

GXA-125~250S Series

CNC Rotary Table

GXA-125S GXA-170S GXA-210S GXA-250S

Operation Manual

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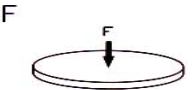
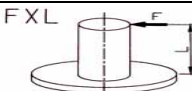

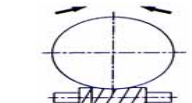
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detron	1 Introduction
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Title	1 Introduction
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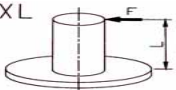
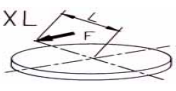

Welcome to detron, thank you for purchasing our CNC Rotary Table. This manual provides important information and detailed instruction for operating and maintaining the machine. We suggest that you peruse the manual thoroughly before operating to ensure optimal conditions of the machine and to effectively prolong its service life.

Keep this manual for convenient consultation.

de tron		2 Specifications			
Title		2.1 GXA-125/170S Specifications			
No.	Item	Unit	GXA-125S	GXA-170S	
1	Worktable diameter	mm	Ø125	Ø170	
2	Center bore diameter	mm	Ø30H7	Ø40H7	
3	Through-bore diameter	mm	Ø25	Ø40	
4	Height of center	Vertical	mm	110	135
5	Height of table	Horizontal	mm	155	175
		Vertical (※Remark 1)	mm	192.5	235
6	Width of T-slot	mm	12H7	12H7	
7	Width of guide block	mm	18	18	
8	Clamping method / pressure	MPa	Pne. / 0.55~0.7	Pne. / 0.55~0.7	
9	Clamping torque	N · m	140	300	
10	Servo motor type (※Remark 2)	FANUC		α2iF	α4iF
		MITSUBISHI		HF75	HF54
		SIEMENS		1FK7042	1FK7060
		HEIDENHAIN		QSY96A	QSY116C
		YASKAWA		SGMJV04A	SGMGV09A
11	Transmission ratio		1/40	1/60	
12	Max. table speed	min ⁻¹	66.6	53.3	
13	Allowable loading inertia	Kg · m ²	0.2	0.72	
14	Resolution	deg.	0.001	0.001	
15	Indexing accuracy(E+/E-)	sec	40	20	
16	Repeatability(R+/R-)	sec	6	6	
17	Net weight (servo motor excluded)	Kg	32	52	
18	Allowable loading capacity	Vertical	Kg	50	100
		Horizontal	Kg	100	200
		Tailstock applied	Kg	100	200
19	Allowable load (when table clamped)		N	9700	14000
			N · m	410	1020
			N · m	140	300
20	Allowable cutting torque		N · m	85	170

※Remark 1 : Vertical table height excluding eye bolt.

※Remark 2 : Other motor brands available, but the motor cover may be varied as the brand differs.

de tron		2 Specifications			
Title		2.2 GXA-210/250S Specifications			
No.	Item	Unit	GXA-210S	GXA-250S	
1	Worktable diameter	mm	Ø210	Ø255	
2	Center bore diameter	mm	Ø65H7	Ø65H7	
3	Through-bore diameter	mm	Ø65	Ø65	
4	Height of center	Vertical	mm	160	160
5	Height of table	Horizontal	mm	175	190
		Vertical (※Remark 1)	mm	268	287.5
6	Width of T-slot	mm	12H7	12H7	
7	Width of guide block	mm	18	18	
8	Clamping method / pressure	MPa	Pne./0.55~0.7	Pne./0.55~0.7	
9	Clamping torque	N · m	400	400	
10	Servo motor type (※Remark 2)	FANUC		α4iF	α4iF
		MITSUBISHI		HF54	HF54
		SIEMENS		1FK7060	1FK7060
		HEIDENHAIN		QSY116C	QSY116E
		YASKAWA		SGMGV09A	SGMGV09A
11	Transmission ratio		1/72	1/72	
12	Max. table speed	min ⁻¹	53.3	53.3	
13	Allowable loading inertia	Kg · m ²	1.38	1.38	
14	Resolution	deg.	0.001	0.001	
15	Indexing accuracy(E+/E-)	sec	20	20	
16	Repeatability(R+/R-)	sec	6	6	
17	Net weight (servo motor excluded)	Kg	60	67	
18	Allowable loading capacity	Vertical	Kg	125	125
		Horizontal	Kg	250	250
		Tailstock applied	Kg	250	250
19	Allowable load (when table clamped)		N	17000	17000
			N · m	1265	1265
			N · m	400	400
20	Allowable cutting torque		N · m	260	260

※Remark 1 : Vertical table height excluding eye bolt.

※Remark 2 : Other motor brands available, but the motor cover may be varied as the brand differs.

detrone	3 Dimensional Drawing
Title	3.2 GXA-170(S/SL)外型尺寸圖(Dimensional Drawing)
<p>The drawing includes the following labels and dimensions:</p> <ul style="list-style-type: none"> Top View: 空壓入口(Ø6管徑) Pne. Inlet, 動力接頭 Power Connector, 訊號接頭 Signal Connector, 4-M5X0.8PX12L PCDØ51 90°等分, 注油孔 Oil Feed Port, 油鏡 Oil level, 170, 157, 18, 25, 4-M6X1PX12L PCDØ52 90°等分, 立臥式潤油孔 Oil Drain Port, 側出線: 437, 325, 190, 235, 135, 115, 135, 440, 聯軸器鎖緊孔 Coupling Tightening Hole. Side View: 286.5 Front View: 170, 157, 18, 25, 4-M6X1PX12L PCDØ52 90°等分, 立臥式潤油孔 Oil Drain Port, 側出線: 437, 325, 190, 235, 135, 115, 135, 440, 聯軸器鎖緊孔 Coupling Tightening Hole. Detail Views: <ul style="list-style-type: none"> T型溝詳圖 Width of T-slot: 12H7, 19, 20, 8. 中心孔尺寸 Through-hole Diameter: 40H7, 21.5, 40. 	
Fig 3-2	
<p>* 尺寸單位：mm</p> <p>* 標準 GXA-170S 馬達：α 4iF、β 8is、HF54、SGMGV09A、SGM7G09A</p> <p>* GXA-170S 系列之馬達護罩位於盤面左側處。</p> <p>* 其餘馬達請參考其他版本外型圖</p> <p>* Measurement unit: mm</p> <p>* Standard rotary axis motor of GXA-170S: alpha 4i F/ beta 8iS / HF54/ SGMJV09A/ SGM7G09A</p> <p>* The motor cover of GXA-170SL series is on the left side of the table plate.</p> <p>* For other type servo motor, please refer to the customized drawing.</p>	

