Original instructions

NC Tilting Rotary Table
INSTRUCTION MANUAL
Model：RKT180ER01

DANGER

- **This instruction manual is for production engineers and maintenance personnel in charge of operation of this product. When a beginner uses this product, receive instructions from experienced personnel, the distributor or our company.**
- **Before installing, operating or maintaining this equipment, carefully read this manual and the safety labels attached to the equipment. Failure to follow these instructions and safety precautions could result in serious injury, death, or property damage.**
- **Store this manual near equipment for future reference.**
- **If any questions related to safety arise about this manual, please confirm them with the distributor or our company.**

KITAGAWA IRON WORKS CO., LTD.

MA1155EHG0

Preface

This manual provides detailed information on the Kitagawa NC rotary table so that you can understand its performance and functions and use it safely and correctly.
Before using this NC rotary table, read this manual carefully to understand how to use it. Always follow the instructions and warnings given in **"Important Safety Precautions"** and **"Precautions for Use"**. Failure to follow these precautions could result in serious injuries.

Terms and Symbols Used for Safety Messages

In this manual, precautions for handling that are considered especially important are classified and displayed as shown below depending on the damage of risk including the seriousness of the harm that could result. Please sufficiently understand the meanings of these terms and follow the instructions for safe operation.

Safety Alert Symbol

This triangle is the safety alert symbol used to alert you to potential safety hazards. To avoid death or injuries that could occur, follow the safety messages given with this safety alert symbol.

DANGER	**Indicates an Imminently hazardous situation which, If not avoided, will result in death or serious injury.**
WARNING	**Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.**
CAUTION	**Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.**
NOTICE	**Indicates instructions which, if not avoided, could result in damage to the equipment or a shortened work life.**

Liability and How to Use this Manual

This unit is installed on the machining centers and suitable for indexing the angle of machining position of the workpieces. Please contact us if it is used for any other applications.
Kitagawa Iron Works Co., Ltd. shall not be held liable for troubles or accidents that arise from a failure to observe these safety precautions mentioned in this manual.

This manual does not predict all potential hazards in operation, inspection, and maintenance under all environmental conditions. There will be an infinite number of matters that cannot or must not be done, and the manual cannot cover all of them.
Therefore, the matters, unless otherwise mentioned clearly as "can be done" or "may be done" in this manual, should be considered as "cannot be done" or "must not be done".
Please contact us or our agents if you have any uncertainty about safety when you try to perform operation, inspection, or maintenance not mentioned in this manual.

Others

The contents of the instruction manual are subject to change without notice for improvement or specification change.

EC DECLARATION OF CONFORMITY

We hereby declare that the following our product conforms with the essential health and safety requirements of EC Directives.

Product	:	NC ROTARY TABLE
Type	:	MR Series, MX Series, MRT Series, CK Series, GT Series, DM Series, TMX Series, THX Series, TRX Series, TLX Series, TR Series, TL Series, TBX Series, TUX Series, TU Series, LR Series, TP Series, RK Series, TM Series, TH Series, TT Series, TW Series, RKT Series
Directives	:	Machinery Directive 2006/42/EC EMC Directive 2004/108/EC

The above product has been evaluated for conformity with above directives using the following European standards.

Machinery Directive:

EN ISO 12100:2010, EN 60204-1: 2006+A1:2009, others

EMC Directive:

Emission	:	EN 55011+A2:2009/A1:2010
Immunity	:	EN 61000-6-2:2005

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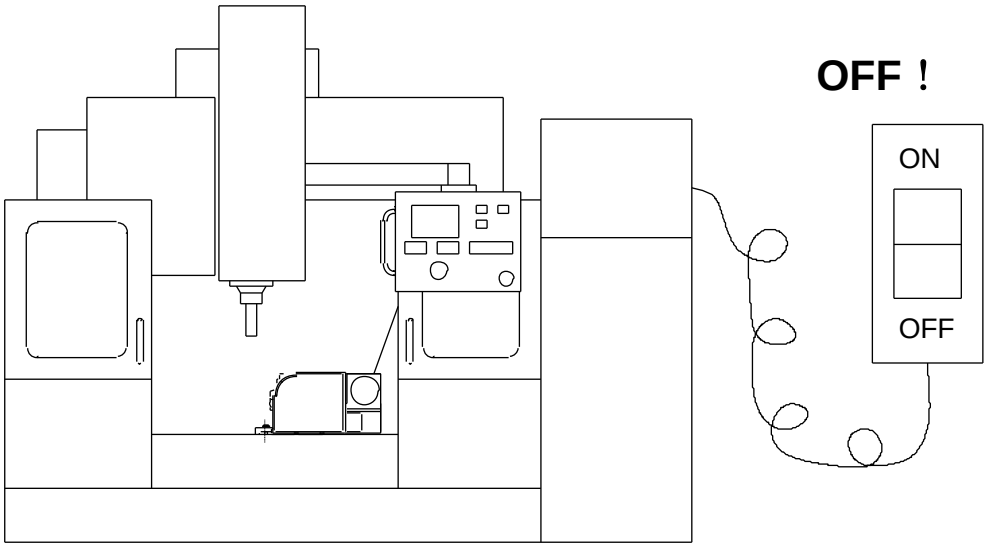
1. For Your Safety

Basic Safety Tips

Please read this manual and follow instructions carefully.

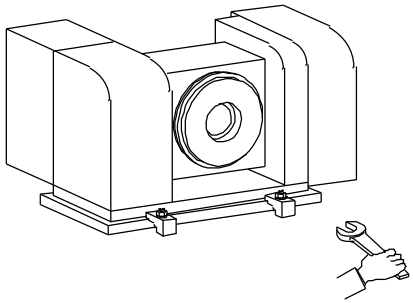
DANGER

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.



WARNING

Tighten the bolts securely when mounting the unit on the machine table.

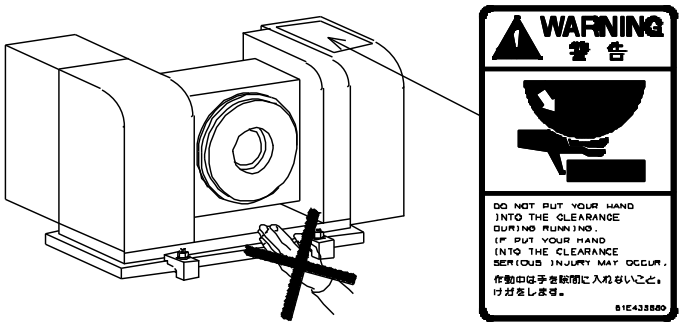


Please refer to the chart below for the recommended tightening torque of the bolts.

Hex. Bolt Size	Torque N･m
M10	33.8
M12	58.9
M16	146.3
M20	294.3

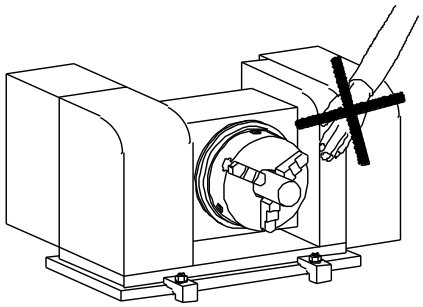
Do not touch rotating object during operation.

Fingers or hand may be caught into gap.

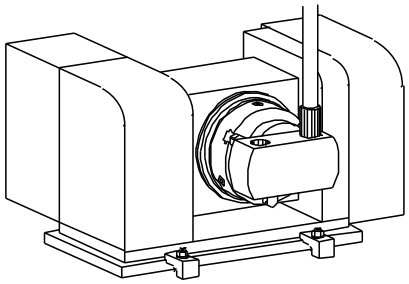


WARNING

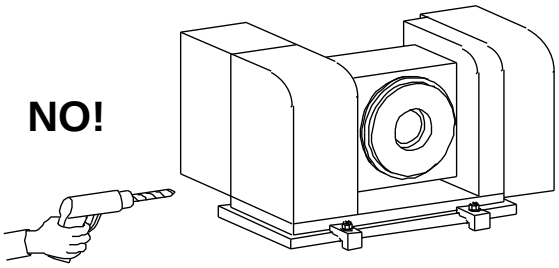
Make sure the working area is clear of any foreign object and/or hand when the unit is in operation to avoid any serious accident and/or injury.



Do not apply cutting force which exceeds the specification in this manual. Failure to do so may cause severe injury and/or damage to the unit.



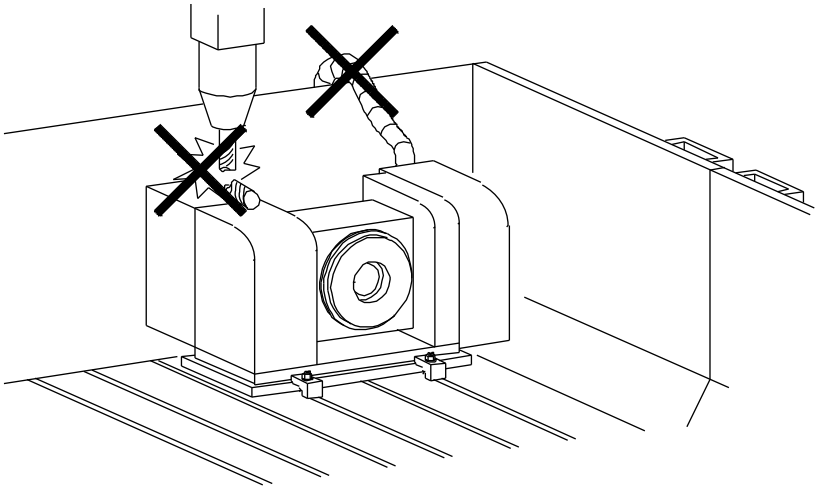
Please consult your local distributor before attempting any modification of the unit.



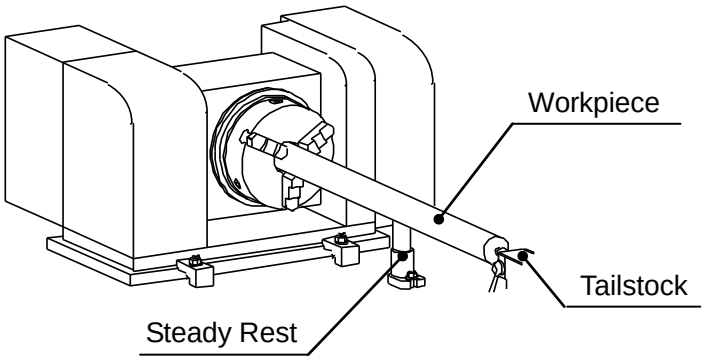
WARNING

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

Avoid bending the external cables and air tube of the unit.

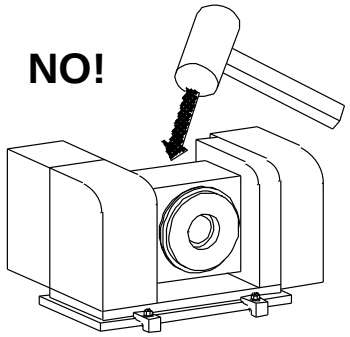


Use a support, steady rest, or tailstock for heavy or long workpieces to prevent any injury and/or accident.

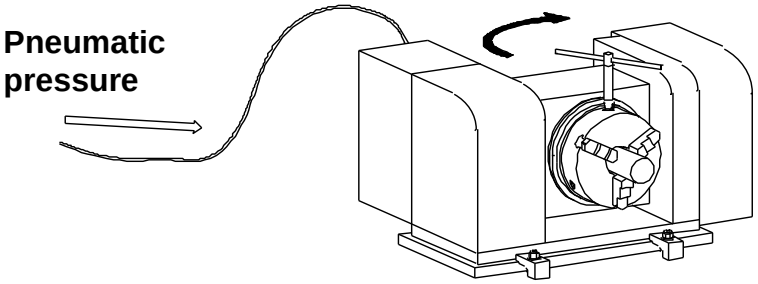


⚠ CAUTION

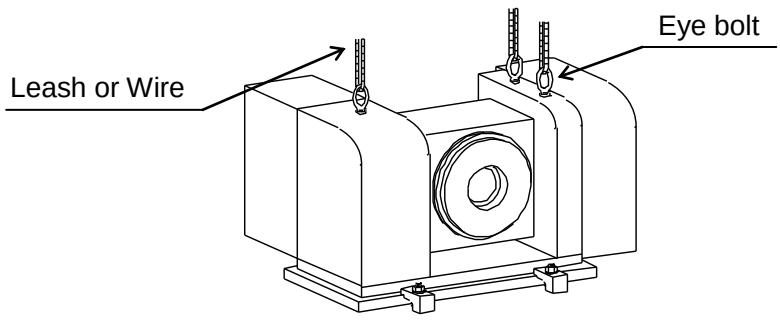
Avoid sudden impact to any part of the unit which may cause damage to the internal mechanism.



Mount or dismount the workpiece to or from the unit while the unit is clamped to avoid damage to the internal mechanism and diminished indexing accuracy of the unit.



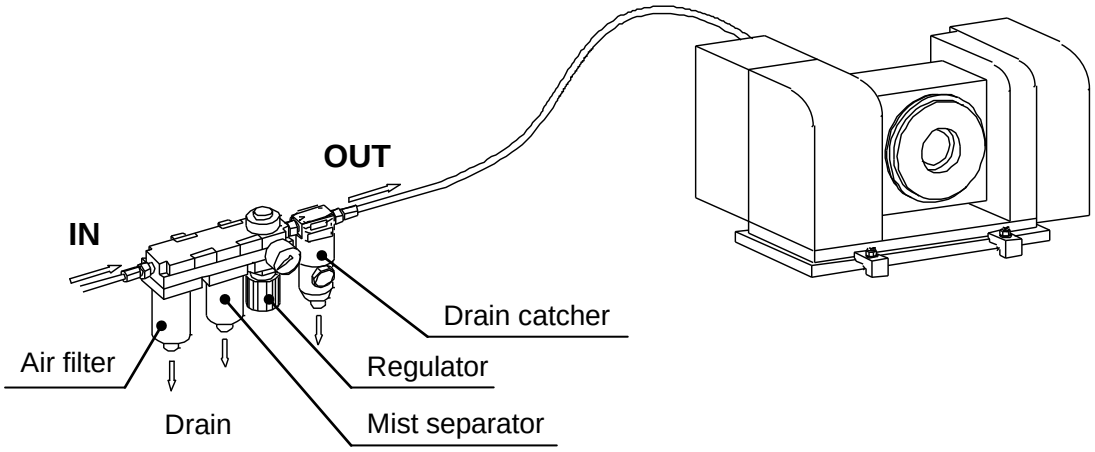
When transporting the unit, make sure to use eye bolts and a sufficient leash or wire.



CAUTION

Supply air through Air combination (Air filter, Mist separator, regulator) + Drain catcher. (The air supply port is on the motor case.)

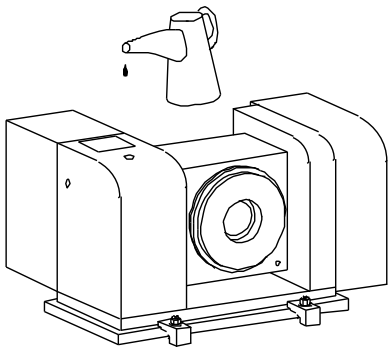
Apply air purge inside the motor case
and be sure to provide dry air.



Periodically drain the water in air filter. (It is recommended to use the auto drain type.)

NOTICE

Replace lubricating oil every 3000 hours.

