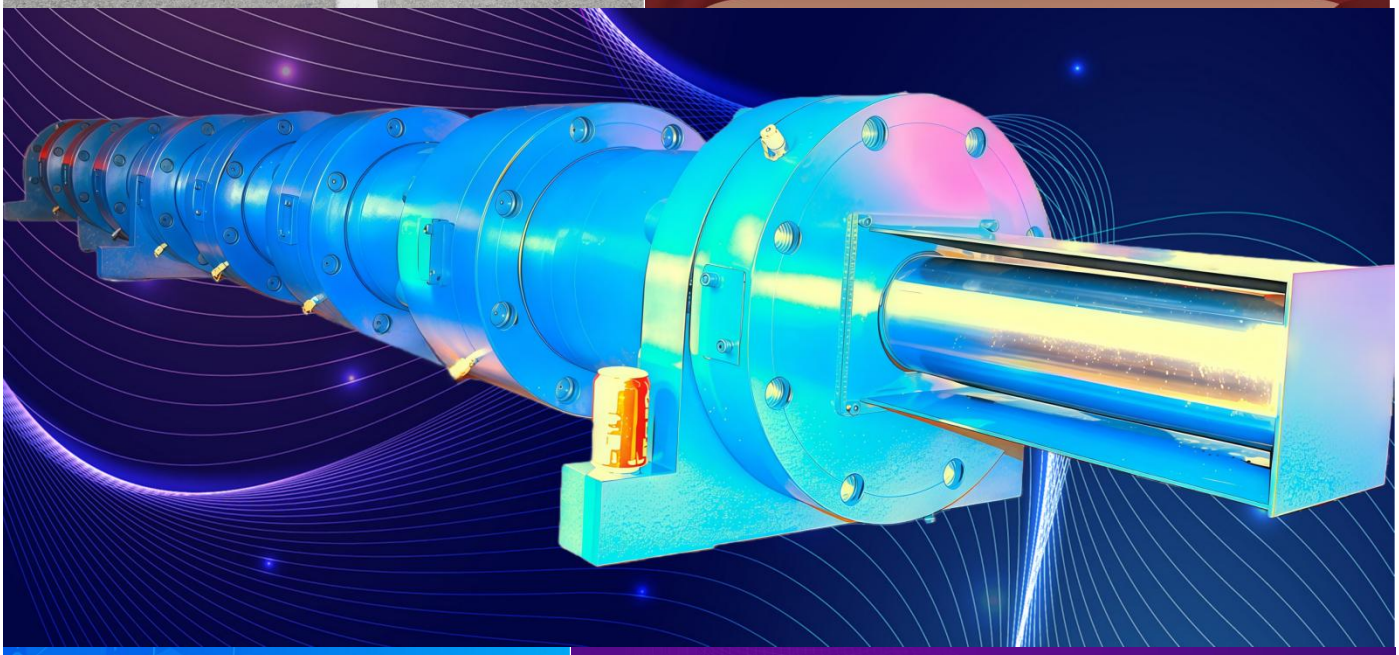
UF Series Synchronous Distributor Hydraulic Cylinder Product Photos



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UF Series Synchronous Distributor Hydraulic Cylinder Product Catalog

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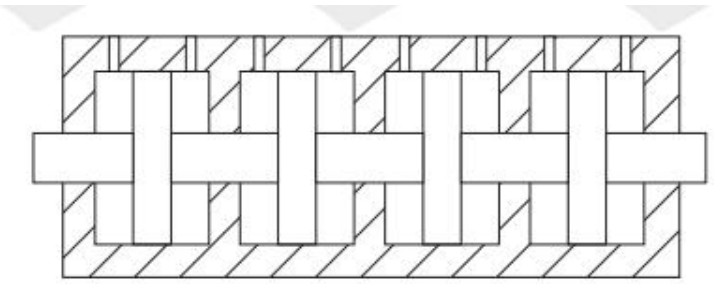
SYNCHRONISM DISTRIBUTER CYLINDER

UF Series Synchronous Distributor Hydraulic Cylinder Selection and Usage Instructions

The UF Series Synchronous Distributor Hydraulic Cylinder (hereinafter referred to as the UF Cylinder) is one of the new product series developed by URANUS.

