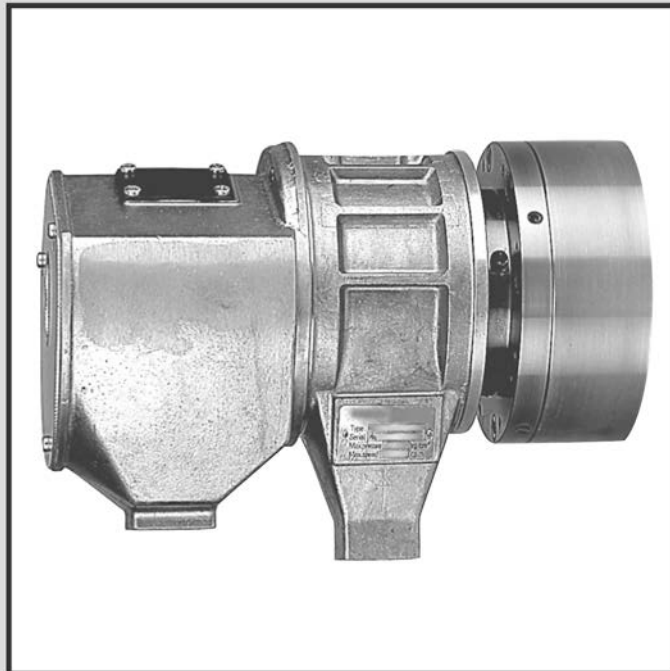




OPERATION MANUAL

ZKV/ZKP TYPE SERIES

THRU-HOLE HYDRAULIC CYLINDER




Logansport Machine Co.

1-1 PRELUDE

Thank you for choosing the LMC hydraulic power cylinder ZKV or ZKP series. Through the use of this operational manual, you will learn to use the power hydraulic cylinder correctly. This will in turn lead to an increase in productivity for your products.

1-2 SAFETY INFORMATION

In order to avoid accidents and operate on the safest level possible, we have indicated safety precautions with this symbol .

PRIOR TO OPERATION, PLEASE READ THIS MANUAL CAREFULLY.

The majority of accidents, without exception, are caused by a lack of following the fundamental rules of safety that pertain to installation, handling, maintenance and inspection. Prior to operation, you should carefully read the precautions and warnings in this manual.

The messages of safety are classified as follows. We will assume no responsibility for any accidents caused by overlooking these precautions.

**DANGER**

In the case of unavoidable danger, this message is used to prevent situations which could lead to serious injury or death.

**WARNING**

In the case of unavoidable danger, this safety message warns the individual of the place of the dangerous situation, which could lead to serious injury or death, may occur. This safety message helps to prevent you from encountering the DANGER situation.

**CAUTION**

In the case of being unable to avoid danger, it means that there is a probable chance of being injured or seriously damaging the machine or cylinder.

**ATTENTION**

In the case that machine safety rules are not followed, it means that there is a chance of damaging the machine and/or shortening the machine life.

It is impossible for us to predetermine all of the dangerous situations pertaining to repairing, handling, maintenance and inspection one might encounter. Therefore, the warnings which are clearly written in this manual are not complete and thorough.

When you proceed with repairing, handling, maintenance or inspection in a way which is not written and explained in this manual, the necessary consideration for safety should be based on your own responsibility.

Please order all parts of products, including the complete cylinder unit, from Logansport Machine Co.

We will not take the responsibility for replacing any parts that are not originally manufactured by Logansport Machine Co.

Safe operation is necessary to contribute to production. Please read and follow the fundamental safety procedures carefully.

**WARNING**

- (1) A 6 micron filtering system is recommended on your hydraulic system. Contamination in the oil passing through the cylinder could cause the cylinder to seize. As the oil passes through the cylinder it lubricates and cools the bearings and the oil is then drained back to the hydraulic supply. Therefore, it is very important to always check and have your oil and filters changed when needed.
- (2) When inspecting, indicating, or exchanging the cylinder, always disconnect the power source.
- (3) Never operate the machine when the machine door is open and the machine is operating.
- (4) When tightening the cylinder mounting bolts, use Table 1 below Clamping Torque for Bolt.
- (5) The spindle of the machine should be designed so the spindle will not rotate when the machine door is open.
- (6) Do not change the maximum oil pressure that has been preset for the machine.
- (7) Secure the draw tube to the cylinder by using the lock nut provided.
- (8) Please avoid using the cylinder on a vertical turning machine. It could cause the cylinder to leak and lack of lubrication to the bearing may cause the cylinder to seize.