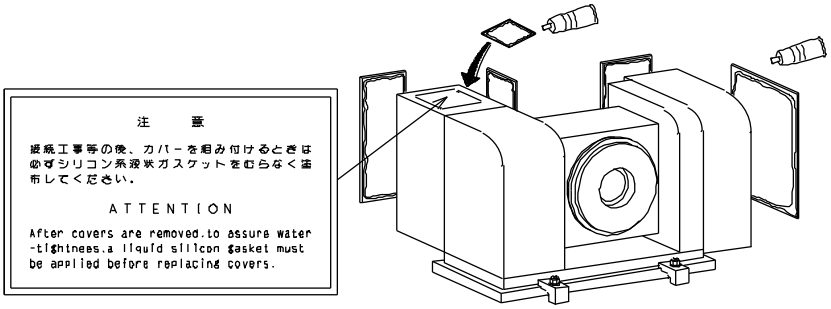


NOTICE

Coat each cover mounting face for motor case with liquid packing.

Because coolant is entered,

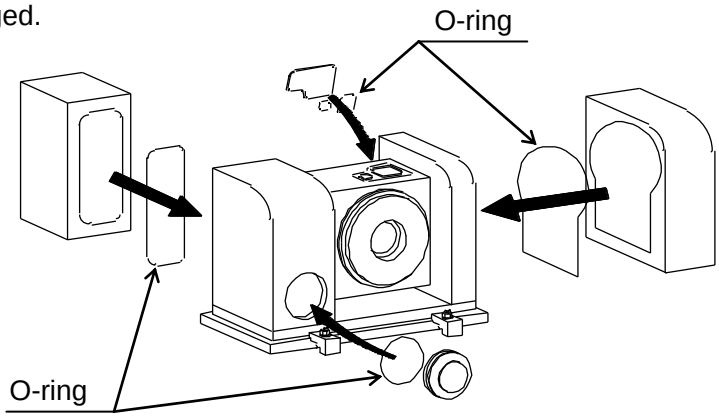
NC rotary table may be damaged.



Attach each O-ring to motor case mounting face, etc. as shown in the following figure. (Do not damage each O-ring.)

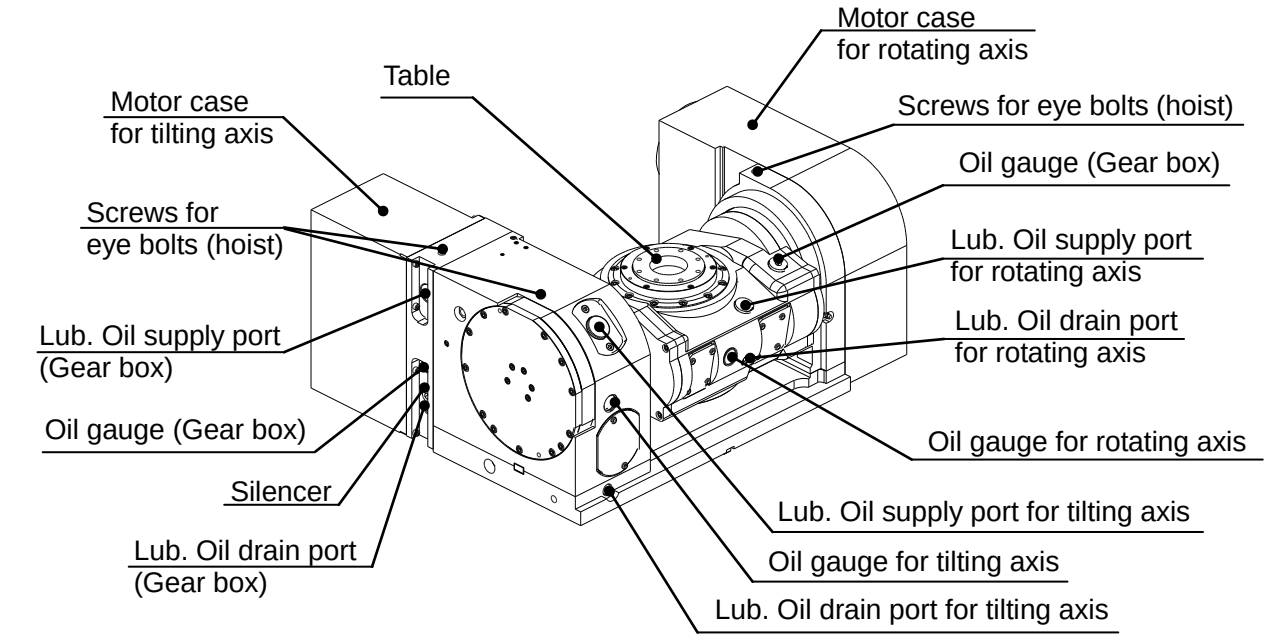
Because coolant is entered,

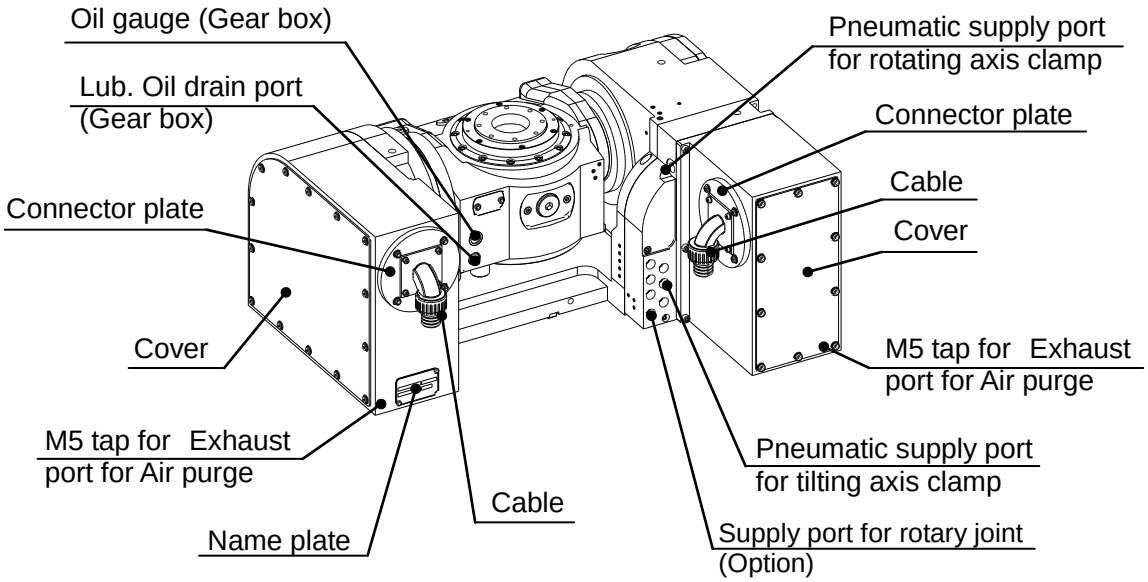
NC rotary table may be damaged.



2. Outside view

The following figure is the standard outside view of model RKT180. For detailed models, refer to appendix outside views in the end of manual.





3. Specifications

	ITEM / MODEL			RKT180
1	Table Diameter		mm	φ95
2	Table Height in Horizontal		mm	235
3	Center Height in Vertical		mm	170
4	Total Height in Vertical		mm	275
5	Table reference hole diameter		mm	φ50
6	Table through hole diameter		mm	φ50
7	Clamping Torque [Pneumatics 0.5MPa]	(Rotating axis)	N·m	350
		(Tilting axis)	N·m	550
8	Allowable Workpiece Dia.		mm	φ180
9	Allowable Mass of Workpiece	(Horizontal)	kg	60
		(Vertical)	kg	40
10	Allowable Work Inertia		$kg \cdot m^2$	0.25
11	Total Reduction Ratio	(Rotating axis)		1/72
		(Tilting axis)		1/120
12	Max. Rotation Speed	(Rotating axis)	min^{-1}	41.6
		(Tilting axis)	min^{-1}	25.0
13	Angle of tilting		degree	-35～110
14	Mass of Rotary Table		kg	About 200
15	Operating temperature range		°C	5～40
16	Operating humidity range		%	30～95
17	Operating altitude range (above sea level)		m	1000 or lower
18	Storage temperature range		°C	-10～60
19	Environmental pollution degree			Degree 3
20	Noise level		dB	79

※ The noise level is measured at a distance of 1m from the NC rotary table in front, rear, left, and right four positions of the unit.

※ When storing the unit, conduct the antirust treatment and store it in a place free from wetting, condensation, or freeze.

NOTICE

The above specification table shows the values at standard specifications. For details, refer to the Outside View.

NOTICE

Max. table rotation speed is the value when the motor rotates at 3000 min^{-1}.

CAUTION

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

CAUTION

There is any case that the tailstock is required by the mass of workpiece, shape, cutting conditions, etc.

CAUTION

For the conditions for using the table, refer to the above specification columns and caution items. Set each cutting condition so as not to exceed the allowance value.

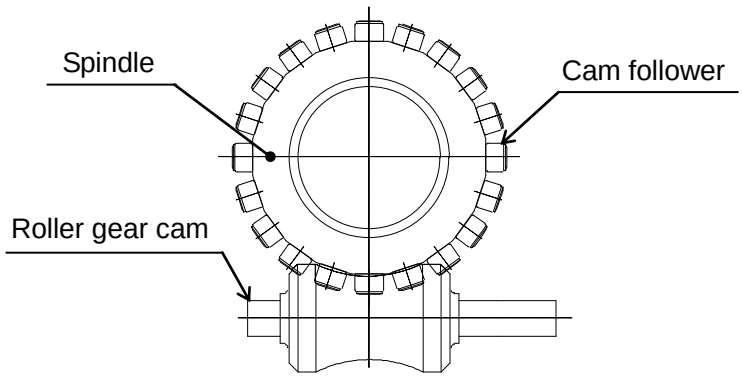
General Description

The RKT180 incorporates the roller gear cam to drive the table.

It is a simple mechanism to transmit power by the engagement of a screw-type roller gear cam installed on the input shaft and a set of cam followers arranged radially on the output shaft.

The tapered rib type roller gear cam is embraced in the cam followers. By applying an adequate precompression to these parts, backlash is eliminated and power transmitted smoothly.

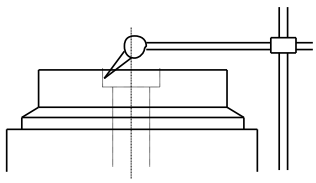
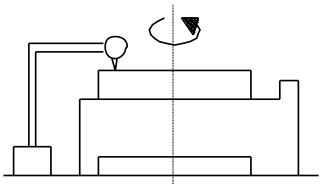
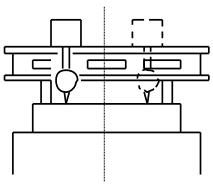
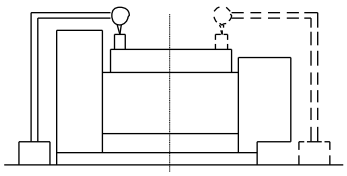
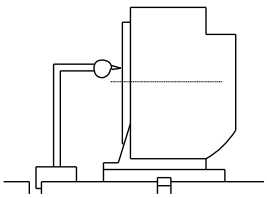
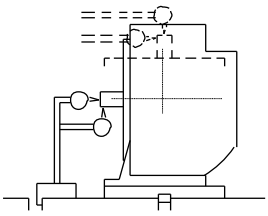
Friction loss is minimal to enhance positioning accuracy because the load is transmitted by rolling contact.



4. Accuracy Standard

(Unit : mm)

	Inspection Item			Allowable Value
1	Run out of table reference hole			0.010
2	Run out of table top face during table rotation			0.015
3	Straightness of table top face (to be concave side.)		Total length	0.010
4	Parallelism of table top face and mounting reference face (tilting axis direction)		Total length	0.020
5	Parallelism of table top face and guide block center line (Tilting angle : 90°)		Total length	0.020
6	Parallelism of tilting axis center line and mounting reference face		Total length	0.020
7	Indexing accuracy	Rotating axis	Cumulative	20 sec
		Tilting axis	Cumulative	20 sec
8	Repeatability	Rotating axis	Cumulative	8 sec
		Tilting axis	Cumulative	4 sec

1 	2 	3 
4 	5 	6 
7,8 Index accuracy is measured with the optical device.		

5. Operation Ready

After unpacking, the tilting rotary table is mounted to the machine tool. Observe the following procedure before performing the operation (trial run).

5-1. Table transfer and mounting to machine tool

1) When transporting the unit, hook ropes to the eyebolts attached and transport the unit carefully, not giving a shock. The ropes used should be wire ropes having enough strength to lift up the unit.
2) Clean the table face on the machine tool and the mounting base surface of NC table after checking that burr or flaw is not found. If the burr or flaw is found, repair them with the oil grinding stone.
3) The motor case may be removed depending on the maintenance work. Accordingly, whenever possible, install the NC rotary table in a position where the motor case can be removed. In case of vertical installation, the guide blocks will fit into the slotted groove on the machine. If there is any play between the guide block and the T-slot, place the unit against one side of the T-slot to eliminate the gap.
4) Securely fix the NC rotary table to the machine tool with the attached clamper.

Do not enter a part of your body under the NC rotary table during transportation.
Unexpected accidents such as a disengagement of lifting devices may cause the NC rotary table to drop on your body.

When mounting the NC rotary table to the machine tool, check the mounting space carefully. Especially, take care so that the NC rotary table, cables and air/hydraulic hoses will not interfere with the splash guard or ATC device and spindle head of machine tool because the table or spindle head moves.

Do not damage the cables by placing a heavy thing or pinching them. If the cables are damaged, there is a danger of electric shock.

Tighten the bolts of clamper at the specified torque by using the mounting seat effectively.

The transport and lifting devices must be operated only by the qualified persons for respective devices.
Operating the transport devices by an unqualified person causes the NC rotary table or machine to be damaged due to an operation error, resulting in accidents.

CAUTION

When transporting a pallet on which NC rotary table is mounted, take measures against over-turning or drop.
Transporting the pallet with NC rotary table mounted unstably may cause the NC rotary table to overturn and then to drop from the pallet.

CAUTION

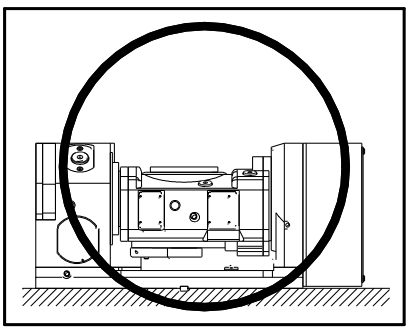
Disconnect electric cables and working fluid piping when relocating the NC rotary table.
Relocating the NC rotary table with electric cables and working fluid piping connected and hung down causes the NC rotary table to be unstable or the worker to be tripped, resulting in unexpected accidents.
Electric cables or working fluid piping may be damaged during relocation, and if the NC rotary table is installed on the machine again, unexpected accidents may occur.
If electric cables and working fluid piping cannot be disconnected, secure them to the NC rotary table.

NOTICE

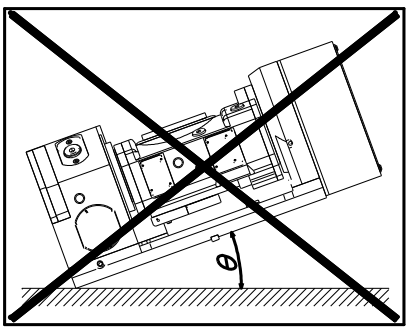
Flush the working fluid piping sufficiently before connecting it to the NC rotary table. If foreign matter enters the piping route, the product capability may not be exhibited.