The UF Cylinder is a single-rod, multi-piston hydraulic cylinder. The schematic diagram is shown on the right：



Since all pistons share a single cylinder barrel and a single piston rod, their annular cross-sectional areas are equal. When the pistons move, all pistons travel the same stroke at the same speed, so the flow and volume of the pressure medium at both input and output are exactly the same. The greatest advantage of the UF Cylinder is that its synchronization accuracy is not affected by system pressure, flow rate, load, or other external factors.

The UF Cylinder adopts the most advanced zero internal and external leakage seals from Europe and the United States. From a macro perspective, the UF Cylinder can achieve absolute synchronization , a capability that speed control valves, synchronous valves, or synchronous motors cannot provide.

Since the UF Cylinder has no synchronization error, there is no need to use various displacement sensors for tracking, detection, or comparison, nor is there a need for expensive servo or proportional systems. This greatly reduces cost, failure rate, and maintenance expenses.

Performance of the UF Cylinder:Working pressure: 0~25 MPa, Minimum starting pressure: ≤0.3 MPa, Pressure test: 32 MPa. Conventional UF Cylinders can use various mineral oils as the working medium. Special UF Cylinders can use water, water–glycol, emulsions, phosphate esters, and various weakly acidic or alkaline working media. Operating temperature: Conventional UF Cylinders: –35 °C to ~80 °C, High-temperature UF Cylinders: –35 °C to ~220 °C. Operating speed: Conventional UF Cylinders: 500 mm/s, High-speed UF Cylinders: up to 2,000 mm/s or higher. Maximum output volume: Double-piston UF Cylinder: 2 × 240 L, Four-piston UF Cylinder: 4 × 120 L

The UF Cylinder can achieve synchronization for the following types of hydraulic cylinders:

1. Single-acting plunger cylinders, single-acting multi-stage cylinders, and rack-and-pinion swing hydraulic cylinders with the same plunger diameter and stroke.
2. Double-acting hydraulic cylinders and double-acting multi-stage cylinders with identical piston diameter, piston rod diameter, and stroke.
3. Double-acting piston cylinders with identical piston diameter and stroke, but different piston rod diameters.
4. When the diameter and stroke of a double-acting piston cylinder are the same as the plunger diameter and stroke of a single-acting plunger cylinder, synchronous operation of these two different types of hydraulic cylinders can also be achieved.
5. Various hydraulic cylinders with different types, cylinder bores, rod diameters, strokes, loads, and working pressures can achieve simultaneous operation as long as their volumes are equal.

We can also provide the UFT Non-Equal-Volume Synchronous Distributor Cylinder, which can achieve synchronous operation of hydraulic cylinders that have the same stroke but different cylinder diameters, rod diameters, and volumes. UFT Cylinders are non-standard cylinders designed and manufactured according to customer requirements.

UF Cylinders equipped with check valves can also be used as fixed-displacement injectors.

UF Cylinders with built-in or external displacement sensors can achieve servo or proportional control of synchronous cylinders.

UF Cylinders are not suitable for synchronous cylinders with large internal leakage.

Our company can also provide complete synchronous hydraulic systems, including both synchronous cylinders and synchronous hydraulic assemblies.

Our synchronous hydraulic cylinders use high-quality imported seals from Europe and the United States, ensuring not only zero internal and external leakage but also extremely long service life. The typical failure-free operational distance ranges from one million meters to ten million meters.

Our UZ Series Synchronous Hydraulic Cylinder Stations are not only reliable in operation but also compact in structure and aesthetically designed.