TABLE 1. CLAMPING TORQUE FOR BOLT

Bolt Size	Clamping Torque N-m (kg-m)	Bolt Size	Clamping Torque N-m (kg-m)
M8	38.2 (3.90)	M14	171.0 (17.40)
M10	72.2 (7.40)	M16	226.0 (23.00)
M12	107.0 (10.90)	M20	402.0 (44.00)

ATTENTION TO CUSTOMERS

Please follow the fundamental safety regulations regarding the handling of machine tools, especially while operating on cylinders and chucks. Also, please make sure that all operators are properly dressed and understand how to operate safely.

We take no responsibility for any accidents caused by an operator who does not fully understand how to properly use the machine.

PRIOR TO STARTING OPERATION, PLEASE READ THIS OPERATION MANUAL THOROUGHLY AND COMPLETELY.

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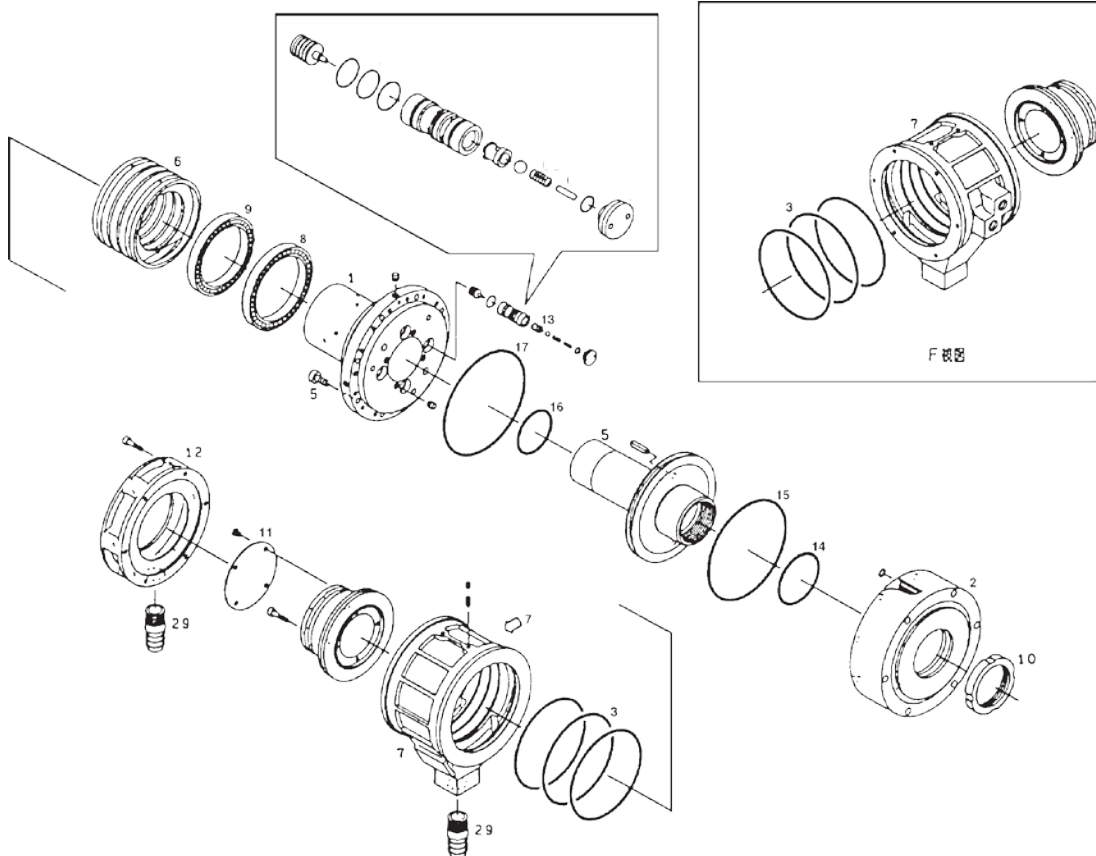


