NC TILTING ROTARY TABLE

INSTRUCTION MANUAL

Model TT120AEE02

IMPORTANT

Please read and understand DANGER / WARNING items in this manual before operating your NC Rotary Table.

Please keep this manual by your side for answers to any questions you may have and to check.

KITAGAWA IRON WORKS CO., LTD.

You selected KITAGAWA brand NC tilting rotary table because it has the feature and benefits. All of its specialized features and their operations are described in this manual.Make sure that you are completely familiar with all its fertures of the table.

Preface

! SAFETY ALERT SYMBOLS

These are the industry "Safety Alert Symbol". Their symbols are used to call your attention to items or operations that could be dangerous to you or other persons using this equipment. Please read these messages and follow these instructions carefully.

Warning terminology

⚠ DANGER	Indicates an imminently hazardous situation which will result in death or serious injury if proper safety procedures and instructions are not adhered to.
⚠ WARNING	Indicates a potentially hazardous situation which could result in death or serious injury if proper safety procedures and instructions are not adhered to.
⚠ CAUTION	Indicates a potentially hazardous situation which may result in minor or moderate injury if proper safety procedures and instructions are not adhered to.
IMPORTANT	Instructions for table performance and avoiding errors or mistakes.

Table of Contents

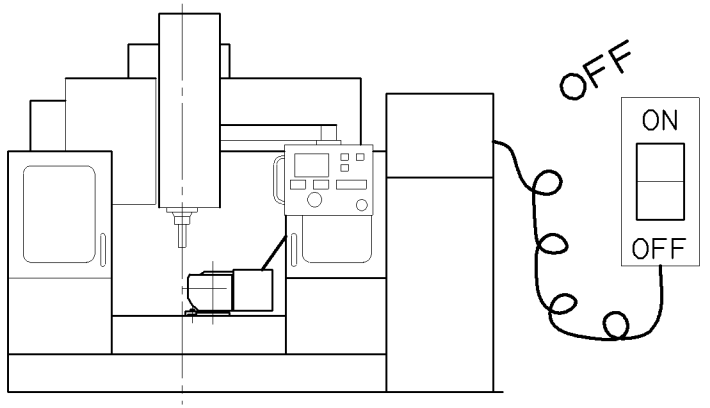
1 For Safety Operation

Please read this manual and follow instructions carefully.

We cannot assume responsibility for damage or accidents caused by misuse of the NC Rotary indexing tables. through non-compliance with the safety instructions.

⚠ DANGER

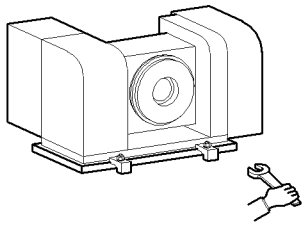
Turn off the main power of the machine prior to maintenance. check. or repair of the unit. Failure to do so may cause severe injury and/or accident.



There is danger in which fingers or clothes may be caught in the table.

WARNING

Secure clamp bolts to correct torque.



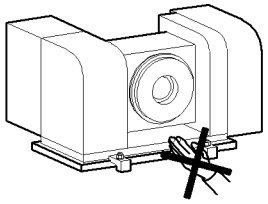
There is a danger of scattering the work because the table overturns.

Tighten to correct torque.

Hex.bolt sizes	Tight.trq.(N·m)
M10	33.8
M12	58.9
M16	146.3
M20	294.3

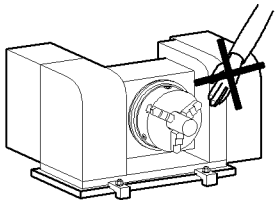
When rotation the table,ensure your hand is out of the space of tilting area.

There is a danger in which fingers may be caught in rotary member.



When rotating the table,ensure your hand out of rotating area.

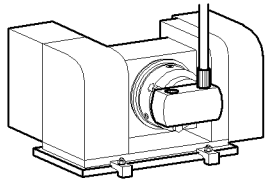
There is a danger in which fingers may be caught in rotary member.



WARNING

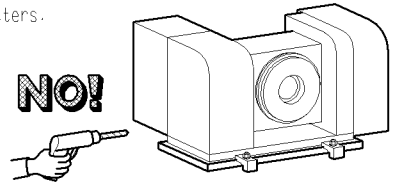
Never apply excessive cutting force.

There is danger in which NC rotary table damages and work scatters.



Do not attempt to modify the NC rotary indexing table.

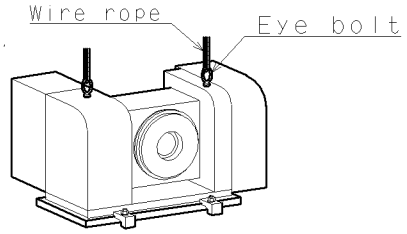
There is danger in which NC rotary table damages and work scatters.



When lifting the NC rotary table, use eye bolts and wire ropes.

(See page 9.)

There is a danger of falling.

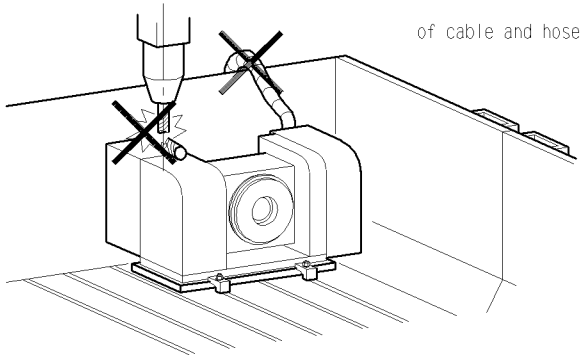


⚠ WARNING

Maintain adequate clearance between the unit and any part of the machine.

Danger of scattering because of work damage.

Interference and extreme bending of cable and hose shoud be avoided.



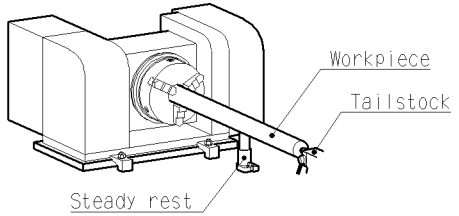
There is the possibility of electric shock if the cable is damaged.

⚠ CAUTION

When machining a long or heavy workpiece,support with a tailstoke or steady rest.

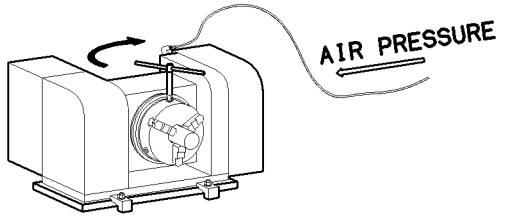
(See page 7.)

Danger of scattering if work is lengthily protruded or heavy.



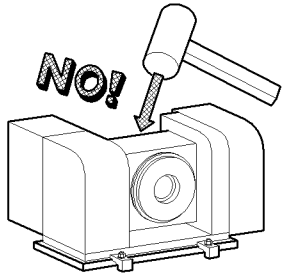
Clamp the table before mounting or removing the work.

Danger because not only machining accuracy drops but also NC rotary table damages or work scatters.



Don't apply a shock to each component of NC rotary table.

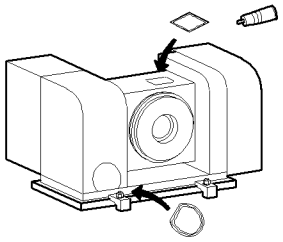
Danger because NC rotary table damages and air work scatters.



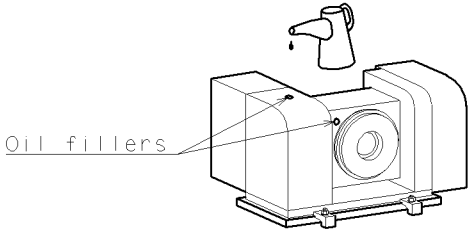
CAUTION

Coat solution packing on the cover mounting face.

Danger by work scattering because NC rotary table will result in misoperation by permeation of coolant,etc.

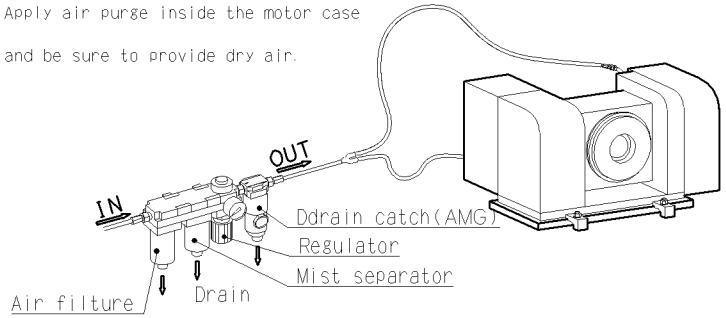


Replace lubricating oil every 6 months(see page 9).



Supply air through Air combination (Air filture,Mist separator,Regulator) +Drain catch.(See page 13)

Apply air purge inside the motor case and be sure to provide dry air.



