

GF170P
CNC Tilting Rotary Table
Operation Manual

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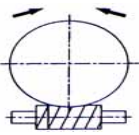
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Thank you for purchasing a "d e t r o n" - NC Rotary Table . To achieve optimum performance, take the time to read this manual carefully. Handling instructions, tips for maintenance and inspection, and much more, are all here at your fingertips. They will help you to maintain the machine's inherent accuracy for a long-term period of time.

This manual should be made available for reference at all times.

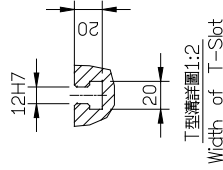
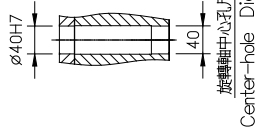
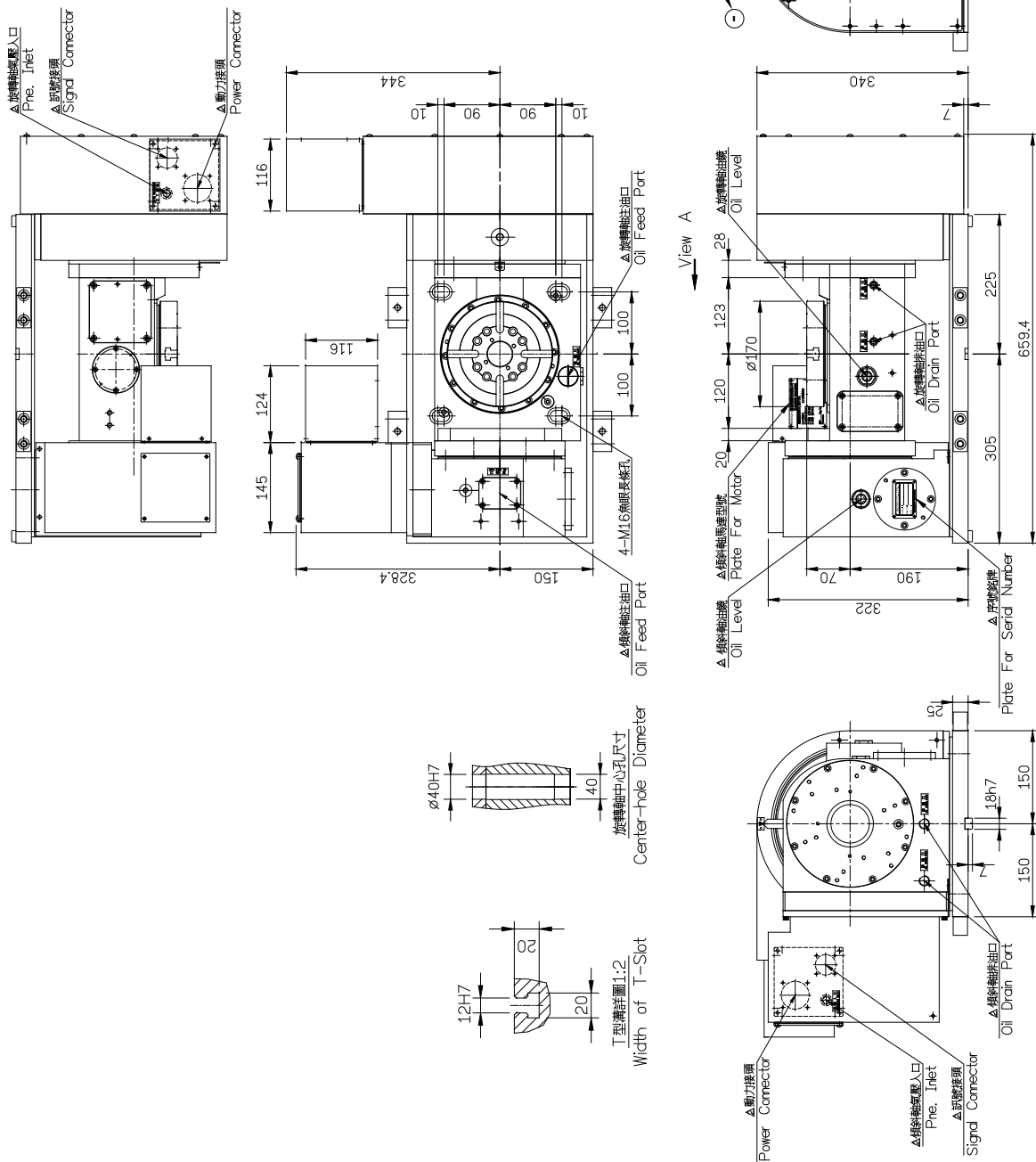
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(2) Specifications

No.	Item	Unit	Specification		Remark	
			Rotary	Tilting		
1	Worktable Diameter	mm	$\varnothing 170$			
2	Center Bore Diameter	mm	$\varnothing 40H7$			
3	Worktable Height in	mm	260			
4	Height of Center	mm	190			
5	Height of Table	mm	340			
6	Width of T-Slots		12H7			
7	Tilting Angle Range	deg	+30 ~ - 120 °			
8	Drive Pressure / Method	kg/cm ²	5/pne.			
9	Clamping Torque	kg-m	18	26		
10	Servo Motor	FANUC		$\alpha 4i$	$\alpha 8i$	
		MITSUBISHI		HF54T	HF104T	
		SIEMENS		1FK7042	1FK7060	
		HEIDENHAIN		QSY116C	QSY116C	
		YASKAWA		SGMGH09A	SGMGH09A	
11	Transmission Ratio		1 : 90			
12	Max. Table Speed		33.3	22.2		
13	Allowable Loading Inertia	kg-cm-sec ²	2			
14	Resolution	deg	0.001°			
15	Indexing Accuracy	sec	20	60		
16	Repeatability	sec	6	8		
17	Net Weight(W/O Motor)	kg	170			
18	Allowable Loading Capacity	Horizontal	kg	50		
		Vertical	kg	35		
19	Allowable Cutting Torque	 kg-m	17			

