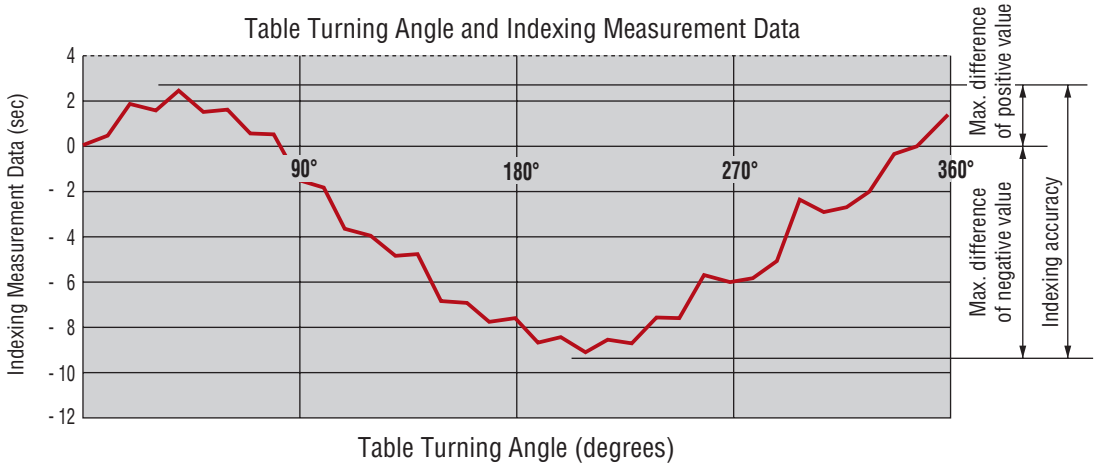
1. INDEXING ACCURACY

By indexing one rotation of the table equally to coincide with the tooth number of the worm gear and measuring the result, the difference between the theoretical turning angle of the table and actual measurement is obtained. As shown below, the indexing accuracy is equal to the sum of the maximum difference of the positive value and that of the negative value, as an absolute value.



2. REPEATABILITY

Indexing operations for positioning at four determined angular positions as 0°, 90°, 180°, and 270° are carried out five times for positive rotation, and the indexing angles are measured. As a result, the difference between the maximum and the minimum of the measurement at each angular position is obtained. Indexing operations for positioning for negative rotation and the measurement of the indexing angles are similarly carried out, and the difference between the maximum and the minimum of the measurement is obtained. The repeatability is equal to the maximum value of the difference obtained through both measurements.

3. CLAMP TORQUE

The clamp torque specifications cover only the clamping mechanism; the self-locking caused by the worm gear is not included. The clamp torque specifications in the catalog are obtained when the rated pressure (500 PSI for hydraulic pressure, and 72 PSI for pneumatic pressure) is supplied to the table. If a more powerful clamp torque than specified in the catalog is required, the supply pressure can be elevated to the maximum allowable pressure (700 PSI for hydraulic pressure, and 100 PSI for pneumatic pressure), and the clamp torque will be proportionally increased.

4. ALLOWABLE WHEEL TORQUE

The allowable wheel torque is equal to the allowable torque for the worm wheel when the table rotation speed is 1 RPM. The allowable torque for the worm wheel is subject to the standard stipulated by the Japan Gear Manufacturers Association.

APPLICABLE SERVO MOTORS

FANUC Alpha (α) type servo motors are standard for Tsudakoma rotary tables. The table below shows additional servo motors classified according to FANUC Alpha (α) type motor capacity.

Motor Manufacturer	Motor Model				
FANUC	Alpha 2	Alpha 3	Alpha 6	Alpha 12	Alpha 22
	Alpha 2i	Alpha 4i	Alpha 8i	Alpha 12i	Alpha 22i
MITSUBISHI	-	HC52T	HC102T	HC202S	-
	HF75T	HF104T	HF154T	HF204S	-
YASKAWA	SGMP-04	SGMG-05	SGMG-09	SGMG-20	SGMG-30
YASKAWA Sigma V	SGMGV-05	SGMGV-09	SGMGV-09	SGMGV-30	
OKUMA	BL-MC24J	BL-MC25J	BL-MC50J	BL-MC100J/150J	BL-MC200J
	BL-ME24J	BL-ME40J	BL-ME80J	BL-ME100J/150J	BL-ME200J
SIEMENS	1FK7042-5AF71-IAG5	1FK7042-5AF71-IAG5 1FK7060-5AF71-IAG5	1FK7060-5AF71-IAG5	1FK7083-5AF71-IAG5	-
HEIDENHAIN	-	QSY 116C	QSY 116E	QSY 155B	-