2 Specifications

NO.	Type			TT120
1	Table diameter		mm	φ125
2	Table height in horizontal		mm	220
3	Center hight in vertical		mm	150
4	Total height		mm	265
5	Center hole diameter		mm	φ50
5	Through hole diameter		mm	φ32
6	Clamping force [Air pressure (5.1kgf/cm²)]	(Rotary axis)	N·m(kgf·m)	120(12.2)
		(Tilting axis)	N·m(kgf·m)	200(20.4)
7	Allowable work diameter		mm	φ125
8	Allowable mass of work	(In horizontal)	kg	35
		(In tilting)	kg	20
9	Allowable work inertia		Kg·m²(kgf·cm·sec²)	0.06(0.6)
10	Total redaction ratio	(Rotary axis)		1/90
		(Tilting axis)		1/180
11	Maximum rotation speed (MOTOR 2000min⁻¹)	(Rotary axis)	min⁻¹	22.2
		(Tilting axis)	min⁻¹	11.1
12	Mass of rotary table		kg	About 100

IMPORTANT

The above list shows the values in standard specifications. Please refer to the outside view for details.

CAUTION

Be sure to observe the allowable work inertia even if mass of the work is within the allowable value.

CAUTION

There is a possibility to need the tailstock by mass of the work.shape.cutting condition.etc.

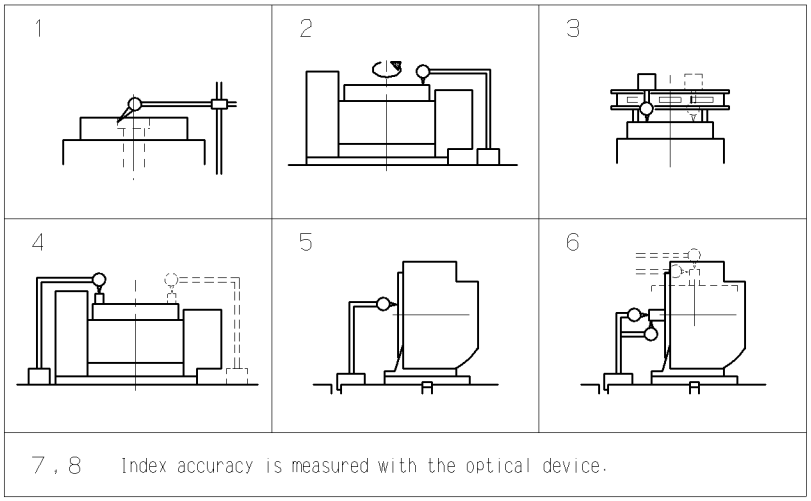
CAUTION

For conditions for using the table.refer to tha above specifications and caution items. Set each cutting condition so as not to exceed the allowable value.

3 Accuracy Standerd

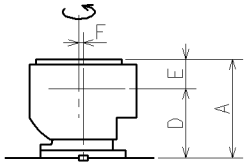
(Unit:mm)

Inspection items				Allowable value
1	Run out of center hole			0.010
2	Run out of upper face during table rotation			0.015
3	Straightness of upper face of table(center low)		Total length	0.010
4	Parallelism of upper face of table and reference plane (tilting axis direction)		Total length	0.020
5	Parallelism of upper face on table and center line of guide block (tilting angle 90°)		Total length	0.020
6	Parallelism of tilting axis and reference plane		Total length	0.020
7	Index accuracy	Rotary axis	Accumulation	30sec
		Tilting axis	Accumulation	60sec
8	Repeatability			4sec



7, 8 Index accuracy is measured with the optical device.

Tilting axis coordinate system value



A_____

D_____

E_____

F_____

4 Preparation

Unpack the unit and remove the packing material.

4-1 Installation

1) When lifting the unit. securely screw in the eye bolts provided. Use wire loop which provided sufficient strength to lift the unit.
2) Clean the unit throughly with an adequate clean agent. When installing the unit on the machine table. make sure there is no foreign material nor damage such as nicks and burrs on the mounting faces. Use an oil stone for correction if necessary.
3) Locate and set the unit at the most suitable location for the operation.
   The guide blocks will fit into the slotted groove on the machine.
   If there is any clearance between the guide block and the T-slot. place the unit against one side of the T-slot to eliminate the gap.
4) Firmly clamp down the unit to the machine with the furnished clamping fixtures.

⚠WARNING When mounting the NC rotary table to the machin tool.check the mounting space. Especially.take care so that the NC rotary table. cable and air hose will not interfere with the splash guide.ATC device.spindle head.etc.. of the machine tool when moving the machine tool table or spindle head.etc.

⚠WARNING Don't damage the cable by applying unreasonable stress. placing a heavy thing or pinching it. If dameged. there is a danger of electric shock.

⚠WARNING Effectively use mounting seats and tighten clamping bolts at the specified torque. (See page 2.)

4-2 Lubrication

Lubricant has been already filled in the NC rotary table body before shipping. Check the lubricant is filled to the center line of the gauge before operating the machine. (See Fig.1.)

⚠CAUTION Replace all lubricant with new one every 6 months. Completelly drain before replacing the oil. when filling the oil.wipe the oil filler so that chips and foreign matter are not entered into the tank. If the chips or foreign matter are entered.the important part such as bearings.etc.. are seized or machining accuracy drops. Use recommended oil in the following table.

Recommended Lubricant(Viscosity grade ISO VG32)

Maker	Oil Name	Maker	Oil Name
Mobil	Vactra Oil No.1	Cosmo	Dainaway 32
Nippon Oil Corporation	Uniway 32	Idemitsu	Dafunimultiway 32MT
JOMO	Slidus HS32	Shell	Shelltona Oil S32
Esso	Unipower MP32		

Required Oil Tilting axis body: 0.4 liter
Rotary axis body : 0.4 liter

☆ Dafunimultiway 32MT has already been filled before shipping.

4-3 Air pressure supply for clamp

1) Supply air through air combination(air filter.mist separator.regulator)+drain catch (See page 6).

2) Connect the air pressure hose to the connection(Rc 1/8)shown in Fig.1.

3) Use the air pressure at the range of 0.5~0.6MPa(5.1~6.1kgf/cm²).

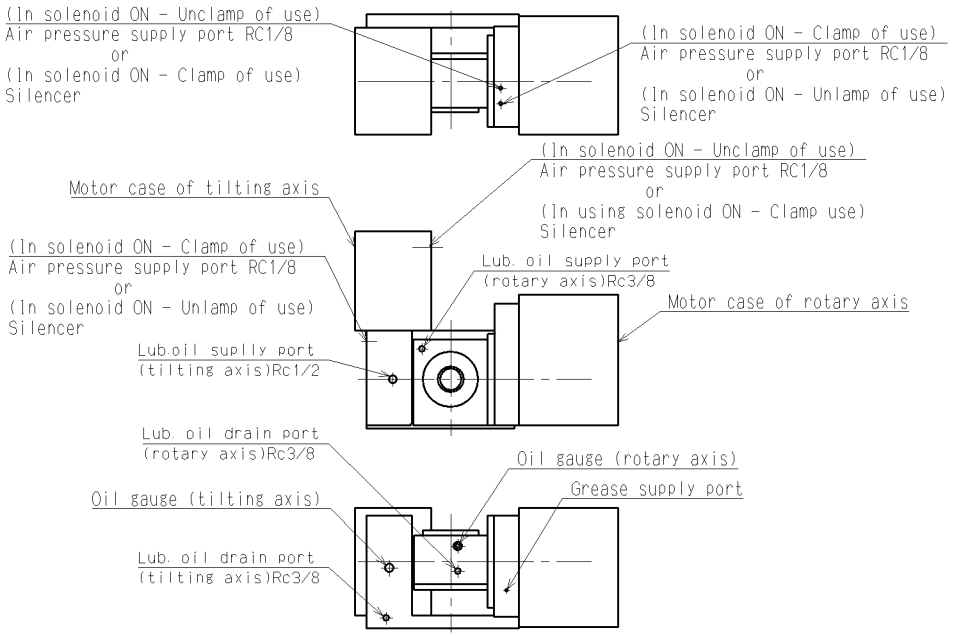


Fig 1

4) Clamp - Unclamp caution

⚠CAUTION Rotate the table and move the tilting axis with the chuck unclamped. After positioning, machine the work with the chuck clumped. Take care because the worm wheel will be damaged by misuse.

⚠CAUTION Avoid the machining more than the clamping force shown in the specification table. The clamped part is worn and the worm wheel is damaged.

⚠CAUTION Completely escape pressure when the unit is unclamped. If remained, the worm gear and clamper will be seized and damaged. therefore, take care of back pressure.