NOTICE

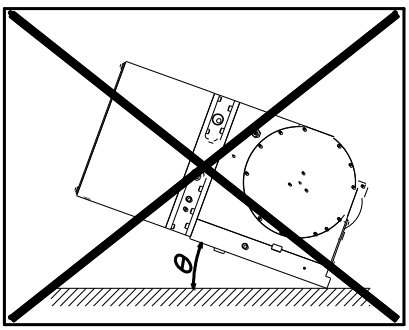
Be sure to use the NC rotary table body in a horizontal state.
If you use the NC rotary table body in an inclined state, hydraulic oil and lubrication oil are not supplied to the proper levels respectively, resulting in operation failure or reduction in the product life.
The following figures indicate the examples. If you intend to use the unit in an inclined state, please contact your sales agent (M/C maker) or your local distributor.



horizontal state



Bad example



Bad example

5-2. Lubrication

The NC rotary table is filled with oil at the factory. Before starting the machine, check that the oil is full to the center of the oil gauge. If not, replenish oil up to the center of the oil gauge.

○ Oiling Procedure

1） Clean the area around the oiling port to prevent ingress of chips and dust. If these are included, major parts including roller gear cam and bearings may be seized or their accuracy lost.

2） Thoroughly discharge the old oil before replacing with new one. Oil can be discharged quickly if you open the supply port as well.

3） Fill new oil up to above the center of the oil gauge.

Oil contamination generally depends on frequency of use. For this machine, we recommend replacing oil once every 3000 operation hours to maintain the performance of the NC rotary table for a long term. Replace the oil at least once a year even if the operation hours are less than the above.

5-3. Required lubrication oil volume

(Unit: liter)

	Oil Quantity	Viscosity grade
Tilting axis body	0.67	VG150
Tilting axis gear box	0.1	VG32
Rotating axis body	0.45	VG150
Rotating axis gear box	0.1	VG32

5-4. Recommended lubrication oil

(Viscosity grade ISO VG150)

Maker	Name
MOBIL	Mobil SHC 629
IDEMITSU	Daphne Alpha Gear 150
COSMO	COSMO GEAR MO 150
JX NIPPON OIL& ENERGY	BONNOC AX 150
SHELL	Shell Omala S2 G 150

MOBIL SHC 628 (MOBIL OIL) is provided in the unit before shipping.

(Viscosity grade ISO VG32)

Maker	Name
IDEMITSU	Daphne Multiway 32MT
MOBIL	Vactra oil No. 1
JX NIPPON OIL& ENERGY	Uniway EV32
SHELL	Shell Tonna oil S32
COSMO	Dynaway 32

Daphne Multiway 32MT (IDEMITSU) is provided in the unit before shipping.

5-5. Safety of Oil and Antirust Oil Used for the Unit

5-5-1. Scope of application

- Specified lubricating oil
- Specified hydraulic oil (MR, MRT, MX, CK, GT, RK, TM(H)2100･3100, TT(W)101･120, TT140, TT150, RKT, DM do not use)
- Antirust oil applied to the unit at delivery (Houghton Japan, Rust Veto 377)

5-5-2. First-aid treatment

Aspiration : In case of much aspiration, go to a place where there is fresh air, and cover your body with a blanket to keep your body warm. Consult a doctor if necessary.

Sticking to your skin : Wipe off the oil, and wash your skin with water and soap. If you feel itchy or you get inflamed, consult a doctor immediately.

Entering your eye : Wash your eye with fresh water for at least 15 minutes, and then consult a doctor.

Accidental drinking : Consult a doctor immediately without vomiting forcibly. If you are polluted in your mouth, wash with water thoroughly.

- For lubrication oils and hydraulic oils other than specified ones, and antirust oils prepared by the customer, refer to the safety information prepared for respective oils.

5-5-3. Flammable characteristics

- Watch out for fire since lubricating oil and hydraulic oil are flammable. Hazardous substances will be generated if they combusted.
- The flash point of lubricating oil and hydraulic oil put in the unit at the delivery exceeds 200°C. It may be different from that of the lubricating oil and hydraulic oil prepared by the customer.
- Antirust oil is highly volatile and thus likely to catch fire, and also it mixes with air to form explosive mixture gas.
- The flash point of antirust oil applied to the unit at the delivery is 38°C. It may be different from that of the antirust oil prepared by the customer.

5-5-4. Disposal of lubricating oil and hydraulic oil

Dispose of used lubricating oil and hydraulic oil exhausted from this unit in accordance with the laws and regulations of your country. You may suffer punishment if you disposed of waste oil without following the laws and regulations.

6. Inspection

Daily inspection

1) Confirm that the NC rotary tables (including jigs, if attached) are securely fixed.
2) Confirm that the chips accumulating in a rotary part of NC rotary table are removed.
3) Confirm that the electric connection cables and hoses are not damaged and the pneumatic pressure is appropriate.
4) Confirm that lubricating oil.
5) Confirm that the machine-zero operation and indexing operation and position.
6) Confirm that there is no abnormal vibration or noise. (eq. Body, gear box and motor)
7) Confirm that there is no abnormal heating. (eq. Body, gear box and motor)

Periodical inspection (Inspect the following items every 6-month.)

1) Confirm that muddiness of the lubricating oil.
2) Confirm that the connectors are securely attached and there is no damage on the cables.
3) Confirm that corrosion and breaking of the wiring in the motor case.

7. Use of NC Rotary Table

This unit is installed on the machining centers, and on its table surface the chuck or fixture is attached to clamp the workpiece. It indexes the angle of machining position by the control of machining center or Kitagawa’s own controller. During the machining, the working fluid is supplied to retain the workpiece.

8. Table Clamp

8-1. Precautions for table clamp

Be sure to rotate the table with the table unclamped and use the table with it clamped when machining after positioning. If the table is operated by mistake, take care since the roller gear cam may be damaged. Check the signals of pressure switch to check Clamp/Unclamp operations.

Never operate the table at clamping torque or more in specification column because the clamping part will be worn and the roller gear cam also will be damaged.

Clamped status is not canceled completely when residual pressure remains while unclamping.
Thus, the table operation may continue under half clamped condition. Since the above mentioned case leads to the seizing of the roller gear cam and clamped part, take extreme care of back pressure.

If a silencer is clogged with cutting fluid etc., there are possibilities that compressed air may not be exhaust and it leads unclamp failure alarms. To avoid clogging, maintain silencer periodically.

8-2. Pneumatic Supply for clamp

1) Supply clean air (moisture, oil content, powder dust eliminated) passing through the air combination (Air filter, mist separator, regulator) + drain catcher.
2) Connect the pipe exclusive for air pressure durable to max. operating pressure over 0.6 MPa to the air pressure supply port. The air pressure supply port is provided on the motor case. See the external view attached for details. (Connection port is Rc1/4).
3) Use this unit in the air pressure range of 0.4 to 0.6 MPa.

8-3. Air purge

Dew drops may occur in the motor case by ambient environment. In this case, each component including electric apparatus will fail or rust will occur. Therefore, the air is purged and exhausted from the air purge exhaust port.
The part of air for clamping is used for the air purge. Thus, air is used in the motor case from joint with hole of 0.4mm.
Be sure to supply clean air passing through the filter (air filter, mist separator, regulator and drain catcher). If moisture, oil content, etc., are mixed in the air, its air is entered in the motor case, thus damaging the equipment. The air in the motor case is exhausted from the air purge exhaust port.

If the air purge exhaust port is closed, condensed drops are not exhausted and pressure is kept in the motor cover as is, thus causing in motor case damaging and motor malfunction. Therefore, never close the air purge exhaust port. When exhausting air, although any exhaust sound occurs, there is no problem.

8-4. Check device for Clamp/Unclamp

To proceed a secure work, be sure to use Clamp/Unclamp Check signals. (See Fig.1)

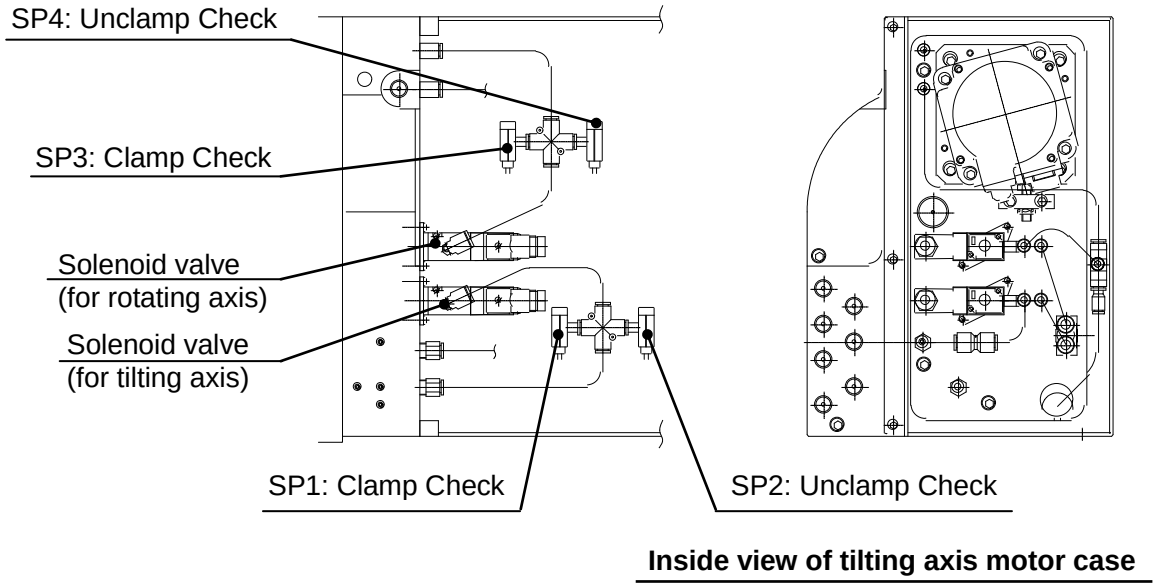


Fig.1

The set pressure values of pressure switches are as follows:

Clamp Check（SP1,SP3）	Unclamp Check（SP2,SP4）
0.25MPa PS1000-R06L-Q-X140	0.055MPa PS1100-R06L-Q-X141

8-5. Solenoid valve for Clamp/Unclamp

In case of NC tilting rotary table made by pneumatic clamp specifications, the solenoid valve is incorporated. Since the following piping is used as standard, take care when electric cables are connected.
Refer to outside view of Appendix

【Excitation Unclamp Spec.】
Solenoid: ON ・・・ Table Unclamp
Solenoid: OFF ・・・ Table Clamp

【Excitation Clamp Spec.】
Solenoid: ON ・・・ Table Clamp
Solenoid: OFF ・・・ Table Unclamp

⚠ CAUTION

Since polar characters (+. -) exist in each pressure switch, proximity switch and solenoid valve, refer to wiring diagram.

9. Mounting of Workpiece

Mount the workpiece securely to increase accuracy.

If the workpiece is not mounted securely, accuracy becomes not only worse but also the machine and tools are damaged. Therefore, take extreme care because it also causes an accident resulting in injury or death in the worst case.

When the workpiece that flatness and straightness are not obtained is tightened as is, the workpiece or the rotary table may be distorted, thus resulting in low accuracy or unevenness rotation. In such case, insert the shim(s) between the workpiece and the rotary table.

When the workpiece is tightened, fix the workpiece equally and securely on the rotary table as much as possible.

10. Maintenance Work

10-1. Corrective Action in Case of Failure, and Disassembly

See the “Troubleshooting” if a failure occurred in the unit due to any reason. Also, for the disassembly procedure when performing the maintenance work, refer to the parts list and the procedure given in the corresponding maintenance item.

10-2. Before Performing Maintenance Work

When performing the maintenance work, shut off the power (primary power supply) of the machining center or Kitagawa’s own controller to set the pressure adjusting valve of air combination that supplies the air to the NC rotary table to 0 MPa or shut off the power of the air compressor to exhaust the compressed air, so as to stop the supply of the working fluid.

Perform the maintenance work with the workpiece removed. Performing the work with the workpiece left on the table may cause the workpiece to be dropped out, resulting in injuries.

Appropriate value in each maintenance item has been set for smooth function of each device, and thus you should observe it. Performing the maintenance work without observing the appropriate value may cause NC rotary table to fail or each device to be damaged.

Clamp the table clamp device of NC rotary table when removing the workpiece.

11. Machine zero point setting

It is necessary to set an arbitrary position as the machine zero point when installing the rotary table for the proper use. This operation is called "machine zero point setting".

This rotary table does not contain a mechanical zero point return deceleration dog. The machine zero point must be set on the CNC or our Controller of the machine on which the rotary table is installed.
When setting the machine zero point, move the NC rotary table to the position where the machine zero point will be set. Then set the position as the machine zero point using the CNC parameters.
For the machine zero point setting procedure using the parameters, refer to our Controller Instruction Manual (in the section of zero point setting procedure) or the instruction manual for the machine on which the rotary table is installed.

NOTICE

Basically, machine zero point should be set at the installation of the NC rotary table. So it does not need to be set under normal conditions of use. However, it must be reset in the following cases.

◇When the encoder cable of the rotary table is removed from the machine or controller.
◇When the encoder backup battery on the machine side or controller runs down.
◇When the servo motor, encoder, or encoder cable is replaced or repaired.

12. Tilting Axis Over Travel Stop Device

12-1. Tilting axis over travel stop device (See Fig.2)

1) Remove the cover on the motor case side.
2) The dog and the limit switch for over travel of the tilting axis stroke limit are contained into the rotating axis motor case.
3) The limit switch A ③ detects dog A ① of stroke limit on the horizontal table face position side.
4) The limit switch B ④ detects dog B ② of stroke limit on the vertical table face position side.
5) The angle until the emergency stop mode is applied to the machine from the horizontal table face is about 35°. The angle until the emergency stop mode is applied to the machine from the vertical table face is about 20°.

⚠ CAUTION

The angle values of 35°or more from the horizontal table face and 20°or more from the vertical table face cannot be set.

⚠ CAUTION

The angle may be limited within a standard value in advance by customer conditions or to prevent the interference with the jig, workpiece, etc. In this case, it cannot be set more than the limited angle.

12-2. Adjusting methods of dog for vertical over-travel

1) When the customer will change position of dog A ① according to the shape of workpiece and jig, loosen hexagon socket head cap screw which fix the dog A ①. Once remove the dog A ①. (See Fig.2.)
2) Rotate the tilting axis to the tilting angle to be set in the minus direction with the manual minus generator or the Manual axis feed key, checking that it does not interfere with the jig or workpiece.
3) After rotating the rotary table to the desired tilting angle, slightly tighten hexagon socket head cap screws which fix the dog A ①.
4) Slide the dog A ① in the reverse direction clockwise (CW) before fixing until the over-travel alarm lamp lights. Tighten hexagon socket head cap screw that loosened slightly.
5) After fixing the dog A ①, rotate the tilting axis again with the manual pulse generator or the Manual axis feed key and check that the tilting axis stops at the desired tilting angle position and alarm lamp lights.
6) After adjusting, mount the side cover of motor case on the rotating axis side.

⚠ CAUTION

When mounting the cover, coat the cover with liquid packing (liquid gasket 1216 made by THREE BOND) evenly.