Notes: 1. For non-FANUC motors, the table speed reduction ratio or motor dimensions may be different from FANUC motors.
2. Motors described above are selected for the equivalent motor torque capacity. The motor which is actually used on your rotary table is determined by the specifications of your machine tool NC controller.
3. Motors other than those listed above are available.

INDEXING CYCLE TIME

The graphs below show the required indexing time, which includes the time for the control command for the machine tool. This information helps you examine the working cycle time when operating the rotary table. The table rotation speed and the acceleration and deceleration constant may differ depending of the model of the rotary table. Additional indexing time charts available for your review.

A: Without clamp command
B: For hydraulic clamp
C: For pneumatic clamp
D: For air/hydraulic clamp

Table rotation speed, 12,000 deg/min (33.3rpm)
Acceleration/deceleration constant, 150msec

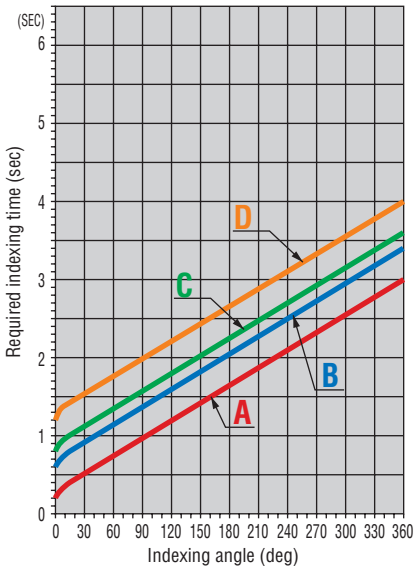
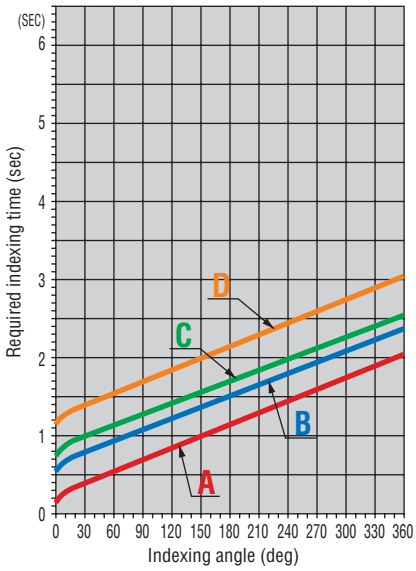
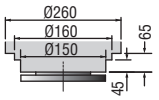
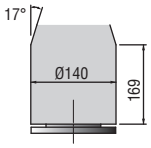
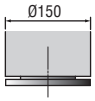
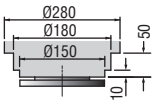
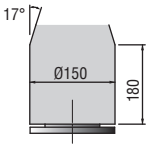
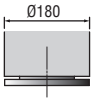
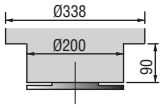
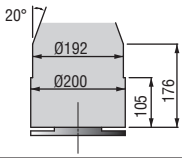
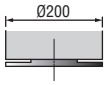
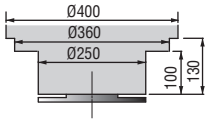
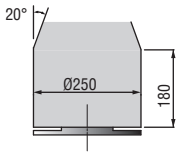
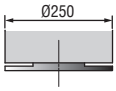
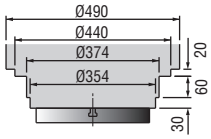
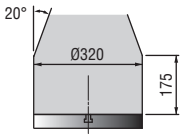
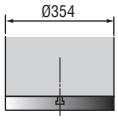
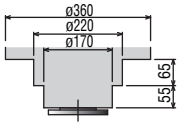
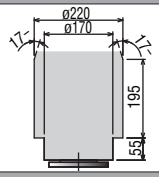
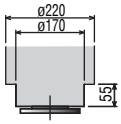
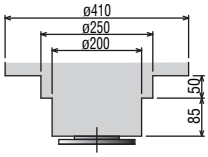
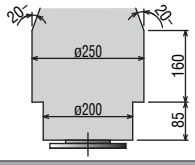
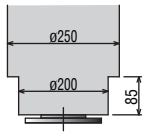
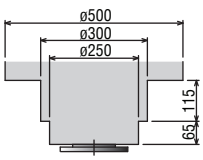
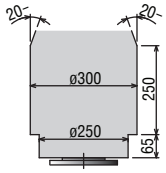
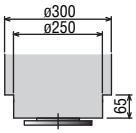