Selection Method for UF Cylinders:

1. Calculate the volume of the synchronous cylinder first: in cm^3 , then divide by the annular area of the UF Cylinder (see page 5) to determine the stroke of the UF Cylinder. Two examples are provided:

1.1 The volume of a plunger cylinder with a diameter of 80 mm and a stroke of 1000 mm, or a piston cylinder with a cylinder diameter of 80 mm, rod diameter of 45 mm, and stroke of 1000 mm (rodless side) is:(80÷20)2 π ×(1000÷10)=1600 π cm3

If a UF Cylinder with a bore of 125 mm is selected, the stroke of the UF Cylinder should be: 1600 π ÷32.81 π ×10≈488mm

If a UF Cylinder with a bore of 140 mm is selected, the stroke should be:1600 π ÷39.08 π ×10≈409mm

1.2 The volume of the rod-side chamber of a piston cylinder with a cylinder diameter of 100 mm, rod diameter of 70 mm, and stroke of 1000 mm is:

[(100÷20)2-(70÷20)2] π ×(1000÷10)=1275 π cm3

If a UF Cylinder with a bore of 125 mm is selected, the stroke of the UF Cylinder should be:

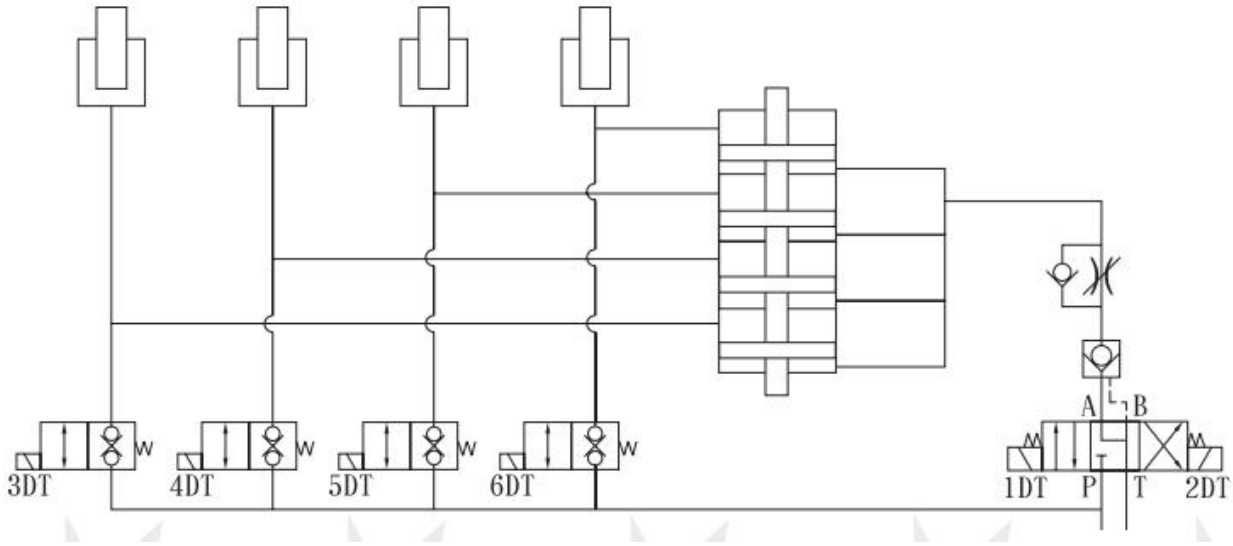
2. Compensation for volume loss: To prevent volume loss caused by calculation errors, manufacturing tolerances, and pipeline volume losses, the UF Cylinder stroke is generally made 3 – 20 mm longer than the calculated stroke. Therefore, in example 1.1, when selecting a UF125 Cylinder, the stroke can be increased to 495 mm; for a UF140 Cylinder, the stroke can be increased to 415 mm. In example 1.2, the UF125 Cylinder stroke can be increased to 395 mm. Extending the actual stroke of the UF Cylinder also prevents impacts at each end of the stroke and prolongs service life.