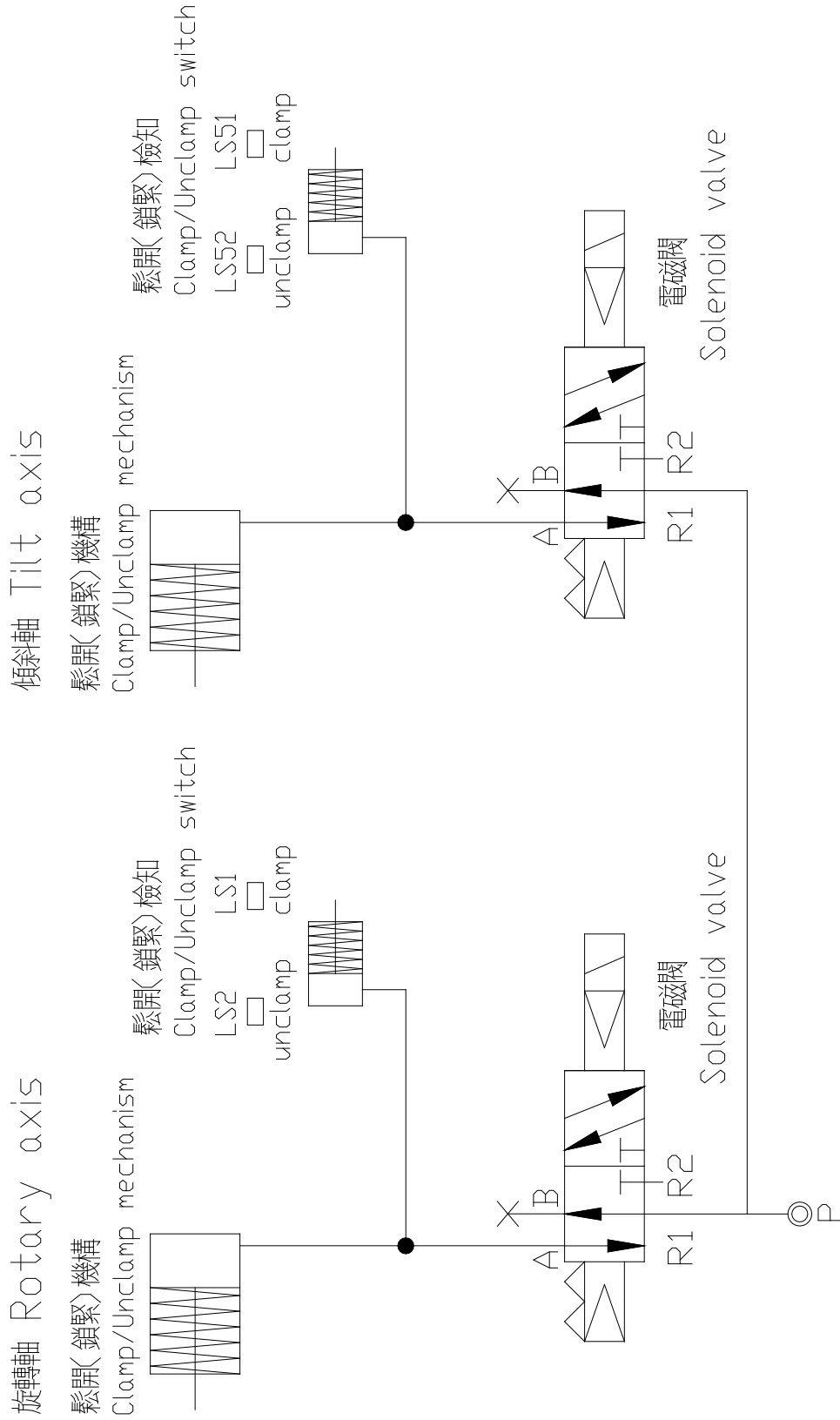
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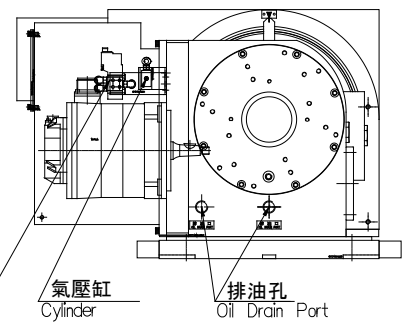
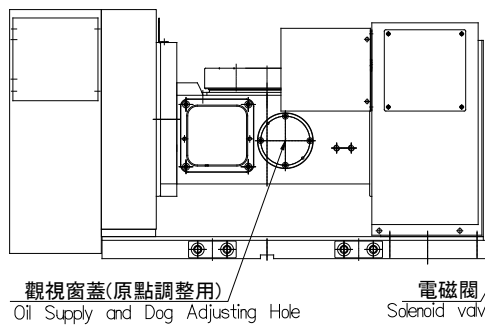
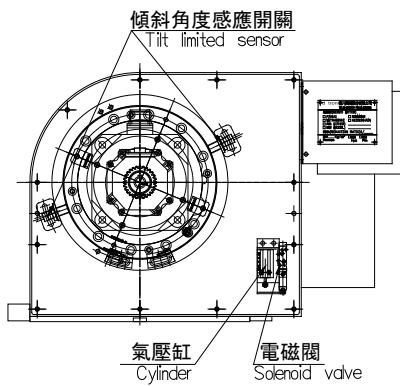
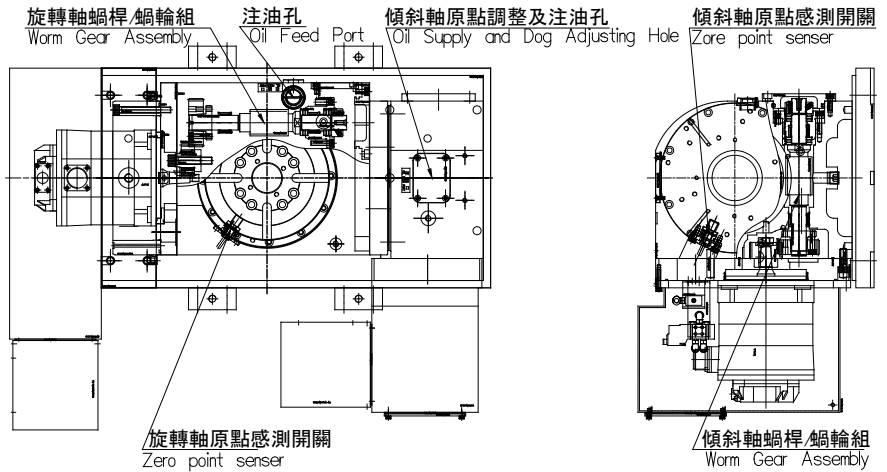
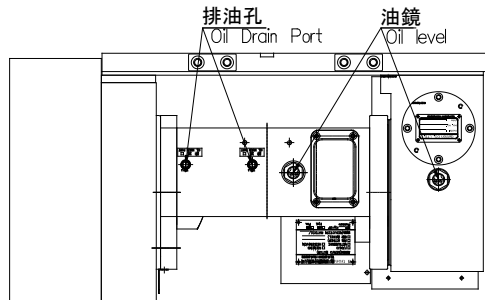
(3) Outline Drawing



Item

(4) Pneumatic Circuit Diagram





The following preliminary steps, including a test run, are necessary before operating the CNC Rotary Table :

A. Installation and Preparation

- (1) Unpacking, and moving the table to the site and setting up onto a mated machine tool.
- (2) Lubrication and Cleaning.
- (3) Supply of clamping air pressure. ◦ (※: Air source has to go through the F.R.L. unit).
- (4) Test run and accuracy check.
- (5) Table zero return shift setting.