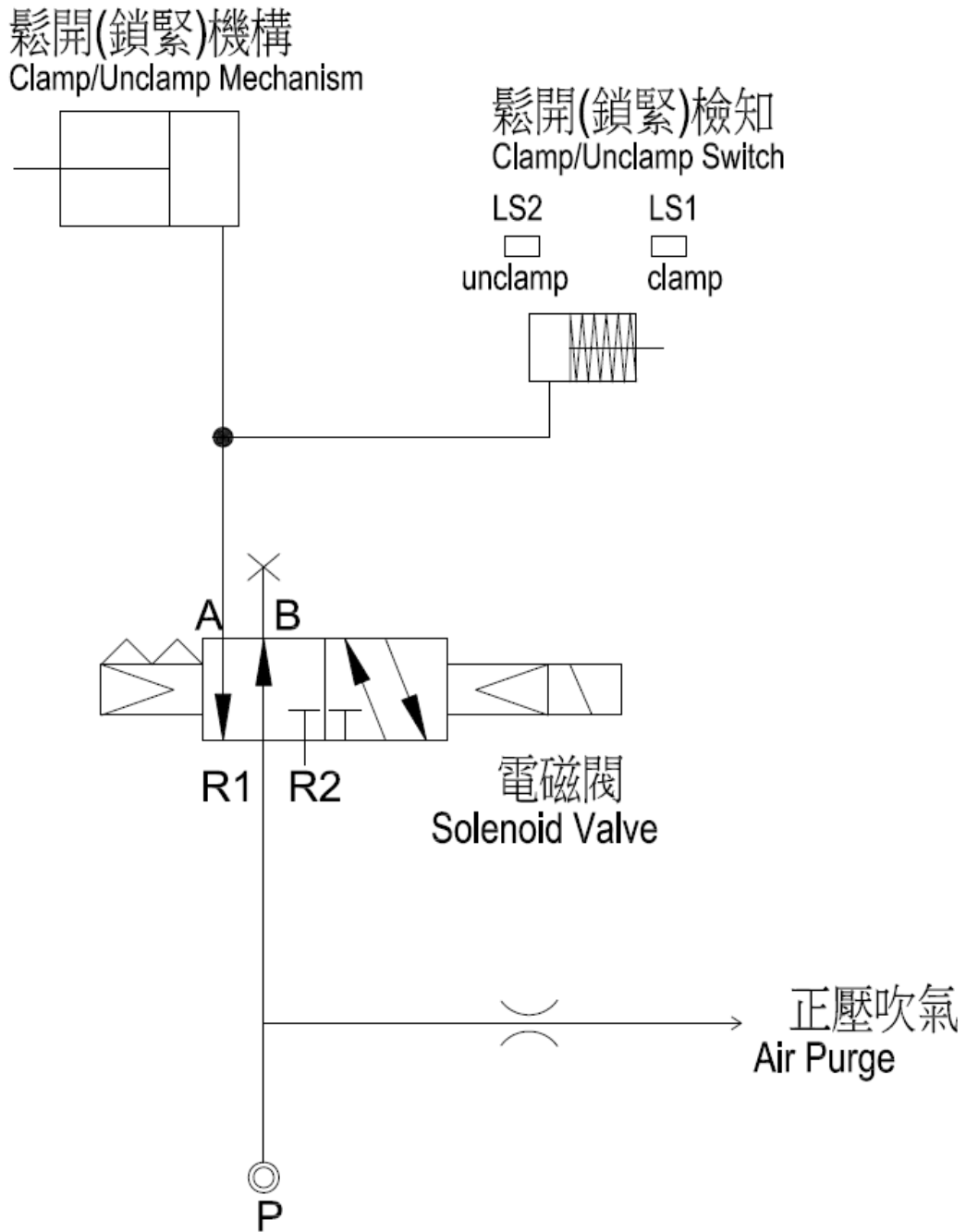


Fig 4-1

※電磁閥送電鎖緊

Table clamped when Solenoid Valve "ON"