3. Stroke limitation: Because the UF Cylinder consists of multiple pistons in series, the stroke of the UF Cylinder (especially when synchronizing multiple cylinders) should not be too long.

Working Principle of the UF Cylinder:

There are many types of synchronization systems for synchronous cylinders. Below, two commonly used simple examples are provided to illustrate the working principle of the UF Cylinder.

1. Hydraulic Schematic Diagram of a Four-Piston Synchronous Cylinder



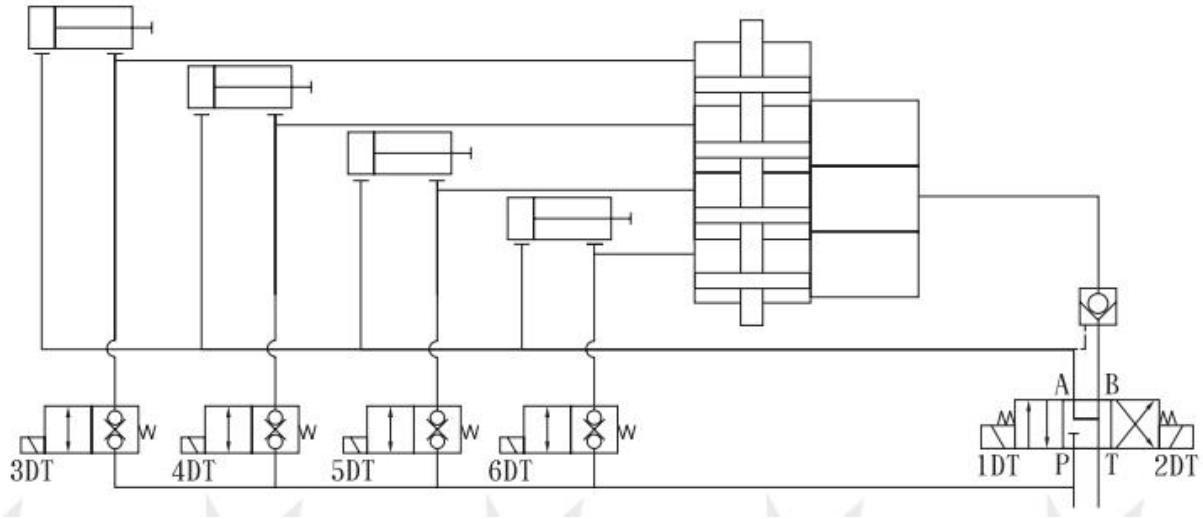
In the diagram, when 1DT is energized, the three-position four-way solenoid valve switches direction, allowing pressurized oil to enter the four lower chambers of the UF Cylinder, pushing the four pistons upward. The working medium is then delivered in equal amounts to the four plunger cylinders, causing all four plunger cylinders to rise synchronously. When solenoid 1DT is de-energized, the directional valve returns to its original position, and the plunger cylinders stop moving. The oil in the lower chambers of the UF Cylinder is locked by the pilot-operated check valves, preventing the plunger cylinders from descending. When 2DT is energized, the directional valve switches, opening the pilot-operated check valves. The load-generated pressure causes the UF Cylinder pistons to move downward, and the working medium flows through throttle valves back to the oil tank, allowing all four plunger cylinders to descend synchronously. To prevent accidents, each synchronous cylinder is equipped with a two-position, two-way make-up oil valve, which must be a zero-leakage type. This valve is actuated by a limit or proximity switch installed just before the stroke end of the synchronous cylinder (the exact distance is determined according to the required synchronization accuracy). For example, if a synchronization accuracy of no less than 2 mm is required, a limit switch is installed 1.5 mm before the end of the plunger cylinder stroke.

If some cylinders reach the stroke end while others have not yet actuated the limit switch, the system triggers an audible and visual alarm and energizes the solenoid of the two-way valve, switching the valve to allow pressurized oil to flow directly into the cylinder, ensuring it reaches the stroke end.