B. Test Run

- (1) Check the table top of the mated machine tool and the CNC Rotary Table bottom for burrs and flaws.
 - (2) Perform a test run without loading applied to the turntable.
 - (3) Check the turntable for normal operation by repeatedly clamping and unclamping the table.
 - (4) Increase the speed slowly when checking the rotational speed of the turntable both in the clockwise and counter clockwise directions.
 - (5) Check the table zero return function.
 - (6) Check various operations using the commands from the NC unit.
- ※ **Before operating; please set the angle limitation of tilting axis to avoid the mechanism over stroke and brake.**
- ※ **To avoid damaging the mechanism; please do not operate the rotary table until the above procedures are completed.**
- ※ **Strongly recommend to delay 500mmsec. after clamp/unclamp command; to avoid the mechanism broken or overheat to make the servo motor alarm.**

Proximity limit switch has no function causing by :

A. Proximity limit switch is broken ◦

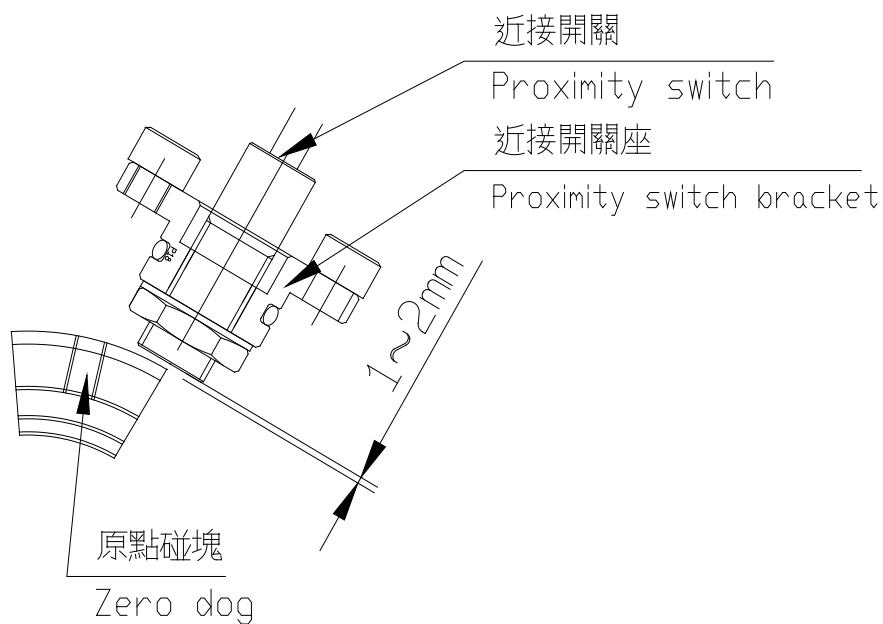
B. The clearance between the proximity switch and the dog is too far; the correct clearance is 1~2mm ◦

How to adjust the dog :

(1) Remove the top cover(see P9) ◦

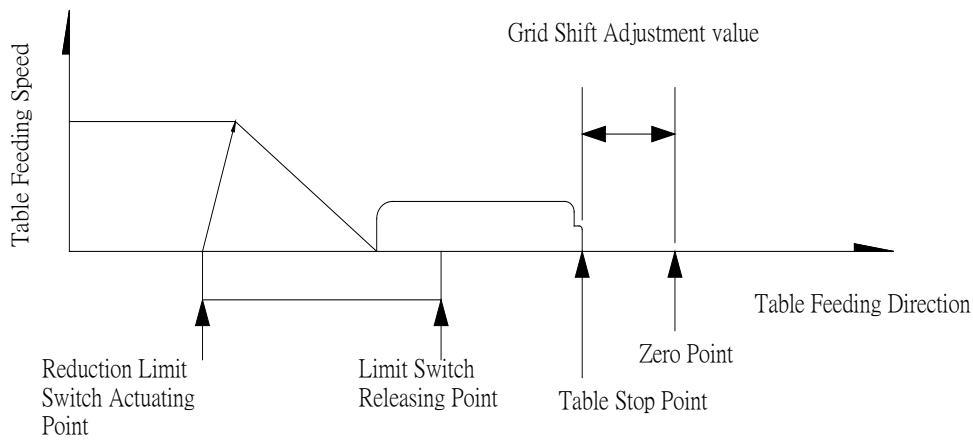
(2) Turn the spindle, and loosen the dog lock bolts (M4) ◦

(3) The dog adjustment range is about $\pm 5^\circ$. After adjustment, tighten the dog lock bolts ◦



Upon receiving of a Zero Return command from the NC unit, the turntable begins to rotate in a specified direction in the rapid traverse mode ◦ When the limit switch is tripped by the speed reduction dog, the table starts decelerating. When the turntable has decelerated to a speed such that the position is not uneven, even with instantaneous stop, it stops upon receipt of a reference signal from the detector of the motor ◦

Repeat the zero return operation of the table several times, measure the difference between the table stop position and the scheduled stop position in degrees, and input the measured value to the zero return grid shift amount of the NC unit as a correction value ◦



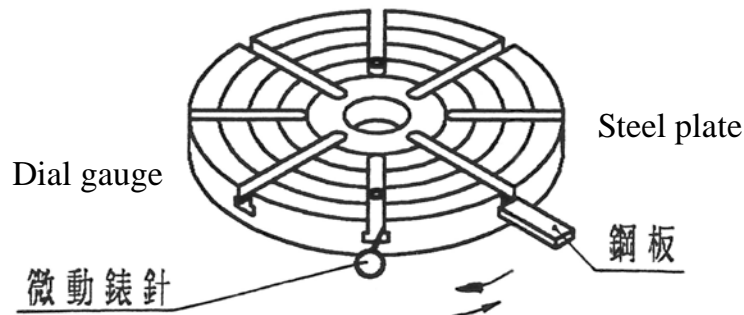
The CNC Rotary Table is a highly reliable, maintenance-free product. To keep the table in the proper state for a long period of time, however, maintenance and adjustment are needed ◦

If the backlash is too large, some play occurs between the worm wheel and the worm shaft, causing vibration or chattering due to the cutting resistance during continuous cutting. If the backlash is too small, the worm gear overheats, which will cause seizure. For the long-term operation, please check the backlash periodically.

Backlash check :

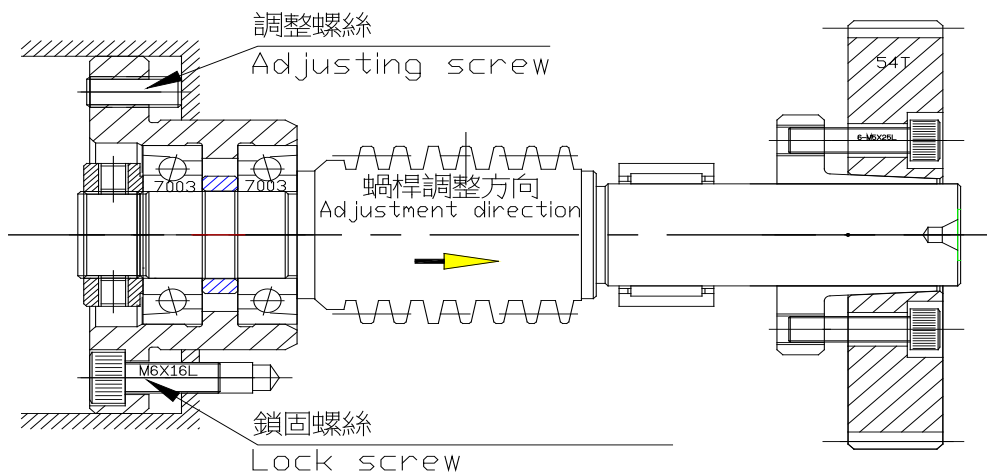
- (1) Set the dial gauge on the T-slot surface near the circumference of the turntable ◦
(drawing shown below)
- (2) Inset a steel plate into another T-slot and move it slowly in one direction with a force of 15 to 20 kg. Release the steel plate and read the indication on the dial gauge. Repeat the same procedure in the reverse direction, and read the indication on the dial gauge. The difference between the two measured values is the backlash.
- (3) Measure the backlash on the circumference of the turntable at intervals of 90 degrees.
- (4) The minimum backlash of the worm gear is 10'' to 15'' at 20°C.

