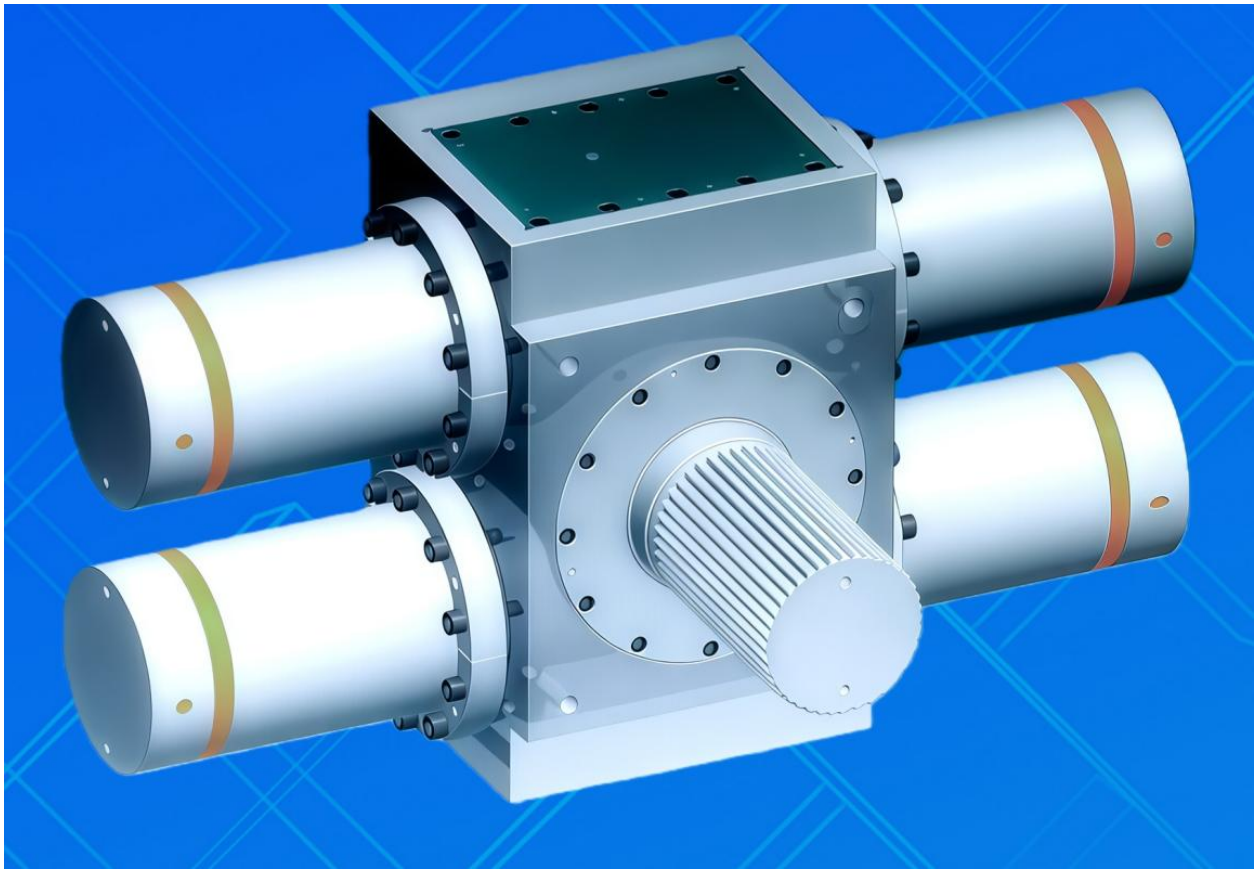
2. **Vehicle Transfer Platform Heavy-Duty Swing Cylinder UBZFZ90-180°

- Bore : 90 mm - Angle: 180° -External Rotary Encoder
- Mounting Method: Foot Bracket - Type: Double Rack
- Output : Splined Shaft EXT60ZX3mX30RX5h (GB/T3478.1-1995)
- Rated Pressure: 31.5 MPa - Test Pressure: 35 MPa - Rated Pressure Output Torque: 50,250 Nm



3. **Fin Stabilizer Servo Swing Cylinder UBFZS200-130°

- **Bore : 200 mm - Angle: 130° - Mounting Method: Flange - Type: Double Rack**
- **Output : Splined Shaft EXT40ZX5mX30RX6f**
- **Backlash ⩽ 0.02 mm - Repeatability ⩽ 0.05° - End Cushioning Angle: 5**
- **Rated Pressure: 25 MPa - Test Pressure: 31.5 MPa - Torque: 201,056 Nm**



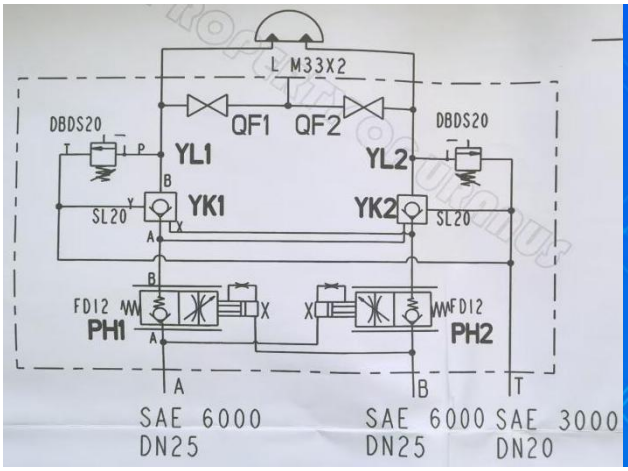
4、Heavy-duty oscillating cylinder UBZJK280/125HBM

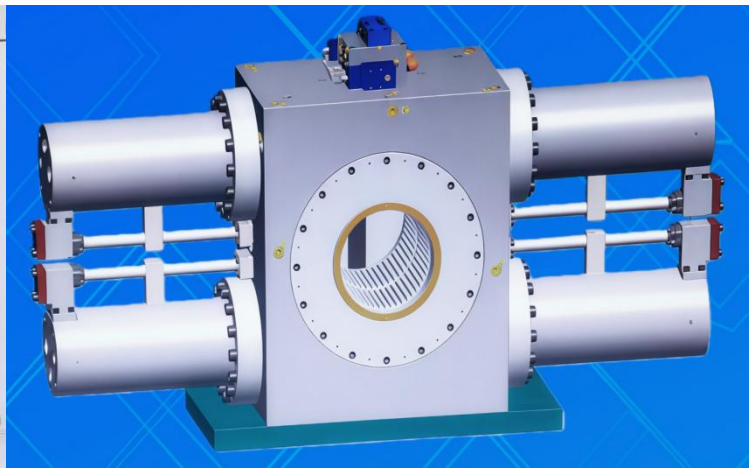
Bore : 280 mm angle: 125° Terminal buffer angle: 12° (both ends)