FIG. 1 CONSTRUCTION FIGURE OF CYLINDER ZKV (ZKP)

TABLE 2. PARTS LIST OF HYDRAULIC CYLINDER

No.	Parts Name
1	Cylinder Body (A)
2	Cylinder Body (B)
5	Piston
6	Distributor
7	Distributor Case
9	Bearing
10	Nut
12	Coolant Collector
13	Check Valve
14	O-Ring
15	O-Ring
16	O-Ring
17	O-Ring
29	Barbed Drain Nipple

5-1 THE TABLE OF SPECIFICATION

TABLE 3. THE TABLE OF SPECIFICATION CLASSIFIED BY TYPE

Name of Unit			ZKP100/24-10	ZKP100/34-10	ZKP125/46-13	ZKP150/52-17	ZKP150/66-17	
	Item	Unit	Specification	Specification	Specification	Specification	Specification	
1	Rotating Dia. Of Cylinder	mm	φ135	φ135	φ160	φ180	φ183	
2	Inner Dia. Of Cylinder	mm	φ100	φ100	φ125	φ150	φ150	
3	Length of Cylinder (From Fixing Plate Face)	mm	262	247	254.1	270.1	295.1	
4	Through Hole Dia.	mm	φ24	φ34	φ46	φ52	φ66	
5	Piston Stroke	mm	10	10	13	17	17	
6	Piston Area	Push Side	cm ²	71.47	65.97	99.82	148.4	126.4
		Pull Side	cm ²	67.2	60.44	89.53	138.2	119.9
7	Piston Thrust* (x0.9 indicate)	Push Side	kgf	1930	1781	2695	4007	3413
		Pull Side	kgf	1814	1632	2417	3731	3237
8	Max. RPM	rpm	8000	7000	7100	6300	5300	
9	GD2	kg*m ²	0.05	0.06	0.11	0.4	0.38	
10	Max. Hydraulic Pressure	kg/cm ²	30	30	30	30	30	
11	Min. Hydraulic Pressure	kg/cm ²	5	5	5	5	5	
12	Balance Goodness	G	16	16	16	10	10	
13	Weight	kg	14	14	18	26	27	
14	Cylinder Fixing In-Lo Dia.	mm	φ80	φ80	φ80	φ80	φ80	
15	Cylinder Fixing Height	mm	4	4	4	4	4	
16	Cylinder Fixing Tapping Pitch	mm	115	115	140	165	165	
17	Cylinder Fixing Tap Size	mm	6-M8 Depth16	6-M8 Depth16	12-M10 Depth20	6-M10 Depth20	12-M10 Depth20	
18	Piston Overhang from Fixing Plate Face	Max.	mm	17	17	19	23	23
		Min.	mm	7	7	6	6	6
19	Piston Diameter		φ38	φ48	φ65	φ70	φ85	
20	Drain Port		PT3/4	PT3/4	PT3/4	PT1	PT1	
21	Oil Inlet Port		PT1/4	SAE#6	SAE#6	SAE#6	PT3/8	