※The backlash will be varied during temperature changes and properly adjust the backlash are necessary. Even if the backlash exceeds the upper limit of the above range, the turntable can be operated. Adjust the backlash when necessary. If the backlash correction value is input to the NC unit as a parameter, the apparent backlash is 0 ◦



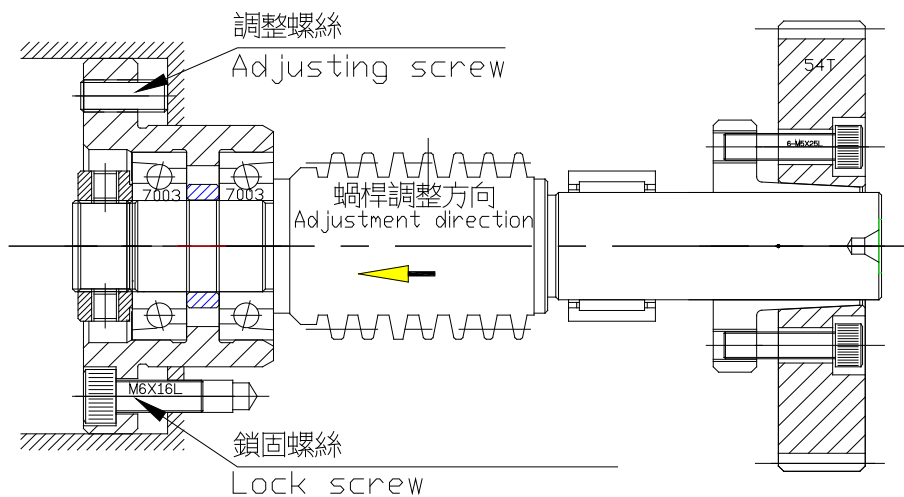
Backlash too large:

Turn the adjusting screw c.c.w. one to fourth uniformly → tighten lock screws uniformly → the worm shaft move forward and reduce the backlash → check the data; Repeat the adjustment and measurement until the proper backlash is obtained ◦



Backlash too small:

Slightly loosen lock screws → Turn the adjusting screw c.w. one to fourth uniformly → tighten lock screws uniformly → the worm shaft moves backward and increases the backlash → check the data; Repeat the adjustment and measurement until the proper backlash is obtained ◦



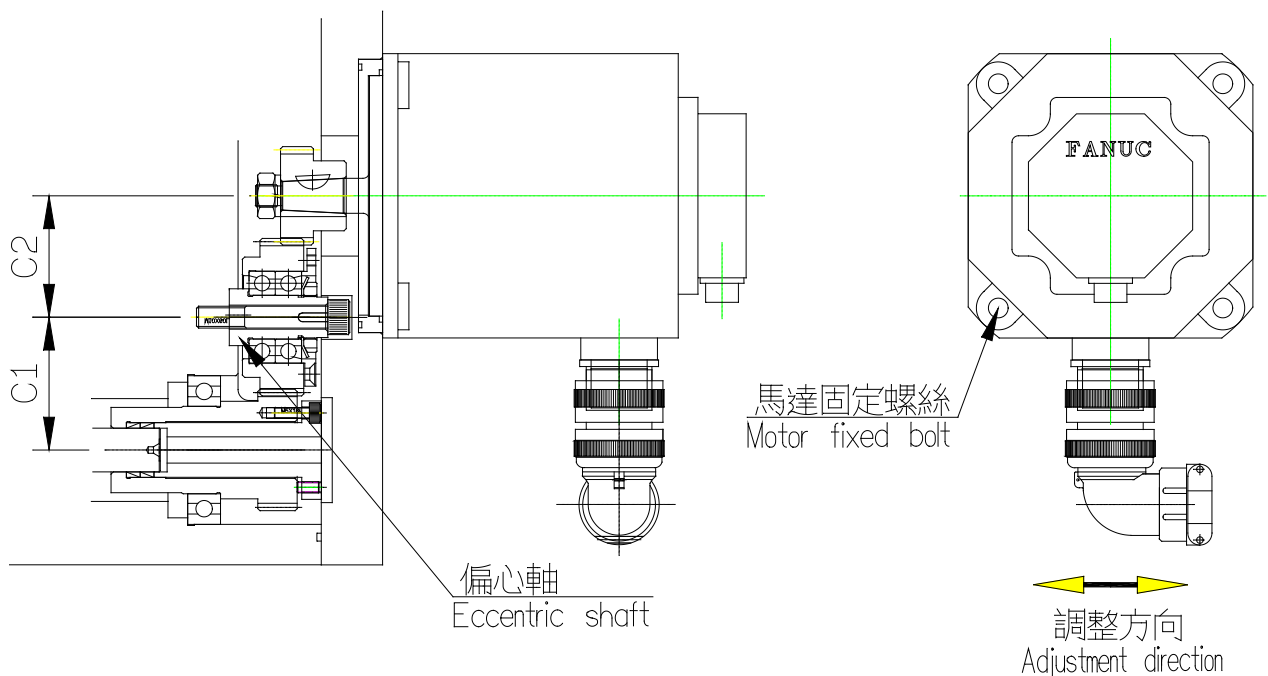
A: Rotary Axis Gear Backlash Adjustment procedure :

Gear center distance C1 adjusting : loosen "locking bolt"→turn "gear spindle"

(The distance between axes can be adjusted up to 0.5mm by the gear spindle) until obtain a proper backlash around 0.03~0.04mm→tighten "locking bolt" ◦

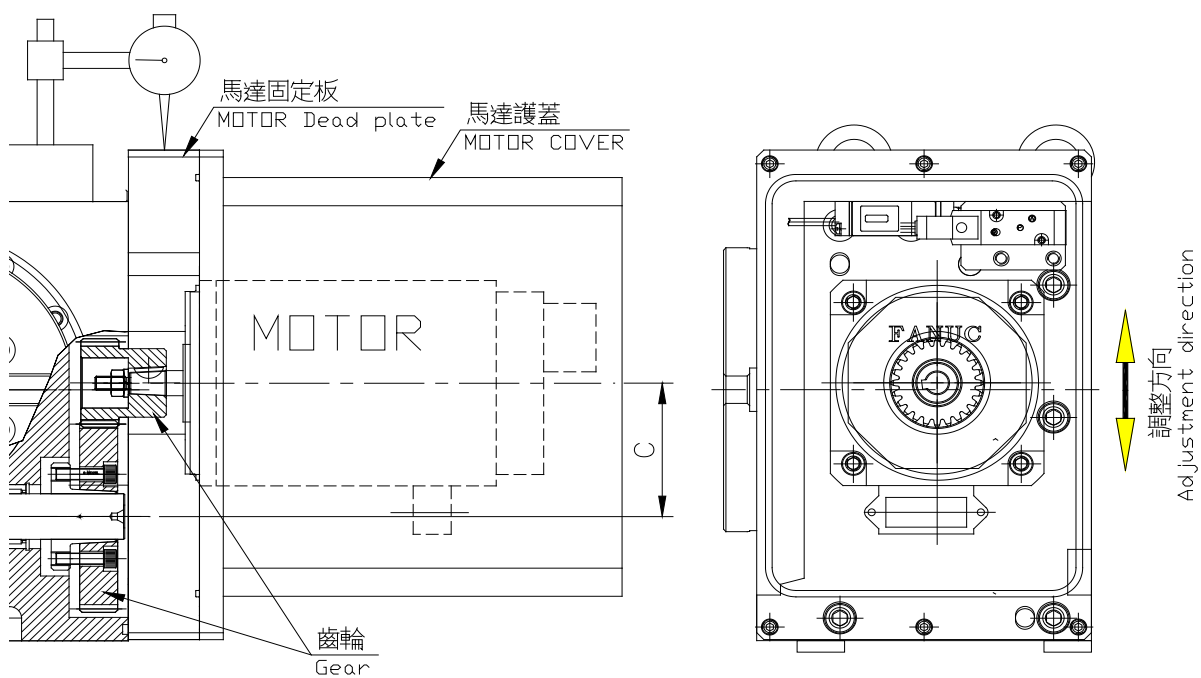
Gear center distance C2 adjusting : loosen "motor locking bolt"→turn