Connection type: Foot bracket Structure type: Double rack

Output type: Spline shaft INT50ZX8mX30RX6H Rated torque output: 778,000 N • m

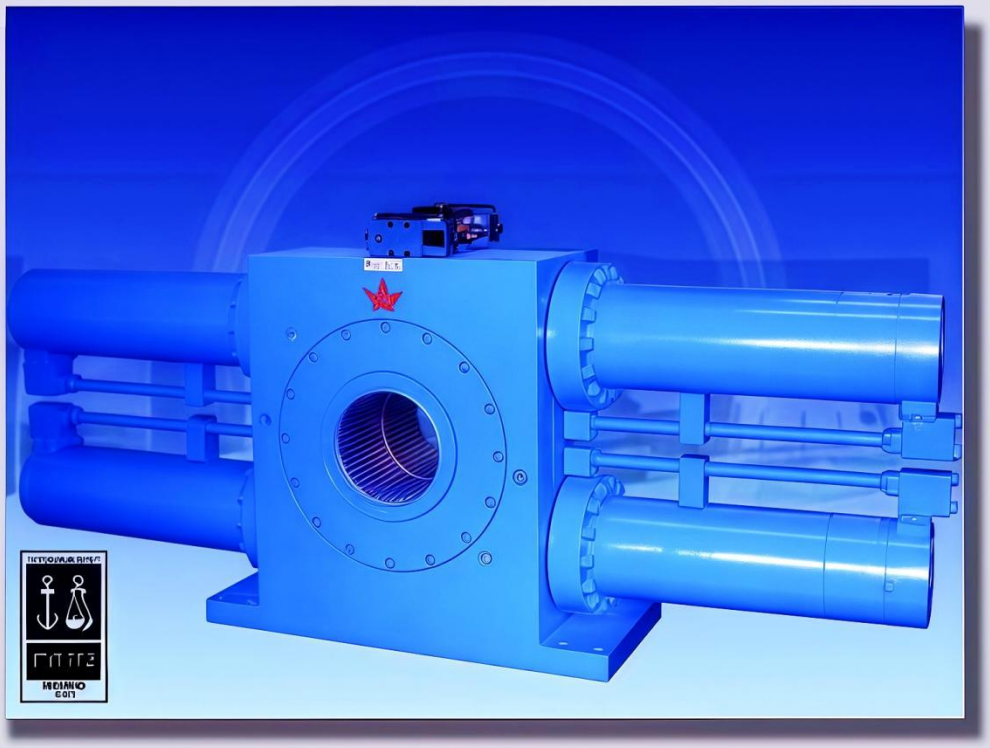
Rated pressure: 21 MPa Test pressure: 31.5 MPa Working medium: HFDU46 hydraulic fluid





优瑞纳斯®
URANUS

UBZ(重)系列齿轮齿条摆动液压缸



URANUS

优瑞纳斯®
URANUS

UBZ Heavy-Duty Series Rack-and-Pinion Hydraulic Rotary Actuator Marking Method

UBZ X X XXX | XXX X X X

URANUS Heavy-Duty Series Rack-and-Pinion Hydraulic Rotary Actuator

Connection method		
	Lifting lug	**R**
	Flange	**F**
	Foot	**J**
	Other	**X**

Drawings must be provided when ordering if marked "X"

Output mode		
	Spline shaft	**Z**
	Spline hole	**K**
	Other	**X**

Drawings must be provided when ordering if marked "X"

Cylinder diameter	100,125,140,160,180 200,220,250,280,320
Swing angle α (tolerance +1°)	0–360°, set as needed; common angles: 90°, 180°, 360°

End cushion	Non-cushion	Unmarked
	With cushion	**H**
Working temperature	<100°C	Unmarked
	<200°C	**R**

Working medium	Mineral oil	Unmarked
	Water-glycol, emulsion	**W**
	Other media	**X**

For other media, clarification must be provided when ordering "X".

Selection Example: required torque: 180,000 Nm; system pressure: 20 MPa; $K_1 = 180000 \div (20 - 1) \approx 9474$; cylinder diameter size: φ = 180 $K > K_1$; mounting method: flange-mounted, hole output; swing angle: 220°; with end cushion; operating temperature 120°C; working medium: hydraulic oil; marking: UBZFK180/220°HR

Technical Specifications Table for Heavy-Duty Series Rack-and-Pinion Hydraulic Rotary Actuator

Model	Cylinder diameter (mm)	Torque Coefficient (kNm/MPa)	Output Torque K(P–1) Nm			Oil Volume per Degree of Rotation (ml/°)	Required Medium Flow Rate at X°/s Swing Speed (L/min)	End Cushion Angle
			10MPa	16MPa	21MPa			
UBZ...100...	100	1979	17811	29685	39580	34.54	2.07X	12°
UBZ...125...	125	3534	31806	53010	70680	61.68	3.70X	12°
UBZ...140...	140	4988	44892	74820	99760	87.05	5.22X	12°
UBZ...160...	160	7238	65142	108570	144760	126.33	7.58X	12°
UBZ...180...	180	10077	90693	151155	201540	175.88	10.55X	12°
UBZ...200...	200	14137	127233	212055	282740	246.74	14.80X	12°
UBZ...220...	220	19158	172422	287370	383160	334.38	20.06X	12°
UBZ...250...	250	28274	254466	424110	565480	493.48	29.61X	12°
UBZ...280...	280	39900	359100	598500	798000	696.40	41.75X	12°
UBZ...320...	320	57906	521154	868590	1158120	1010.65	60.64X	12°

优瑞纳斯®
URANUS

Selection and Maintenance Instructions for UBZ Heavy-Duty Series Rack-and-Pinion Hydraulic Rotary Actuator

Uranus Hydraulic Machinery (Shanghai & Tianjin) Co., Ltd., established in 1992, is one of the first companies in China's hydraulic industry to obtain the ISO 9001 certification from DNV and implement ERP management.

Uranus's originally developed **UB** series rack-and-pinion hydraulic rotary actuator has been officially recognized by the National Bureau of Standards as the **JB/ZQ4713-98** standard. The **UBZ** heavy-duty series rack-and-pinion hydraulic rotary actuator (hereinafter referred to as **UBZ** actuator) represents a new product line developed specifically by our company for the metallurgical and heavy machinery industries.

UBZ actuators adopt **Uranus's** proprietary rotary actuator technology, featuring a robust structure, reliable operation, high mechanical efficiency, and a long service life. The most notable feature of **UBZ** actuators is that although the external installation dimensions are identical, they contain various internal sealing and guiding structures designed to accommodate different operating conditions. Therefore, when selecting **UBZ** actuators, please contact us in advance if you have any special operating conditions. All sealing and guiding components in **UBZ** actuators use premium brand-name products from Europe and the United States, ensuring no internal or external leakage and an exceptionally long fault-free interval.