5) Clamp - Unclamp check

The set up pressures of the switches for pneumatic systems are as follows:

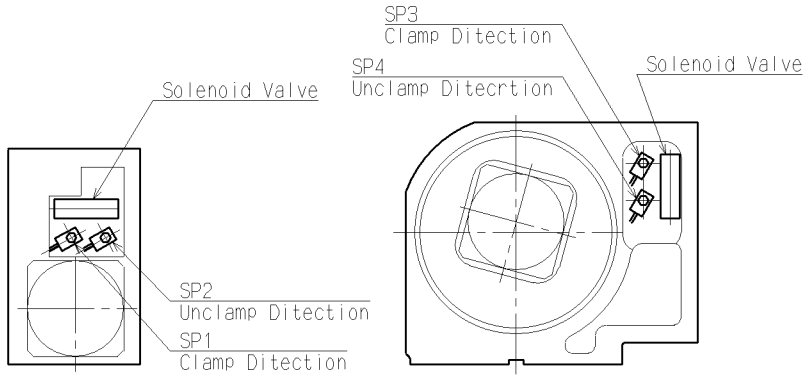
Clamp Signal (SP1、3) —— 0.25 MPa (2.55kgf/cm²)

Unclamp Signal(SP2、4) —— 0.055MPa (0.56kgf/cm²)

6) In the case of air pressure specification.the solenoid valves are incorporated. The piping is as follows with the standard specification. Take care when the electric wires are routed.

Solenoid ON —— Unclamp

Solenoid OFF —— Clamp



Tilting axis motor case

Rotary axis motor case

Fig 2

4-4 Trial run. accuracy check

1) Perform the trial run under no load in which no work is mounted on the table.
2) Check there is no noise and vibration during the operation of axis LOW. HIGH. FORWARD and REVERSE. Perform the running-in of rotary axis by two slowly increase the forward and reverse directions at 1 rpm at first. After that.slowly increase the speed in high speed.
   Perform the running-in of the tilting axis by two strokes at the feed of 1 RPM. paying attention so as not to enter in the over travel area and slowly increase the speed.
3) During the above operation. check there are the working sound and exhaust sound form the solenoid valves and silencer incorporated in the NC table. (In air clamp of use)
4) Check accuracy. referring to the inspection result table and the accuracy standard in the manual.

4-5 Setting of ZRN and shift value to machine datum

1) After checking the above operation.when there is no alarm. reture each axis to machine datum.for the ZRN of each axis. the axis rotates at high speed in the fixed direction and decelerates with the sensor (proximity switch) of the incorporated ZRN decelerating dog before stopping by receiving the standard signal of motor detector.
2) The tilting axis datum (0°) is where the table face is horizontal and +90°where the table face is vertical. The standard ZRN direction of tilting axis is set from - (minus) direction to 0°.
3) The ZRN direction of rotary table is right.
4) Individually perform ZRN for the tilting axis and the rotary table to find the angle difference between the actual stopping position and the machine datum. To compensate this angle difference. set the parameter value of datum shift volume of control unit. If the compensating value exceeds the setting range. it is necessary to adjust the ZRN deceleration dog position (See item 6-3).

4-6 Work mounting

Securely mount the work for a high accuracy machining.

WARNING If the work is not securely mounted. not only accuracy is wrong but also the machine and tool are damaged. In the worst case. it will result in serious injury.

CAUTION Avoid mounting a workpiece which has poor flatness or perpendicularity directly to a table face. This may strain the table and prevent smooth rotation. which may result in very poor indexing accuracy. Shimming may be required to prevent this problem.

CAUTION Clamp the work in equipartition on the rotary table as much as possible.

4-7 Air purge

WARNING

According to the circumstance of use. the dew may be occurred in the motor case.
Air is exhausted from the portion of the air exhaust so that it causes the obstacle of electric parts or each part.
The air purge is performed by air branched inside of NC table that uses air for clamp.
Be sure to use the clean air (passing through air filter. mist separator. regulator and drain catch) passing through the filter. If the air contains water content (moisture). oil content. etc.,
it is entered in the motor case. thus causing in equipment damage. The air inside of motor case is exhausted from the air exhaust port.
In case that the portion of the air closed. motor case or motor etc. may be damaged so that the dew cannot be exhausted and that air pressure is kept in the motor case. Therefore. the portion of exhaust should not be closed.
When exhausting. though exhaust sound occurs. there is no trouble.

5 Daily Inspection

Inspect the following items before starting the machine.

1. Check the fixing condition of the NC rotary table(including jig).
2. Check the electic connection cables and houses are not damaged and also check the air pressure pressure.
3. Check each ZRN operation. index operation and position.

6 Each Component and Maintenance. Adjustment

This chapter explains the structure and maintenance. adjustment about worm gear. spur gear drive mechanism. ZRN device. tilting axis emergency stop device and motor case.

6-1 Backlash adjustment of worm gear

The worm and worm wheel are made of the special material and accurately machined. Though the backlash of the worm gear has already been adequately adjusted before shipping. it may be necessary to adjust it after using for a long period of time .

The adequate values of backlash are as follows. These values were measured when the machine is cooled. Thus. values are measured after interrupting for a long period of time. Consequently. when operating the machine for a long period of time. the backlash values become smaller than the following table due to thermal expansion.

CAUTION If backlash is too small. the worm gear will be seized.

Adequate backlash

	Circular arc length at peripheral table position(μm)	Angle(sec.)
Rotary axis	12~29	38~96
Tilting axis	4~7	10~20

When adjusting the backlash. measure the current backlash with the following method before adjusting it.

6-1-1 Backlash measuring method of rotary axis worm gear (See Fig.3)

1) Tighten a block at the tap on outer side of the table surface and set dial gauge on the side face of the block.
2) Insert a flat or round steel bar into the table through a tapped hole on the table surface. Turn the table slowly, release your hands when the tooth of the worm wheel makes contact with with the worm shaft, and read the value on the dial gauge. Then, rotate the table in the opposite direction, in the same way as stated above, until the tooth of the worm wheel makes contact with the worm shaft and read the dial gauge. The difference of these measurements is the amount of backlash.
3) The above measurements should be conducted at eight different points by rotating the table 45 degrees at a time. Compare the readings with the correct amount of backlash shown above. If the reading is out of the range specified, take the following procedures to adjust the backlash so that the minimum reading is within the correct range specified above.

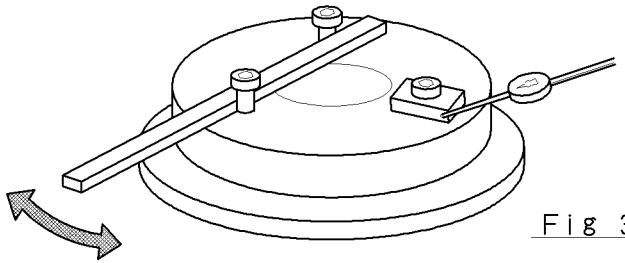


Fig 3

6-1-2 Backlash measuring method of tilting axis worm gear

1) Set the dial gauge around the outer periphery on the table surface.
2) After turning the tilting body at about 10kg in the minus direction, loosen force and read the value of dial gauge with the body maintained at the force of 2~3kg in the same direction. Similarly turn the body in the reverse direction and read the value of dial gauge. This difference of measuring values is the backlash. (See Fig.4.)

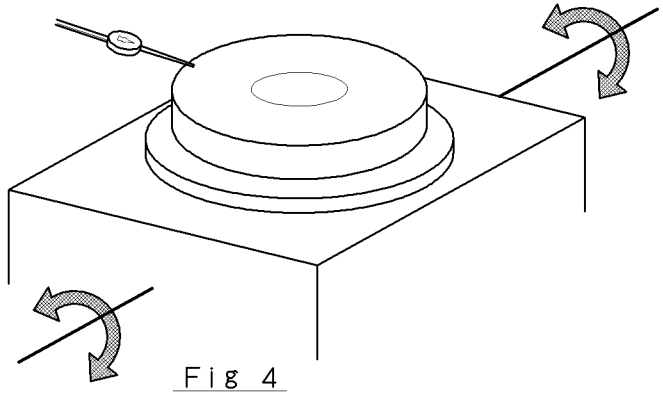


Fig 4

6-1-3 Backlash adjusting method of rotary axis worm gear(Fig.5)

1) Drain the lubrication oil from the drain port.
2) Remove the cover ①.
3) The Lock nut ② and the bearing case ③ is set up with M42×P1.5 thread. When you loosen these parts, you lock the bearing case ③ by using the bar. (You can lock it by plugging in the hole of ϕ5-8)
4) The degree of backlash becomes to be small by the direction of clockwise.
5) Confirm the degree of backlash after setting up the bearing case ③ and tightening the lock nut ② tightly.

IMPORTANT	The picth of bearing case's outside hole ϕ5-8 is 45 degrees. The bearing case is turned for 45 degrees moving, backlush beaomes to be 0.006mm smaller.
⚠ CAUTION	Don't adjust the backlash once. Slowly and carefully adjust it.