adjustable shaft sleeve by rod"(The distance between axes can be adjusted up to 0.5mm) until obtain a proper backlash around 0.03~0.04mm→tighten "motor locking bolt" ◦



B: Tilting Axis Gear Backlash Adjusting procedure :

Remove motor cover→Loosen lock screw for motor adapter→push motor adapter downward→put dial gauge on the frame(drawing show as bellow)→push motor adapter upward; to enlarge the backlash→until obtain a proper backlash around 0.045~0.06mm→Re-tighten “lock screw”→put motor cover back ◦



Item

(12) Clamping Device

To reach a high clamping torque; the air should be passing through the filter, regulator, and lubricator at 5 to 6 kg/cm². This product provides two end connector (PT 1/4), located on the top and at the back of the table. Use either one of them, whichever is suitable.

- ※ **Please open the drainage hole monthly which is located on the backside of rotary table. Check whether there is any mist entering through the tube, if so, please ameliorate the air filters of table (3-point combination).**
- ※ **It is an extremely design for using air solenoid valve and brake mechanism. In order to maintain good condition, the particles should be under 5 um after filtration. This can avoid the blocking solenoid valve by suspended particles or causing the shut down of brake mechanism.**

When a work piece has been set-up, clamp the turn table. If a work piece is machined with the turn table unclamped, the worm gear will be worn out quickly or damaged. The tool and the work piece may also be damaged. When positioning the turn table or performing continuous cutting, leave the turntable unclamped. To ensure the status is correct, please check the clamp and unclamp signals before use.

Use sensor switch to determine the table status is clamp or unclamp, the single-acting Cylinder moving pressure is around 2~3 kg/cm².

Clamp and unclamp are switched on and off by the solenoid valve built in the table. When the power is on, clamp is selected. Clamp piston will push forward by air pressure to press clamp disk to the frame. The frictional force on this part is the clamping torque ◦

- ※ **Under the standard operation, the table is clamped when the solenoid valve is on. If the table is unclamped when the solenoid valve is on, the solenoid valve or manifold should be replaced (optional) ◦**
- ※ **Strongly recommend to delay 500msec. after clamp/unclamp command; this is to avoid the mechanism being broken or overheat to make the servo motor alarm.**

To maintain the CNC rotary table in the proper operating condition for a longer period of time, lubricating oil is indispensable.

Oil required on tilting axis around : 1 liters

Oil required on rotary axis around : 2 liters

(1) There are some criteria for choosing correct oil, such as anti-rust, anti-oxidant, and the grade of viscosity should be around ISO-VG100~150.

Use high quality oil could maintain good operation.

※Recommended lubricating oil list is as bellow :

Manufacturer	Trade name
Shell	Omala 150
Esso	Spartanep 150
Mobile	Mobile Gear 629
JoMo	Reductus 100

※Note the following:

- (2) Keep lubricating oil clean, including all the accessories in order to avoid the chips and dusts into the oil tank during oil supply.
- (3) Different brands lubricating composition are different, mixed use will undermine the performance.
- (4) Supply lubricating oil up to the central line of the oil gauge (see P9).
- (5) The cycle of oil replacement depends on the operation frequency.

It is recommended that a complete oil change should be done semi-annually

Item		(14) Trouble Shooting			
	Symptom	Probable cause	Isolation instruction	Remedy	Ref. Item in text
1	Turntable fails to rotate 1) Motor does not rotate 2) Motor rotates normally	<ul style="list-style-type: none"> • Burnout • Gear locking sleeve 	<ul style="list-style-type: none"> • Check cable terminals • Check gears inside the gear case 	<ul style="list-style-type: none"> • Reinstall 	<ul style="list-style-type: none"> • Electrical diagram • Adjustment of gears in gear case
2	Rotation is not smooth Abnormal noise is generated during rotation	<ul style="list-style-type: none"> • Overload • Gears inside the gear case • Motor setup • Lubrication • Worm gear or gears in the gear case • Unclamping operation(residual pressure) 	<ul style="list-style-type: none"> • Check weight and inertia of workpiece • Measure current values of motor • Check rotation during low speed operation • Check assembly • Measure backlash • Rotation conditions with motor by itself • Check oil level and impurities <p>See clamping device and table clamp/unclamp limit switch unit</p>	<ul style="list-style-type: none"> • Change workpiece cutting method and conditions • Reassembly adjustment • Replenish or replace • Correct tooth surface or replace 	<ul style="list-style-type: none"> • Specifications • Adjustment of gears in gear case • Lubrication
3	Current value rises	<ul style="list-style-type: none"> • Clamped table not released • Overload • Worm gear backlash too small or not uniform 	<ul style="list-style-type: none"> • Inspect hydraulic hose and signal line, for connection • Check value function and LS signals • Check for residual pressure when table is unclamped • Check workpiece and cutting conditions 	<p>See clamping device and table clamp/unclamp limit switch unit</p> <ul style="list-style-type: none"> • Change workpiece and cutting conditions 	<ul style="list-style-type: none"> • Feeding oil pressure for table clamp deaeration

Item

(14) Trouble Shooting

	Symptom	Probable cause	Isolation instruction	Remedy	Ref. Item in text
3		<ul style="list-style-type: none"> Insufficient warm up or parameter setting 	<ul style="list-style-type: none"> Check program 	<ul style="list-style-type: none"> Correct program 	<ul style="list-style-type: none"> Routine checking work
		<ul style="list-style-type: none"> Lube oil: Overfilling Over viscosity Low temp 	<ul style="list-style-type: none"> In these cases, current value often increases 	<ul style="list-style-type: none"> Replace oil 	<ul style="list-style-type: none"> Lubrication
4	Impaired accuracy 1) Index accuracy	<ul style="list-style-type: none"> Worm wheel tooth surface Worm wheel; deformation or alignment 	<ul style="list-style-type: none"> Measure backlash Measure variations in backlash 	<ul style="list-style-type: none"> Adjust backlash 	<ul style="list-style-type: none"> Worm gear backlash adjustment
	2) Runout in table shaft hole	<ul style="list-style-type: none"> Bearing nut on shaft 	<ul style="list-style-type: none"> Compare with specified value 	<ul style="list-style-type: none"> Contact detron or dealers 	
5	Chattering during cutting operation 1) When positioning cutting operation takes place	<ul style="list-style-type: none"> External force Clamping function Excessive worm gear backlash Excessive gear backlash Worm shaft MSR locknut 	<ul style="list-style-type: none"> Check cutting conditions Clamping device and table clamp/unclamp limit switch unit Measure backlash Measure backlash Inspect lock nut 	<ul style="list-style-type: none"> Correct cutting conditions Backlash adjustment Backlash adjustment Retighten and lock worm nut, MSR 	<ul style="list-style-type: none"> Worm gear backlash adjustment Adjustment of gears in gear case Worm gear backlash adjustment