When an alarm signal occurs, the fault should be promptly addressed. Possible causes of the fault include:

① External leakage in the pipelines or fittings. ② Internal or external leakage in the synchronous cylinders. ③ Internal or external leakage in the make-up oil valves. ④ Internal or external leakage in the UF Cylinder.

2. Hydraulic Schematic Diagram of a Four-Piston Synchronous Cylinder



The piston-type synchronous cylinders, whether with a rod chamber or without a rod chamber, can all be connected to the UF Cylinder at the user's discretion. In general, it is recommended to connect the UF Cylinder to the chamber with smaller volume and lower working pressure. A smaller volume results in a lower cost for the UF Cylinder, and a lower working pressure ensures a longer fault-free service life. In the diagram, when 1DT is energized, the directional valve switches, and pressurized oil enters the lower chamber of the UF Cylinder, pushing the piston and transferring oil from the upper chamber into the rod chamber of the synchronous cylinder, causing the piston rod to retract synchronously. When 1DT is de-energized, the directional valve returns to the center position, and the pilot-operated check valves lock all hydraulic cylinders. When 2DT is energized, pressurized oil enters the rodless chamber of the synchronous cylinder, simultaneously opening the pilot-operated check valves. The movement of the synchronous cylinder piston transfers the working medium from its rod chamber into the upper chamber of the UF Cylinder, pushing the piston downward and causing all four piston rods to extend synchronously. The make-up oil operation is essentially the same as for synchronous plunger cylinders, except that the limit switch should now be installed just before the fully retracted position of the piston rod.

Installation of the UF Cylinder:To save space and extend service life, UF Cylinders are designed for vertical installation. The flange dimensions are provided on page 5. The mounting foundation for the flange must be secure and reliable. If horizontal installation is absolutely necessary, the cylinder should be kept as level as possible. Longer and heavier UF Cylinders should have additional support points and be firmly secured to prevent displacement or impact caused by directional changes. UF Cylinders installed horizontally do not come with a base mounting flange, but mounting supports can be provided upon customer request.

Precautions for Using UF Cylinders:Since UF Cylinders are volumetric synchronous cylinders, any leakage will affect their synchronization performance. Therefore, the following precautions must be observed:

1. All air inside the UF Cylinder, synchronous cylinders, and piping must be completely purged.
2. Synchronous cylinders, make-up oil valves, pipelines, and connections must be free of leaks.
3. The working fluid must be filtered, with a cleanliness level of NAS1638 Class 9 or ISO4406:19/15 or higher.
4. The UF Cylinder's vent screw must be securely tightened after venting.
5. Working pressure must not exceed the rated pressure.
6. The mounting foundation must be firm and reliable.
7. Any synchronous error alarms must be promptly inspected and rectified.
8. For long high-pressure pipelines, expansion and contraction should be minimized as much as possible.

For long-term storage, UF Cylinders should be filled with anti-corrosion oil and the oil ports sealed.

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UF Series Synchronous Distributor Hydraulic Cylinders