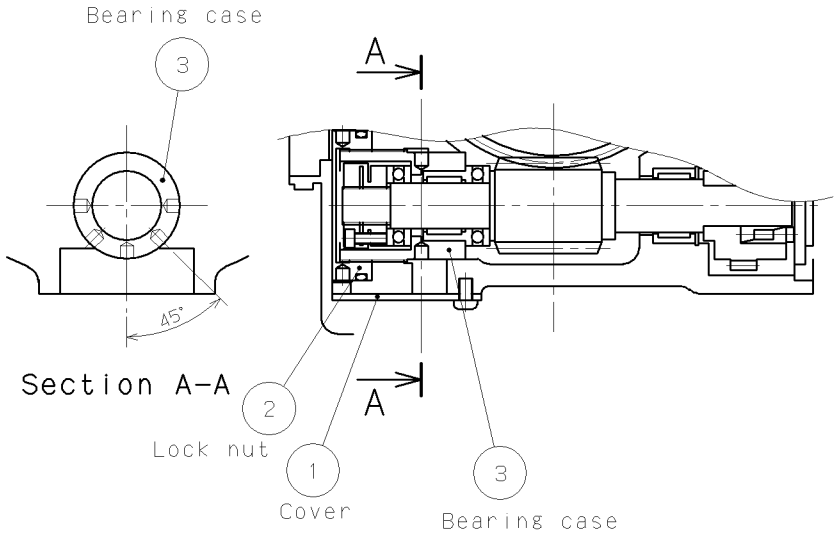


Fig 5

6-1-4 Backlash adjusting method of tilting axis worm gear(Fig.6)

1) Remove the work, jig, etc..on the table before adjusting and level the table.
2) Don't have to drain lubricating oil from the drain port.
3) Remove the cover ①.
4) The bearing case ④ is fixed on the hexagon socket head cap screws ② and the adjusting screws ③.
5) Slightly loosen four pieces of hexagon socket head cap screws ②.
6) Backlash becomes smaller by forwarding Bearing case ④, when 8 pieces of the adjusting screws ③ are loosen equally and 4 pieces of the Hexagon socket head cap screw ② are tighten.

IMPORTANT

Backlash becomes to be 0.01mm smaller by turning the adjusting screws through 90° the spacer ③ in CCW.

⚠ CAUTION

Don't adjust the backlash once.
Slowly and carefully adjust it.

After adjusting, reassemble the worm gear by the reverse procedure of the aboveand securely tighten the bolts. After reassembling, measure the backlash again at the outer periphery of the table and at the same position. Check that the backlash is proper.

⚠ CAUTION

When the cover ① is re-installed, be carefull not to damage the O-ring⑤. The damaged O-ring ⑤ may allow the cutting water to enter the motor case.

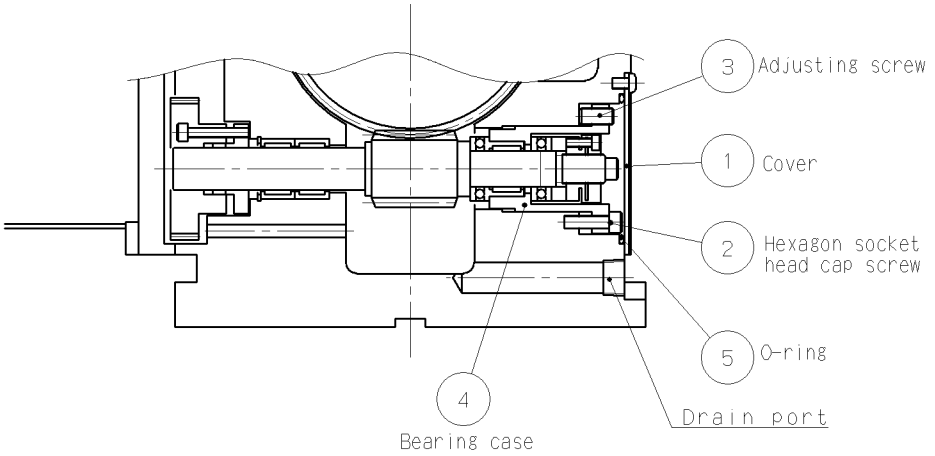


Fig 6

6-2 Backlash adjustment of spur gear

6-2-1 Backlash adjusting method of rotary axis drive spur gear(Fig.7-1,7-2)

The backlash between spur gears of Z1 and Z2 is adjusted by touching the hex. head bolt ① for stopper to the side face of the servo mator and by varying the distance between axes after adjusting the motor position.

1) When you adjust the backlash, it is necessary to keep tilting axis in the horizontal position (0 degree).
2) Drain the lubricaation oil from the drain port.
3) Remove the motor case④.
4) Slighrly loosen four set screws ② whitch fix the servo motor.(When there is flange on the servo-motor's back, loosen 4 set screws ⑫ for setting up the flange Notice: don't loosen the set screws ② for being set up the motor.
5) Tune the hex. socket head cap screw ① for stopper to left, return it and lower the servo motor until the backlash becomes nearly zero(0).
6) the proper backlash is 0.02~0.04mm. When turning the hex. head bolt ① 10°(1/36-turn) to right, the backlash of 0.02mm can be obtained. At this time, check the motor travel with the dial gauge touched to the seavo motor side.
7) Fasten the 4 set screws ② with putting the motor on the hexagon bolt for motor's stopper.
   Notice: In case(Fig.7-2), loosen the set screws ⑫ in the stead of the 4 set screws ②.
8) After adjusting, rotate the motor from slow speed to high speed to cheak no noise occurs.

⚠ CAUTION

When remounting the motor, be sure to carefully set O-ring ③.
Fig.7-2 : When you set up the flange, don't forget to set the O-ring ④ ⑬.
Make sure to put the liquid gasket on the thread part of set screws ② and tighten them firmly.

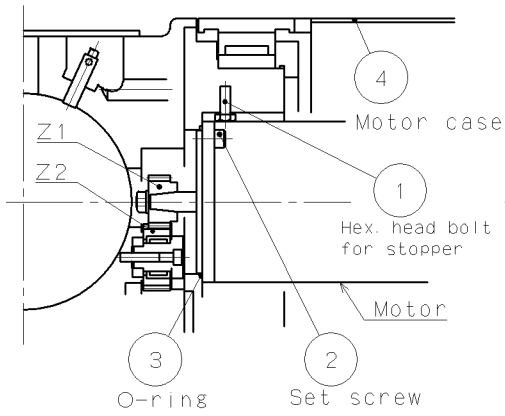


Fig 7-1

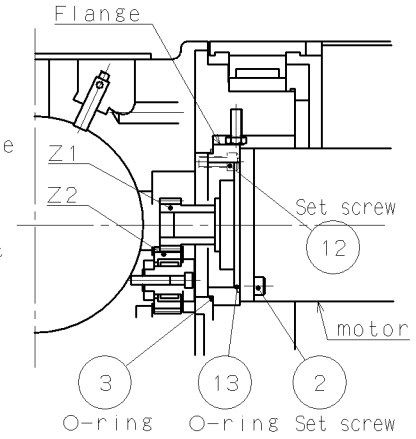


Fig 7-2

6-2-2 Backlash adjusting method of tilting axis drive spur gear (Fig.8-1.8-2)

1) Drain the lubrication oil from the drain port.
2) Remove the motor case ①.
3) Touch the hex. socket head cap screw ② for stopper to side face of servo motor.
   In case of Fig 8-2(with flange), touch the hex. socket to the face of flange.
4) Slightly loosen four bolts ③ whitch fix the servo motor.
   When there ifs another flange on the motor loosen the 4 bolts ③ lightly.
5) Tune the hex. socket head cap screw ② for stopper to left, return it and lower the servo motor until the backlash becomes nearly zero(0).
6) the proper backlash is 0.02~0.04mm. When turning the bolt 10°(1/36-turn)to right, the backlash of 0.02mm can be obtained. At this time, check the motor travel with the dial gauge touched to the seavo motor side.
   When there is flange, confirm the stroke-degree of flange with putting the dial-gage on flange's face-side.
7) Securely tighten bolt ③.
8) After adjusting, rotate the motor from slow speed to high speed to cheak no noise occurs.

⚠CAUTION When remounting the motor, be sure to carefully set O-ring ④.
Fig8-2 : When you set up the flange, be sure to carefully set the O-ring ④ ⑭.