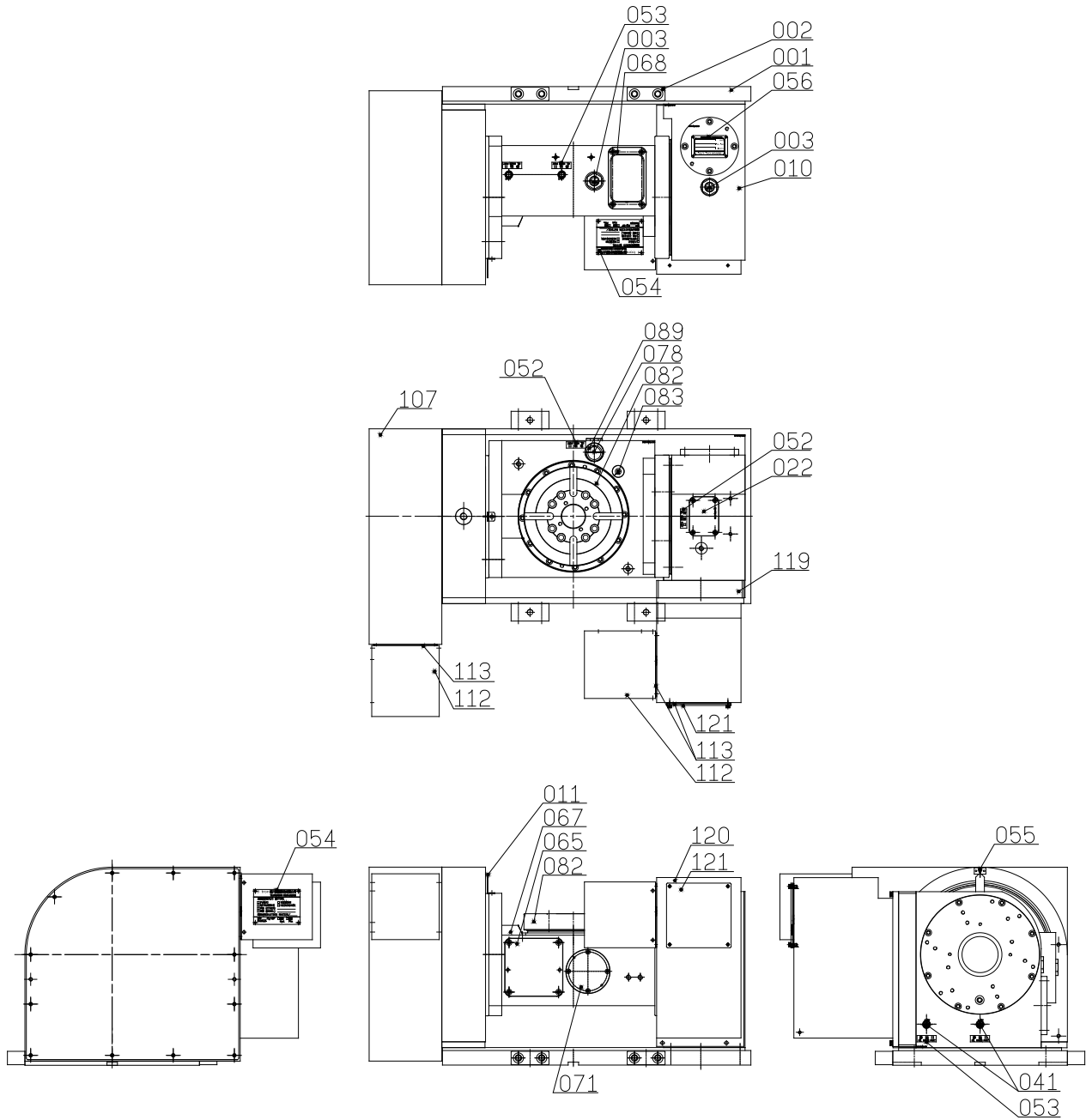
Item

(14) Trouble Shooting

	Symptom	Probable cause	Isolation instruction	Remedy	Ref. Item in text
6	1) No clamp signal	<ul style="list-style-type: none"> Limit switch 	<ul style="list-style-type: none"> Table clamp/unclamp limit switch ass'y Clamping sleeve Check limit switch 	<ul style="list-style-type: none"> P9 Contact detron to disassemble the table replace 	Clamping device and table clamp/unclamp limit switch unit
	2) No unclamp signal	<ul style="list-style-type: none"> Limit switch dog position Piston Signal 	<ul style="list-style-type: none"> Check position Check the motion 	<ul style="list-style-type: none"> Correct mounting positions Replace O-ring spring, etc. 	
	3) Unclamp signal delay	<ul style="list-style-type: none"> Hydraulic discharge line resistance excessive Return spring fatigue 	<ul style="list-style-type: none"> Check lines including valves, hoses, etc. Check for viscosity and impurities 	<ul style="list-style-type: none"> Replace with large caliber pipes. Replace 	
	4) Clamp hydraulic fluid (oil) is leaking	<ul style="list-style-type: none"> Hose connection 	<ul style="list-style-type: none"> Check piston fatigue 	<ul style="list-style-type: none"> Correct setting or replace 	
7	Zero resetting				Zero return limit switch unit structure
	1) Table fails to move	<ul style="list-style-type: none"> Signal line connection 			
	2) Table does not stop; decelerating speed reduction and stop are unattainable	<ul style="list-style-type: none"> Limit switch 	<ul style="list-style-type: none"> Inspect limit switch 	<ul style="list-style-type: none"> Replace limit switch 	
3) Table does not stop	<ul style="list-style-type: none"> MS dos stepping allowance Dog position Plunger 	<ul style="list-style-type: none"> Check dog operation Check operation Inspect parts for damage 	<ul style="list-style-type: none"> Remount and adjust Readjust Replace O-ring, spring 		