※機型：GXA-S/SL 系列

Model：GXA-S/SL series

Title

5.1 GXA-S Series Mechanism of Main Parts

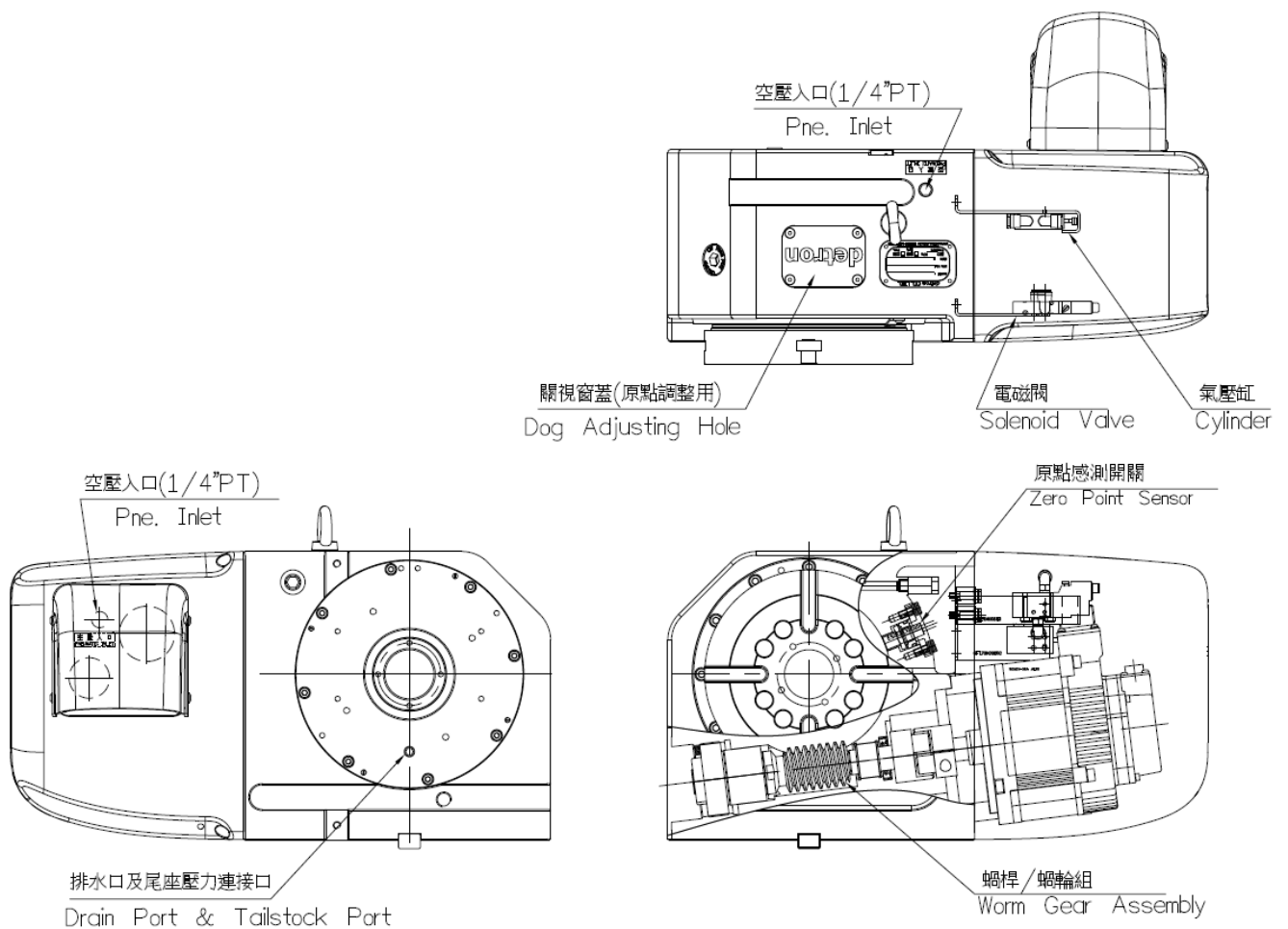


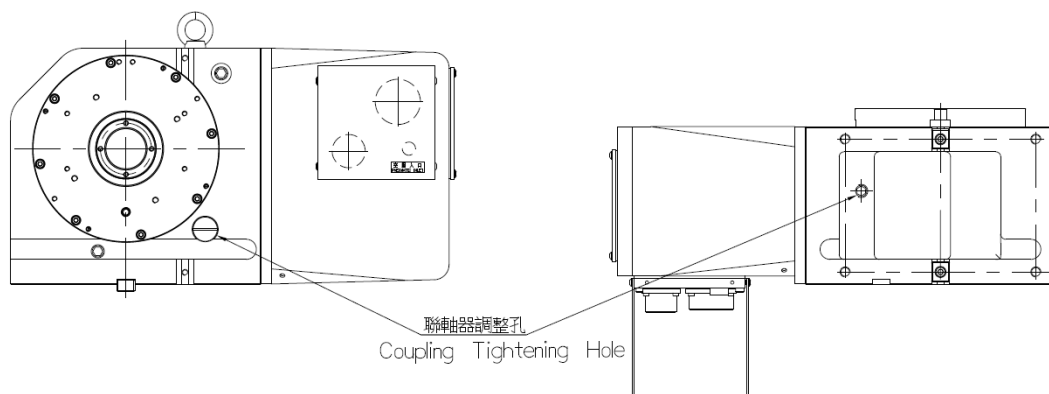
Fig.5-1.

*GXA-SL 系列之馬達護罩位於盤面左側處。

*The motor cover of GXA-SL series is on the left side of the plate.

*GXA-SL 系列之聯軸器調整孔位於本體背後，使用於臥式時調整孔位於本體底部。

*The Coupling Tightening Hole of GXA-SL series is at the back of the body, the Hole would be at the bottom side when it is used in horizontal application.



※ **Prior to using the rotary table, prepare the machine in the following sequence:**

A. Unpacking and preparation

Prior to using and commissioning the rotary table, prepare the follows:

- (1). Unpack and remove the attaching parts from the rotary table.
- (2). Wipe away the grease with a cleaning agent.
(Note : Do not use benzene, gasoline, or diesel which would produce rust.)
- (3). Clean and de-burr the mounting surfaces and the rotary table.
- (4). Mount the rotary table on the machine center. (see Fig 6-2) ◦
- (5). Add Lubrication. (see Fig 5-1 ◦ Page 11-1)
- (6). Make sure that the electrical connection between the Rotary Table and the machine controller is well connected according to the attached electrical circuit diagram.
(see **Electronic Circuit Diagram of packing**)
(Note : Switch off the main power of the machine center before connecting the electric cables.)
- (7). Supply compressed air for clamping. (see Fig 5-1 ◦ Page 10-1)
(Note: pneumatic source requires a F.R.L. Unit to ensure the suspending particulates are less than 5um)
- (8). Supply compressed air to bring up barotropic fluid inside of motor cover. Release stable air pressure through throttle connector. The positive air pressure stays to avoid any humidity accumulated in the cover and prevent damage and corrosion of internal electrical components.
(see Fig 6-1)
- (9). Set up rotary table parameters.(see **Parameter Sheet of package**)
- (10). Trial run.
- (11). Set the grid shift amount for machine zero-return.(see **Page 8-2**)

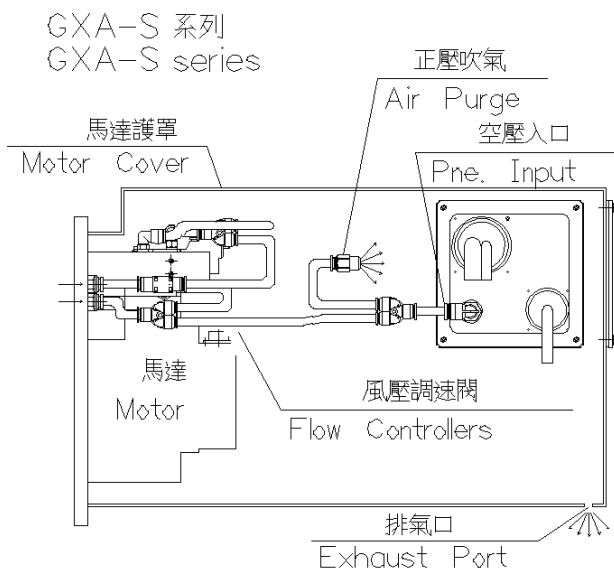


Fig 6-1

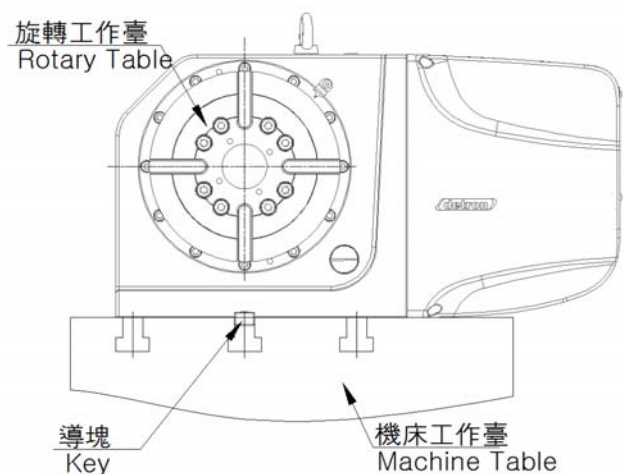


Fig 6-2

de tron	6 Commissioning Procedure
Title	6.2 Trial Run
<p>B. Trial run</p> <p>(1).Make sure both the Rotary table mounting face and plate surface are clean.</p> <p>(2).Make sure the Rotary table is load-free.</p> <p>(3).Repeat clamp and unclamp functions; test for normal operation.</p> <p>(4).Check precision. (<i>see Inspection Certificate sheet of package</i>)</p> <p>(5).Rotate the CNC Rotary Table clockwise and counter-clockwise about twice at low speed(F300) for the first time, and make sure that the Rotary Table rotates smoothly, then gradually increase the speed up to the rapid speed.</p> <p>(6).Perform Zero reset, check for correct return to 0° .</p> <p>(7).Check different command operations by using NC operation commands.</p> <p>※ When an unclamp/clamp signal is detected, it is strongly suggested that a 0.5 sec. delay be applied before carrying out the subsequent command to ensure the table has completed the unclamping or clamping action. This is to prevent internal mechanism damage or overload of the servo motor.</p> <p>※ Never start processing with the Rotary table before completing the above actions, otherwise mechanism damage may occur.</p>	

de tr on	7 PLC Flow Chart of Control System
Title	7 PLC Flow Chart of Control System