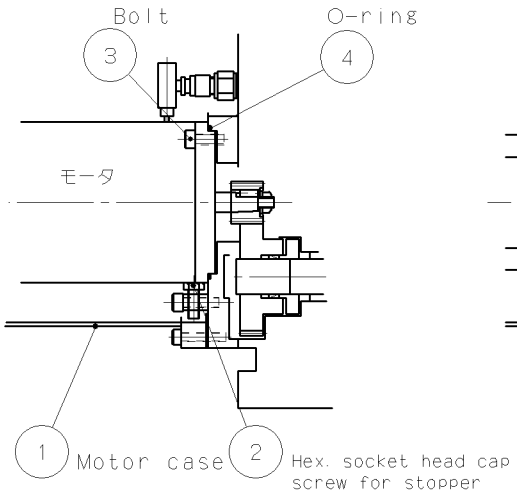


Fig 8-1

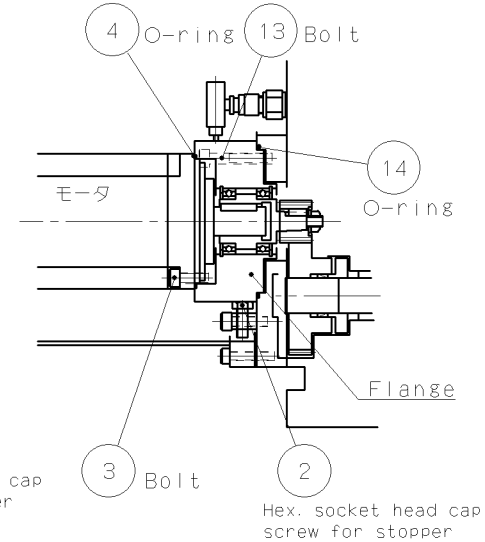


Fig 8-2

6-3 ZRN device

6-3-1 ZRN device on table (Fig.9)

The ZRN device rotates clockwise (CW) on the standard specification. The ZRN deceleration dog is mounted in the table and it can be mounted on the optional position of outer periphery.When changing the ZRN position or ZRN rotary direction counterclockwise, the dog position can be changed by the following procedure.

1) Drain the lubricating oil from the drain port.
2) Remove the cover ①.
3) Loosen the set screws ③ which fix the dog ②.
4) Shift the dog to the proper position.
5) After adjusting the position, securely tighten the set screws.

⚠CAUTION When setting the cover ① again after adjusting the dog position, be sure to evenly coat seal agent on the cover ①. (The seal agant 1216 made by Three Bond Co., has already been coated on the cover ① before shipping.)

The proximity switch is provided as the sensor for detecting the dog. The gap between the dog and the switch is set to about 0.75mm. (The thread pitch for mounting the proximity switch is 1mm.) The proximity switch is equipped with the lamp. Since the lamp goes out when the dog is detected, use it when the dog is adjusted.

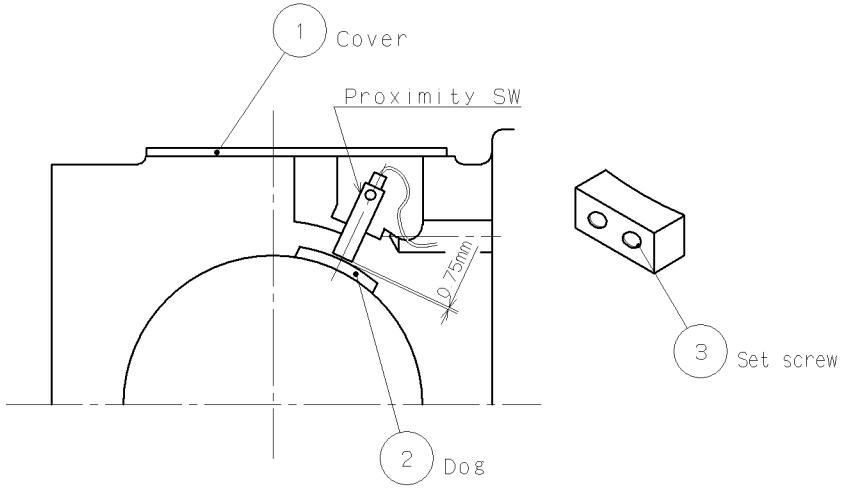


Fig 9

6-3-2 Tilting axis ZRN device (Fig.10)

1) This is the proximity switch and the dog in the motor case.
2) The horizontal table face is the datum as the standard specification. The dog A ① of Fig.10 is detected with the proximity switch A ②.
3) When you change the vertical mechanical-zero position from horizontal one (standard spec).It is necessary to replace the dog ① on the ※ position.

6-4 The equipment for stopping the over-travel (Fig.10)

1) The dog for emergency stop of stroke limit of tilting axis and proximity switch are inside the motor case.
2) The dog B ③ of Fig.10 located on the stroke limit on the horizontal table face position is detected with the proximity switch B ④.
3) The dog C ⑤ located on the stroke limit on the vertical table face position is detected with the proximity switch C ⑥
4) The angle of 20° is provided until the emergency stop is applied from the horizontal and vertical positions of table face. Provide the soft limit by the work shape. etc.

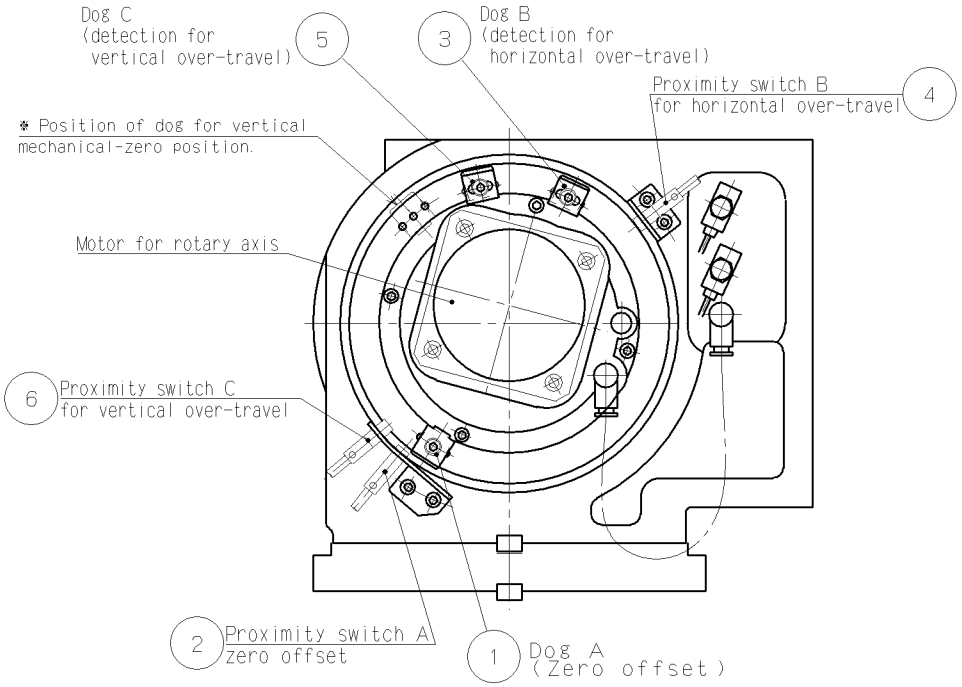


Fig 10

6-5 Motor case

Remove the motor case with the following menu.
(See Fig.11)

1) Remove the motor's case and the cover ② in the first place, and remove the electric line from terminal. In second place, remove cannon-conector for the electric lines of sarvo motor.
2) When you remove the motor case, there is the 1 bolt in it which is set up from motor case inside.
3) Pull out nylon tube from the tube-connection.
4) Remove the motor case ① from table's body slowly.

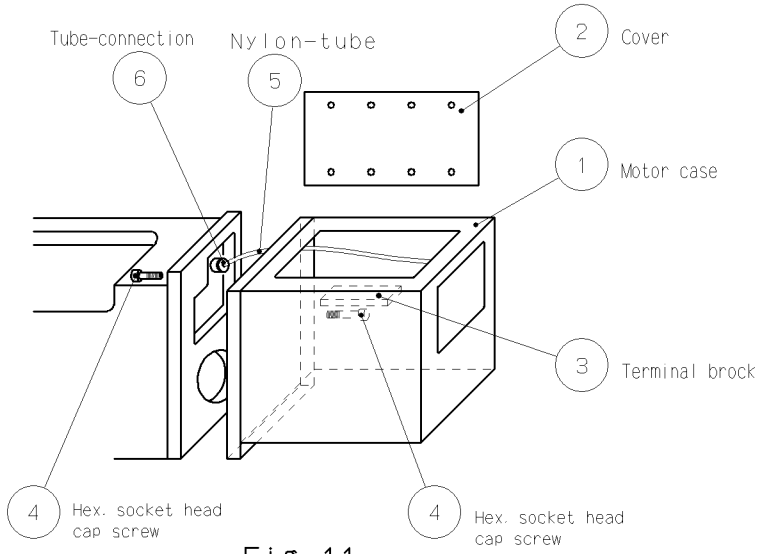


Fig 11

7 Storage

CAUTION

When storing the NC rotary table after removing it from the machine tool, place it on the stable wooden base for maintaining accuracy after removing chips or coolant, etc. Coat the table with rust preventionoil and case or lap it with the wooden cover or vinyl cover, etc. when using the wooden base and box, avoid the green wood. Since the green wood is not chemically neutral, use the wood moistened with paraffin.