12-3. Adjusting methods of dog for horizontal over-travel

1) When the customer will change position of dog B ② according to the shape of workpiece and jig, loosen hexagon socket head cap screw which fix the dog B ②. Once remove the dog B ②. (See Fig.2.)
2) Rotate the tilting axis to the tilting angle to be set in the minus direction with the manual pulse generator or the Manual axis feed key, checking that it does not interfere with the jig or workpiece.
3) After rotating the rotary table to the desired tilting angle, slightly tighten hexagon socket head cap screws which fix the dog B ②.
4) Slide the dog B ② in the reverse direction counterclockwise (CCW) before fixing until the over-travel alarm lamp lights. Tighten hexagon socket head cap screw that loosened slightly.
5) After fixing the dog B ②, rotate the tilting axis again with the manual pulse generator or the Manual axis feed key and check that the tilting axis stops at the desired tilting angle position and alarm lamp lights.
6) After adjusting, mount the side cover of motor case on the rotating axis side.

⚠ CAUTION

When mounting the cover, coat the cover with liquid packing (liquid gasket 1216 made by THREE BOND) evenly.

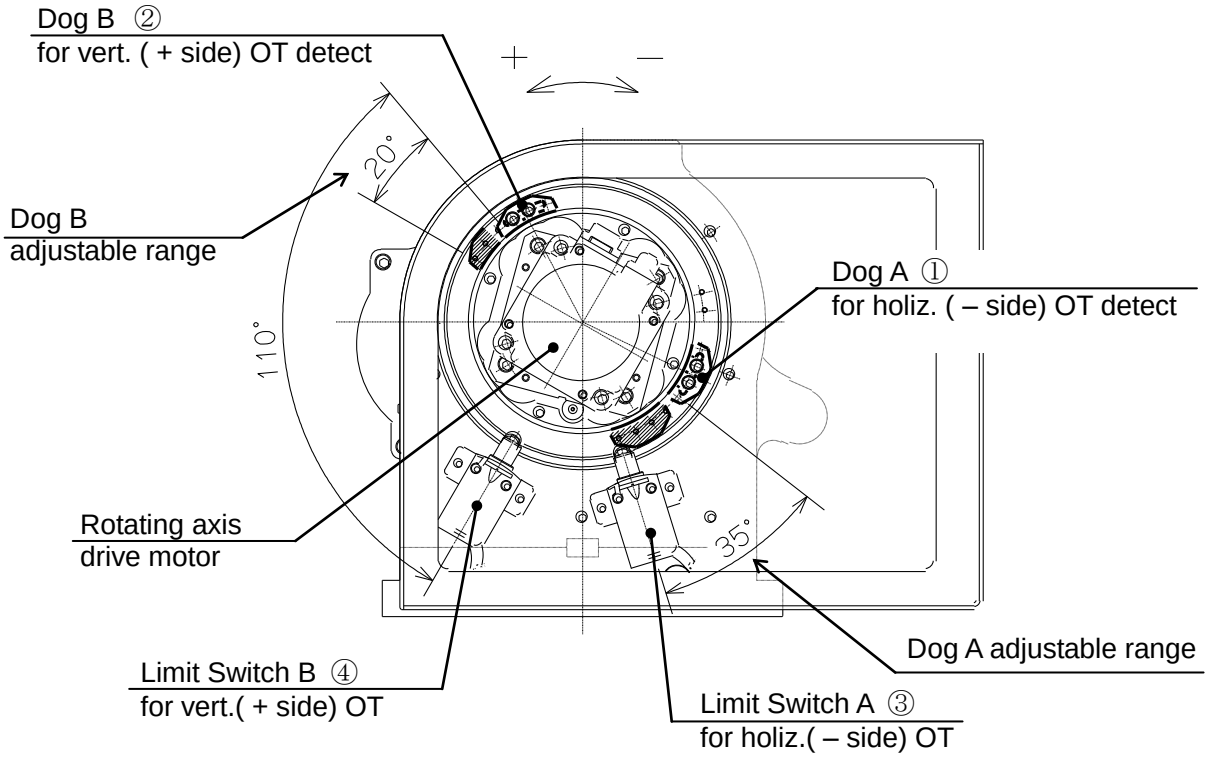


Fig.2

13. Motor case

13-1. To remove motor case (See Fig.3)

When removing the motor case of tilting axis for maintenance, etc., the following procedure is recommended.

1) Remove the covers ② of motor case ① and disconnect wiring cables from electric apparatuses of motor and solenoid valves, etc.
2) Loosen hexagon socket head cap screws ⑤ which fix the motor case ① and remove the motor case slowly with the motor case ① raised.

CAUTION Connect the air hose correctly and take care so as not to bend it.

13-2. Countermeasures for waterproof

To prevent the motor from coolant penetration, O-rings are used to the mounting faces on the motor case and the connector plate, and also, liquid packing (1216 made by Three Bond) are used on connection parts between the motor case and covers ②, ③.

CAUTION When reassembling the motor case and connector plate, take extreme care so that the O-rings will not be damaged. If the O-rings are damaged, coolant may enter into the motor case.
When reassembling the covers, coat connection parts with liquid packing.

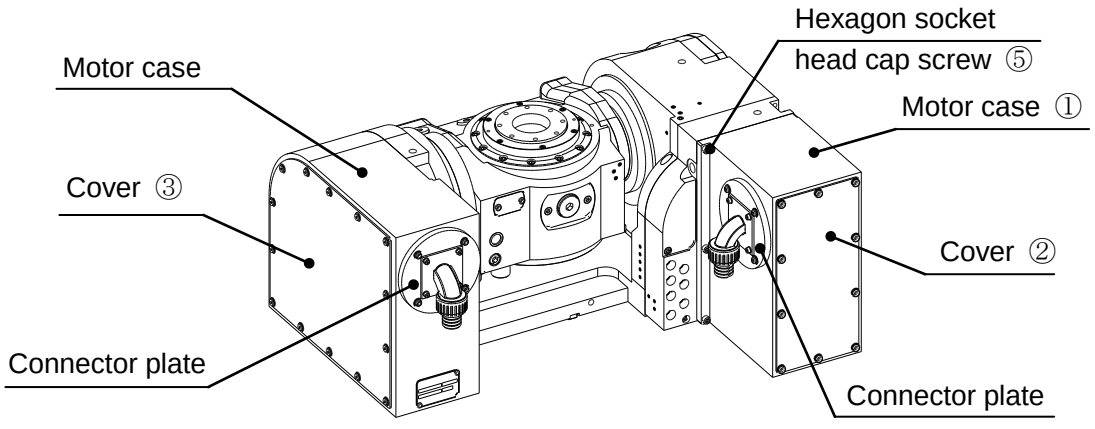


Fig.3

14. Motor

14-1. Tilting axis drive motor

14-1-1. To remove drive motor

When replacing the motor, remove the motor according to the following procedure. (See Fig.4)

1) Drain lubrication oil from the tilting axis lubrication oil drain port. (See outside view.)
2) Remove the motor case according to item 13-1.
3) Remove hexagon socket head cap screws ⑤ which fix the motor ④.
4) Remove the motor ④ slowly, raising it.

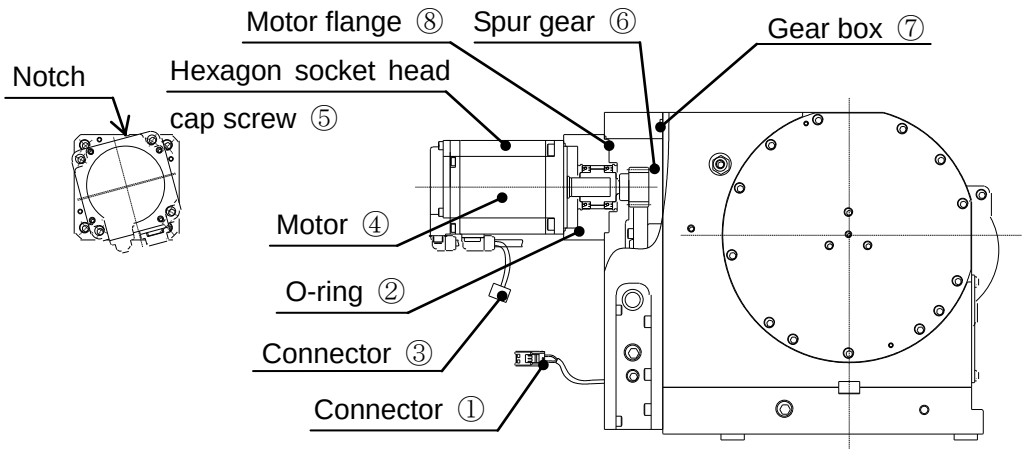


Fig.4

14-1-2. To mount drive motor

1) Clean mounting face (gear box ⑦ and motor ④) and O-ring groove.
2) Mount the O-ring ② and mount the motor ④ by the reverse procedure as the above removing.

CAUTION

The motor flange must be mounted in the correct orientation. Check the notch position, and mount the motor in the same orientation as that before the motor was removed. (See Fig.4)

CAUTION

Mount the motor to the spur gear ⑥ carefully after cleaning so that the spur gears are not damaged.

CAUTION

When mounting the motor ④, take extreme care so that O-ring ② is not damaged because lubrication oil may enter into the motor case.

CAUTION

Connect the connector ① according to item 15-2. Connect the connector ③ securely so that the pin does not cause contact failure, and also cables are not bent or crushed.

14-2. Rotating axis drive motor

14-2-1. To remove drive motor

When replacing the motor, remove the motor according to the following procedure. (See Fig.5)

1) Drain lubrication oil from the rotating axis lub. oil drain port. (See the outline drawing.)
2) Remove the cover ⑦.
3) Remove hexagon socket head cap screws ⑤ which fix the motor ④.
4) Remove the motor ④ slowly, raising it.

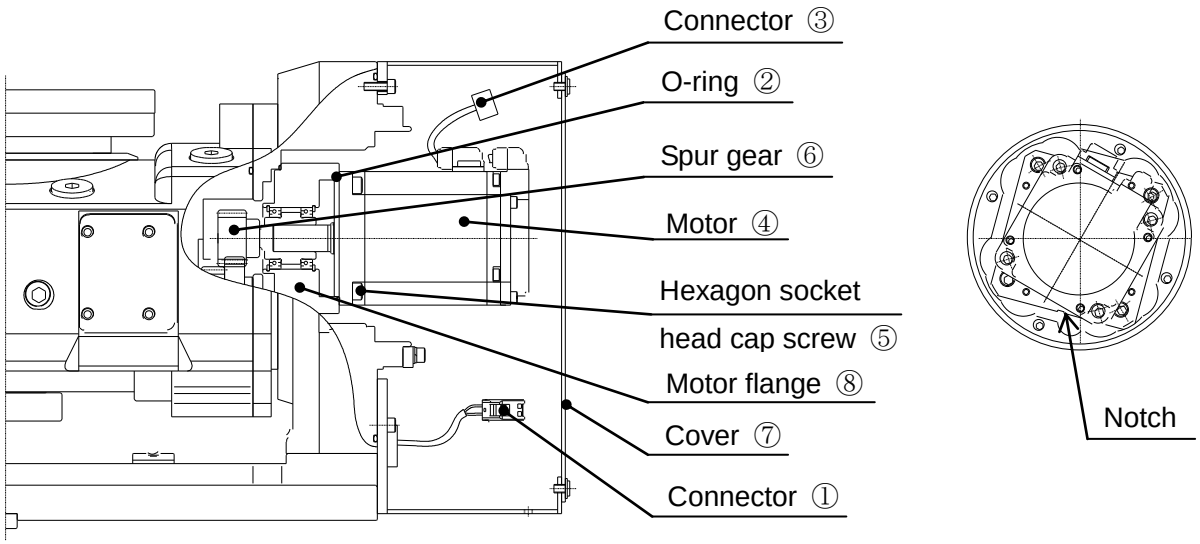


Fig.5

14-2-2. To mount drive motor

1) Clean mounting face (motor ④) and O-ring groove.
2) Mount the O-ring ② and mount the motor ④ by the reverse procedure as the above removing.
3) After mounting the motor, adjust the backlash of spur gears ⑥ according to item 12.

⚠ CAUTION

The motor flange must be mounted in the correct orientation. Check the notch position, and mount the motor in the same orientation as that before the motor was removed. (See Fig.5)

⚠ CAUTION

Mount the motor to the spur gear ⑥ carefully after cleaning so that the spur gears are not damaged.

⚠ CAUTION

When mounting the motor ④, take extreme care so that O-ring ② is not damaged because lubrication oil may enter into the motor case.

⚠ CAUTION

Connect the connector ① according to item 15-2. Connect the connector ③ securely so that the pin does not cause contact failure, and also cables are not bent or crushed.

14-3. To mount spur gears

The mounting method of spur gears varies by the motor shaft and flange diameter. The following procedure is recommended to mount the spur gears by three-method mainly used.

○**Taper shaft**

1) Wipe up dust adhered on the taper shaft surface and inside of spur gears.
2) Attach the key to the shaft before mounting the spur gear.
3) Attach the washer and tighten the nut securely.

○**Straight shaft (with key)**

1) Wipe up dust adhered on the straight shaft surface and inside of spur gears.
2) Attach the key to the shaft.
3) Fix the spur gear and waster securely.
4) Mount the spur gear with the washer to the shaft securely by using the bolt.

○**Straight shaft (locking element spec.)**

1) Wipe up dust adhered on the straight shaft surface and inside of super gears and coat them with oil or grease. However, do not use lubricate of silicon system or molybdenum system, or oil and grease including an extreme-pressure additive agent.
2) Insert the washer, locking element, spacer and spur gear in order.
3) At this time, attach the locking element (Generic name for inner ring and outer ring) so as to pressurize the inner ring.
4) Tighten bolts on each diagonal line equally in order so that the end face of spur gear and the flange end face of motor become parallel.
5) Tighten the bolts until washers do not move in an axial direction. After that, adjust the mounting position of spur gear.
6) Attach the dial gauge to the end face of spur gear and tighten bolts equally. Rotate the spur gears and also, tighten each bolt until the run out of dial gauge becomes 0.01mm or less.
7) Check that the spur gears are fixed to the shaft securely.

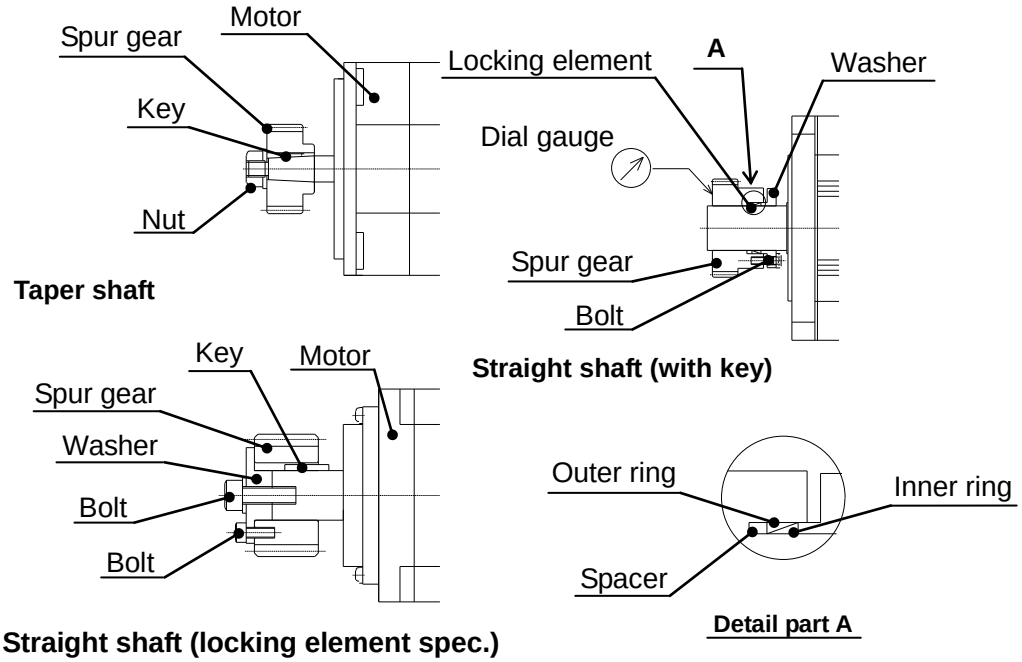


Fig.6

15. Connector

When removing connectors (made by MOLEX) such as proximity switches, etc., unavoidably in motor case removing, the following procedure is recommended.