To make sure detron Rotary tables are under good conditions when operating, please follow below PLC control circuit process for operation. (see Fig 7-1)

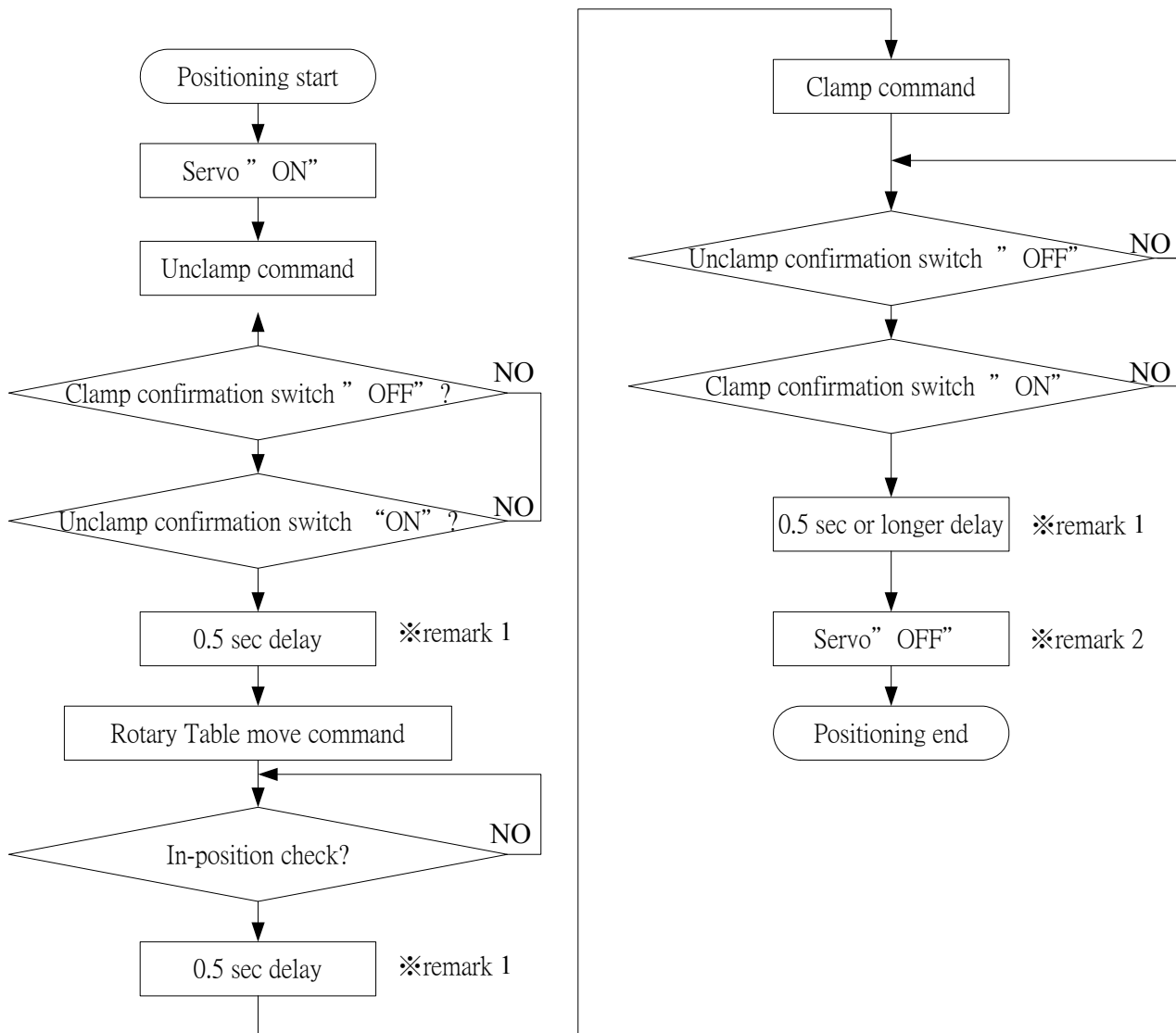


Fig 7-1

※ Remark 1 : Delay time is our recommended time, but actual delay time may differ depending on different rotary table operation conditions.

※ Remark 2 : When the unbalanced load makes a large current (70% or more of the rated current) occur in operation, turn the servo motor OFF. Turn the servo motor OFF as well when applying to full closed loop control.

de tron	8 Zero Return Adjustment and Grid Shift Amount Setting
Title	8.1 Zero Return Adjustment

Zero Reset of Rotary Table is achieved via detection of proximity switches.

Inactive or false action of proximity switch may be caused by the following conditions:

- Proximity Switch failure.
- Excessive distance between proximity switch and Zero Dog (remove proximity switch bracket, loosen nut and adjust the distance of proximity switch); the optimal distance shall be 1.0~2.0 mm. (*see Fig 8-1*)
- Inaccurate relative position between proximity switch and Zero Dog. Open the cover of observation window, loosen screws on Zero Dog; move Zero Dog to a proper position and test for correct action. Replace the cover of observation window. (*see Fig 5-1*)