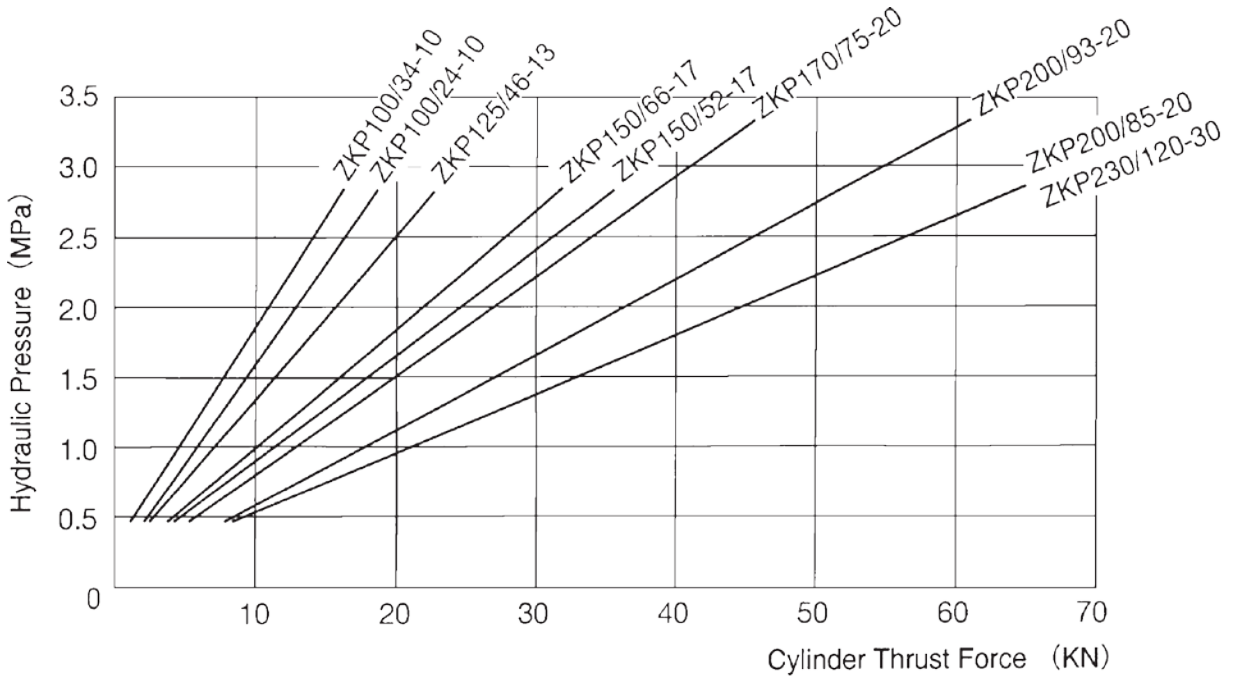
* At Maximum Pressure

Name of Unit			ZKP170/69-25	ZKP170/75-20	ZKP195/93-20	ZKP200/85-25	ZKP230/120-30	
Item	Unit	Specification	Specification	Specification	Specification	Specification	Specification	
1	Rotating Dia. Of Cylinder	mm	φ205	φ213	φ240	φ240	φ270	
2	Inner Dia. Of Cylinder	mm	φ170	φ170	φ195	φ200	φ230	
3	Length of Cylinder	mm	332.6	327.6	369.1	365.1	398.1	
4	Through Hole Dia.	mm	φ69	φ75	φ93	φ85	φ120	
5	Piston Stroke	mm	25	20	20	25	30	
6	Piston Area	Push Side	cm ²	170.2	170.2	211.95	243.28	282.7
		Pull Side	cm ²	163.3	156.1	194.68	219.13	250.3
7	Piston Thrust* (x0.9 indicate)	Push Side	kgf	5361	5361	6676	6569	7633
		Pull Side	kgf	5144	4917	6132	5917	6758
8	Max. RPM	rpm	5000	5000	4000	4300	3400	
9	GD2	kg*m ²	0.48	0.42	1.3	0.71	2	
10	Max. Hydraulic Pressure	kg/cm ²	35	35	35	30	30	
11	Min. Hydraulic Pressure	kg/cm ²	5	5	5	5	5	
12	Balance Goodness	G	10	10	10	10	6.3	
13	Weight	kg	36	33	46.5	42	65	
14	Cylinder Fixing In-Lo Dia.	mm	φ125	φ145	φ180	φ145	φ165	
15	Cylinder Fixing Height	mm	4	4	7	7	7	
16	Cylinder Fixing Tapping Pitch	mm	185	185	215	220	250	
17	Cylinder Fixing Tap Size	mm	6-M10 Depth20	12-M12 Depth20	12-M12 Depth24	12-M12 Depth24	12-M12 Depth24	
18	Piston Overhang from Fixing Plate	Max.	mm	44	26	28	34	39
		Min.	mm	19	6	8	9	9
19	Piston Diameter		φ98	φ95	φ115	φ110	φ145	
20	Drain Port		PT3/4	PT1	PT3/4	PT3/4	PT1	
21	Oil Inlet Port		PT3/8	PT3/8	PT3/8	PT3/8	SAE#6	

* At Maximum Pressure

5-2 HYDRAULIC PRESSURE AND CYLINDER THRUST DIAGRAM

FIG. 2 HYDRAULIC PRESSURE AND CYLINDER THRUST DIAGRAM



NOTE:

- (1) ZKP: With check valve and stroke confirm device.
ZKV: Without check valve and stroke confirm device.