UBZ actuators offer three mounting options: lifting lug-mounted, flange-mounted, and foot-mounted, with **10** cylinder diameter sizes and any swing angle between **0° and 360°**. Their output uses GB standard spline holes or shaft output. The maximum operating pressure of a **UBZ** actuator is **21 MPa**, and the maximum output torque reaches **1,158,120 Nm** (approximately **116 t**on-meters). Please note that when selecting the lifting lug-mounted and flange-mounted models, the bolts connecting the lifting lugs or flanges must not bear torque for the following reasons: **1**. Torque will affect the accuracy of the swing angle; **2**. Torque will induce shear stress on the bolts, which may result in bolt shearing. For lifting lug-mounted models, torque must be transmitted and borne by the two side faces of the lifting lugs (**A1h8**). For flange-mounted models, torque must be transmitted and borne by the two side faces of the flanges (**A4h8**). Since the bolts of foot-mounted models are subjected to substantial cyclic alternating tensile forces during operation, high-strength bolts of grade **10.9** or above must be used.

A **UBZ** actuator is a swing mechanism that utilizes a four-cylinder, four-piston, dual-plunger rack to drive a pinion shaft. The two hydraulic cylinders at diagonal positions simultaneously receive oil supply and oil return. During manufacturing, the diagonally opposed hydraulic cylinders are connected separately via pipelines and oil passages, allowing the customer to operate all four cylinders by connecting only two oil pipes. **UBZ** actuators feature **SAE** standard flange ports. The hydraulic ports on all four cylinders of each rotary actuator have identical connection dimensions, allowing flanges to be mounted interchangeably. Consequently, the two oil pipes can be connected to the hydraulic ports on either side or both sides of the **UBZ** actuator. A pair of **SAE** flanges is supplied with the **UBZ** actuator, allowing the customer to simply weld the oil pipes to the flanges for installation. Upon request, we can also supply hydraulic ports in metric threads, imperial threads, or other customized types.

The output torque of the **UBZ** actuator is directly proportional to the medium pressure provided by the hydraulic system. The static and dynamic friction resistance (minimum starting pressure) of the **UBZ** actuator is **≤1 MPa**. The specifications table on page 1 lists the torque coefficient K, representing the output torque per unit of medium pressure (**MPa**). If the supplied medium pressure to the **UBZ** actuator is **P** (**MPa**), the output torque will be calculated as **K(P−1)** Nm. If the required output torque is **M** (**KN**) and the supplied medium pressure is **P** (**MPa**), then the required torque coefficient K_1 $(\mathbf{KN/Mpa}) = \frac{\mathbf{M}}{\mathbf{P-1}}$, and you must select a **UBZ** model where **K** ≥ $\mathbf{K_1}$. For user convenience, Table **1** lists the output torques of **UBZ** actuators under several commonly used operating pressures. The output torque at **21 MPa** represents the rated torque capacity of the **UBZ** actuator, meaning that neither the forward output torque nor the reverse torque (torque transmitted back to the **UBZ**

actuator through the pinion shaft from external forces) should exceed this rated torque value. Exceeding this value may result in reduced service life or even mechanical failure.

UBZ actuators offer a swing angle range of **0° to 360°**, which can be freely selected by the customer as needed. Commonly selected swing angles include **90°**, **180°**, **270°**, and **360°**. **UBZ** actuators are shipped with an angle tolerance of **±1°**, and a repetitive positioning accuracy of **≤30°**.

Proper positioning of the rotary actuator's swing angle is a critical aspect that is often overlooked. Such oversight may lead to irreversible issues. The swing angle of the rotary actuator must be perfectly aligned with that of the equipment to ensure proper operation. Without precise positioning design, misalignment between the swing angle of the rotary actuator and that of the equipment may occur, making the system inoperable.

I. Selection and Design Positioning: On the side of the **UBZ** actuator's non-output end, there is a scribed line at the **12** o'clock position on the pinion shaft end cover. There is also a scribed line on the end face of the pinion shaft. When these two lines coincide, the pinion shaft is positioned at the midpoint of the swing angle α. At this position, the pinion shaft can rotate left by **1/2**α or right by **1/2**α (as indicated in the sample front view). The scribed line on the end face of the pinion shaft coincides with the center of the spline tooth crest of its output shaft or hole. Therefore, the swing angle centerline of the spline shaft or hole connected to the **UBZ** actuator on the equipment must pass through the center of the spline groove base.

II. Equipment Installation Positioning: Before connecting the **UBZ** actuator to the equipment, both the **UBZ** actuator and the equipment must be positioned at the midpoint of their swing angles. Only then can the connection and installation proceed. Alternatively, the equipment can be placed at one end position of its swing range, and the **UBZ** actuator's output shaft or hole can then be rotated to the corresponding end position before performing the connection and installation. However, it is crucial to ensure that the rotation directions of both end positions correspond; otherwise, the **UBZ** actuator will not be able to rotate. When the swing angle of the **UBZ** actuator is greater than that of the equipment, it is recommended to use the first installation method (positioning both at the midpoint position).

The swing speed of the **UBZ** actuator is directly proportional to the flow rate of the medium supplied by the hydraulic system. The swing angular velocity (°/min) can be calculated using the following formula: Swing Angular Velocity (°/min) $= \frac{\text{Medium Flow Rate (L/min)}}{\text{Oil Volume per Degree of Rotation (L/°)}}$. The oil volume per degree of rotation for the **UBZ** actuator can be found in the specifications table on page 1. Conversely, if you need to determine the required medium flow rate for a specified swing angular velocity, you can calculate it using the same formula. For applications with swing frequency requirements, it is essential to properly consider the acceleration and deceleration forces and timing.

The **UBZ** actuator is equipped with a check valve-type adjustable end-of-working-stroke cushion device. With a cushion angle of **12°**, this device ensures that when pressurized medium enters, the check valve opens, allowing flow without throttling resistance. When the medium returns and enters the cushion zone, the check valve closes, and the flow is throttled through the cushion adjustment valve, generating backpressure to decelerate and prevent impact at the end of the stroke. The structure of the cushion adjustment valve is shown in the enlarged detail view. The adjustment procedure is as follows: Stop supplying pressurized medium to the **UBZ** actuator. After confirming that there is no pressure inside the cylinder, unscrew the plug counterclockwise. Use a flathead screwdriver to adjust the cushion valve core—turn clockwise to increase the throttling effect and counterclockwise to decrease the throttling effect. After adjustment, reinstall and tighten the screw plug, then perform a test run. Repeat the adjustment as necessary until satisfactory results are achieved. Important Note: When adjusting the cushion, factors such as pressure transmission in the working chamber and the kinetic energy of the moving load must be considered. A sudden deceleration can instantaneously convert the load's kinetic energy into an impact torque, causing damage to the gear and rack tooth surfaces or even resulting in tooth

breakage. To prevent such incidents caused by over-adjustment, every **UBZ** actuator is equipped with a safety valve, which prevents instantaneous excessive backpressure during cushioning and protects the **UBZ** actuator from the impact caused by torque exceeding its rated capacity. All safety valves are precisely set at the factory and must not be adjusted arbitrarily.

When the swing speed is below **5°**/s and there is no significant kinetic energy from the load, the end cushion can be omitted to reduce costs. The end cushion device is not suitable for proportional servo systems that require precise frequency or timing control.