Table rotation speed, 8,000 deg/min (22.2rpm)
Acceleration/deceleration constant, 150msec



Note: For the above B and C cases, the indexing required time includes the time to respond to the clamp and un-clamp confirmation signals.

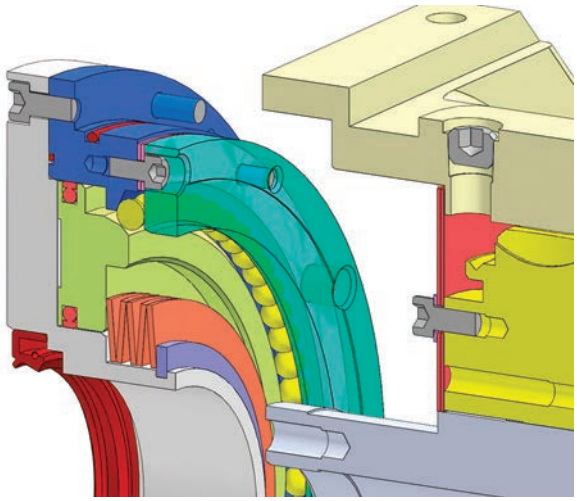
WORKPIECE MOUNTING SPACE FOR TILTING ROTARY TABLES

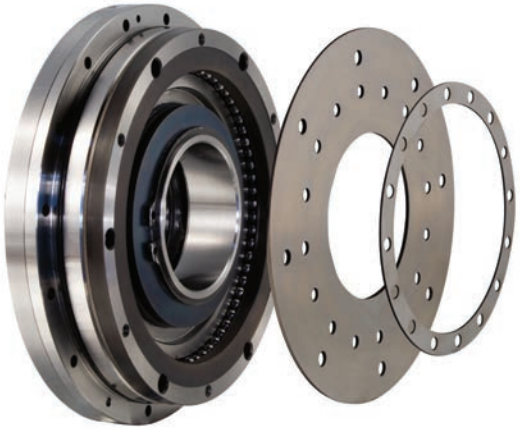
	0 ~ + 90°	0 ~ + 107°	- 17° ~ 0
TN-101			
	0 ~ + 90°	0 ~ + 107°	- 17° ~ 0
TN-131			
	0 ~ + 90°	0 ~ + 110°	- 30° ~ 0
TN-161			
	0 ~ + 90°	0 ~ + 110°	- 30° ~ 0
TN-201			
	0 ~ + 90°	0 ~ + 110°	- 30° ~ 0
TN-320			
	0 ~ + 90°	0 ~ + 107°	- 17° ~ 0
TND-130			
	0 ~ + 90°	0 ~ + 110°	- 30° ~ 0
TND-160			
	0 ~ + 90°	0 ~ + 110°	- 30° ~ 0
TND-200			

Note: To ensure workpiece, rotary table, and machine tool integration, contact us for 3D CAD support.