- (2) Drain volume condition.

Oil Pressure	Max. Hydraulic Pressure
Oil Temperature	at 60°C
Oil Kinds	150 VG32
Number of Revel.	Max. Rev. Inspecif.

- (3) Way to find piston thrust,

$$\text{Max. Oil Pressure} \times \text{Pull Area} \times \text{Efficiency}$$

- (4) Use oil pressure should be matched to specification values.

6-1 PREPARATION FOR INSTALLATION: OPENING THE SHIPPING CRATE AND INSTALLATION PREPARATIONS

- (1) Remove the products from the box carefully and check the accessories.
- (2) Wipe off the rust proof oil and clean the unit. At this time, be careful that dusts, cutting chips, water, and so on, do not enter into the hydraulic cylinder.
- (3) Be careful not to dent or nick the cylinder. Handle it with the utmost of care.
- (4) The environment with the least amount of dust and best available ventilation should be used for opening the box.



CAUTION

In order to maintain the cylinder, you must make sure to install a filter system in the pressure supply lines. (The filtration accuracy is less than 20 μ m.)

6-2 MANUFACTURING AND INSTALLING THE CYLINDER ADAPTER

The run out of facing side and faucet joint side should be within 0.005mm. The large amount of run out causes vibration and shortens the life of the cylinder, and the machine life.

Regarding the cylinder, the inertia force is caused by start, stop and vibration of the spindle and cylinder output power. Therefore, it is necessary to make the cylinder adapter with enough rigidity so that it may endure these forces.

The adapter should be made rather tightly, matching the spindle with the part or screw and faucet.

Once more, in order to have the delicate adjustment of run out of center and to prevent the looseness of the screws, set 3 tap holes and tighten the screw through the soft metal to adjust the adapter.

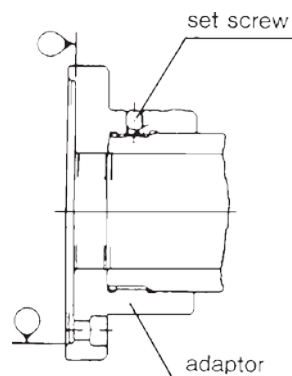


FIG. 3 FIXING CYLINDER ADAPTER



CAUTION

As you mount and balance the cylinder, be sure the cylinder adapter stays Indicated.