15-1. To remove connector

1) Pushing the claw ③ of receptacle housing, remove the plug housing ① and receptacle housing ②.

CAUTION Do not apply any load to cables.

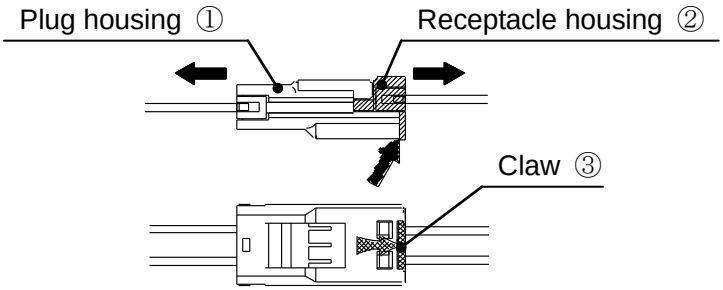


Fig.7

15-2. To mount connector

1) Mate the plug housing ① to the receptacle housing ② as shown in the following figure.
2) Insert the receptacle housing ② into the plug housing ① securely until a clicking noise occurs.
3) After mounting, pull the receptacle housing ② slightly and check that it does not draw out.

CAUTION Check that connectors and cables are not damaged before connecting.

CAUTION Connect cables so as not to be bent or crushed.

CAUTION Do not apply any load to cables.

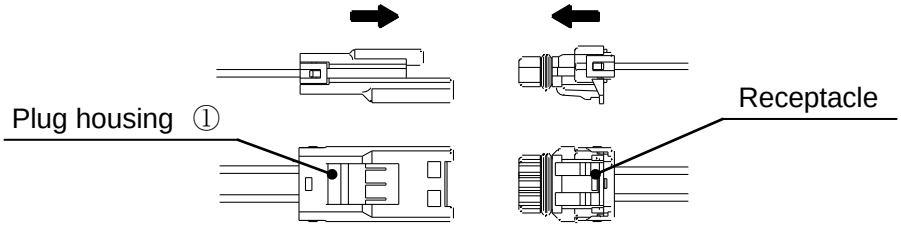
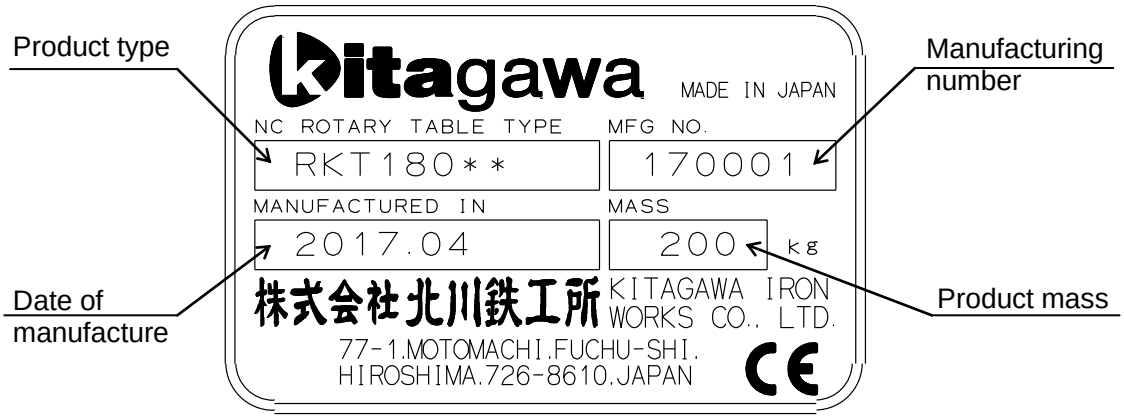


Fig.8

16. Troubleshooting

Check corresponding item given in this chapter to take corrective actions when the unit seems to be faulty. If the fault persists, please contact your sales agent (M/C maker) or us. When making an inquiry, let us know the product type and manufacturing number marked on the nameplate of the NC rotary table body.



Nameplate

Symptom ①: Table does not rotate

Possible causes	Corrective actions
No cable connection between NC rotary table and control unit	Check the cable for connection, and connect it
Broken cable between NC rotary table and control unit	Check the cable for continuity, and replace it
Faulty clamp device	See “Symptom ⑤”
Decentered workpiece, overloaded fixture, and friction torque of steady rest and rotary joint make the load torque larger than the motor torque	Compare the specification of NC rotary table with the work condition to make improvement
Use of unit out of specified temperature range	Adjust ambient temperature within specified temperature range

Symptom ②: Table does not rotate but generates a noise

Possible causes	Corrective actions
Motor makes a howling sound to try to rotate →Seizure of gears due to lack or deterioration of lubricating oil	Stop the use of NC rotary table immediately. Please contact the sales agent.
Gears generate a noise →Faulty rotation due to damaged gears	Stop the use of NC rotary table immediately. Please contact the sales agent.
Unit generates a noise at startup and stops soon →Faulty rotation because foreign substances mix in the oil bath	Supply lubricating oil until foreign substances come out of the drain port.

Symptom ③: Table does not rotate smoothly but generates a noise

Possible causes	Corrective actions
Noise is generated repeatedly during rotation →Gears are damaged	Stop the use of NC rotary table immediately. Please contact the sales agent.
→Faulty rotation of gears because foreign substances mix in the oil bath	Open the lubricating oil drain port, and supply lubricating oil until foreign substances come out of the drain port.
Load due to overloading exceeds motor output	Compare the specification of NC rotary table with the work condition to make improvement
Lack or deterioration of lubricating oil blocks smooth rotation	Check oil level, viscosity and change interval of lubricating oil
Faulty clamp device	See “Symptom ⑤”
Inappropriate backlash amount	Please contact the sales agent.

Symptom ④: Chattering occurs during cutting

Possible causes	Corrective actions
Inappropriate clamp condition of NC rotary table or fixture	Check the clamp condition, and correct it
Excess cutting force is applied during cutting	Adjust cutting condition to the specified condition to change the cutting force to appropriate value
Faulty clamp device	See “Symptom ⑤”
Faulty locking of worm spindle in the backlash adjustment	Readjust
Fault due to damaged NC rotary table or expired life of components	Stop the use of NC rotary table immediately. Please contact the sales agent.
Fault occurs only during continuous cutting →Lack or deterioration of lubricating oil blocks smooth rotation →Inappropriate backlash amount	Check oil level, viscosity and date of last change of lubricating oil Please contact the sales agent.
Chips accumulate in rotary part of NC rotary table	Remove accumulated chips in daily inspection

Symptom ⑤: Table is not clamped or unclamped

Possible causes	Corrective actions
Faulty solenoid valve	Replace the solenoid valve
Faulty clamp/unclamp confirming device (pressure switch)	Check and replace the clamp/unclamp confirming device (pressure switch)
Damage or connection failure of working fluid pipe for clamp	Check the piping for connection, and replace
Supply pressure of working fluid for clamp is lower than specified value	Change to appropriate value according to the specification
Back pressure acts to the air pressure exhaust port of solenoid valve, as the air purge port in the motor case is blocked.	Remove the cause that blocks the air purge port.
Faulty clamp device	Stop the use of NC rotary table immediately. Please contact the sales agent.
Fault due to damaged NC rotary table or expired life of components	Stop the use of NC rotary table immediately. Please contact the sales agent.

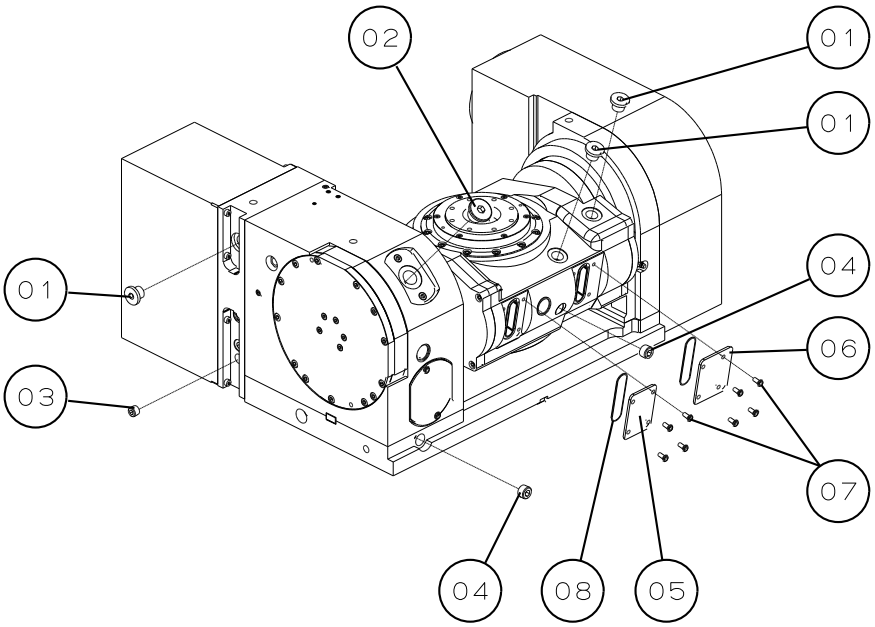
Symptom ⑥: Index accuracy error

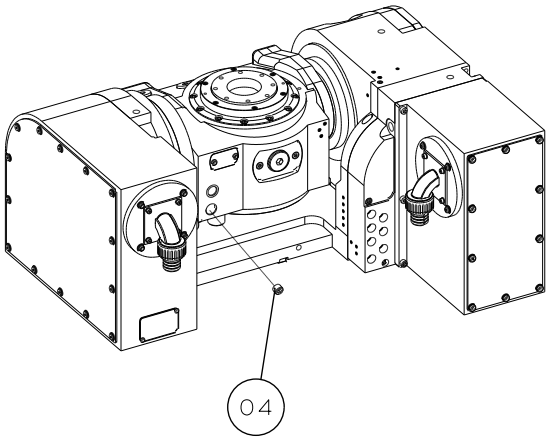
Possible causes	Corrective actions
The unit is overloaded during rotation	Compare NC rotary table specification with work condition to make improvement
Workpiece is dislocated due to low clamp torque	Compare NC rotary table specification with cutting condition to make improvement
Faulty clamp operation	See “Symptom ⑤”
Inappropriate backlash amount	Please contact the sales agent.
Inappropriate backlash compensation amount	Change the backlash compensation amount
Fault due to damaged NC rotary table or expired life of components	Stop the use of NC rotary table immediately. Please contact the sales agent.

17. Parts List

○ Main Body

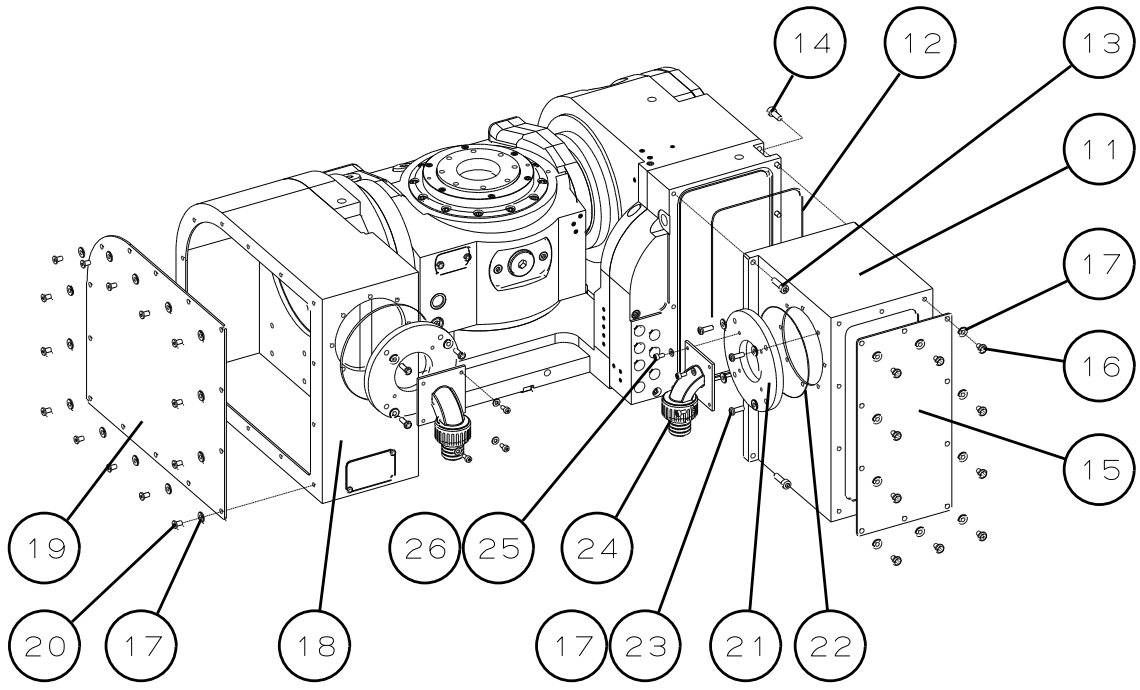
MARK	NAME	RKT180	Q'ty	Recital
01	Hexagon socket flange head screw plug with O-Ring	M16x1.5	3	Gosho
02	Hexagon socket flange head screw plug with O-Ring	M20x1.5	1	
03	Hexagon socket headless tapered pipe plug	Rc1/4	1	
04	Hexagon socket headless tapered pipe plug	Rc3/8	3	
05	Cover (1)		1	
06	Cover (2)		1	
07	Machine screw	M5x10	8	
08	O-ring	G40	2	





○ Motor Case(For M Signal)

MARK	NAME	RKT180	Q'ty	Recital
11	Motor case (1)		1	
12	O-ring	GS230	1	
13	Hexagon socket head cap screw	M6x20	3	
14	Hexagon socket head cap screw	M5x16	4	
15	Cover (1)		1	
16	Machine screw	M5x8	10	
17	Seal washer	5	32	
18	Motor case (2)		1	
19	Cover (2)		1	
20	Hexagon socket head cap screw (Special low head)	SSH M5x8	14	
21	Connector plate		2	
22	O-ring	S112	2	
23	Machine screw	M5x14	8	
24	Cable		2	
25	Hexagon socket head cap screw	M4x8	8	
26	Plain washer	4	8	