The standard **UBZ** actuator uses clean hydraulic oil (**NAS7-9** grade) as the working medium. If emulsions or water-glycol will be used as the medium, this must be specified when placing the order. For media such as clean water, phosphate esters, slurry, or acidic/alkaline fluids, written clarification is required. All **UBZ** actuators are factory-tested with hydraulic oil, and a small amount of hydraulic oil is retained upon delivery to prevent rust during transportation. Before using a medium that is incompatible with hydraulic oil, the user must perform thorough cleaning or circulation flushing.

The standard **UBZ** operating temperature range is **-15°C to 100°C**. High-temperature **UBZ** models operate within **-10°C to 200°C**.

The **UBZ** actuator is equipped with an air vent and pressure measurement port. During installation and operation, all air inside the hydraulic cylinder must be completely vented; otherwise, the **UBZ** actuator may experience creeping or vibration. Additionally, the internal seals may suffer cavitation damage, leading to internal leakage.

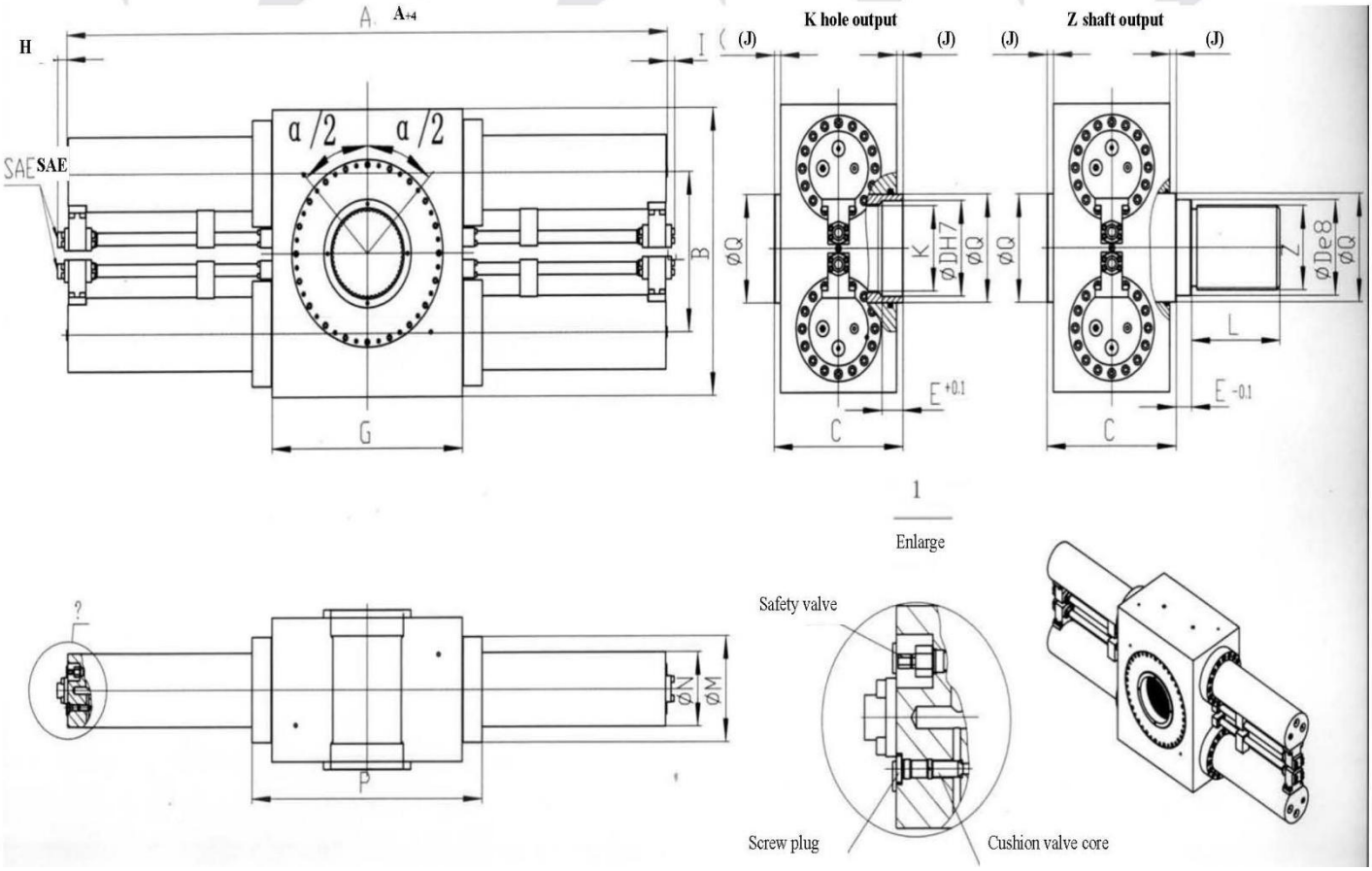
Under normal operation after installation, the **UBZ** actuator requires no maintenance for several years. There is an oil drain port on the **UBZ** housing, sealed with a screw plug. If there are no external leaks in the **UBZ** housing, it is recommended to inject lubricating grease through this port once a year as preventive maintenance. In cases of minor external leakage after prolonged operation, an oil return pipe from a low-level oil tank can be connected to the drain port, allowing continued use for an extended period. Maintenance and seal replacement should be performed only when the output torque no longer meets performance requirements.

Our company ships **UBZ** actuators with only a small amount of rust-preventive hydraulic oil inside the cylinder to prevent corrosion during transportation and short-term storage (within **one** month). For long-term storage, please fill the **UBZ** actuators completely with rust-preventive oil or hydraulic oil and seal the oil ports to prevent metal oxidation and seal aging. All exposed metal parts, such as the output shaft, threaded holes, and mating surfaces, should be coated with rust-preventive grease. Before installing a **UBZ** actuator that has been stored for an extended period, drain the rust-preventive oil from the cylinder, flush it thoroughly, and then connect it to the system.

According to customer requirements, we can also provide **UBZ** actuators with the following special features: **1**. Swing angle greater than **360°**; **2**. Output shafts on both ends; **3**. Customized connection and output methods as requested by customers; **4**. Output torque greater than **1158120 Nm**; **5**. Servo **UBZ** actuators with higher repetitive positioning accuracy and lower starting pressure; **6**. Equipped with a hydraulically controlled check valve to ensure locking at any stop position; **7**. Equipped with angle displacement sensors (rotary encoder for swing angles over **120°**); **8**. Equipped with pressure sensors or pressure relays; **9**. Equipped with proximity switches or travel switches.