DUAL TAPER PNEUMATIC CLAMPING MECHANISM

APPLIES TO: RNA/RNA,B-SERIES TABLES • TN-131/161/201 • TN-161,B/201,B





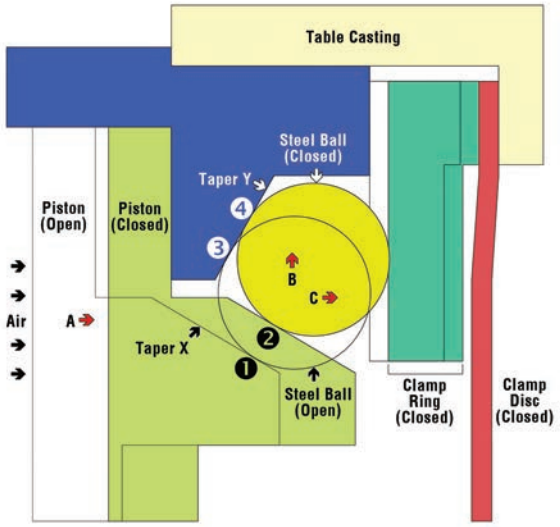
Tsudakoma Dual Taper Clamping Mechanism

1) Air pressure moves Piston in Direction A

2) Steel Ball moves in Direction B along Taper X from Position 1 to Position 2. Force is multiplied by a factor of 1.73

3) As Steel Ball moves in Direction B, Taper Y forces Steel Ball to move in Direction C from Position 3 to Position 4. Force is multiplied by a factor of 1.73

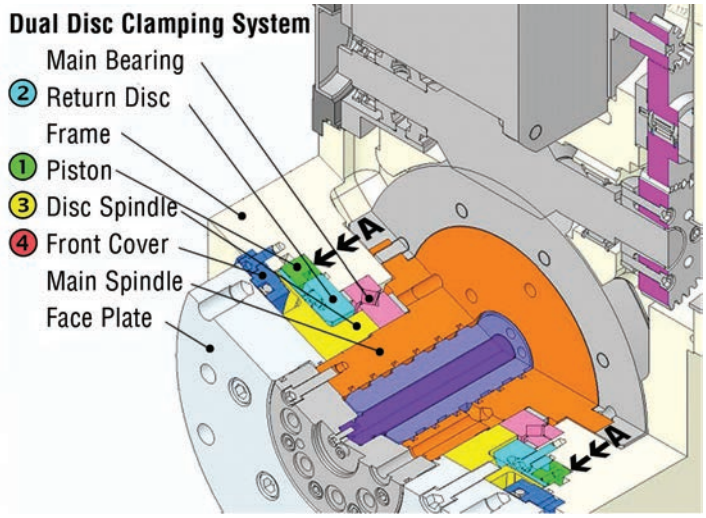
4) Steel Ball moving in Direction C forces Clamp Ring against Clamp Disc. The movement of the Steel Ball along Taper X and Taper Y results in the applied force being multiplied by a factor of 1.73 x 1.73 = 3.0



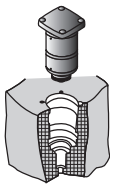
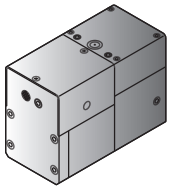
Tsudakoma Dual Disc Clamping Mechanism

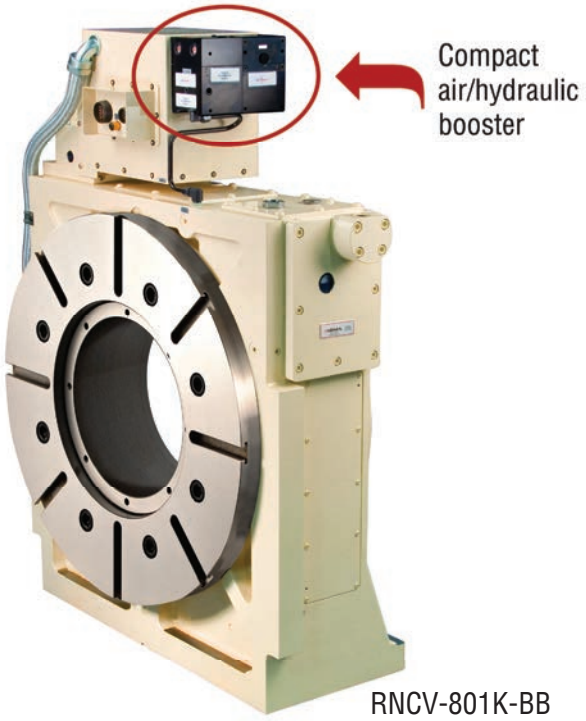
1) Hydraulic pressure* moves Piston ① in Direction A.