6-4 MANUFACTURING OF DRAW TUBE

■ MANUFACTURE DRAW TUBE AS TABLE BELOW

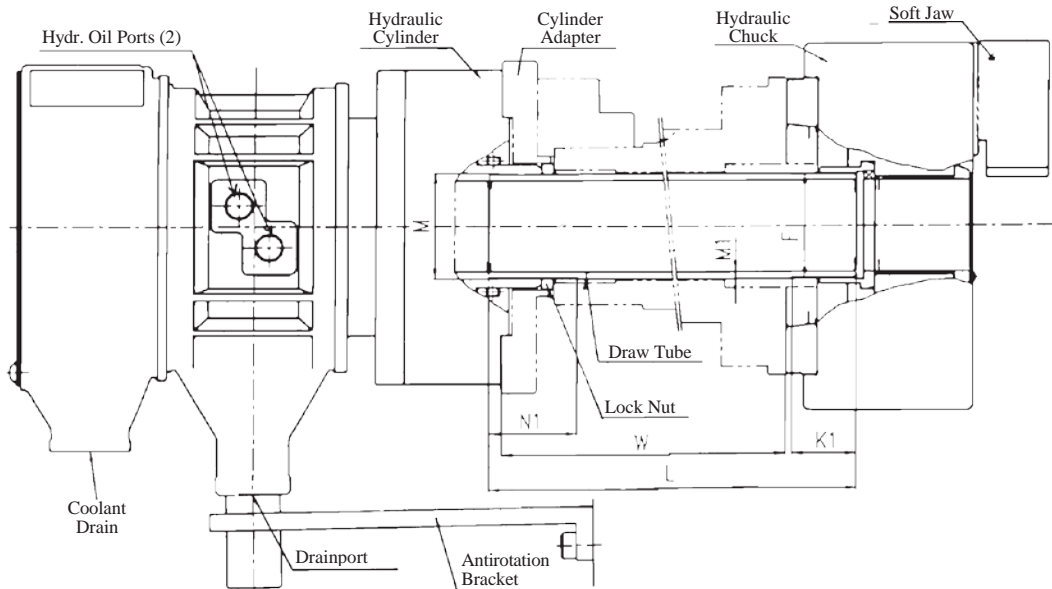


TABLE 4. DRAW TUBE SIZE

FIG. 4 FIXING CHUCK/CYLINDER

Chuck, Cylinder Combination	L	N1	M	K1	F	M1
Z-4-21xZKP100/24-10	W+26	45	M28P1.5	23	M25P1.5	3.5
ZA5-5-34xZKP100/34-10	W+32	45	M40P1.5	32	M40P1.5	3
ZA5-6-46xZKP125/46-13	W+35	50	M55P1.5	27	M55P1.5	4.5
ZA6-8-52xZKP150/52-17	W+46.5	50	M60P1.5	31	M60P1.5	4
ZA6-8-66xZKP150/66-17	W+54.5	55	M75P2.0	40	M75P2.0	4.5
ZA8-10-66xZKP170/69-25	W+47	55	M76P1.5	42	M76O1.5	5
ZA8-10-75xZKP170/75-20	W+57	55	M85P2.0	40	M85P2.0	5
ZA8-12-85xZKP200/85-20	W+49	55	M93P2.0	40	M93P2.0	4
ZA8-12-93xZKP200/93-20	W+64.5	55	M103P2.0	31	M103P2.0	5
ZA11-15-120xZKP230/120-30	W+65	60	M130P2.0	43	M130P2.0	5
ZA11-18-120xZKP230/120-30	W+65	60	M130P2.0	43	M130P2.0	5

**WARNING**

It is important that the thickness of the draw tube has enough strength. If it breaks due to lack of strength, clamping power will be lost suddenly, throwing the workpieces.

**ATTENTION****LOOSE THREADS ON THE DRAW TUBE**

- (1) Looseness in the threads of the draw tube causes vibration and lack of strength.
- (2) Maintain the thickness and allowable max., thread diameter of the draw tube. The tensile strength of the tube to be used should be more than 380Mpa (39kgf/mm²).
- (3) The concentricity degree of the draw screw thread should be less than 0.05.

6-5 INSTALLING THE CYLINDER**WARNING**

This cylinder cannot be installed on a vertical turning machine.

- (1) The proper way of installing the hydraulic cylinder is described in FIG. 4. In the front of the spindle, install the hydraulic chuck and in the rear install the hydraulic cylinder. They are connected with the draw tube. The hydraulic cylinder is mounted to the rear side of the spindle using the cylinder adapter. You should mount them correctly and firmly to the spindle, and be careful not to loosen them through sudden starting and stopping.
- (2) Follow the steps below when installing the cylinder.

TABLE 5. PROCEDURE FOR INSTALLING

No.	Procedure	Caution
1	The method for installing the hydraulic cylinder should follow that shown in FIG. 4.	
2	In the front of the spindle, install the hydraulic chuck and in the rear side fix the hydraulic cylinder. They are connected with the draw tube.	
3	The cylinder adapter should be installed at the rear side of the spindle.	Be careful not to loosen it through sudden motion.
4	Run out of face of the adapter plate should be within 0.005mm.	
5	Run out of ext.-dia. of the adapter plate should be within 0.005mm.	
6	When mounting the cylinder indicate for runout on the o.d. of the cylinder.	Bad installation or misuse.
7	The installation of the cylinder, piping of oil unit and piping of the drain must not interfere with the hydraulic cylinder.	
8	We recommend the hydraulic pressure rubber hose has inside diameter of more than 9mm.	It should be within 0.005mm.
9	Drain piping should not be bent. Avoid when hooking up the hydraulic hoses to the cylinder.	Normal working pressure is 35kg/cm ² .
10	Install an antirotation bracket as shown in FIG. 5. Antirotation bracket is not supplied with the cylinder.	
11	Thread for the lock nut supplied with the cylinder on the draw tube. Set the cylinder on the coolant collector so it is in the vertical position. Screw the draw tube into the threaded piston until it bottoms out. Back the draw tube off 1/2 turn then screw the lock nut down, securing the draw tube to the cylinder.	Do not use thread adhesive to attached drawtube to piston