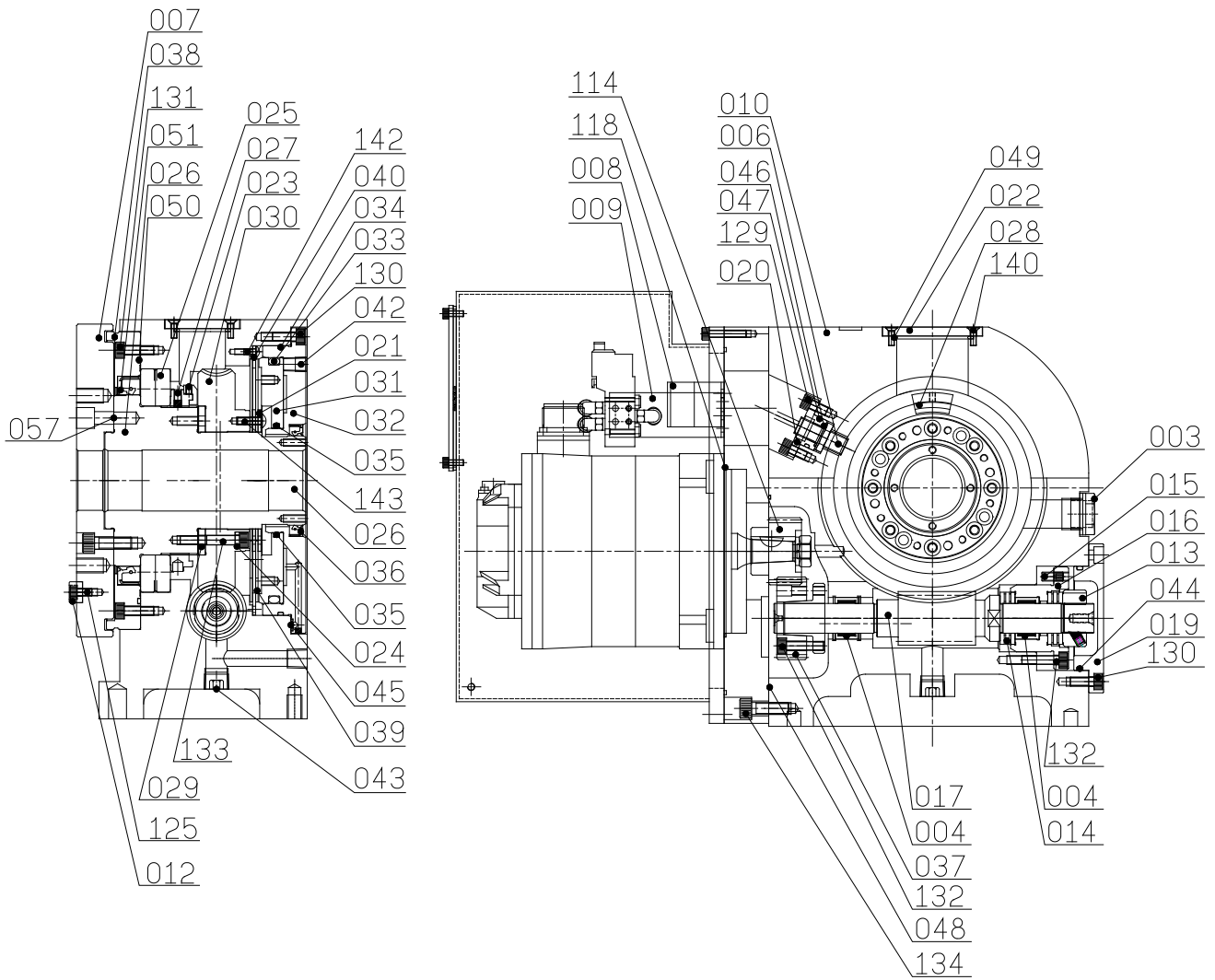
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(15) Parts List



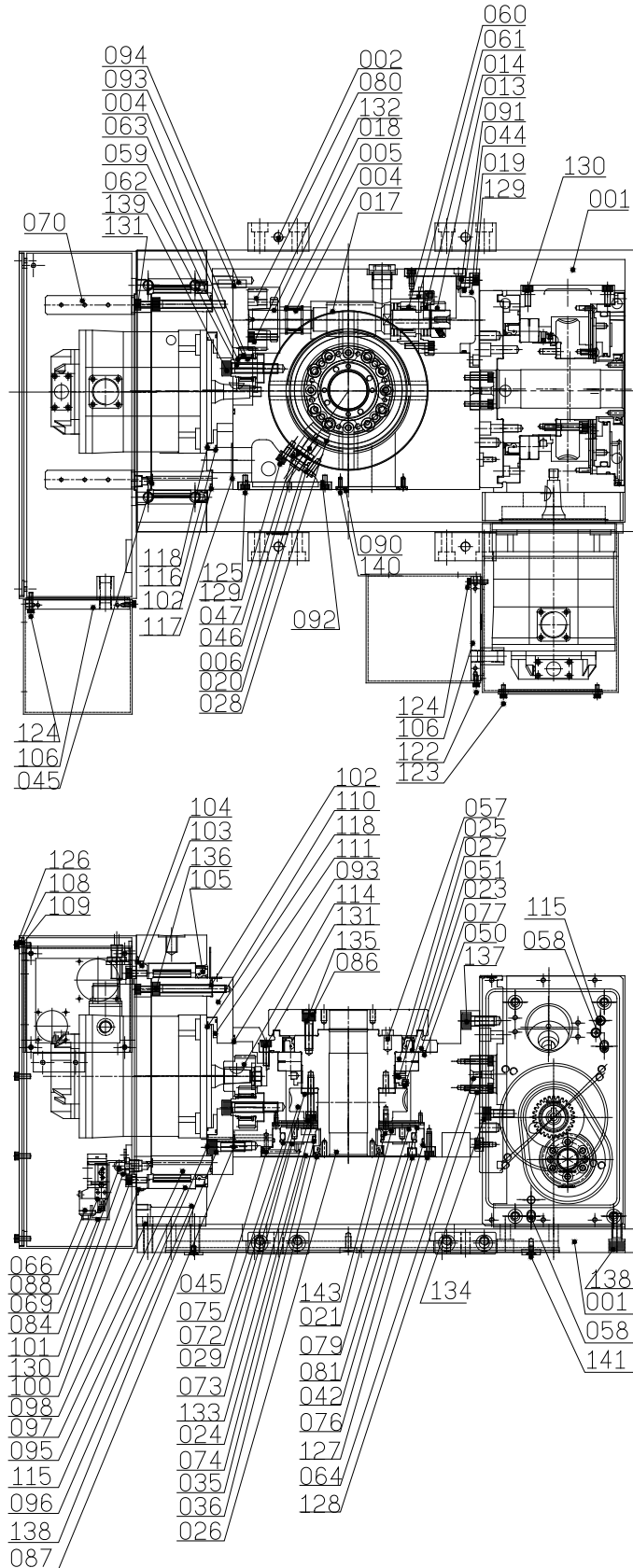
Item

(15) Parts List



Item

(15) Parts List



Item

(15) Parts List

No	Part number	Part	Qty	Spec.
1	GF170N0022B	Plate	1	
2	GF211N0039A	Block for ring	4	
3	A200CS0012F	Oil serl	2	PF1/2
4	BH000NK2016	Bearing	5	
5	C06000R0280	Retainer	4	
6	ES0E2EX3D20	Proximity switch	4	(φ 12;NC)E2E-X3D2-N-2M
7	GF170N0021B	Main body of tail	1	
8	GF170N0024A	Bracket	1	
9	GF170N0025C	Bracket	1	
10	GF170NW001B	Main body of tilting	1	
11	GF211N0088A	Zero plate	1	
12	GX125N0044A	Key	2	
13	A35JJ0PM200	Precision nut	2	
14	BL0081104TN	Taper roller	4	81104TN
15	GX125N0078A	Skt .Set .Screw	6	
16	GX170N0021C	Sleeve of worm shaft	1	
17	GX170N0034F	Worm shaft	2	
18	GX170N0023B	Flange of pulley	2	
19	GX170N0028D	Cover	2	
20	GX170N0030A	Bracket	2	
21	GX170N0037A	Spacer for disk	4	
22	GX170N0044B	Plug of oil	1	
23	A05CB04X005	Skt .Set .Screw	2	M4X5L
24	A41JJ00SM06	Washer	16	
25	B0RB10020BB	Cross roller	2	
26	GX170N0024F	Main shaft	2	
27	GX170N0029B	Nut	2	
28	GX170N0031C	Home dog	2	
29	GX170N0042A	Spacer for worm	2	
30	GX210N0021D	Worm	1	