2) Piston ① presses Return Disc ② against Disc Spindle ③ which clamps the Disc Spindle against the Front Cover ④.



*If the machine tool does not have a hydraulic source to power the rotary table clamp mechanism, a Tsudakoma air/hydraulic booster is used to power the clamping. An air source is plumbed to the inlet port of the booster, and the outlet port of the booster is plumbed to the rotary table hydraulic inlet port. Air/hydraulic boosters are either built-in internal units (for RBA-Series tables) or compact externally mounted units.

Booster Type	Table models	Booster
Internal	RBA-Series tables only	
External (enclosure size varies)	Rotary table diameter is 300mm or more	

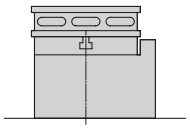


RNCV-801K-BB

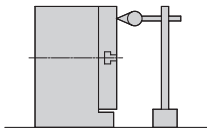
INSPECTION STANDARDS

SINGLE AXIS ROTARY TABLES

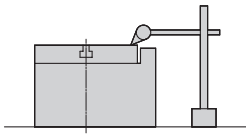
1



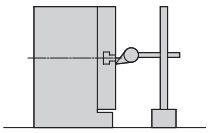
2



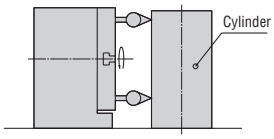
3



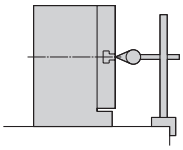
4



5



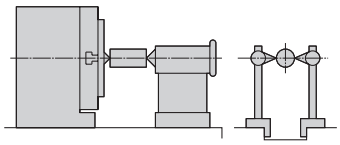
6



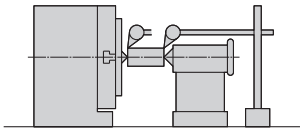
7

Indexing accuracy is measured by an optical measuring device.

8



9



▶ RN/RNE/RNA-SERIES

Unit: mm

No.	Inspection items			RN-100	RNA-161		RNA-201		RNA-251		RNA-321	
					Std.	Scale	Std.	Scale	Std.	Scale	Std.	Scale
2	Table top runout			0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
3	Parallelism of table top to frame bottom	Per overall length	Horizontal	0.015	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
4	Center bore runout	Spindle nose		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
5	Perpendicularity of table top to frame bottom	Per overall length	Vertical	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
6	Perpendicularity of table top to frame bottom guide blocks	Per overall length	Vertical	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
7	Indexing accuracy (arc sec.)			±22.5	±12.5	±5	±12.5	±5	±10	±3	±10	±3
8	Parallelism of center line between rotary table and tailstock to frame bottom guide blocks	Per 300mm	Vertical	-	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
9	Height difference of both center lines of headstock and tailstock		Vertical	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03

Notes: 1. For RN-100, RNA-161 and 201 models, "Spindle end" replaces "Table top" 2. Indexing accuracy for tables with scales reflects Heidenhain encoder accuracies.

▶ RCV-SERIES

Unit: mm

No.	Inspection items			RCV-800		RCV-1000		RCV-1250	
				Std.	Scale	Std.	Scale	Std.	Scale
1	Table top flatness (concave)	Per overall length		0.04	0.02	0.04	0.02	0.04	0.02
2	Table top runout			0.03	0.02	0.03	0.02	0.03	0.02
3	Parallelism of table top to frame bottom	Per overall length	Horizontal	0.04	0.02	0.04	0.02	0.04	0.02
4	Center bore runout	Spindle nose		0.01	0.01	0.01	0.01	0.01	0.01
5	Perpendicularity of table top to frame bottom	Per overall length	Vertical	0.04	0.03	0.04	0.03	0.04	0.03
6	Perpendicularity of table top to frame bottom guide blocks	Per overall length	Vertical	0.04	0.03	0.04	0.03	0.04	0.03
7	Indexing accuracy (arc sec.)			±7.5	±3	±7.5	±3	±7.5	±3
8	Parallelism of center line between rotary table and tailstock to frame bottom guide blocks	Per 300mm	Vertical	0.02	0.02	0.02	0.02	0.02	0.02
9	Height difference of both center lines of rotary table and tailstock (Tailstock center line should be higher)		Vertical	0.02	0.02	0.02	0.02	0.02	0.02

Note: Indexing accuracy for tables with scales reflects Heidenhain encoder accuracies.