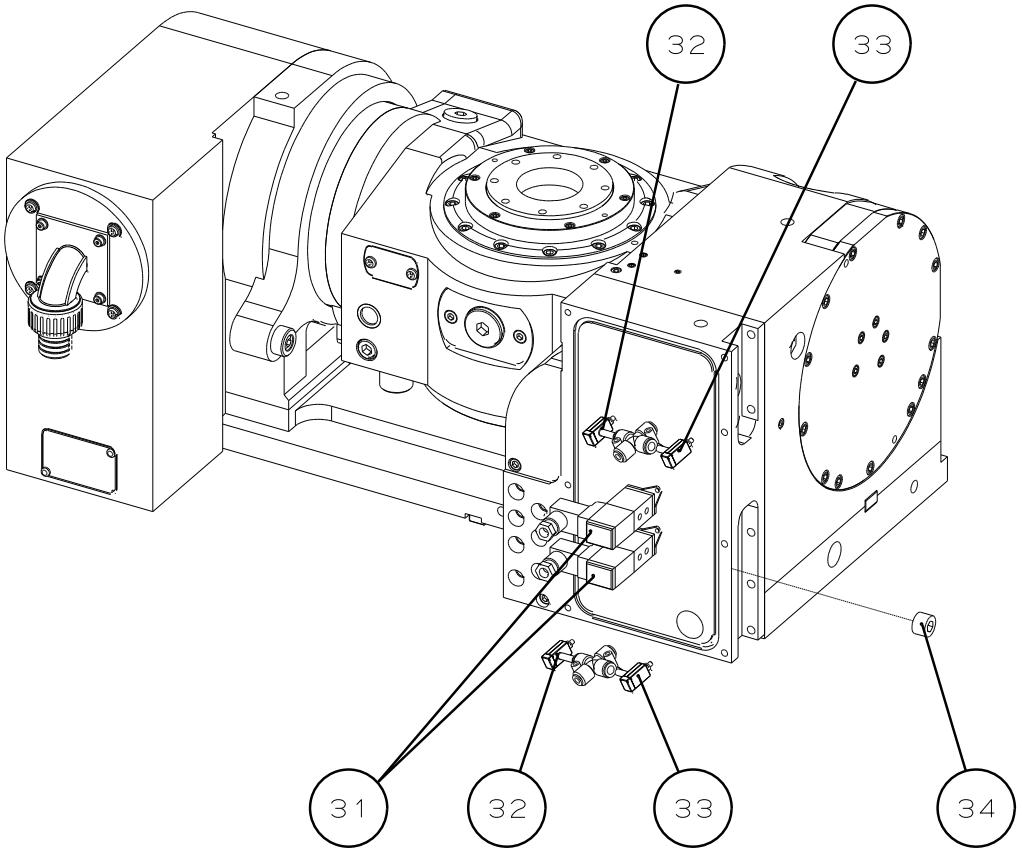


When the specification is 4th and 5th axises, the motor case and the cable are different from the above figure.

For detailed models, refer to attached outside view.

○ Clamp Detection Device

MARK	NAME	RKT180	Q'ty	Recital
31	Solenoid valve	VK332-5DS-M5-F-Q	2	SMC
32	Pressure switch for clamp detection	PS1000-R06L-Q-X140	2	SMC
33	Pressure switch for unclamp detection	PS1100-R06L-Q-X141	2	SMC
34	Plug silencer	PSA103	1	TAIYO

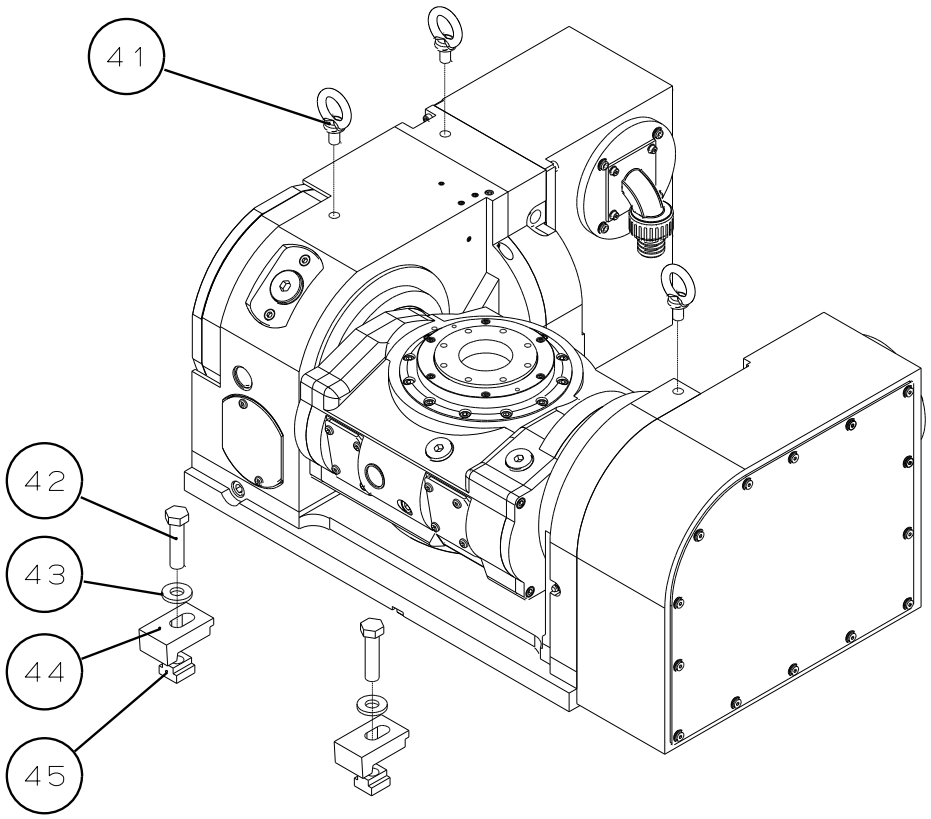


When the specification is different, the model and the installation position of the solenoid valve and the pressure switch are different from the above figure.

For detailed models, refer to attached wiring diagram.

○ Accessory

MARK	NAME	RKT180	Q'ty	Recital
41	Eye bolt	M10	3	
42	Hexagon head bolt	M12x50	4	Strength Dimension : 8.8
43	Washer	12	4	
44	Clamp		4	
45	T-slot nut	1412	4	



When the specification is different, the clamping parts and guide block are different from the above figure. For detailed models, refer to attached outside view.

18. Storage

NOTICE

When storing 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 prevention oil and case or lap it with the wooden cover or vinyl cover, etc. When using the wooden base and box, avoid the wooden base and the green wood. Since the green wood is not chemically neutral, use the wood moistened with paraffin.

19. Disposal of NC Rotary Table

Dispose of this unit in accordance with the laws and regulations of your country.
You may suffer punishment if you disposed of this unit without following the laws and regulations.

20. Reference Data

20-1. Conversion of arc length and angle

NOTICE

"What is the linear length at the table circumference with 20 seconds cumulative indexing accuracy ?"

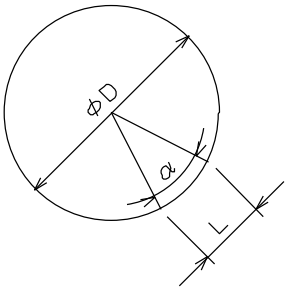
"What is the angle with a cumulative pitch error of 0.01mm ?"

To answer these questions, use the following formula representing the relationship between the angle and linear length at the table circumference.

D: Diameter of Workpiece (mm)

α: Angle (seconds)

L: Linear length at the table circumference (mm)



$$\frac{L}{\pi \times D} = \frac{\alpha}{360° \times 60' \times 60''} \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \quad (1)$$

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

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

(Examples)

Assuming the diameter of the workpiece is 100mm, and by using formula (2), the cumulative indexing accuracy of 20 seconds as linear length at table circumference will be:

$L = 2.424 \times 20 \times 100 \times 10^{-6} = 0.004848mm$

Therefore, the length is approximately 0.0048mm.

And converting the cumulative pitch error of 0.01mm to an angle, use formula (3):

$$\alpha = \frac{4.125 \times 0.01 \times 10^5}{100} = 41.25''$$

Therefore, the angle is approximately 41 seconds.

Thus, by using the formula (2) and (3), the indexing precision and pitch error can be converted in terms of linear length and angle.

20-2. Coordinate calculation of table center for tilting angle

When the coordinate of table center as the tilting axis is 0° (horizontal) is regarded as X = 0, Z = 0. the calculation formula finding the coordinate of table center when tilting axis is tilted θ° is shown as follows:

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

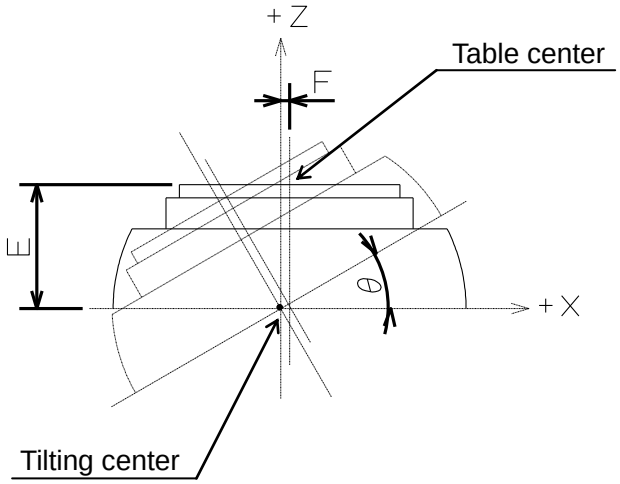
$Z = E\cos\theta + F\sin\theta - E$

<Example>

In case of E=70, F = 0.

$X = -70\sin\theta$

$Z = 70\cos\theta - 70$



20-3. Workpiece interference area

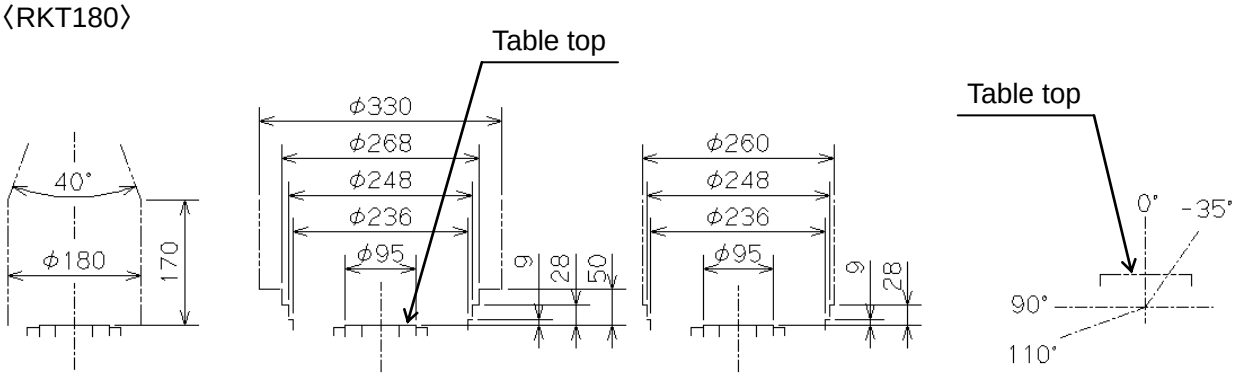
Since the following shows standard specifications, take care in case of special specifications. Interference with the clamp device is not considered.

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.

〈RKT180〉



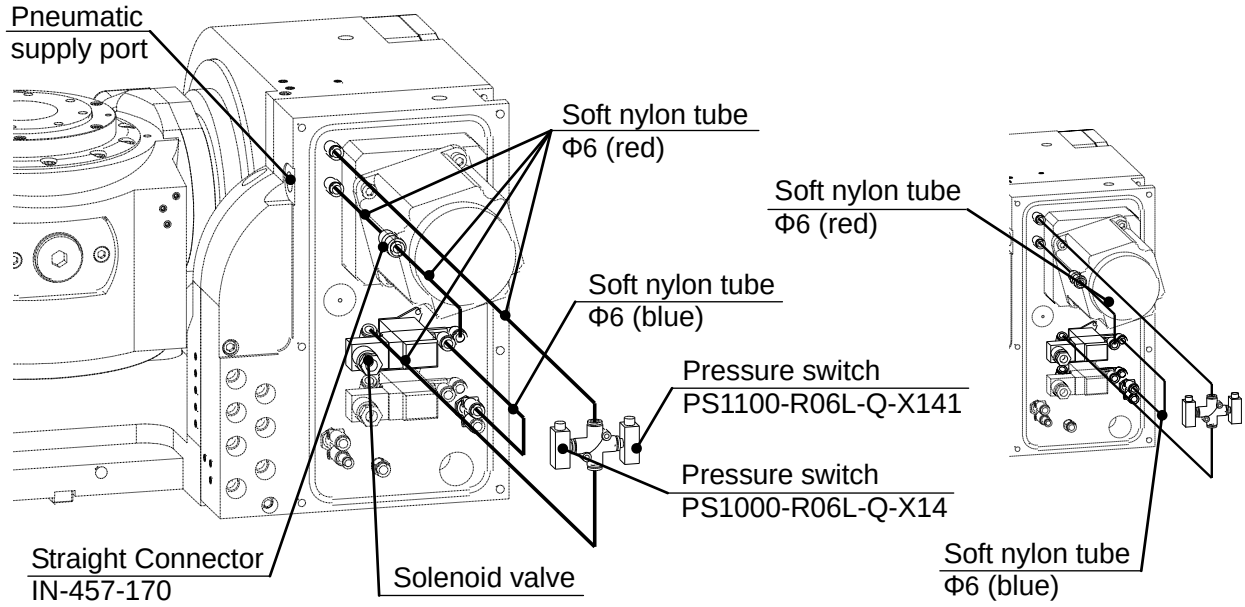
90°～110°　　0°(Horizontal)～90°(vertical)　　-35°～0°　　Tilting angle

21. Piping Diagram on Pneumatic Specifications

When removing the piping unavoidably to remove the motor case, refer to the following outside view and circuit diagram.