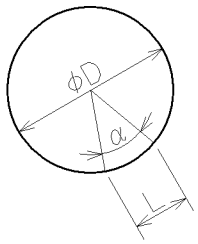
8 Reference Material

8-1 Conversion of peripheral length and angle

IMPORTANT

When understanding "How long at periphery is accumulation index accuracy 30 seconds?" or "How angle is the accumulation pitch error 0.05?", use the following formula form the relationship between the angle and the periphery length.

D : Work diameter (mm)
α : Angle (sec)
L : Periphery length (mm)



$$\frac{L}{\pi \times D} = \frac{\alpha}{360(\text{degree}) \times 60(\text{min}) \times 60(\text{sec})} \quad \cdots\cdots\cdots (1)$$

From (1)

$$\alpha = \frac{360 \times 60 \times 60 \times L}{\pi \times D} = \frac{4.125 \times L \times 10^5}{D} \quad \cdots\cdots\cdots\cdots (2)$$

or

$$L = \frac{\alpha \times \pi \times D}{360 \times 60 \times 60} = 2.424 \times 10^{-6} \times \alpha \times D \quad \cdots\cdots\cdots\cdots (3)$$

(Example)

When the work diameter is regared as 100mm. the following is formulated by "Accumulation accuracy of 30 sec. is indicated with periphery length." and formula (3).

$L = 2.424 \times 30 \times 100 \times 10^{-6} = 0.007272\text{mm} = 7.3\mu\text{m}$

Consequently, the periphery length is about 0.0073mm or 7.3μm.

The following is formulated by "Acculation pitch error is indicated with angle of 0.05." and formula (2).

$$\alpha = \frac{4.125 \times 0.05 \times 10^5}{100} = 206.25\text{sec}$$

Therefore, the angle is 206 seconds or 3 minutes and 26 seconds. As shown above, the periphery length and angle are converted by formulas of (2) and (3).

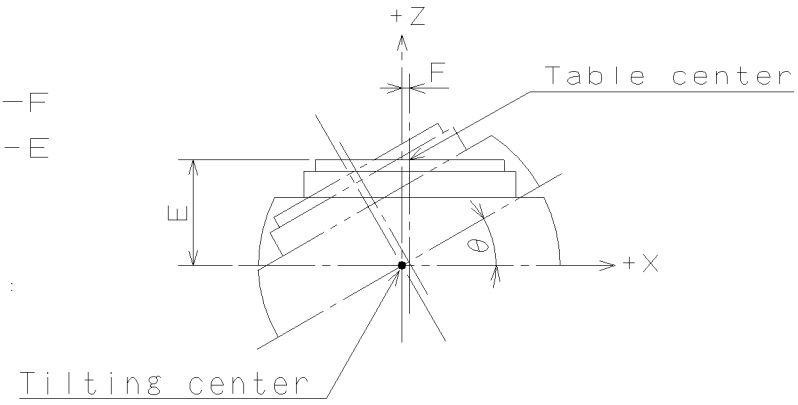
8-2 Coordinate calculation of table center for tilting angle

The calculation which finds the table center coordinate when tilted θ°is shown as follows.
For values of E and F, use values entered in the inspection table.

$$X = F\cos\theta - E\sin\theta - F$$
$$Z = E\cos\theta + F\sin\theta - E$$

(Example)
In case of E=70.F=0:

$$X = -70\sin\theta$$
$$Z = 70\cos\theta - 70$$



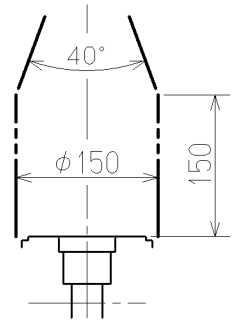
8-3 Work interference area

Since the following shows the standard specifications. take care in the case of special specifications. The interference with the clamper is not considered.

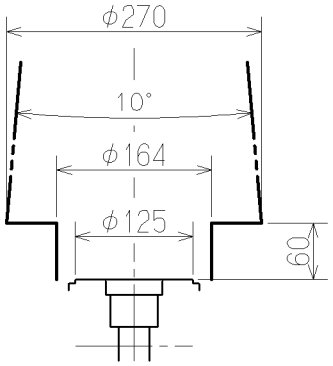
Tilting range may be reduced due to fit the Jig or Chuck onto Face plate.

(Refer to the back of the Instruction Manual drawing and the outside view.)

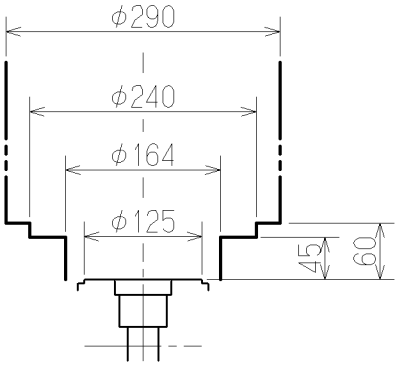
Set a soft limit by the parameter to prevent interference at the customer.



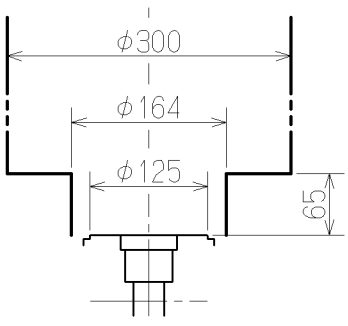
95° ～ 110°



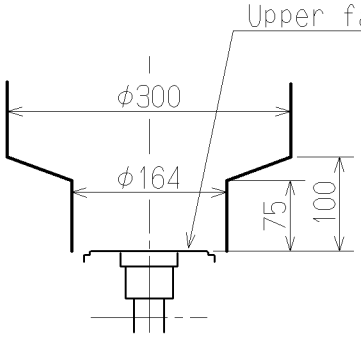
90° ～ 95°



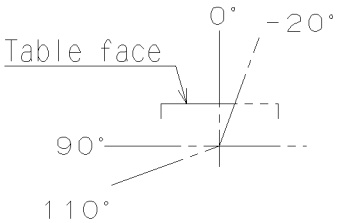
0°（水平）～ 90°（垂直）



-5° ～ 0°



-20° ～ -5°



Tilting angle

CUSTOMER		
MOF.NO.	DATE	REASON OF RIVISION
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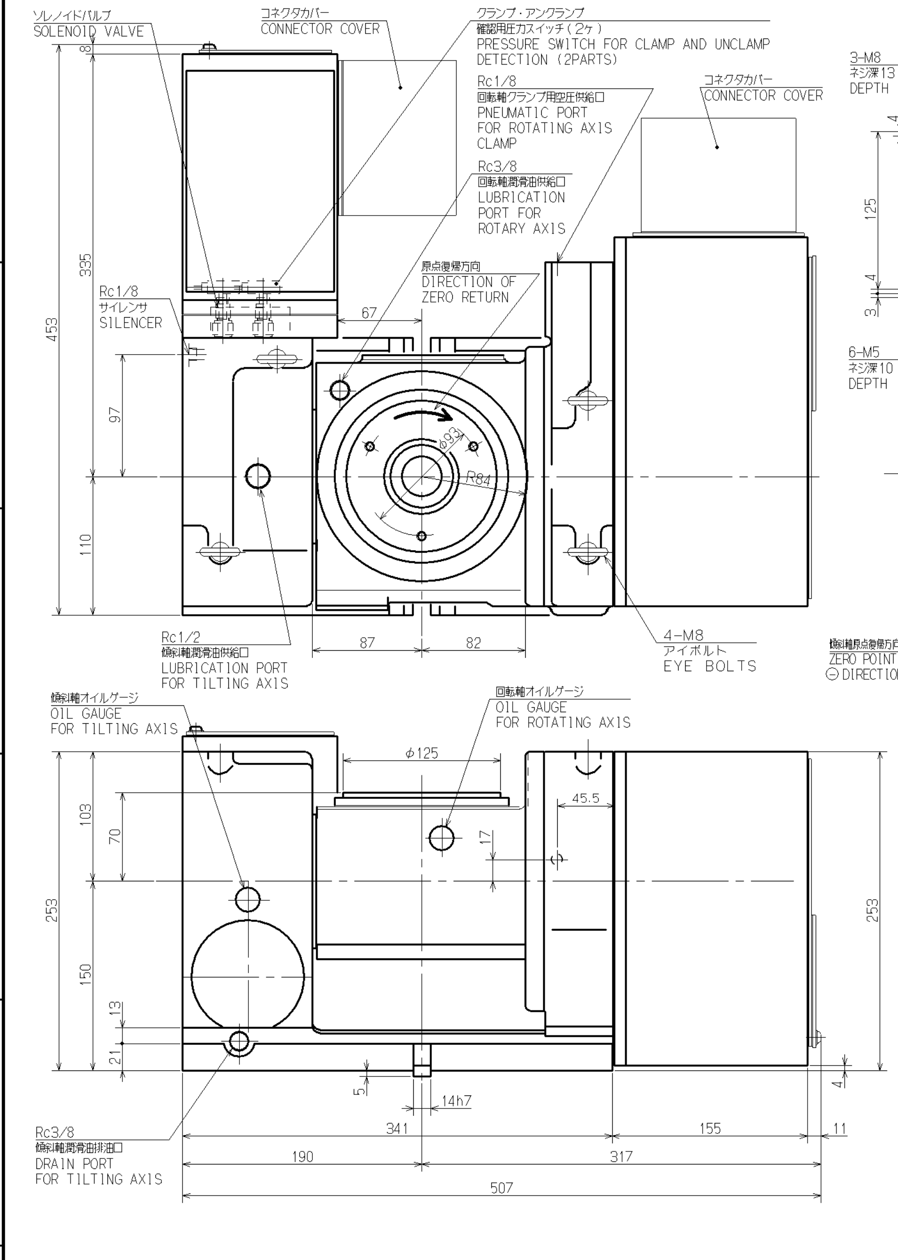
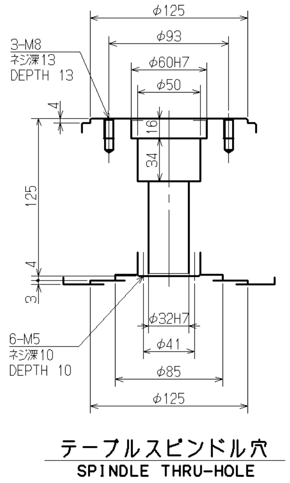
2	04.04.10	ADJUSTMENT