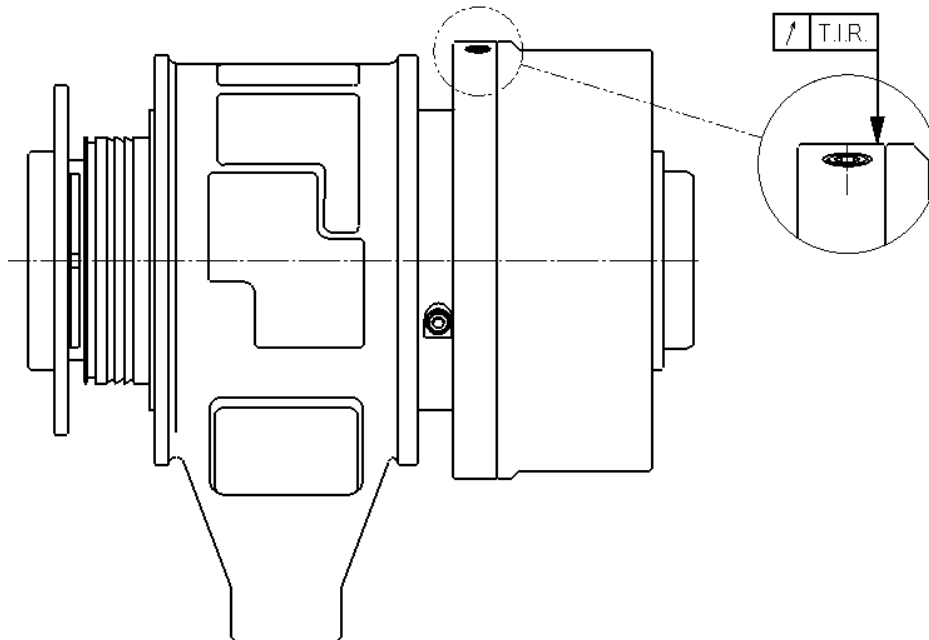
**WARNING**

Using thread adhesive (Loctite type products) will void warranty.

6-3 CYLINDER INSTALLATION: CORRECT MEASUREMENT OF RUN-OUT OF THE CYLINDER

Please measure the run-out of the cylinder at the location showed in the figure below.

Please make sure the surface of the indicated surface is clean and avoid screw plug while measuring the run-out of the cylinder.



All measured T.I.R. at the given location showed above must be within the number provided in the table below.

MAX T.I.R. FOR EACH CYLINDER MODEL					
Cylinder Model	ZKP125	ZKP150	ZKP170	ZKP230	ZKP280
MAX T.I.R. (mm)	0.015	0.02	0.025	0.025	0.03

**CAUTION**

In order have best performance of the cylinder, please make sure follow the MAX T.I.R showed in the table above.

7-1 CHECKLIST BEFORE START-UP

Prior to start-up, you may again confirm the following steps to assure proper installation.

- (1) Are all bolts tightened to the correct torque?
- (2) Is the oil supply in each part sufficient? Is the hydraulic oil tank full?
- (3) Does the hydraulic unit motor rotate in the correct direction?
- (4) Is the settled hydraulic pressure of the unit below 5kg/cm²?
- (5) Is the spindle revolution set in low speed?
- (6) After confirming the above affairs, turn the machine on and check the pressure gauge.
- (7) After checking the gauges, slowly increase the oil pressure and check for leaks in the plumbing and in the cylinder.
- (8) Activate the cylinder and check the chuck for proper jaw movement.
- (9) Start the spindle at low RPM's.
- (10) Slowly increase the speed of the spindle and look for any problems.



WARNING

When the work holding is not indicated correctly on the spindle, vibration may occur.



CAUTION

When rotating the cylinder at a high RPM for a long period of time, the oil temperature could rise to the point of possible damage to the seals in the cylinder. If your jobs require long run times at high RPM, then a cooling unit needs to be added to the oil system to keep the temperature under 60 degrees C.