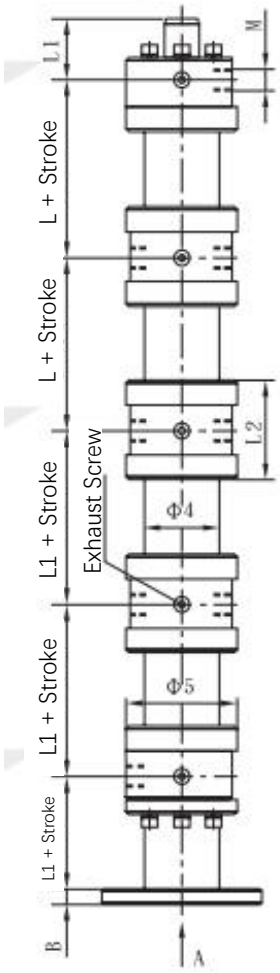
Selection Guide

UF ___ X ___ X ___ ___ ___ ___ ___

URANUS Synchronous Distributor Hydraulic Cylinders		
Number of Pistons	2，3，4……	
Cylinder diameter	Φ80，Φ100，Φ125，……	
Stroke		……mm
Mounting Type	Vertical	No Marking
	Horizontal	P
Rated pressure	≤25MPa	No Marking
	>25MPa	Pressure (MPa)
Working Medium	Mineral Oil	No Marking
	Water-Glycol Emulsion	W
	Other Media	Description
Medium Temperature	-35~+80 ℃	No Marking
	-30~220℃	R
Operating Speed	0~500mm/s	No Marking
	0~2000mm/s	V

UF Series Distributor Hydraulic Cylinders Overall Dimensions and Mounting Sizes

Cylinder diameter	Rod diameter	Annular Area (cm^2)	L	L1	L2	Φ1	Φ2	Φ3	Φ4	Φ5	Φ6	B	Oil Port (M)
80	40	12 π	154	50	104	180	210	17	108	152	50	16	M27×2
100	40	21 π	187	60	125	215	250	17	127	176	50	16	M33×2
125	50	32.81 π	227	65	145	260	300	17	159	220	60	16	M42×2
140	63	39.08 π	231	65	155	290	335	17	178	246	70	16	M42×2
160	70	51.75 π	242	70	176	330	380	17	194	272	80	16	M48×2
180	70	68.75 π	262	70	186	365	420	17	219	300	80	16	M48×2
200	90	79.75 π	262	75	196	400	460	22	245	330	100	20	M48×2
220	100	96 π	262	75	216	450	520	22	270	365	110	20	M48×2
250	110	126 π	296	80	236	500	570	22	299	410	120	20	M48×2
280	125	56.94 π	306	80	256	570	660	22	325	642	130	20	M48×2
320	140	207 π	326	80	256	650	750	22	375	525	150	20	M48×2
360	160	260 π	356	80	276	650	780	22	420	560	170	20	M48×2
400	160	336 π	406	80	276	730	820	22	470	625	170	20	M48×2



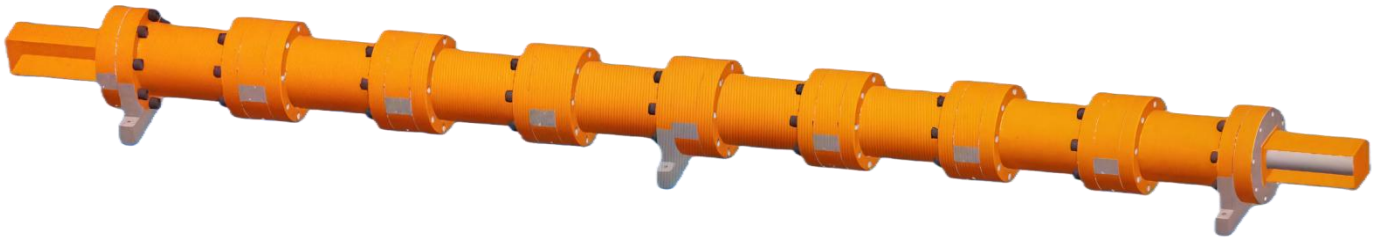
Non-Equal-Volume Synchronous Distributor Hydraulic Cylinders

The synchronization principle of non-equal-volume synchronous distributor hydraulic cylinders is the same as that of UF cylinders. They are also single-rod, multi-piston hydraulic cylinders, with all pistons having identical strokes and speeds. The size of each piston is determined by the output volume required by the customer. The size of each piston is determined by the output volume required by the customer. When you require a non-equal-volume synchronous distributor hydraulic cylinder, please provide the desired volume (or the cylinder bore, rod diameter, and stroke of the synchronous cylinder), quantity, working pressure, and other relevant parameters. Based on this information, we will provide precise overall dimensions and technical specifications, which will be finalized upon your confirmation before design and manufacturing.