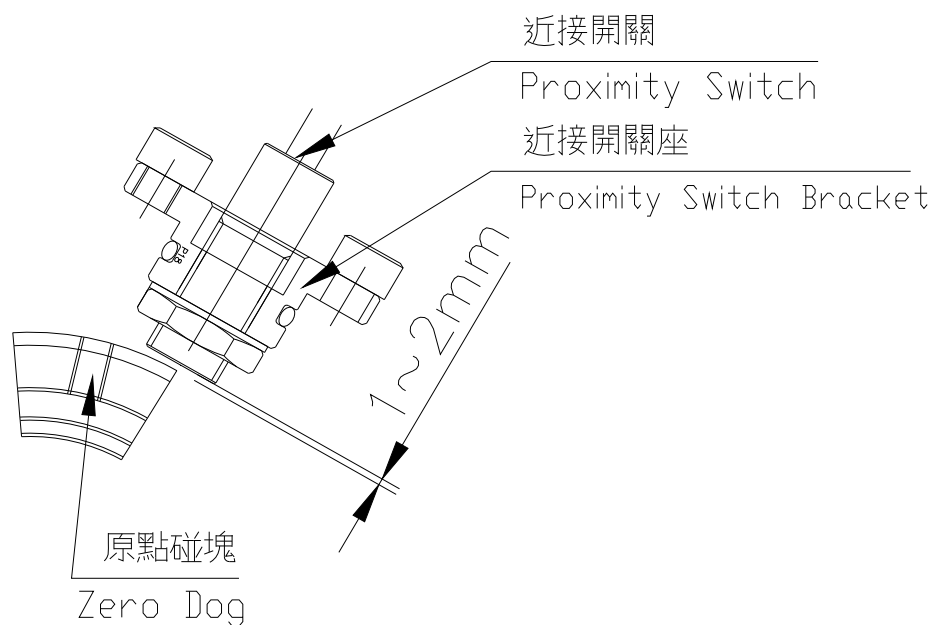


Fig 8-1

Title

8.2 Zero Return Grid Shift Amount Setting

- (1).When the machine receives Zero Reset Command from NC controller, the Rotary Table will start to rotate in the specified forward direction to zero position.
- (2).When the Zero Dog touches the Proximity Switch, Rotary Table starts to decelerate for an accurate and prompt stop.(see Fig 8-3)
- (3).When the Rotary Table reduces its rotation speed, it will stop at Zero when a reference signal from the motor is received.
- (4).Perform turntable operation several times; measure errors between the actual stopping point and nominal stopping point of the Rotary Table. Enter the measurements into Zero Offset of the NC System for correction.

NOTE :

※In general, Zero Return is positioned when face plate T-slot is parallel to the bottom of the body, and the "0" position on the face plate indicates to the zero plate position.(see Fig 8-2)

※If the result is different, the computer parameter needs to be adjusted to achieve parallelism. The correction parameter shall not be of negative value. If a negative value occurs, it means the Zero Dog must be moved forward to a proper position for carrying out parameter adjustment.

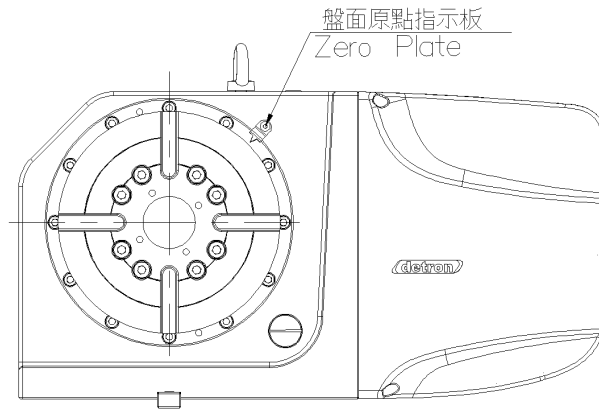


Fig 8-2

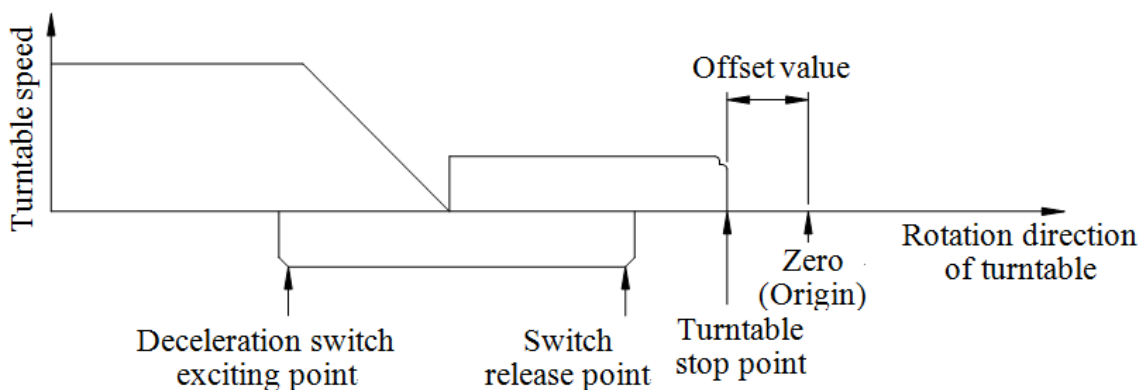


Fig 8-3

Title

9.1 Worm Wheel and Worm Shaft Backlash Inspection

Detron NC Rotary Table is highly reliable and meant for maintenance free. In order to maintain normal conditions for a prolonged period, some adjustments and maintenance are required.

Excessive backlash between the Worm Wheel and the Worm Shaft will cause an undesirable effect between the Worm Wheel and the Worm Shaft when operating the Rotary Table. This not only affects processing accuracy of the work piece, but also directly reduces the service life of both the Worm Wheel and the Worm Shaft. When the backlash between the Worm Wheel and the Worm Shaft is too small, excessive heat may be generated by the Worm Wheel will cause the worm wheel seized. In order to maintain long-term operation of the machine, the proper gap between the Worm Wheel and the Worm Shaft must be checked periodically. (see Page 9-1)

《Inspection Procedure》 (see Fig 9-1)

- (1). Make sure that braking mechanism of the measuring axis is in released state, and the servomotor is in the OFF state.
- (2). Place dial gauge pin on the inner side of the T-slot.
- (3). Place a steel plate into the T-slot of face plate.
- (4). Slowly turn the face plate manually by using the steel plate, exert a 15 to 20 kg force clockwise or counter clockwise; release the force immediately after exerting it, allow the gauge to resume a steady reading. Followed by doing the same in the reverse direction and read the reading. The difference between two readings of the dial gauge is the value of the gap between gears.
- (5). Method for measuring the backlash: Take 4 points on the Worm Wheel in 90° intervals (Rotary Table rotation angle). Make one measurement every 90° and take the average.
- (6). At 20°C environmental temperature, the proper backlash between the Worm Wheel and the Worm Shaft should be 10 to 15 seconds. Adjustment is required if otherwise.

※Based on thermal expansion principle, this backlash value should be properly adjusted in accordance with surrounding temperatures.

※Room temperature for using the rotary table : $5^\circ\text{C} \sim 40^\circ\text{C}$.

The turntable is still operable even when the backlash exceeds the upper limit listed above. When a backlash adjustment is required, and the backlash correction value is entered into the NC Unit by using parameter methods, then the backlash value becomes 0.

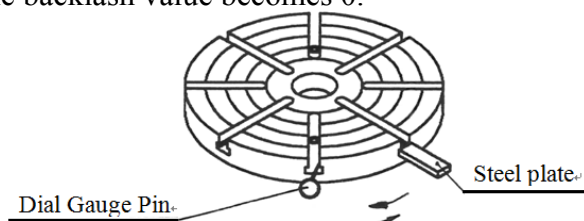


Fig 9-1

Title 9.2 Worm Wheel and Worm Shaft Backlash Adjustment

※ **Adjusting an excessive backlash**(see Fig 9-2)

- (1). Remove the Plug, loosen SKT.HD.CAP.SCR ① to the coupling.
 - (2). Evenly loosen flat HD.SKT.SCR ②, remove Cover.
 - (3). Measure the backlash as described on the previous page. (see Page 9-1)
 - (4). According to step (3), adjust sleeve of worm shaft clockwise to reduce worm gear backlash.
 - (5). Based on the measurement, adjust the sleeve of worm shaft repetitively until the standard backlash value is reached. (see Page 9-1)
 - (6). As adjustment accomplished, recover the assembly on consequence.
- (The tightening torque of SKT.HD.CAP.SCR ① is M5 screws 8Nm、M6 screws 15Nm).
 (The tightening torque of Locking Screw ③ is 3Nm).