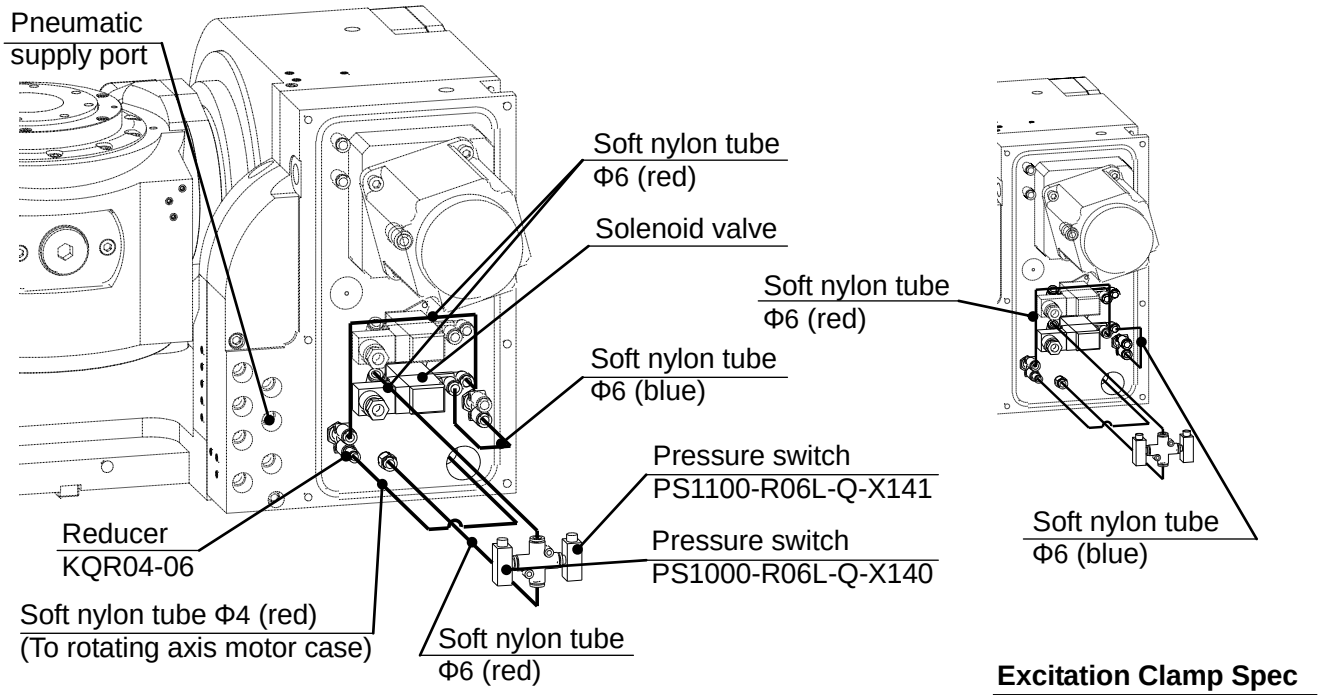
21-1. Outside view of connection piping system

21-1-1. Outside view of piping system for rotating axis



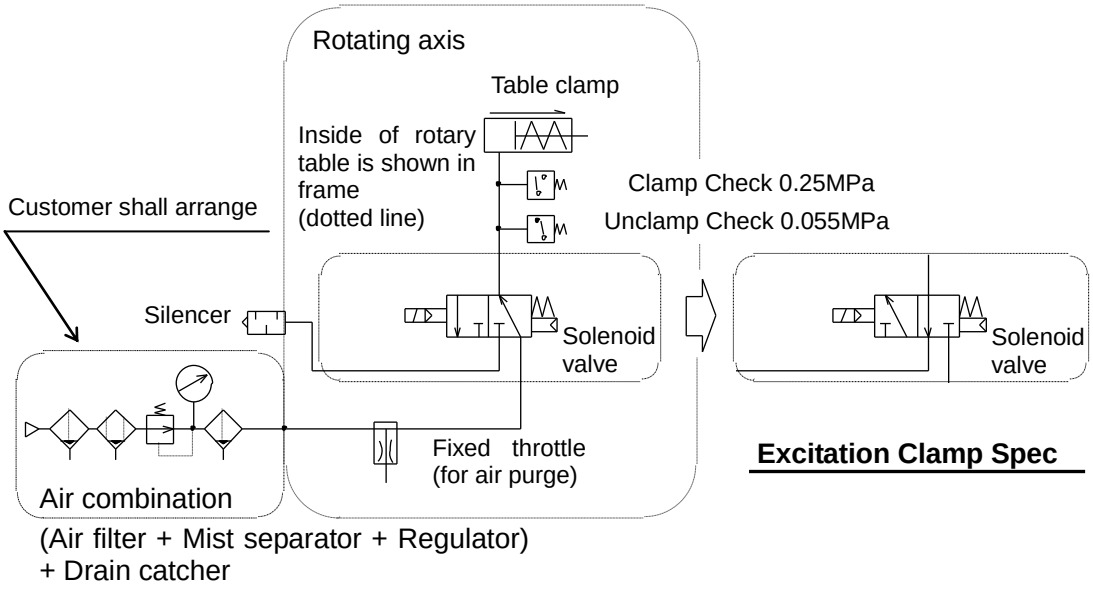
Excitation Unclamp Spec **Excitation Clamp Spec**

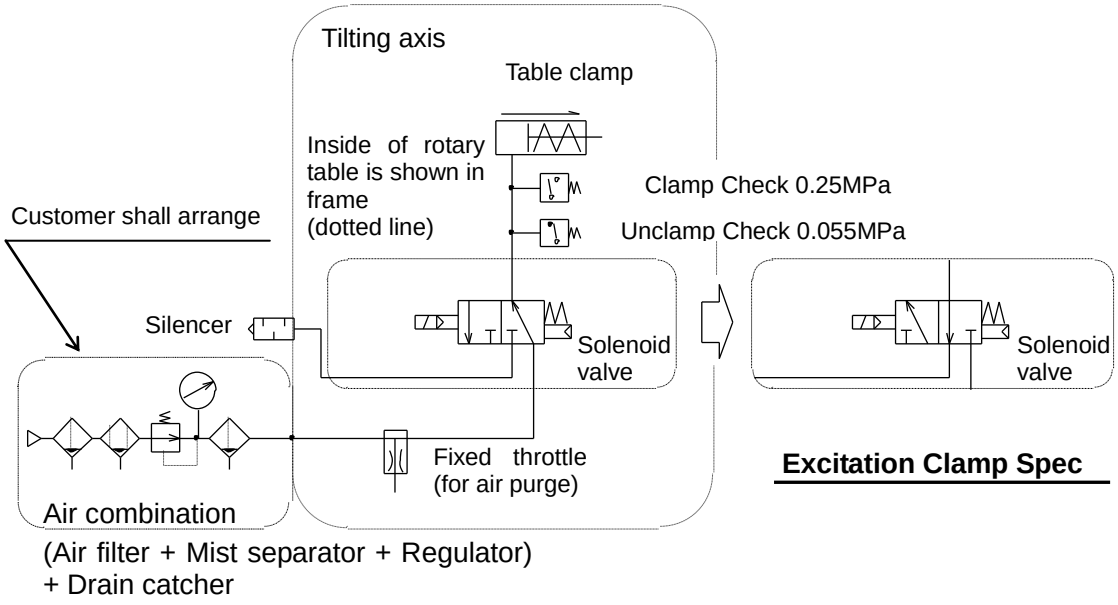
21-1-2. Outside view of piping system for tilting axis



Excitation Unclamp Spec **Excitation Clamp Spec**

21-2. Pneumatic circuit diagram





CUSTOMER		
MDF.NO.	D A T E	REASON OF RIVISION

テーブル面
TABLE SURFACE

テーブル最水平位置
HORIZONTAL POSITION OF TABLE FACE

0°
-35°
90°
110°

ストロークリミット設定位置
STROKE LIMIT SETUP ANGLE
-35.3° ～ -35.6°

ストロークリミット設定位置
STROKE LIMIT SETUP ANGLE
110.3° ～ 110.6°

傾斜範囲
TILTING AREA
(-35° ～110°)

図は標準の傾斜範囲を示しています。テーブル面に治具やチャックが付く場合は傾斜範囲が制限される場合があります。
A FIGURE SHOWS NORMAL TILTING AREA.
IF JIG OR CHUCK IS INSTALLATION ON FACE PLATE. TILTING AREA MAY BE LIMITED.

仕 様 SPECIFICATIONS

回 転 軸 ROTATING AXIS		傾 斜 軸 TILTING AXIS	
割出精度 INDEXING ACCURACY	20 sec以内	割出精度 INDEXING ACCURACY	20 sec以内
再現精度 REPEATABILITY	8 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 [モータ MOTOR]	41.6 min⁻¹ [3000 min⁻¹]	テーブル最高回転速度 MAXIMUM ROTATION SPEED [モータ MOTOR]	25.0 min⁻¹ [3000 min⁻¹]
クランプトルク CLAMPING TORQUE [空圧力 PNEUMATIC PRESS]	350 N·m [0.5 MPa]	クランプトルク CLAMPING TORQUE [空圧力 PNEUMATIC PRESS]	550 N·m [0.5 MPa]
許容最大空圧力 MAXIMUM PNEUMATIC PRESS	0.7 MPa	許容最大空圧力 MAXIMUM PNEUMATIC PRESS	0.7 MPa
総減速比 TOTAL REDUCTION RATIO	1/72	総減速比 TOTAL REDUCTION RATIO	1/120
駆動系モータ軸換算イナーシャ MACHINE INERTIA (REDUCED TO MOTOR SHAFT)	0.000334kgm²	駆動系モータ軸換算イナーシャ MACHINE INERTIA (REDUCED TO MOTOR SHAFT)	0.000404kgm²
許容積載質量 ALLOWABLE MASS OF WORK		水平時 HORZ 傾斜時 TILT	60 kg 40 kg
許容積載ワーク径 ALLOWABLE WORK DIA.		φ180 mm	
製品質量 MASS OF ROTARY TABLE		200 kg	

注記 NOTE

※□ 1) ACサーボモータ：客先にて手配及び取付願います。
WITHOUT MOTOR (SETTING WORKS OF MOTOR AT CUSTOMER.)
傾斜軸取付け可能モータ FANUC A06B-0205-B000(αIF 2/5000 パルスコーダ αIA1000付)
MOUNTING POSSIBLE MOTOR FOR TILTING AXIS FANUC A06B-0205-B000(αIF 2/5000 αIA1000)
回転軸取付け可能モータ FANUC A06B-0205-B000(αIF 2/5000 パルスコーダ αIA1000付)
MOUNTING POSSIBLE MOTOR FOR ROTATING AXIS FANUC A06B-0205-B000(αIF 2/5000 αIA1000)
2) 図面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.
3) 配線の為にカバーを再組付けする際は、必ずシリコン系液状ガスケットを切らさず塗布して下さい。
AFTER COVERS ARE REMOVED, TO ASSURE WATERTIGHTNESS, A LIQUID SILICON GASKET MUST BE APPLIED BEFORE REPLACING COVERS.
4) 本機はエアパージ仕様ですので空圧供給口からクリーンエアを供給して下さい。
THIS ROTARY TABLE IS DESIGNED UNDER THE CONDITION OF AIR PURGE, ACCORDINGLY CLEAN AIR FROM PNEUMATIC PORT HAVE TO BE SUPPLIED.
※□Ⓐ 5) 指定色： マンセル 5Y8/14-2G
PAINTED COLOR FOR THIS UNIT ARE MANCEL 5Y8/14-2G
※□ 6) 本テーブルは、指定されたモータを回転させる試験装置がないため、弊社回転試験機にて動作確認をしております。
THERE IS NO TEST EQUIPMENT TO ROTATE THE SERVO MOTOR THAT DECIDED BY THE CUSTOMER SO THE ROTATION OF THIS ROTARY TABLE IS CHECKED BY KITAGAWA TEST EQUIPMENT.
7) ワーク積載可能領域はカタログを参照ください。領域を超える場合は弊社に問合せ下さい。
PLEASE REFER TO THE CATALOGUE FOR ALLOWABLE LOADING AREA.
IF THE WORK PIECE SIZE IS LARGER THAN THE ALLOWABLE LOADING AREA.PLEASE CONTACT US.
8) 本機を機械に設置する場合には、周辺との干渉を防止する為に、外形寸法より10mm以上の余裕を確保下さい。
WHEN YOU INSTALL A ROTARY TABLE ON A MACHINE.PLEASE KEEP A CLEARANCE OF MORE THAN 10 mm BETWEEN THE ROTARY TABLE AND THE MACHINE SPLASHGUARD IN ORDER TO PREVENT THE INTERFERENCE.
※□ 9) ロータリジョイント：最高使用圧力(A.B.C.D.Fポート) 7.0MPa ．クーラント使用不可。
最高使用圧力(Eポート) 0.7MPa ．Eポートはエア専用です。
ROTARY JOINT : MAX.PRESSURE (A.B.C.D.F PORT) 7.0MPa COOLANT CAN NOT BE SUPPLY.
MAX.PNEUMATIC (E PORT) 0.7 MPa. E PORT FOR AIR ONLY.

回転軸テーブルクランプ
ROTATING AXIS TABLE CLAMP

クランプ確認
CLAMP DETECTION 0.25MPa
アンクランプ確認
UNCLAMP DETECTION 0.055MPa
ソレノイドバルブ
SOLENOID VALVE VK332-5DS-M5-F-Q (DC24V)
励磁クランプ
EXCITATION CLAMP
モータケース
MOTOR CASE
エアパージ
AIR PURGE
エア排出
AIR EXHAUST

傾斜軸クランプ
TILTING AXIS CLAMP

クランプ確認
CLAMP DETECTION 0.25MPa
アンクランプ確認
UNCLAMP DETECTION 0.055MPa
ソレノイドバルブ
SOLENOID VALVE VK332-5DS-M5-F-Q (DC24V)
励磁クランプ
EXCITATION CLAMP
モータケース
MOTOR CASE
エアパージ
AIR PURGE
エア排出
AIR EXHAUST
ドレンキャッチ(オートドレン付)
DRAIN CATCHER with AUTO DRAIN AMG150C-02BC (SMC)
エアコンビネーション(オートドレン付)
AIR COMBINATION with AUTO DRAIN AC25C-02CG-A (SMC)
NOTICE 要注意
許容最大空圧力 0.7MPa
MAXIMUM PNEUMATIC PRESS 0.7MPa
客先にて手配願います
CUSTOMER MUST PREPARE

エア回路図
AIR DIAGRAM

治具
(客先手配)
JIGU
(CUSTOMER MUST PREPARE)
A B C D E F
Eポート(エア専用)
E PORT(AIR ONLY)
ロータリジョイント
ROTARY JOINT
ソレノイドバルブ
(客先手配)
SOLENOID VALVE
(CUSTOMER MUST PREPARE)

Aポート
A PORT
Cポート
C PORT
Bポート
B PORT
Dポート
D PORT
Eポート(エア専用)
E PORT(AIR ONLY)
Fポート
F PORT
Oリング S 5
O-RING S 5
(テーブルセンター穴)
(TABLE CENTER HOLE)
5-Oリング P 6
5-O-RING P 6
テーブル上面
SURFACE OF TABLE

ロータリジョイント治具取付面詳細 (S=2:3)
ROTARY JOINT JIG ATTACHMENT SIDE DETAILS

コネクタカバー
CONNECTOR COVER
コネクタカバー
CONNECTOR COVER

6-M10
ネジ深16
DEPTH 16

テーブル面詳細 (S=2:5)
DETAIL OF FACEPLATE

Rc1/4
Aポート
A PORT
Rc1/4
Bポート
B PORT
Rc1/4
Eポート(エア専用)
E PORT(AIR ONLY)
(Rc1/4)
(傾斜軸クランプ用空圧供給口)
(PNEUMATIC PORT FOR TILTING AXIS CLAMP)
Rc1/4
Cポート
C PORT
Rc1/4
Dポート
D PORT
Rc1/4
Fポート
F PORT

接続口詳細 (S=2:5)
DETAIL OF PORT

傾斜軸
TILTING AXIS

※□
コネクタプレート(客先にて穴加工下さい)
CONNECTOR PLATE (CONNECTOR HOLES MUST BE PREPARED BY CUSTOMER)

M16
ギヤーボックス潤滑油供給口
LUBRICATION PORT FOR GEAR BOX
SP1:傾斜軸クランプ確認用圧力スイッチ
SP2:傾斜軸アンクランプ確認用圧力スイッチ
SP1:TILTING PRESSURE SWITCH FOR CLAMP DETECTION
SP2:TILTING PRESSURE SWITCH FOR UNCLAMP DETECTION
ギヤボックス用オイルゲージ
OIL GAUGE FOR GEAR BOX
ロータリジョイント
ROTARY JOINT RJ60H
M5 エアパージ排出口
EXHAUST PORT FOR AIR PURGE
サイレンサ
SILENCER FOR
SP3:回転軸クランプ確認用圧力スイッチ
SP4:回転軸アンクランプ確認用圧力スイッチ
SP3:ROTATING PRESSURE SWITCH FOR CLAMP DETECTION
SP4:ROTATING PRESSURE SWITCH FOR UNCLAMP DETECTION
Rc1/4
ギヤーボックス潤滑油排油口
DRAIN PORT FOR GEAR BOX