Product Application Examples:

1.Synchronous Distributor Hydraulic Cylinder UF8Φ320×480P

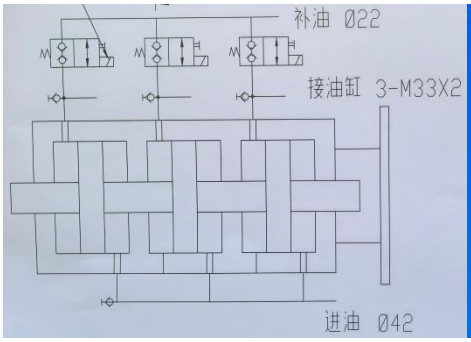
Bore Diameter: 320 mm; Rod Diameter: 140 mm; Stroke: 480 mm

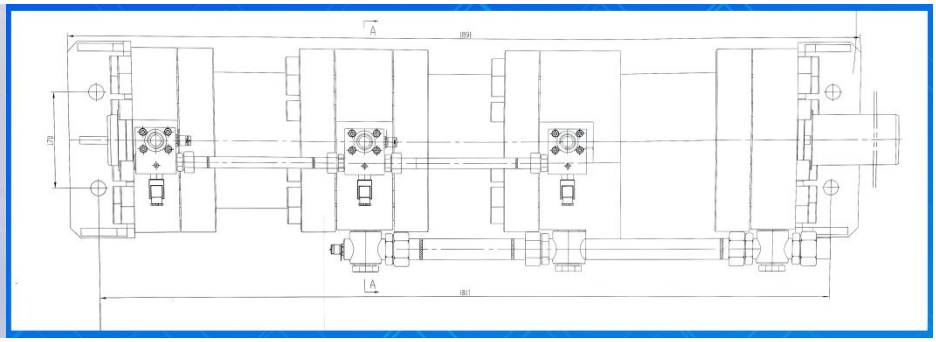


2.Synchronous Distributor Hydraulic Cylinder UF3Φ160×295

Bore Diameter: 160 mm; Rod Diameter: 70 mm; Stroke: 295 mm

Working Pressure: 25 MPa; Test Pressure: 37.5 MPa



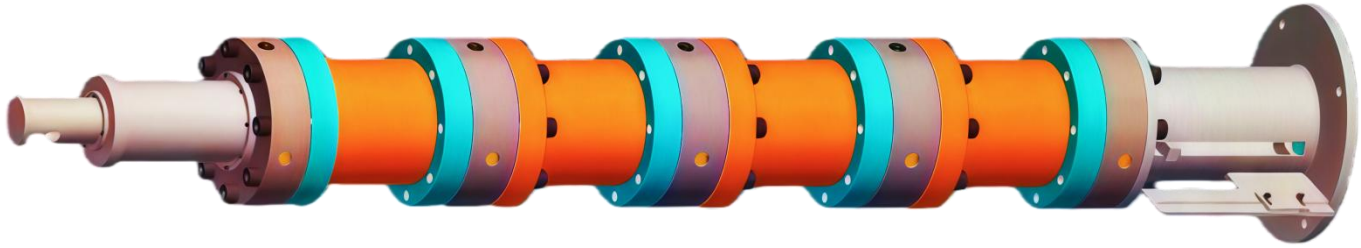


3.Synchronous Distributor Hydraulic Cylinder UF4Φ200/90-200LH

Bore Diameter: 200 mm; Rod Diameter: 90 mm; Stroke: 200 mm

Working Pressure: 25 MPa; Test Pressure: 32 MPa; Working Medium: Water Glycol

Built-in Displacement Sensor



4.Synchronous Distributor Hydraulic Cylinder UF2Φ125×145P

Bore Diameter: 125 mm; Rod Diameter: 50 mm; Stroke: 145 mm

Working Pressure: 21 MPa; Test Pressure: 31.5 MPa; Working Medium: Hydraulic Oil