优瑞纳斯 URANUS

Basic Diagram of UBZ Heavy-Duty Series Rack-and-Pinion Hydraulic Rotary Actuator



优瑞纳斯 URANUS

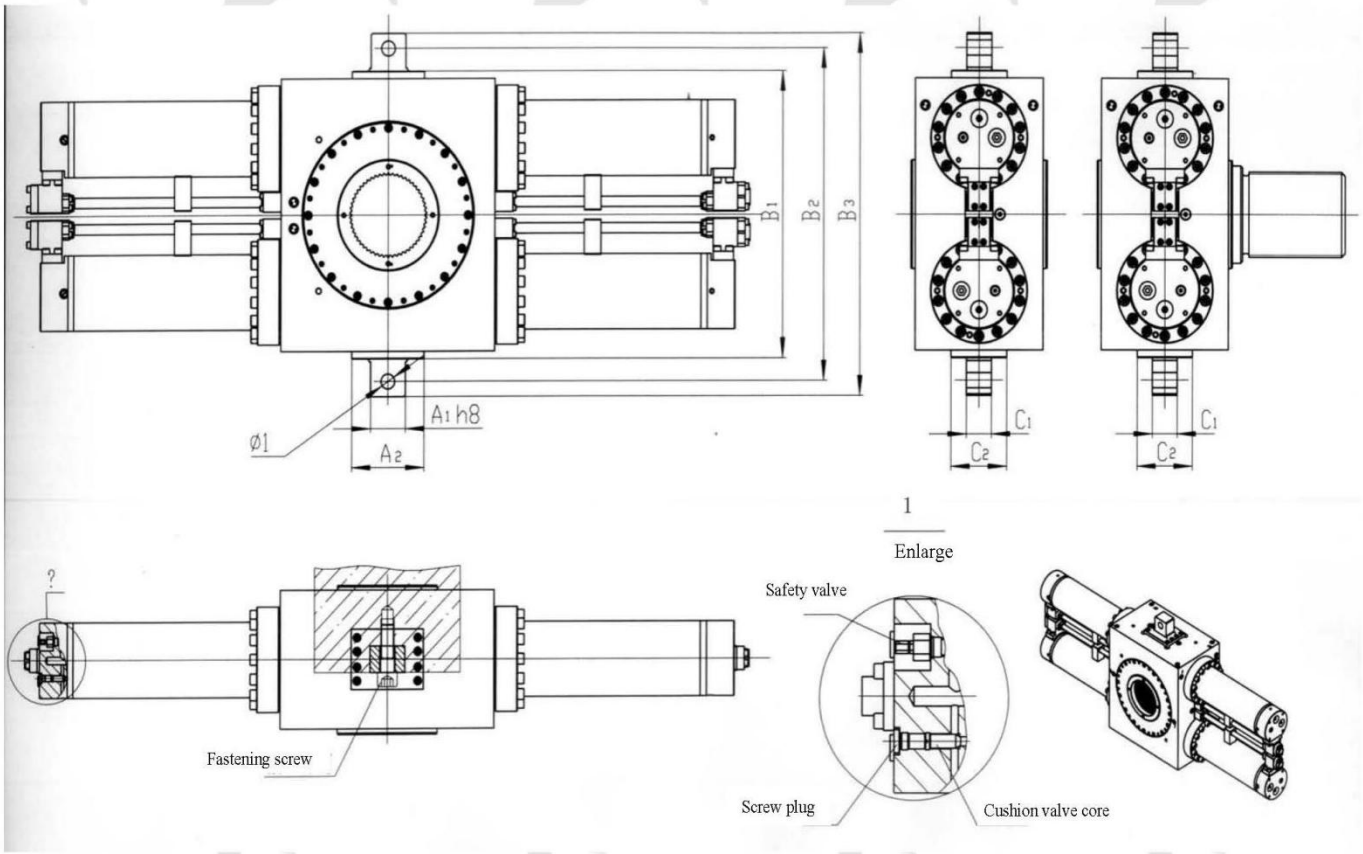
Basic Dimensions Table for UBZ Heavy-Duty Series Rack-and-Pinion Hydraulic Rotary Actuator

Model	A (Swing Angle α)	B	C	φD	E	F	G	H	I	J	L	P	φM	φN	φQ	K(Z)GB/T3478.1-1995	SAE Flange Port
UBZ...Z(K)100...	1248+4.398α	540	300	164	25	284	480	5.5	0.5	5	280	574	176	127	220	INT52zX3mX30PX6H (EXT52zX3mX30PX6f)	SAE-AFS64S
UBZ...Z(K)125...	1375+5.026α	620	340	194	30	326	530	5.5	0.5	5	300	640	220	159	254	INT46zX4mX30PX6H (EXT46zX3mX30PX6f)	SAE-AFS64S
UBZ...Z(K)140...	1495+5.564α	680	360	210	25	366	580	5.5	0.5	5	320	700	246	178	280	INT50zX4mX30PX6H (EXT50zX4mX30PX6f)	SAE-AFS64S
UBZ...Z(K)160...	1600+6.284α	760	390	250	40	406	620	5.5	0.5	5	350	750	272	194	320	INT60zX4mX30PX6H (EXT60zX4mX30PX6f)	SAE-AFS64S
UBZ...Z(K)180...	1725+6.912α	850	440	260	30	447	660	9	4	5	380	830	300	219	350	INT50zX5mX30PX6H (EXT50zX5mX30PX6f)	SAE-AFS64S
UBZ...Z(K)200...	1807+7.854α	950	470	280	40	508	770	54	50	5	420	940	330	240	360	INT54zX5mX30PX6H (EXT54zX5mX30PX6f)	SAE-AFS65S
UBZ...Z(K)220...	1959+8.796α	1040	510	312	45	569	830	54	50	5	470	1020	365	270	400	INT60zX5mX30PX6H (EXT60zX5mX30PX6f)	SAE-AFS65S
UBZ...Z(K)250...	2177+10.054α	1180	586	375	60	651	920	66	62	8	530	1130	410	295	440	INT60zX5mX30PX6H (EXT60zX5mX30PX6f)	SAE-AFS66S
UBZ...Z(K)280...	2417+11.31α	1340	676	415	60	732	1080	82	74	8	600	1310	462	320	480	INT50zX8mX30PX6H (EXT50zX8mX30PX6f)	SAE-AFS68S
UBZ...Z(K)320...	2668+12.566α	1480	750	458	80	812	1200	60	47	8	680	1450	525	370	550	INT55zX8mX30PX6H (EXT55zX8mX30PX6f)	SAE-AFS606T-76.1X12.5

Notes: 1. For SAE flange port dimensions, refer to page 13.

2. For spline shaft and hole dimensions, refer to page 14.

UBZ Heavy-Duty Series Rack-and-Pinion Hydraulic Rotary Actuator — Lifting Lug Mounting Outline Drawing (UBZR...)