Item

(15) Parts List

No	Part number	Part	Qty	Spec.
31	GX210N0026C	Piston for disk	1	
32	GX210N0036D	End cover	1	
33	J260000G155	O ring	1	G155
34	J26000AS165	O ring	1	ARP165
35	J2600AR4233	X seal	2	QRAR4233
36	J28AE3193F0	Oil seal	2	TC60X75X9
37	GX210N0022A	Gear	1	
38	GX210N0023C	Flange	1	
39	GX210N0024A	Disk –II	2	
40	GX210N0035A	Disk –I	1	
41	H36A000014T	Plug	1	1/4
42	H36A000018T	Plug	2	1/8
43	H36A000038T	Plug	2	3/8
44	J260000G065	O ring	2	G65
45	J260000P005	O ring	4	P5
46	J260000P010	O ring	2	P10
47	J260000P018	O ring	2	P18
48	J26000AS047	O ring	1	ARP47
49	J26000AS135	O ring	1	ARP135
50	J26000AS164	O ring	2	ARP164
51	J28AE4279E0	Oil seal	2	TC115X140X15
52	P00E000004A	Plate for oil inlet	2	
53	P00E000005A	Plate for oil drain hole	4	
54	P00E000020A	Plate for motor	2	
55	P00E000025A	Plate	1	
56	P00E000047A	Plate for order number	1	
57	P110008D020	Pin	2	8X20L
58	P110008D040	Pin	2	8X40L
59	C06000S0200	Retainer	1	
60	GF211N0033A	Sleeve of worm shaft	1	

Item

(15) Parts List

No	Part number	Part	Qty	Spec.
61	GX255N0061A	Skt .Set .Screw	4	
62	GF170N3022A01	Gear shaft	1	
63	GF170N3023A	Gear	1	
64	GF170N3024A	Center ring	1	
65	GF170N3025A	Cover;body of swing	1	
66	VPMVSY100A0	Solenoid valve	1	DC24
67	GF170NW003B01	Main body of swing	1	
68	GF211N0032B	Cover	1	
69	GF211N0036B	Bracket	1	
70	GF211N0090A	Bracket	2	
71	GX125N0036B	Cover	1	
72	GX170N0035D	Worm	1	
73	GX170N0036D	Piston for disk	1	
74	GX170N0045B01	End cover	1	
75	J260000P135	O ring	1	P135
76	J26000AS163	O ring	1	ARP163
77	GX170N0026C	Flange	1	
78	GX170N0027A	Plug of oil	1	
79	GX170N0040A	Disk -II	2	
80	GX170N0041A	Gear	1	
81	GX170N0047A	Disk -I	1	
82	GX170NW002F	Worktable	1	φ 170
83	GX255N0037B	Zero plate	1	
84	H07A006D14T	Elbow connector	1	PL6-02
85	H07A006D38T	Elbow connector	1	
86	H36A00005C1	Plug	8	M8
87	J260000P009	O ring	1	P9
88	CYP0006X005	Cylinder	1	
89	J260000P022	O ring	1	P22
90	J260000S055	O ring	1	S55

Item

(15) Parts List

No	Part number	Part	Qty	Spec.
91	J260000S080	O ring	1	S80
92	J260000S095	O ring	1	S95
93	J26000AS159	O ring	1	ARP159
94	P120008D030	Taper pin (1/50)	2	8X30L
95	BH0RNA48380	Bearing	1	
96	GF170NW002B	Main body of tail	1	
97	GF211N0024B01	Shaft of tail	1	
98	GF211N0026A	Spacer of tail	1	
99	GF211N0029A	Bracket	2	
100	GF211N0034A	Cover	1	
101	GF211N0040B	Block for limit	1	
102	J26000AS170	O ring	1	ARP170
103	J26000AS177	O ring	1	ARP177
104	J26000AS178	O ring	1	ARP178
105	J28STB21012	Oil seal	1	TB210X235X12
106	GF320N0025B	Plate for connect	2	
107	GF170N2021A	Box of tail	1	
108	GF170N2022B	Cover;box of tail	1	
109	GF170N2023A	Rubber for cover	1	
110	GF170N3021C01	Motor plate	1	
111	GF211N0025A	Plate for adjust	1	
112	GX320N0054C	Cover	2	
113	GX320N0056B	Cover for plate	3	
114	GX170N0033C	Gear (M=1.5)	2	
115	J260000P007	O ring	3	P7
116	J260000S115	O ring	1	S115
117	J260000S31S	O ring	1	S31S
118	J26000AS046	O ring	2	ARP46
119	GF170N0023B	Motor plate	1	
120	GF170N0026A	Cover for motor	1	

Item

(15) Parts List

No	Part number	Part	Qty	Spec.
121	GX320N0052A	Plate	1	
122	A06CB04X008	Skt.Hd.Cap.Screw	12	M4X8L
123	A06CB04X010	Skt.Hd.Cap.Screw	4	M4X10L
124	A06CB04X016	Skt.Hd.Cap.Screw	4	M4X16L
125	A06CB05X010	Skt.Hd.Cap.Screw	10	M5X10L
126	A06CB05X012	Skt.Hd.Cap.Screw	14	M5X12L
127	A06CB05X020	Skt.Hd.Cap.Screw	8	M5X20L
128	A06CB05X025	Skt.Hd.Cap.Screw	8	M5X25L
129	A06CB06X012	Skt.Hd.Cap.Screw	8	M6X12L
130	A06CB06X016	Skt.Hd.Cap.Screw	6	M6X16L
131	A06CB06X020	Skt.Hd.Cap.Screw	28	M6X20L
132	A06CB06X025	Skt.Hd.Cap.Screw	30	M6X25L
133	A06CB06X040	Skt.Hd.Cap.Screw	16	M6X40L
134	A06CB08X025	Skt.Hd.Cap.Screw	12	M8X25L
135	A06CB08X030	Skt.Hd.Cap.Screw	8	M8X30L
136	A06CB08X070	Skt.Hd.Cap.Screw	10	M8X70L
137	A06CB10X025	Skt.Hd.Cap.Screw	5	M10X25L
138	A06CB10X030	Skt.Hd.Cap.Screw	9	M10X30L
139	A06CB10X050	Skt.Hd.Cap.Screw	1	M10X50L
140	A08CB04X010	Flat Hd.Skt.Screw	8	M4X10L
141	A08CB05X008	Flat Hd.Skt.Screw	4	M5X08L
142	A09CB04X008	Button Hd.Skt.Screw	14	M4X8L
143	A09CB05X016	Button Hd.Skt.Screw	16	M5X16L
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