仕様 SPECIFICATIONS		
回転軸 ROTATING AXIS	割出精度 INDEXING ACCURACY	30 sec以内
	再現精度 REPEATABILITY	4 sec以内
	テーブル最高回転速度 MAXIMUM ROTATION SPEED	33.3 min⁻¹(rpm) [モータ MOTOR 3000 min⁻¹(rpm)]
	クランプトルク CLAMPING TORQUE	120N·m (12.2kgf·m) [空圧 PNEUMATIC PRESS 0.5MPa (5.1kgf/cm²)]
	総減速比 TOTAL REDUCTION RATIO	1/90
	駆動系モータ軸換算イナーシャ MACHINE INERTIA (REDUCED TO MOTOR SHAFT)	0.000072Kgm² (0.00073kgfcms²)
傾斜軸 TILTING AXIS	割出精度 INDEXING ACCURACY	60 sec以内
	再現精度 REPEATABILITY	4 sec以内
	テーブル最高回転速度 MAXIMUM ROTATION SPEED	16.6 min⁻¹(rpm) [モータ MOTOR 3000 min⁻¹(rpm)]
	クランプトルク CLAMPING TORQUE	200N·m (20.4kgf·m) [空圧 PNEUMATIC PRESS 0.5MPa (5.1kgf/cm²)]
	総減速比 TOTAL REDUCTION RATIO	1/180
	駆動系モータ軸換算イナーシャ MACHINE INERTIA (REDUCED TO MOTOR SHAFT)	0.000034Kgm² (0.00034kgfcms²)
許容積載質量 ALLOWABLE MASS OF WORK		水平時 HORZ 35 kg / 傾斜時 TILT 20 kg
許容積載ワーク径 ALLOWABLE WORK DIA.		φ125 mm
製品質量 MASS OF ROTARY TABLE		100 kg

注記 NOTE

1) ACサーボモータ ： 客先にて手配及び取付け願います。
AC SERVO MOTOR : CUSTOMER MUST PREPARE AND ASSEMBLE.

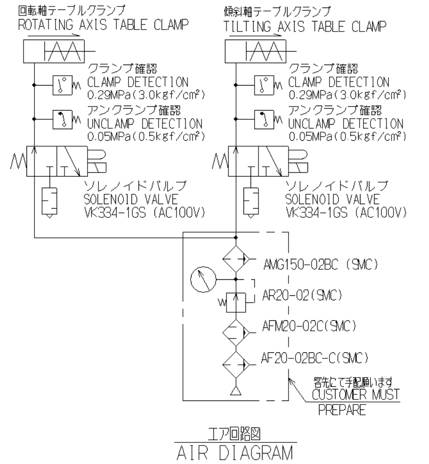
2) FANUC α2/3000,α2/2000及びα2/5000iが、このモータケースで取付け可能です。
FANUC α2/3000,α2/2000 AND α2/5000i ARE POSSIBLE TO BE INSTALLED IN THIS MOTOR CASE.

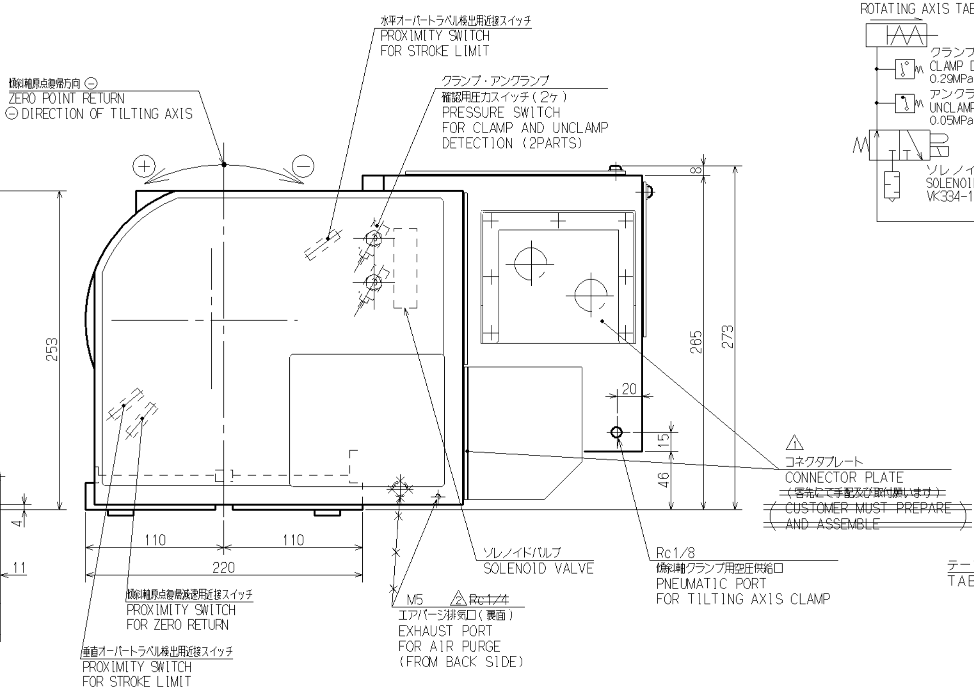
3) 図中に記載のない精度規格は、カタログ記載の値とします。
ACCURACY STANDARDS EXCEPT STATED IN THIS DRAWING SHOULD BE APPEALED TO THAT IN CATALOGUE.

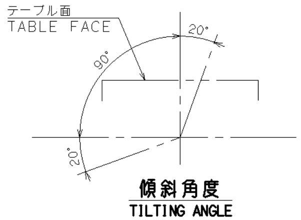
4) NCテーブルのカバー類は、外部からの切削油等の侵入を防ぐ為、パッキンを使用しています。
THE COVER FOR NC ROTARY TABLE ARE USED WITH PACKING IN ORDER TO PREVENT THE ENTERING OF COOLANT FROM THE OUTSIDE WATER PROOF CONNECTER WOULD BE USED FOR ELECTRICAL CONNECTION.

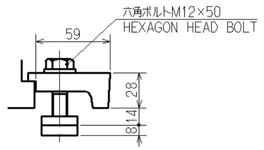
5) 本機はエアパージ仕様です。クリーンエアを供給下さい。
THIS ROTARY TABLE IS DESIGNED UNDER THE CONDITION OF AIR PURGE. ACCORDINGLY CLEAN AIR FROM PNEUMATIC PORT HAVE TO BE SUPPLIED.

6) このNC円テーブルはモータが確定していませんので動作確認しておりません。御手数をお掛けしますがお客様でご確認お願いします。
MOVEMENT CONFIRMATION IS NOT DONE. BECAUSE A MOTOR WITH THIS NC ROTARY TABLE IS NOT PROVIDED.
THE CUSTOMER MUST CONFIRM THE MOVEMENT AFTER YOU MOUNT THE MOTOR.