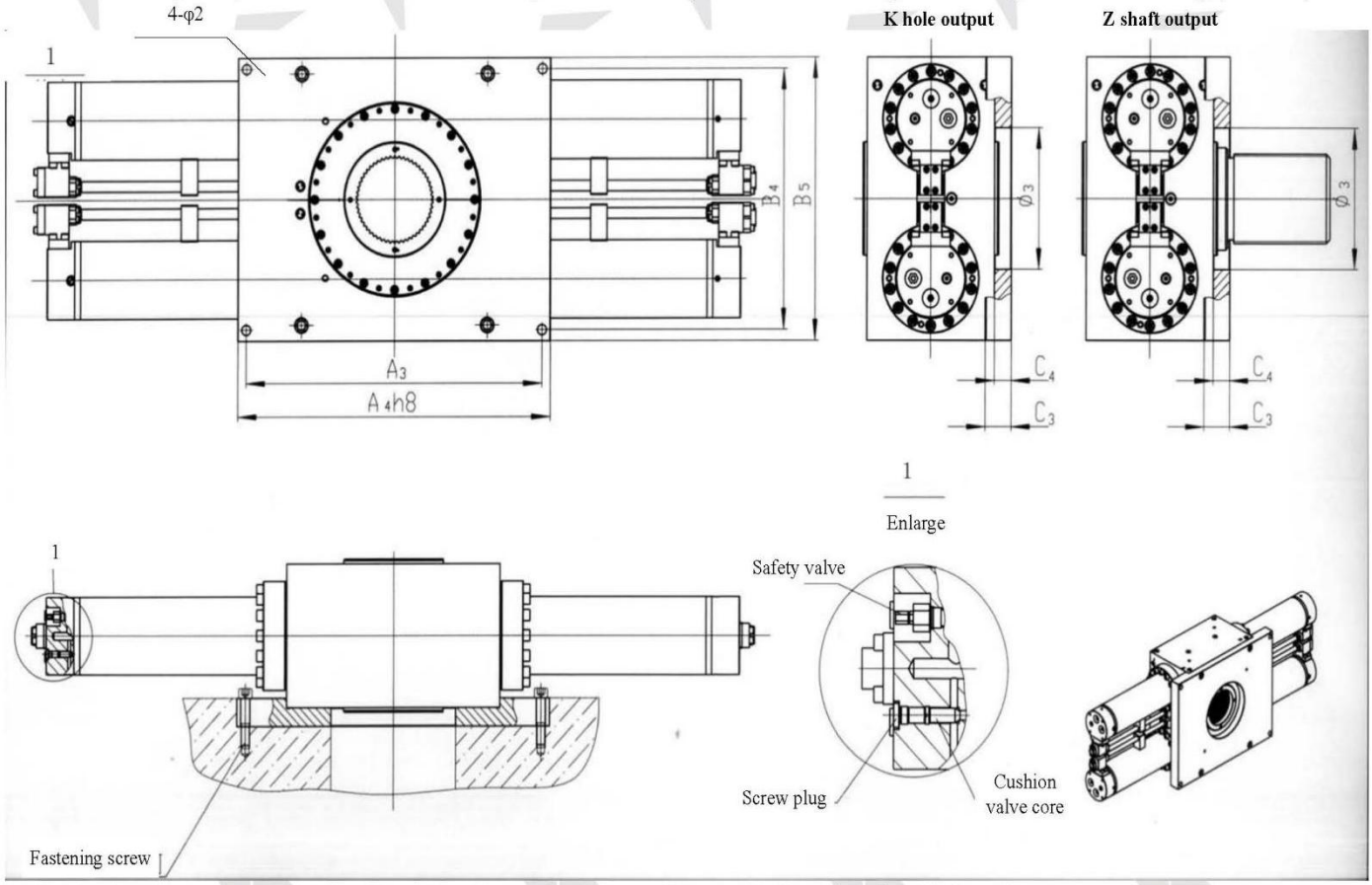
Note: The two fastening screws are not designed to withstand torque. Torque transmission must be borne by both A1h8 side surfaces.

UBZ Heavy-Duty Series Rack-and-Pinion Hydraulic Rotary Actuator — Lifting Lug Mounting Dimensions Table

Model	A4(h8)	A2	B1(h13)	B2	B3	C1	C2	Ø1(H8)	K(Z)GB/T3478.1-1995	SAE Flange Port
UBZR...100...	$85^{-0.054}$	168	550-1.1	640	722	45	128	$38^{+0.039}$	INT52zX3mX30PX6H (EXT52zX3mX30PX6f)	SAE-AFS64S
UBZR...125...	$105^{-0.054}$	188	630-1.1	730	830	52	128	$44^{+0.039}$	INT46zX4mX30PX6H (EXT46zX3mX30PX6f)	SAE-AFS64S
UBZR...140...	$105^{-0.054}$	188	690-1.25	790	886	52	128	$44^{+0.039}$	INT50zX4mX30PX6H (EXT50zX4mX30PX6f)	SAE-AFS64S
UBZR...160...	$110^{-0.054}$	204	770-1.25	870	970	52	150	$50^{+0.039}$	INT60zX4mX30PX6H (EXT60zX4mX30PX6f)	SAE-AFS64S
UBZR...180...	$115^{-0.054}$	210	860-1.4	970	1085	70	160	$50^{+0.039}$	INT50zX5mX30PX6H (EXT50zX5mX30PX6f)	SAE-AFS64S
UBZR...200...	$125^{-0.063}$	260	970-1.4	1100	1200	90	200	$50^{+0.039}$	INT54zX5mX30PX6H (EXT54zX5mX30PX6f)	SAE-AFS65S
UBZR...220...	$140^{-0.063}$	296	1060-1.65	1200	1320	100	200	$60^{+0.046}$	INT60zX5mX30PX6H (EXT60zX5mX30PX6f)	SAE-AFS65S
UBZR...250...	$140^{-0.063}$	310	1220-1.65	1360	1480	100	240	$60^{+0.046}$	INT60zX5mX30PX6H (EXT60zX5mX30PX6f)	SAE-AFS66S
UBZR...280...	$170^{-0.063}$	370	1380-1.95	1560	1720	120	262	$70^{+0.046}$	INT50zX8mX30PX6H (EXT50zX8mX30PX6f)	SAE-AFS68S
UBZR...320...	$180^{-0.063}$	400	1520-1.95	1720	1880	140	280	$76^{+0.046}$	INT55zX8mX30PX6H (EXT55zX8mX30PX6f)	SAE-AFS606T-76.1X12.5

Note: For the remaining dimensions, please refer to the Basic Dimensions Table (page 6).

UBZ Heavy-Duty Series Rack-and-Pinion Hydraulic Rotary Actuator — Flange Mounting Outline Drawing (UBZF...)



Note: The four fastening screws are not designed to withstand torque. Torque transmission must be borne by both A4h8 side surfaces.