3-M10
アイボルト
EYE BOLT
M20 傾斜軸潤滑油排油口
LUBRICATION PORT FOR TILTING AXIS
M16
回転軸潤滑油排油口
LUBRICATION PORT FOR ROTATING AXIS
M16
ギヤボックス潤滑油排油口
LUBRICATION PORT FOR GEAR BOX

傾斜軸オイルゲージ
OIL GAUGE FOR TILTING AXIS
回転軸オイルゲージ
OIL GAUGE FOR ROTATING AXIS
Rc3/8
傾斜軸潤滑油排油口
DRAIN PORT FOR TILTING AXIS
Rc3/8
回転軸潤滑油排油口
DRAIN PORT FOR ROTATING AXIS
ロータリジョイント
ROTARY JOINT RJ50RKT180

傾斜方向
TIRECTION OF TILT
傾斜軸中心
TILTING CENTER
M5 エアパージ排出口
EXHAUST PORT FOR AIR PURGE
垂直オーバートラベル検出用リミットスイッチ
LIMIT SWITCH FOR VERTICAL STROKE LIMIT
水平オーバートラベル検出用リミットスイッチ
LIMIT SWITCH FOR HORIZONTAL STROKE LIMIT

※□
Rc1/4
回転軸クランプ用空圧供給口
PNEUMATIC PORT FOR ROTATING AXIS CLAMP
傾斜軸用ソレノイドバルブ
SOLENOID VALVE FOR TILTING AXIS
ギヤボックス用オイルゲージ
OIL GAUGE FOR GEAR BOX
回転軸用ソレノイドバルブ
SOLENOID VALVE FOR ROTATING AXIS
Rc3/8
ギヤボックス潤滑油排油口
DRAIN PORT FOR GEAR BOX
※□
Rc1/4
傾斜軸クランプ用空圧供給口
PNEUMATIC PORT FOR TILTING AXIS CLAMP

六角ボルト M12×50
HEXAGON HEAD BOLT

クランプ器具 付属品 4組
CLAMPING PARTS ACCESSORY 4 PAIR

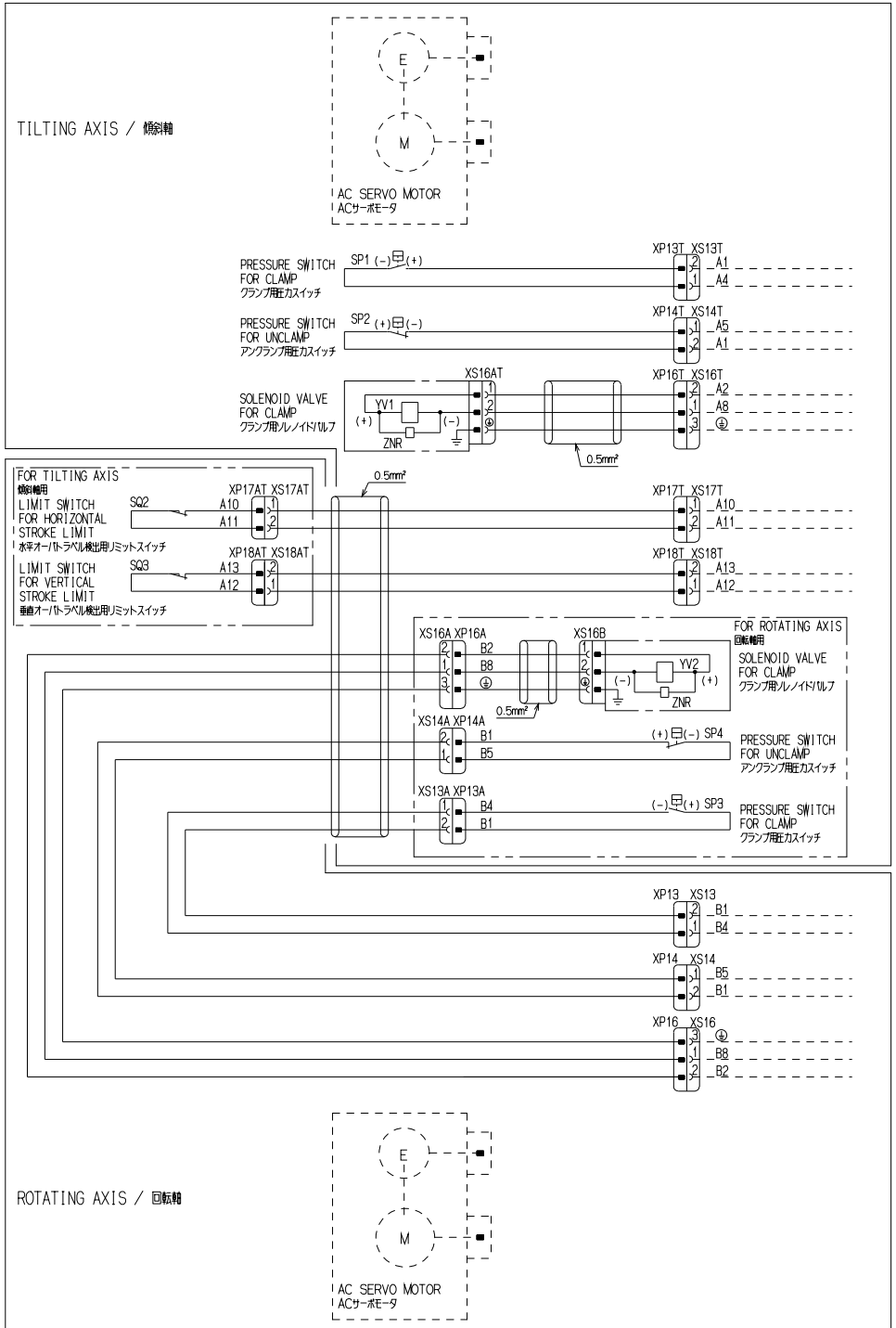
モータ MOTOR
回転軸 総減速比1/72
ROTATING AXIS TOTAL REDUCTION RATIO 1/72
傾斜軸 総減速比1/120
TILTING AXIS TOTAL REDUCTION RATIO 1/120

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	研削加工 切削加工	鋳造加工	鍛造加工	記号	Rmax	種類	記号	種類	記号		
1以上 4以下	±0.1	±0.3	±0.5	▽▽▽	6.3S	形状	真直度	—	平行度	//	
4を越え16以下	±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	⌭	位置度	⌖	
250 〃 1000 〃	±0.8	±2.0	±2.5	▽▽	25 S	試	線の形状	⌒	同軸度	◎	
1000 〃 2000 〃	±1.0	±2.5	±3.5				面の形状	⌓	対称度	⌯	
2000 〃 5000 〃	±1.5	±3.5	±5.0	▽	100S	表	レ	／	振れ精度・振れ	↗	

A	追加変更	
符号 MARK	品名 NAME	SPECIFIED COLOR

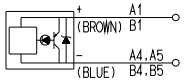
CAREER	61E115032	SCALE	TYPE	RKT180ER01	WEIGHT	kg
W.D.	61E280487	1:4	NAME	NCテーブル NC ROTARY TABLE RKT180ER01 ガイケイ OUTSIDE VIEW		
MANAGER	CHIEF / DRAWN BY E.KUROTOBI	3RD ANGLE				
KITAGAWA IRON WORKS CO.,LTD	DATE 17.02.27		DRW NO.	61E115175		0



CUSTOMER		
MDF.NO.	D A T E	REASON OF REVISION

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	PS1000-R06L-Q-X140	2	0.25MPa 1a
SP2,SP4	PRESSURE SWITCH プレッシャスイッチ	SMC	PS1100-R06L-Q-X141	2	0.055MPa 1b
(OT SWITCH / OTスイッチ) ※□ SQ2,SQ3	LIMIT SWITCH リミットスイッチ	Azbil	LJM-D2502L1	2	
(SOL VOLTAGE / ソレノイド電圧) ※□ YV1,YV2	SOLENOID VALVE ソレノイドバルブ	SMC	VK332-5DS-M5-F-Q	2	DC24V
XS16B,XS16AT	SOLENOID VALVE ソレノイドバルブ	SMC	VK300-82-1	2	
XP13,XP13A XP13T	PLUG HOUSING プラグハウジング	MOLEX	52116-0240	3	
XP14,XP14A XP14T	PLUG HOUSING プラグハウジング	MOLEX	52116-0241	3	
XP17T,XP17AT XP18T,XP18AT	PLUG HOUSING プラグハウジング	MOLEX	52116-0242	4	
XP16,XP16A XP16T	PLUG HOUSING プラグハウジング	MOLEX	52116-0341	3	
XS13A	RECE HOUSING リセプハウジング	MOLEX	52117-0240	1	
XS14A	RECE HOUSING リセプハウジング	MOLEX	52117-0241	1	
XS17AT XS18AT	RECE HOUSING リセプハウジング	MOLEX	52117-0242	2	
XS16A	RECE HOUSING リセプハウジング	MOLEX	52117-0341	1	
XS13,XS13T	RECE HOUSING リセプハウジング	MOLEX	52117-0240	2	ACCESSORIES 付属品
XS14,XS14T	RECE HOUSING リセプハウジング	MOLEX	52117-0241	2	ACCESSORIES 付属品
XS17T,XS18T	RECE HOUSING リセプハウジング	MOLEX	52117-0242	2	ACCESSORIES 付属品
XS16,XS16T	RECE HOUSING リセプハウジング	MOLEX	52117-0341	2	ACCESSORIES 付属品

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



SPECIFICATIONS
プレッシャスイッチ仕様

OPERATING VOLTAGE RANGE	使用電圧範囲	DC12~24V
SWITCHING CURRENT	制限出力開閉電流	5~40 mA
LEAKAGE CURRENT	漏れ電流	max.1.0 mA
RESIDUAL VOLTAGE	制限出力残留電圧	max.5 V
OUTPUT CONTACT	出力接点	NO(PS1000-R06L-Q-X140)
		NC(PS1100-R06L-Q-X141)

※□ NOTE/要注意

NOTE 注意

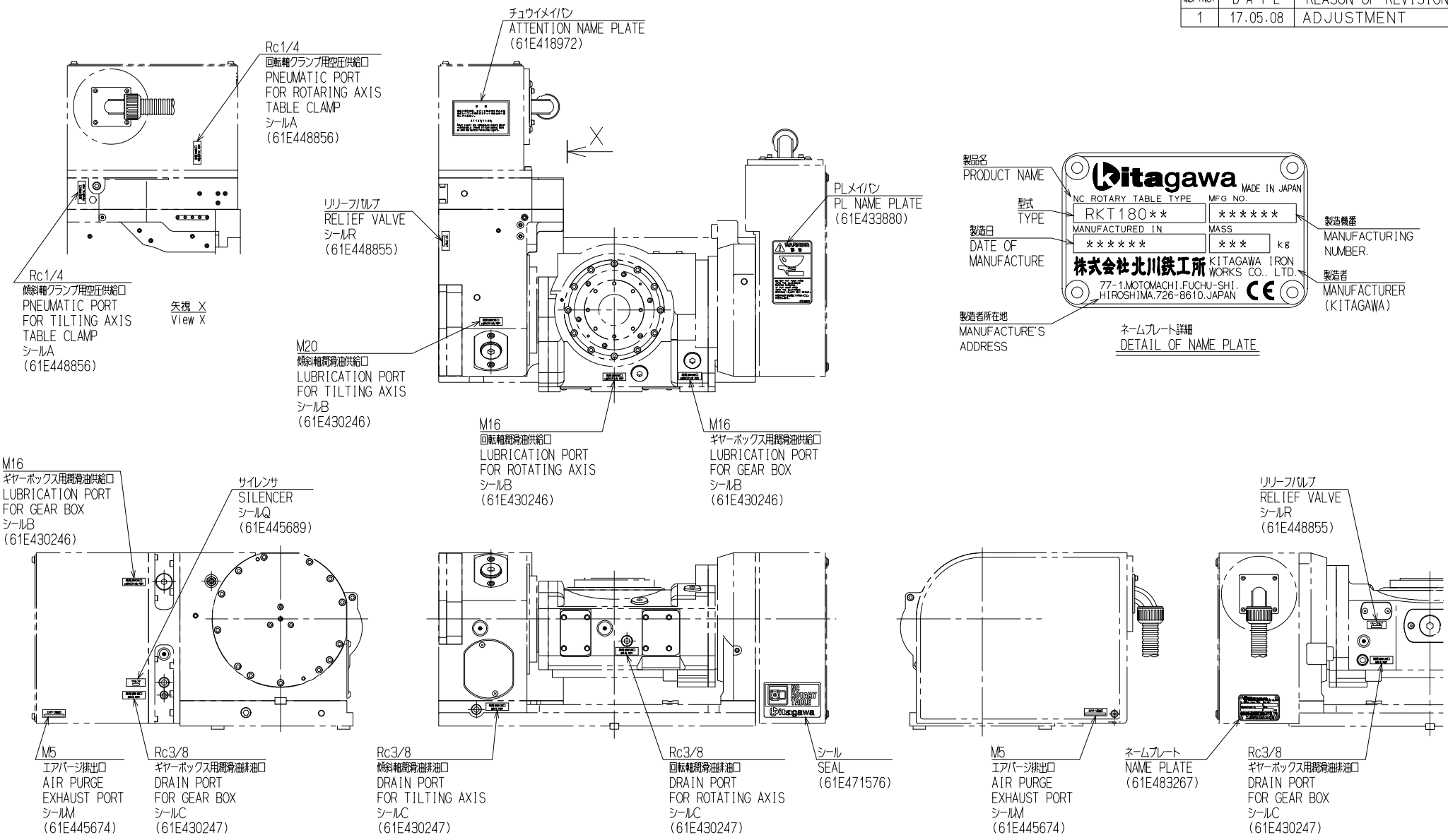
1) THERE IS NO PROXIMITY SWITCH FOR DECELERATION OF ZERO RETURN.
原点復帰減速用近接スイッチがありません

SOLENOID VALVE SPECIFICATIONS
ソレノイドバルブ 仕様

	YV1,YV2
RATED SUPPLY VOLTAGE 定格電源電圧	DC24V
POWER CONSUMPTION 消費電力	4W

CAREER	61E273284,61E256093		SCALE	TYPE	RKT180ER01	WEIGHT	kg
				NAME	NC ROTARY TABLE NCテーブル		
MANAGER	CHIEF	DRAWN BY N.MASUMUNE	3RD ANGLE		WIRING DIAGRAM テンキシヨウ		
KITAGAWA IRON WORKS CO.,LTD.		DATE 17.02.23		DRW NO.	61E 28 0487		0

CUSTOMER		
MDF.NO.	D A T E	REASON OF REVISION
1	17.05.08	ADJUSTMENT



要注意 NOTE

1）図はRKT180V-00のメイバン位置を示しています。
貼り付け位置詳細は外形図を参考にしてください。
THE POSITION OF RKT180V-00 NAMEPLATE IS SHOWED IN THIS DRAWING.
THE POSITION OF NAMEPLATE SHOULD BE REFERRED TO OUTSIDE VIEW.

CAREER			SCALE	TYPE	RKT180V-00	WEIGHT	kg
			1:6	NAME	NCテーブル NC ROTARY TABLE		
MANAGER	CHIEF	DRAWN BY S.SATOH	3RD ANGLE		メイバン詳細図 DETAILS OF NAME PLATE		
KITAGAWA IRON WORKS CO.,LTD.		DATE 17.04.17		DRW NO.	61E 83 9865		1

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2017.05.