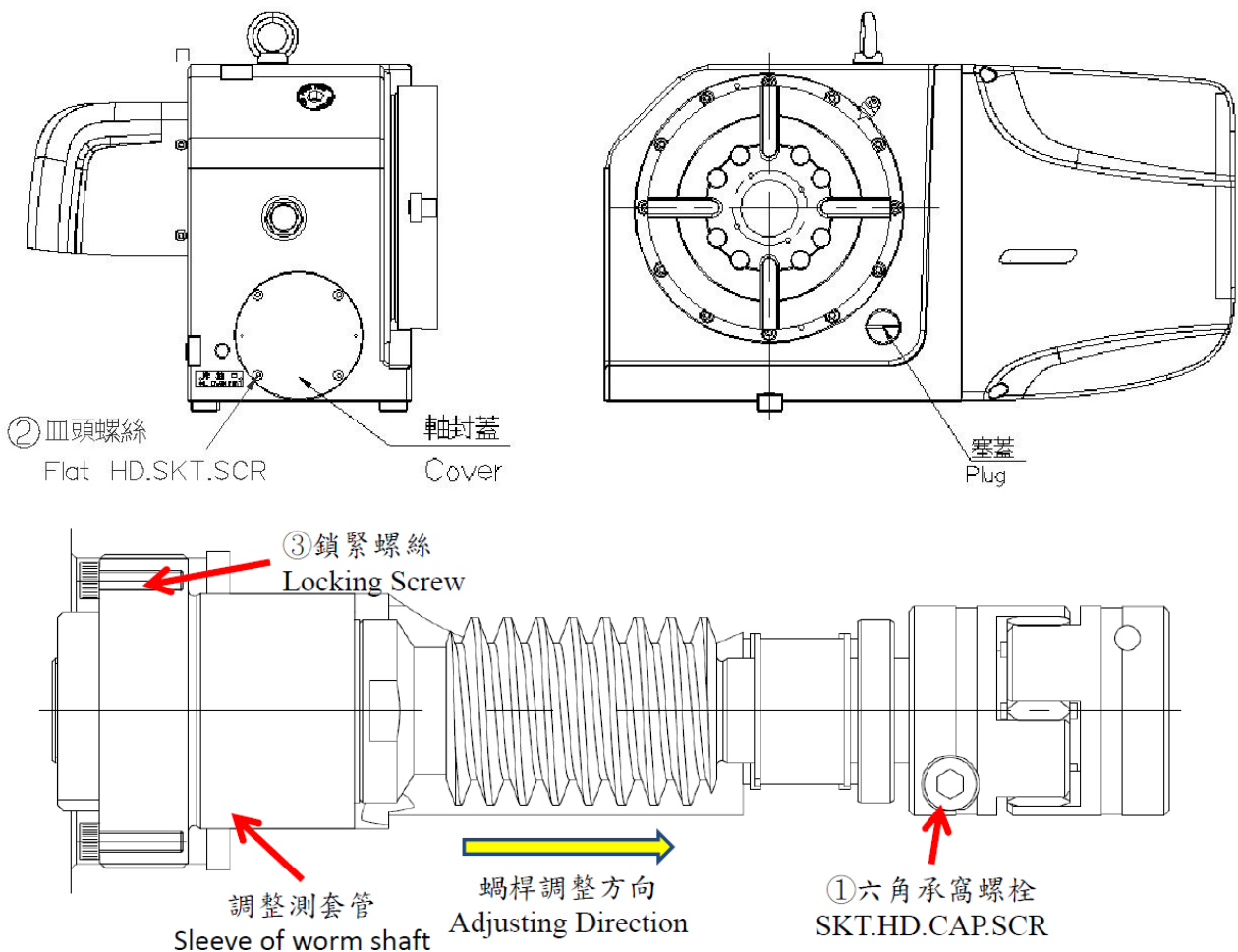


Fig 9-2

Title 9.2 Worm Wheel and Worm Shaft Backlash Adjustment

※ **Adjusting an insufficient backlash**(see Fig 9-3)

- (1). Remove the Plug, loosen SKT.HD.CAP.SCR ① to the coupling.
 - (2). Remove flat HD.SKT.SCR ②, remove Cover.
 - (3). Measure the backlash as described on the previous page. (see Page 9-1)
 - (4). According to step (3), adjust sleeve of worm shaft counterclockwise to increase worm gear backlash.
 - (5). Based on the measurement, adjust the sleeve of worm shaft repetitively until the standard backlash value is reached. (see Page 9-1)
 - (6). As adjustment accomplished, recover the assembly on consequence.
- (The tightening torque of SKT.HD.CAP.SCR ① is M5 screws 8Nm · M6 screws 15Nm).
 (The tightening torque of Locking Screw ③ is 3Nm).