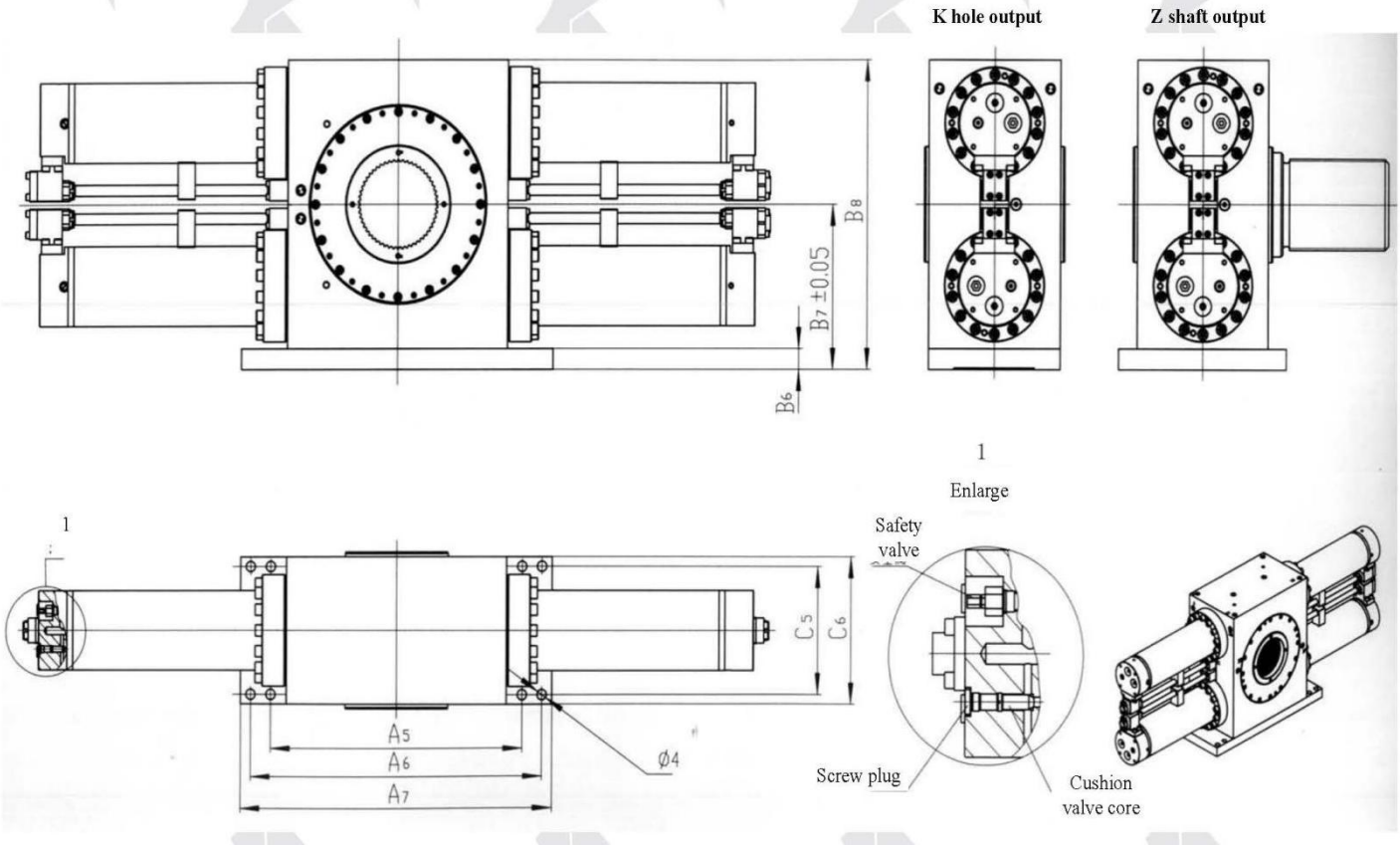
UBZ Heavy-Duty Series Rack-and-Pinion Hydraulic Rotary Actuator — Flange Mounting Dimensions Table

Model	A3	A4(h8)	B4	B5	C3	C4	φ2	φ3	K(Z)GB/T3478.1-1995	SAE Flange Port
UBZF...100...	660	$706^{-0.125}$	470	520	62	42	23	225	INT52zX3mX30PX6H (EXT52zX3mX30PX6f)	SAE-AFS64S
UBZF...125...	740	$790^{-0.125}$	540	590	70	45	25	260	INT46zX4mX30PX6H (EXT46zX3mX30PX6f)	SAE-AFS64S
UBZF...140...	810	$860^{-0.140}$	600	650	70	45	28	290	INT50zX4mX30PX6H (EXT50zX4mZ30PX6f)	SAE-AFS64S
UBZF...160...	870	$930^{-0.140}$	660	720	85	55	32	330	INT60zX4mX30PX6H (EXT60zX4mX30PX6f)	SAE-AFS64S
UBZF...180...	960	$1020^{-0.165}$	740	810	85	55	35	360	INT50zX5mX30PX6H (EXT50zX5mX30PX6f)	SAE-AFS64S
UBZF...200...	1070	$1130^{-0.165}$	830	900	90	60	35	370	INT54zX5mX30PX6H (EXT54ZX5mX30PX6f)	SAE-AFS65S
UBZF...220...	1100	$1160^{-0.165}$	920	990	90	60	38	410	INT60zX5mX30PX6H (EXT60zX5mX30PX6f)	SAE-AFS65S
UBZF...250...	1220	$1290^{-0.195}$	1030	1120	100	68	38	450	INT60zX5mX30PX6H (EXT60zX5mX30PX6f)	SAE-AFS66S
UBZF...280...	1410	$1490^{-0.195}$	1180	1280	120	80	44	500	INT50zX8mX30PX6H (EXT50zX8mX30PX6f)	SAE-AFS68S
UBZF...320...	1570	$1660^{-0.230}$	1320	1460	125	80	50	570	INT55zX8mX30PX6H (EXT55zX8mX30PX6f)	SAE-AFS606T-76.1X12.5

Note: For the remaining dimensions, please refer to the Basic Dimensions Table (page 6).

优瑞纳斯®
URANUS

UBZ Heavy-Duty Series Rack-and-Pinion Hydraulic Rotary Actuator — Foot Mounting Outline Drawing (UBZJ...)



优瑞纳斯®
URANUS

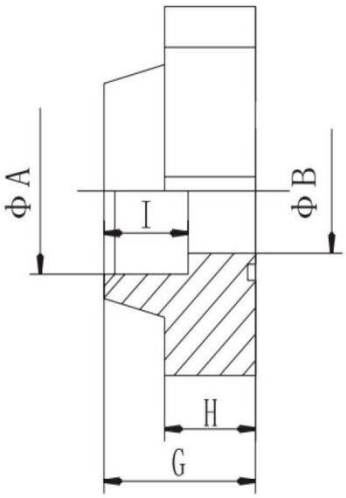
UBZ Heavy-Duty Series Rack-and-Pinion Hydraulic Rotary Actuator — Foot Mounting Dimensions Table