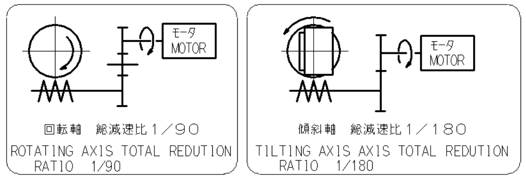








クランプ部品 付属品 4組
CLAMPING PARTS ACCESSORY 4 SETS

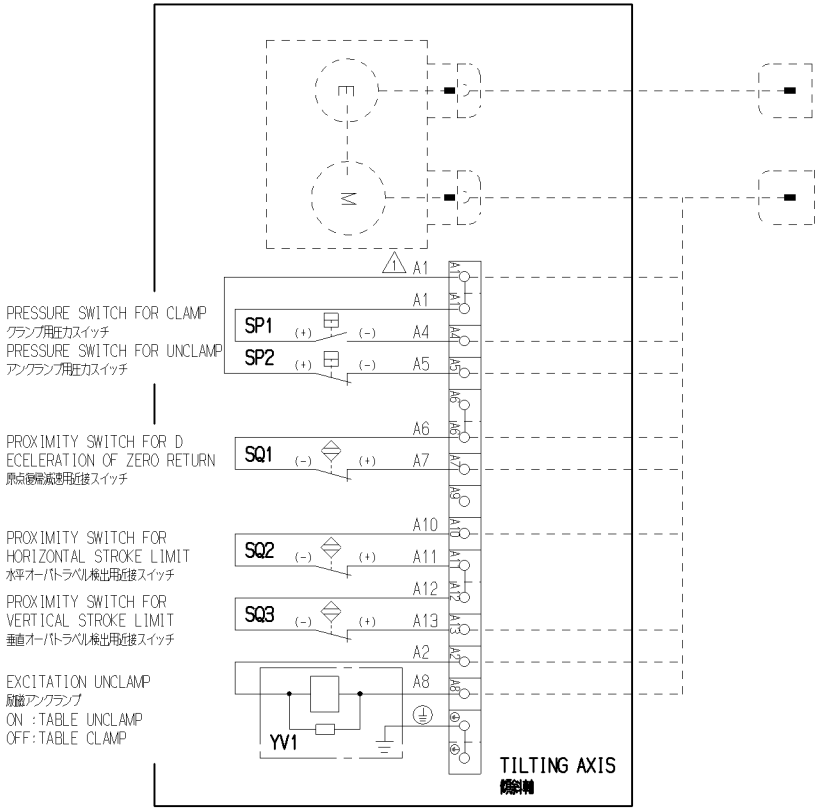


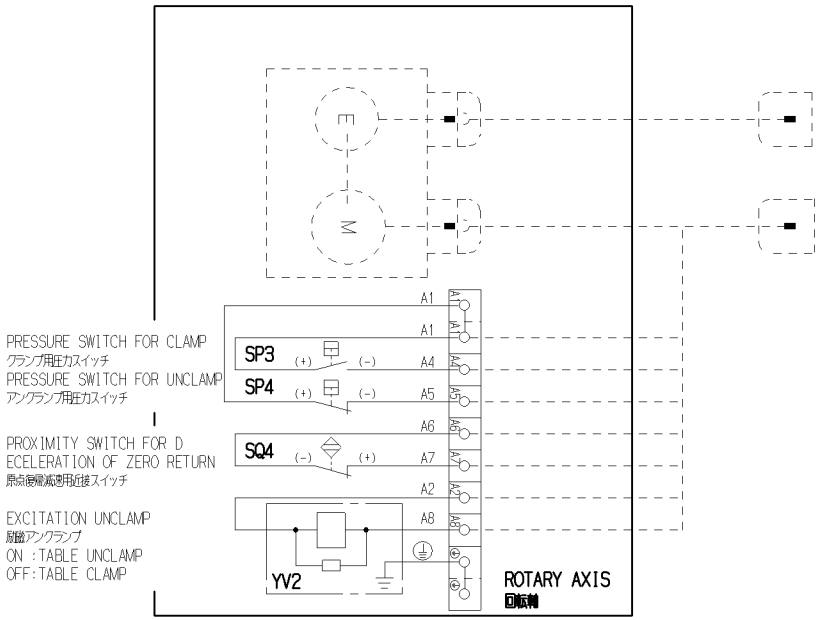
駆動系スケルトン
SKELTON DRAWING OF DRIVE SYSTEM

図面に記入のない寸法の一般公差				表面アラサ		形状・位置の精度の種類と記号					
寸法区分 mm	切削加工 穴明中心	板金加工 製缶加工	鋳鉄鋼 鍛造品	記号	Rmax	種類		記号	種類		記号
1以上 4以下	±0.1	±0.3	±0.5	▽▽▽▽	0.8S	形状	真直度	—	方向	平行度	//
4を越え16〃	±0.2	±0.5	±0.7				平面度	▱		直角度	⊥
16 〃 63 〃	±0.3	±0.7	±0.9	▽▽▽	6.3S		真円度	○		傾斜度	∠
63 〃 250 〃	±0.5	±1.2	±1.5				円筒度	⌭	位置	位置度	⌖
250 〃 1000 〃	±0.8	±2.0	±2.5	▽▽	25 S		線輪郭	⌒		同軸度	◎
1000 〃 2000 〃	±1.0	±2.5	±3.5				面輪郭	⌓		対称度	⌯
2000 〃 5000 〃	±1.5	±3.5	±5.0	▽	100S	振れ		↗	基準線・面		▲

CAREER			SCALE	TYPE	TT120AEE02	WEIGHT kg
W.D. 61E366984			1:3	NAME	NCテーブル NC ROTARY TABLE	
MANAGER	CHIEF	DRAWN BY Y.Sakamoto	3RD ANGLE		TT120AEE02 ガイケイ OUTSIDE VIEW	
KITAGAWA IRON WORKS CO.,LTD.		DATE 03.02.26		DRW NO.	61E 24 4176 3	

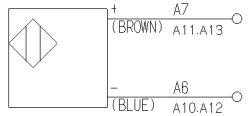
CUSTOMER		
MDF.NO.	D A T E	REASON OF RIVISION
1	04.11.09	ADJUSTMENT
2	07.11.28	ADJUSTMENT （プレッシャスイッチ変更△3ヶ所）





MARK 記号	NAME 品名	MAKER メーカー	TYPE 型式	Q'ty 個数	REMARKS 備考
SP1,SP3	PRESSURE SWITCH プレッシャスイッチ	SMC △2	PS1000-R06L-Q-X140 ~~PS1000-R06L~~	2	0.25 MPa(3 kgf/cm²) 1a ~~0.29~~
SP2,SP4	PRESSURE SWITCH プレッシャスイッチ	SMC △2	PS1100-R06L-Q-X141 ~~PS1100-R06L~~	2	0.055 MPa(0.5 kgf/cm²) 1b ~~0.05~~
SQ1~SQ4	PROXIMITY SWITCH 近接スイッチ	YAMATAKE	FL7M-2K6H-Z	4	DC10~30V
YV1,YV2	SOLENOID VALUVE ソレノイドバルブ	SMC	VK334-1GS	2	AC100V
XT1,XT2	TERMINAL BLOCK 端子台	WAGO	264-701	14	
	TERMINAL BLOCK 端子台	WAGO	264-721	4	
	TERMINAL BLOCK 端子台	WAGO	264-727	2	
	END PLATE エンドプレート	WAGO	264-368	2	
	END STOP エンドストップ	WAGO	249-101	4	
	CARRIER RAIL キャリアレール	WAGO	210-111	2	

近接スイッチ接続要領
CONNECTION OF PROXIMITY SWITCH



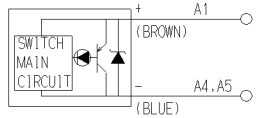
近接スイッチ仕様
SPECIFICATIONS

電源電圧	POWER SUPPLY	DC10~30V
負荷容量	LOAD CURRENT	3~100 mA
漏れ電流	LEAK CURRENT	max.0.55 mA
残留電圧	RESIDUAL VOLTAGE	max.3.0 V
出力機能	OUT PUT TYPE	NC

NOTE 注意

1) '⏚' IS EARTH.
'⏚' はアース.
2) プレッシャスイッチの共通ラインは+コモンです.
THE COMMON LINE OF A PRESSURE SWITCH IS (+) COMMON.

プレッシャスイッチ接続要領
CONNECTION OF PRESSURE SWITCH



プレッシャスイッチ仕様
SPECIFICATIONS

負荷電圧	POWER SUPPLY	DC12~24V
負荷容量	LOAD CURRENT	5~40 mA
漏れ電流	LEAK CURRENT	max.1.0 mA
内部降下電圧	RESIDUAL VOLTAGE	max.5 V
出力機能	OUT PUT TYPE	NO(PS1000-R06L-Q-X140) NC(PS1100-R06L-Q-X141)

△2 ~~PS1000-R06L~~ ~~PS1100-R06L~~

SOLENOID VALUVE SPEC
ソレノイドバルブ仕様

APPARENT POWER 皮相電力	INRUSH 起動	50Hz	4.5VA
		60Hz	4.2VA
	HOLDING 保持	50Hz	3.5VA
		60Hz	3.0VA

CAREER			SCALE	TYPE	TT120AEE02	WEIGHT kg
				NAME	NCテーブル NC ROTARY TABLE	
MANAGER	CHIEF	DRAWN BY K.Okunaga	3RD ANGLE		デンキシヨウ WIRING DIAGRAM	
KITAGAWA IRON WORKS CO.,LTD.		DATE 03.02.28		DRW NO.	61E 36 6984 △2	

kitagawa http://www.mta.kiw.co.jp

KITAGAWA IRON WORKS CO., LTD.

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