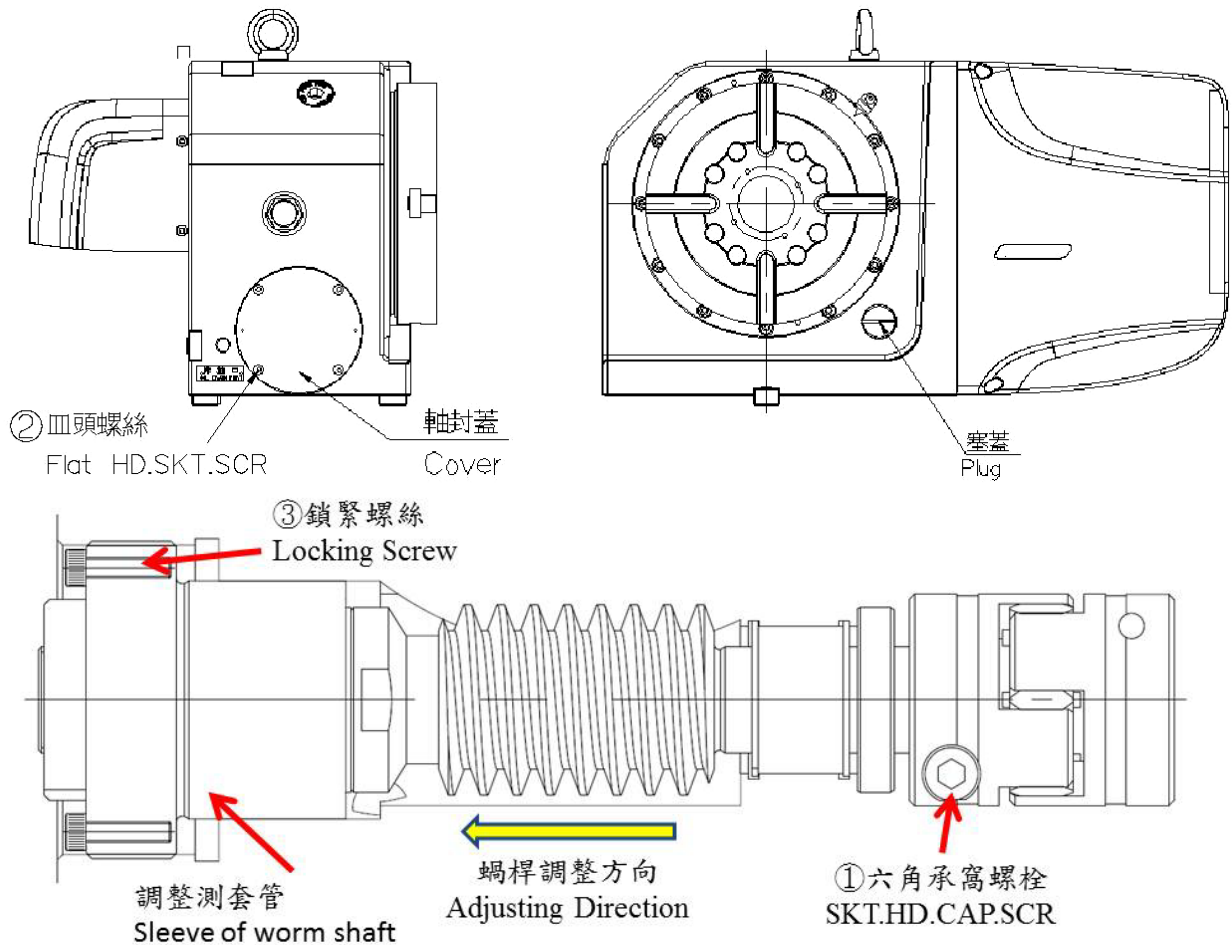


Fig 9-3

Title 9.3 The Assembling/Disassembling of Motor Coupling

Installation Guide for Servo motor:

1. Clean the rust oil on the worm shaft surface.
2. Remove the plug on the Sleeve of worm shaft ①. (*see Page 9-4*)
3. Softly loosen the SKT.HD.CAP.SCR ② on the Coupling. (Do not remove, just loosen)
4. Remove motor cover, install Servo motor, and tighten four SKY.HD.CAP.SCR ③.
5. Tighten SKT.HD.CAP.SCR ② by standard torque through the Sleeve of worm shaft ①.
(The tightening torque of ② is M5 screws 8Nm · M6 screws 15Nm).
(The tightening torque of ③ is M6 screws 15Nm · M8 screws 30.4Nm).
6. Lock the plug, ensure the O ring inside the plug has been installed.
7. Assemble the wires according to circuit diagram. Mount the motor cover back.

Disassemble Guide for Servo motor:

1. Remove the plug of ① from body. (*see Page 9-4*)
2. Loosen SKT.HD.CAP.SCR ② on the Coupling through Sleeve of worm shaft ①.
(Do not remove, just loosen)
3. Remove motor cover, notice the internal wires must be connected when you remove. Pull the internal wires strongly is prohibited.
4. Remove the four SKT.HD.CAP.SCR ③ on the body where servo motor is mounted. The motor can be dismantled.

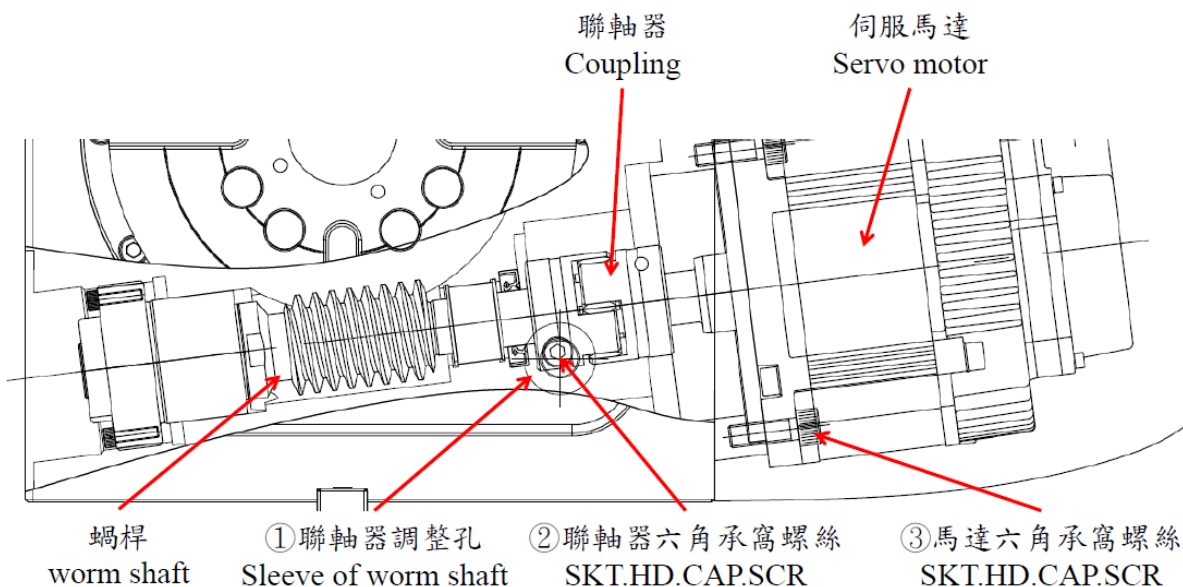


Fig 9-4

detrone	10 Clamping/Unclamping Device
Title	10.1 Pneumatic Clamping/Unclamping Device
<p>After placing a work piece, make sure to tighten the rotary table. Processing without tightening the rotary table will cause quick wear or damage of the worm wheel as well as tool and work piece damage. When adjusting the angle of the rotary table or performing continuous cutting, always confirm that the rotary table is in the released state. To ensure the correct state, always check the Clamp/Unclamp signal for correct indication.</p> <p>In order to achieve proper clamp torque, the rotary table requires a pneumatic pressure of 0.55~0.7 MPa and the compressed air must flow through an air filter, pressure regulator and lubricant filter.</p> <ul style="list-style-type: none"> ※ On monthly basis, open the drain hole cover at the back of rotary table and check for any moisture ingress from the pipeline. If water ingress exists, improve the F.R.L. Unit on the machine. ※ Solenoid valve set and pneumatic brake mechanism are high precision designs. To maintain proper functionality, the F.R.L. Unit accuracy requirement is under 5um, so as to prevent solenoid valves or the brake mechanism from being clogged by suspending particles and causing a machine stop. <p>The solenoid valve on the machine controls the Clamp/Unclamp action. When power is switched on and the Clamp is selected, the piston in the solenoid valve is pushed forward by compressed air when the valve receives the Clamp command, causing the brake disk clamping on the Rotary Table. Friction at this time is the clamping torque.</p> <p>A reed switch on the single movement pneumatic cylinder is provided to detect the Clamp/Unclamp state of the Rotary Table. Pressure setting of the switch is 0.2~0.3 MPa.</p> <ul style="list-style-type: none"> ※ When an unclamp/clamp signal is detected, it is strongly suggested that a 0.5sec. delay be applied before carrying out the subsequent command, to ensure the table has completed the unclamping or clamping condition. This is for preventing internal mechanism damage or overload of the servo motor. 	

de tr on	10 Clamping/Unclamping Device
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Title	10.2 Cutting Force and Clamping Torque
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Referring configuration 10-1, cutting force is considered as the thrust for NC rotary table.