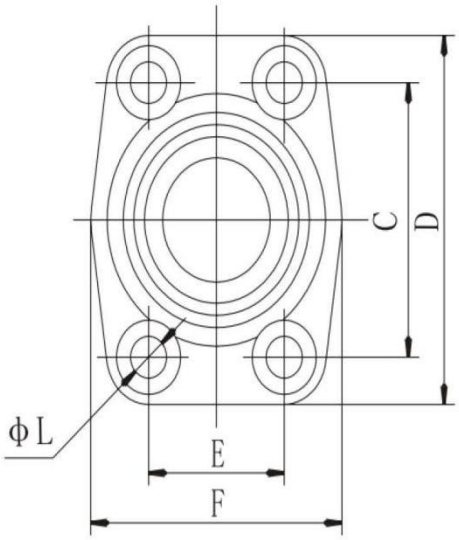
Model	A5	A6	A7	B6	B7-0.1	B8	C5	C6	φ4	K(Z)GB/T3478.1-1995	SAE Flange Port
UBZJ...100...	560	X	620	40	300-0.1	570	236	296	4-φ24	INT52zX3mX30PX6H (EXT52zX3mX30PX6f)	SAE-AFS64S
UBZJ...125...	630	X	695	45	345-0.1	655	275	330	4-φ29	INT46zX4mX30PX6H (EXT462X3mX30PX6f)	SAE-AFS64S
UBZJ...140...	690	X	760	55	385-0.1	725	295	350	4-φ35	INT50zX4mX30PX6H (EXT50zX4mX30PX6f)	SAE-AFS64S
UBZJ...160...	740	X	820	60	430-0.1	810	320	380	4-φ38	INT60zX4mX30PX6H (EXT602X4mX30PX6f)	SAE-AFS64S
UBZJ...180...	800	X	890	65	480-0.1	905	360	430	4-φ44	INT50zX5mX30PX6H (EXT50zX5mX30PX6f)	SAE-AFS64S
UBZJ...200...	870	1050	1115	65	530-0.1	1005	395	460	8-φ29	INT54zX5mX30PX6H (EXT54zX5mX30PX6f)	SAE-AFS65S
UBZJ...220...	940	1130	1200	70	580-0.1	1100	430	500	8-φ35	INT60zX5mX30PX6H (EXT602X5mX30PX6f)	SAE-AFS65S
UBZJ...250...	1040	1250	1330	80	660-0.1	1250	490	570	8-φ38	INT60zX5mX30PX6H (EXT602X5mX30PX6f)	SAE-AFS66S
UBZJ...280...	1220	1470	1560	90	750-0.1	1420	560	660	8-φ44	INT50zX8mX30PX6H (EXT50zX8mX30PX6f)	SAE-AFS68S
UBZJ...320...	1360	1650	1750	100	830-0.1	1570	630	734	8-φ50	INT55zX8mX30PX6H (EXT55zX8mX30PX6f)	SAE-AFS606T-76.1X12.5

Note: For the remaining dimensions, please refer to the Basic Dimensions Table (page 6).

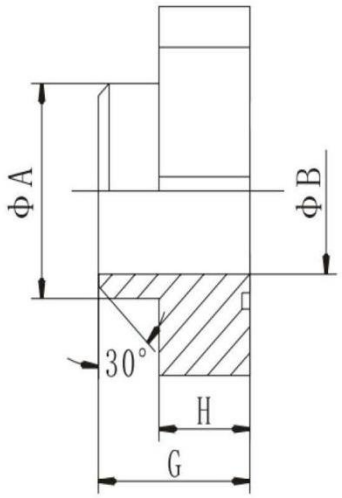
SAE Insert-Type Weld Flange

AFS type





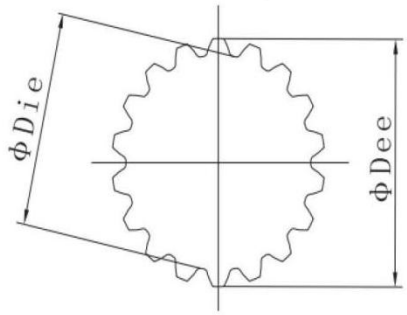
AFS606T type



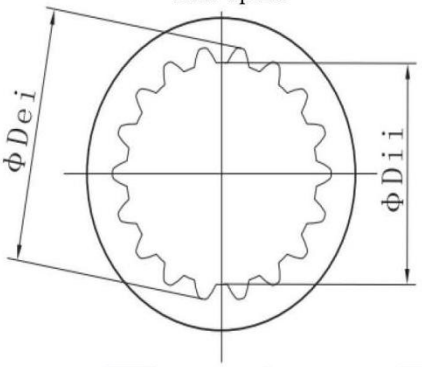
Model	Dimension Annotations										Compatible Hex Socket Screws Grade 12.9	Compatible O-Ring (TUO)	Weight (kg)
	A	B	C	D	E	F	G	H	I	L			
SAE-AFS64S	34	25	57.2	81	27.8	65	42	25	22	13	M12X45	32.5X3.53	0.76
SAE-AFS65S	42.8	32	66.7	95	31.8	78	45	27	25	14.5	M14X45	37.5X3.53	1.2
SAE-AFS66S	48.6	38	79.4	112	36.5	94	50	30	28	17.5	M16X60	47.5X3.53	1.65
SAE-AFS68S	61	51	96.8	134	44.5	114	65	37	24	21	M20X65	56X3.53	2.45
SAE-AFS606T-76.1X12.5	76.1	51	96.8	133	44.5	114	70	37	-	21	M20X65	56.75X3.53	4.2

GB/T 3478.1-1995 Involute Spline Dimensions Table

Shaft Spline



Hole Spline



Model	Major Diameter (External Spline)	Minor Diameter (External Spline)	Number of Teeth	Module	Pressure Angle	Accuracy Class	Model	Major Diameter (External Spline)	Minor Diameter (External Spline)	Number of Teeth	Module	Pressure Angle	Accuracy Class
	Dee	Die	z	m	α			Dei	Dii	z	m	α	
EXT52zX3mX30PX6f	159	151.5	52	3	30°	6f	INT52zX3mX30PX6H	160.5	153.5	52	3	30°	6H
EXT46zX4mX30PX6f	188	178	46	4	30°	6f	INT46zX4mX30PX6H	190	180.6	46	4	30°	6H
EXT50zX4mX30PX6f	204	194	50	4	30°	6f	INT50zX4mX30PX6H	206	196.6	50	4	30°	6H
EXT60zX4mX30PX6f	244	234	60	4	30°	6f	INT60zX4mX30PX6H	246	236.6	60	4	30°	6H
EXT50zX5mX30PX6f	255	242.5	50	5	30°	6f	INT50zX5mX30PX6H	257.5	245.7	50	5	30°	6H
EXT54zX5mX30PX6f	275	262.5	54	5	30°	6f	INT54zX5mX30PX6H	277.5	265.7	54	5	30°	6H
EXT60zX5mX30PX6f	305	292.5	60	5	30°	6f	INT60zX5mX30PX6H	307.5	295.7	60	5	30°	6H
EXT60zX6mX30PX6f	366	351	60	6	30°	6f	INT60zX6mX30PX6H	369	354.8	60	6	30°	6H
EXT50zX8mX30PX6f	408	388	50	8	30°	6f	INT50zX8mX30PX6H	412	392.9	50	8	30°	6H
EXT55zX8mX30PX6f	448	428	55	8	30°	6f	INT55zX8mX30PX6H	452	432.9	55	8	30°	6H