7-2 DAILY START-UP PROCEDURES

- (1) In cold conditions, start the spindle at a low RPM and slowly increase speed to warm up the spindle.
- (2) Before shift start-up, turn the oil pressure up and activate the cylinder 3 to 4 times. This is necessary before operating the spindle.
- (3) Check the pressure setting to assure correct gripping pressure. High pressure on thin parts will distort the work piece.
- (4) Before running the spindle at high RPM, check the soft jaw mounting bolts for proper torque. Loose bolts on the soft jaw could cause damage to the chuck and injury to the operator.
- (5) The higher the RPM, the lesser the grip force. Check the operation manual specification for the cylinder on your machine.
- (6) Be sure all chips are removed from the coolant daily. Chip buildup could cause coolant to back up in the coolant collector and leak into the cylinder and cause damage.
- (7) If the machine is not used for a long period of time, remove the chuck and cylinder and store properly oiled.

8-1 THE INSPECTION OF OPERATING OIL

It is very important to keep the operation oil clean through continuous inspection. The inspection of operation oil is described below.



CAUTION

- (1) Every 6 months, check the consistency of the oil.
- (2) The operating oil in the hydraulic cylinder should be in turbine oil #32, and should be kept at the regular volume. (Fill to top level of oil gauge.)
- (3) **THE REJECTION OF HUMIDITY:** Humidity will cause condensation in the oil tank. Drain all water from the tank once a week.
- (4) Change the filter in the oil filter system when needed.
- (5) Change the oil at least once a year as needed.

8-2 REMOVING THE CYLINDER FROM THE MACHINE

- (1) First remove the chuck from the front of the spindle. Support the chuck with the eye bolt provided. Remove the cover lid and remove the mounting bolts. Be sure you are supporting the chuck by the eye bolt of an overhead crane. Use the chuck wrench to unscrew the drawscrew from the draw tube.
- (2) Next, support the cylinder with a leather strap and overhead crane. Remove all the mounting bolts from the cylinder adapter to the cylinder. The cylinder should then break away from the cylinder adapter. Check to be sure all mounting bolts have been removed. Tap the cylinder with a rubber mallet next to the adapter to break the cylinder free. In a backward motion, remove the cylinder from the spindle with the draw tube still attached.
- (3) Place the cylinder on a workbench resting on the coolant collector end. Loosen the lock nut and unscrew the draw tube. The cylinder is now ready to ship to the manufacturer for service.

**FAILURE TO OPERATE PROPERLY,
WHAT TO LOOK FOR, SOLUTION**

TABLE 6. DISORDER, CAUSES OF TROUBLE, COUNTERMEASURES

Failure to Operate Properly	Reason	Solution
Insufficiency of stroke	Loose draw tube. Build up of chips inside the chuck or cylinder	Disassemble and clean. Take out draw tube and check locking nut.
Master jaw motion is slow or not moving.	Gauling of slots in chuck body.	Grease the chuck or disassemble for inspection.
	Oil leakage of cylinder.	Replace worn o-ring in the cylinder.
Slippage of clamped workpiece. Workpiece slips when clamping and cutting.	Lack of master jaw stroke.	When clamping the workpiece, set the master jaw in the middle of the stroke.
	Lack of clamp force.	Confirm that the constant oil pressure is correct.
	Formed dia. of top jaw does not match the workpiece.	Bore the jaws to match the part you are gripping.
	Too much cutting force.	Following the specified value, check the cutting condition. Check for correct feeds and speeds for the application.
	Lubricating oil has dried up on the master jaw sliding surface.	Grease the chuck and actuate several times to distribute the grease. Grease again.
	Spindle speed is too high.	Slow down the revolution until getting the suitable clamp force.
Oil leakage from the rear hole of cylinder. Oil leakage from whole chuck surface.	Cylinder oil leakage.	Disassemble cylinder and replace o-rings.
Oil leakage from hose joint.	Breakage of o-ring. Loosening of joint. Bad hydraulic hose or fittings.	Check all fittings for tightness. Check all hoses for cracks.

THE ACCESSORIES FOR HYDRAULIC CYLINDER

- | | | |
|---|-----------------------------|---|
| 1 | Threaded Barb for Oil Drain | 1 |
| 2 | Lock Nut for Draw Tube | 1 |

≡MEMO≡



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