To calculate the value by the formula:

Cutting Torque = Cutting Force * radius

$$T [N \cdot m] = F [N] * r [mm] / 1000$$

To avoid dispositioning and deformation at NC rotary table, the safe coefficient of clamping torque shall be 200% of or more than cutting force.

$$\text{Cutting torque} \times 2 \leq \text{clamping torque}$$

The quality and sharpness of tooling is the factor of cutting force. Cutting force will be increased due to the higher wearing out of the tool. Dispositioning and deformation will be caused accordingly when cutting force is over then NC table clamping torque.

To remain long-term accuracy of NC rotary table, the shorter moment of fixture (shorter fixture swing) is recommended.

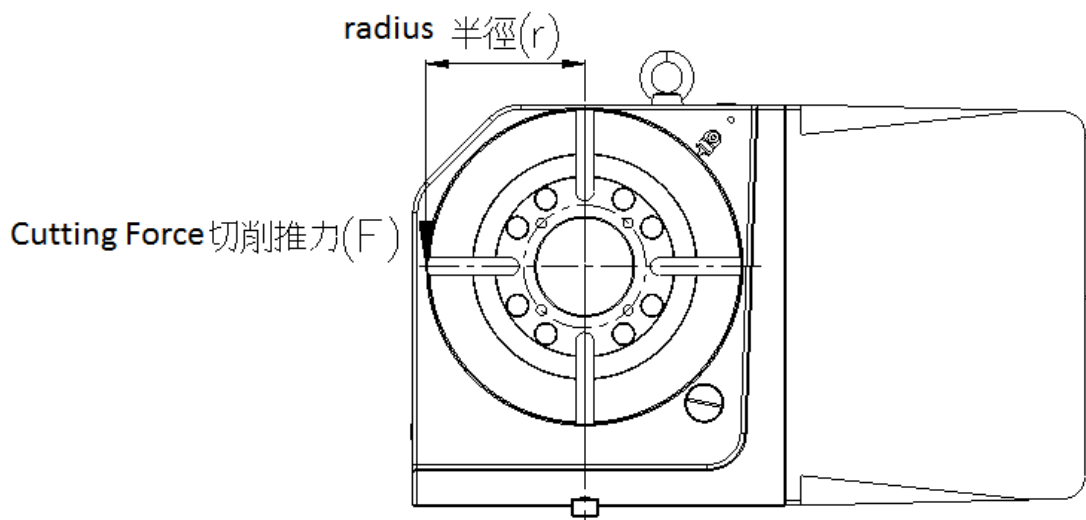


Fig 10-1

Lubricant is a key factor to performance and service life of your machine. Always use lubricants recommended in the manual.

Model	GXA-125S	GXA-170S	GXA-210/250S
Oil requirement of Table Unit: Liter	0.5	0.8	1

※ Precautions for replenishing and replacing lubricant.

(1) Selection of lubricant is based on several features :

- a. The Oil film strength, rust resistance and oxidation resistance.
- b. The viscosity class shall be within ISO-VG100~150.

※ Since lubricants engulf the Worm Wheel, Worm Shaft and other respective parts, quality products must be used to ensure satisfactory operation.

※ Recommended Ambient Temp. range is 18°C~40°C under normal usage, Contact Lubricant mfg for suggested lubricant product if the temp. is higher or lower than the recommended range.

mfg	Product
Shell	Oma a 150
Esso	Spartanep 150
Mobile	Mobile Gear 629
JoMo	Reductus 100

(2) Pay attention to keep the lubricant clean; always clean up auxiliary tools for replenishing oils. Never allow external dust and debris entering the oil tank.

(3) DO NOT mix lubricants of different brands since their ingredients are different; mixed use may impair lubrication properties.

(4) Replenish the oil to the centerline of the oil level window (*see Fig 5-1 for oil level position*).

(5) Replace the lubricant every 6 months or after 1200hr operation; check oil amount from time to time and replenish as necessary.

Title

12 Troubleshooting

No.	Symptom	Cause	Check	Solution
1	Turntable not turning (1) Motor not running (2) Motor idle running	* Cable damage * Tapered sleeve slackened	* Check cable and end connections * Check all gears	* Refer to electric circuit diagram * Fix again
2	Turntable runs not smoothly	* Overload	* Check load and gyration inertia * Check motor operation at that time * Check operation condition at low-speed.	* Reduce the load or stop processing this workpiece
3	Noise when rotating	* Faulty fixation of gears in gear box * Incorrect lubrication * Slackened operation (Residual hydraulic pressure) * Damaged worm wheel, worm shaft or gear in gear box	* Check equipment condition * Check lubricant type and quantity * Check clamp part and turntable clamps (Slackened) pressure switch control	* Re-calibrate * Replenish or replace lubricant * Calibrate tooth face or replace gear
4	Motor over-current	* Faulty zero offset * Overload operation * Backlash of worm wheel and worm shaft too small or uneven * Insufficient warm-up time or incorrect parameter setting	* Over current only when tightened * Check load * Check backlash * Check program	* Re-do zero offset * Alter load or loading method * Adjust backlash * Revise program
5	Inaccuracy (1) Poor division precision (2) face plate face undulation or center sway	* Insufficient Hyd. pressure * Incorrect solenoid valve spec. * Pipeline clogged * Worm Wheel face worn out * Slackened nut of shaft bearing	* Check pressure * Check solenoid valve spec. * Check solenoid valve condition * Check pipeline * Measure backlash * Compare with precision tolerance	* Adjust pressure * Replace with correct solenoid valve spec. * Replace solenoid valve * Replace pipeline * Adjust backlash * Contact detron or dealer
6	Clamp/Unclamp operation (1) No Clamp/Unclamp signal (2) Delayed signal output	* Signal line connection defect * Improper adjustment of switch equipment * Pressure switch damaged * Hydraulic filter screen clogged * Insufficient hydraulic pressure	* Check signal cable * Check filter screen * Check pipeline for clog or fracture * Check hydraulic pressure supply system for normal operation	* Re-adjust * Replace pressure switch * Replace pipeline
7	Clicking sound in cutting operation. (1) When starting to cut after replacing workpiece (2) In continuous cutting	* External force * Clamping action * Excessive worm wheel backlash * Poor teeth engagement	* Check cutting condition * Check tightening tool and turntable clamp (or unclamp) pressure switch * Measure backlash of worm shaft and worm wheel * Measure gear backlash	* Correct cutting condition * Adjust backlash * Adjust backlash