▶ RNCV-SERIES

Unit: mm

No.	Inspection items			RNCV-1501	
				Std.	Scale
1	Table top flatness (concave)	Per overall length		0.04	0.02
2	Table top runout			0.03	0.02
3	Parallelism of table top to frame bottom	Per overall length	Horizontal	0.04	0.02
4	Center bore runout	Spindle nose		0.01	0.01
5	Perpendicularity of table top to frame bottom	Per overall length	Vertical	0.04	0.03
6	Perpendicularity of table top to frame bottom guide blocks	Per overall length	Vertical	0.04	0.03
7	Indexing accuracy (arc sec.)			±7.5	±3
8	Parallelism of center line between rotary table and tailstock to frame bottom guide blocks	Per 300mm	Vertical	0.03	0.03
9	Height difference of both center lines of rotary table and tailstock (Tailstock center line should be higher)		Vertical	0.04	0.04

Note: Indexing accuracy for tables with scales reflects Heidenhain encoder accuracies.

INSPECTION STANDARDS

▶ RNCM-SERIES

Unit: mm

No.	Inspection items			RNCM-251, 301		RNCM-401, 501		RNCM-631	
				Standard	With scale	Standard	With scale	Standard	With scale
1	Table top flatness (concave)	Per overall length		0.01	0.01	0.02	0.01	0.03	0.02
2	Table top runout			0.015	0.01	0.015	0.01	0.02	0.01
3	Parallelism of table top to frame bottom	Per overall length	Horizontal	0.02	0.01	0.02	0.01	0.03	0.02
4	Center bore runout	Spindle nose		0.01	0.005	0.01	0.005	0.01	0.005
5	Perpendicularity of table top to frame bottom	Per overall length	Vertical	0.02	0.01	0.02	0.01	0.03	0.02
6	Perpendicularity of table top to frame bottom guide blocks	Per overall length	Vertical	0.02	0.01	0.02	0.01	0.03	0.03
7	Indexing accuracy (arc sec.)			±7.5	±3	±7.5	±3	±7.5	±3
8	Parallelism of center line between rotary table and tailstock to frame bottom guide blocks	Per 300mm	Vertical	0.02	0.01	0.02	0.01	0.02	0.02
9	Height difference of both center lines of rotary table and tailstock (Tailstock center line should be higher)		Vertical	0.02	0.01	0.02	0.01	0.02	0.02

Note: Indexing accuracy for tables with scales reflects Heidenhain encoder accuracies.

▶ RBA,RBA-K SERIES

Unit: mm

No.	Inspection items			RBA-250, 250K RBA-320, 320K		RBA-400, 400K RBA-500, 500K	
				Standard	With scale	Standard	With scale
1	Table top flatness (concave)	Per overall length		0.01	0.01	0.02	0.01
2	Table top runout			0.015	0.01	0.015	0.01
3	Parallelism of table top to frame bottom	Per overall length	Horizontal	0.02	0.01	0.02	0.01
4	Center bore runout	Spindle nose		0.01	0.005	0.01	0.005
5	Perpendicularity of table top to frame bottom	Per overall length	Vertical	0.02	0.01	0.02	0.01
6	Perpendicularity of table top to frame bottom guide blocks	Per overall length	Vertical	0.02	0.01	0.02	0.01
7	Indexing accuracy (arc sec.)			±7	±3	±7	±3
8	Parallelism of center line between rotary table and tailstock to frame bottom guide blocks	Per 300mm	Vertical	0.02	0.01	0.02	0.01
9	Height difference of both center lines of rotary table and tailstock (Tailstock center line should be higher)		Vertical	0.02	0.01	0.02	0.01

Notes: 1. Indexing accuracy for tables with scales reflects Heidenhain encoder accuracies. 2. For RBA-K models, No. 3 does not apply.

▶ RTV,AA/BA/CA-SERIES

Unit: mm

No.	Inspection items			RTV-304,404 AA/BA/CA		RTV-504 AA/BA/CA		RTV-604 AA/BA/CA		RTV-801 AA/BA/CA	
				Std.	Scale	Std.	Scale	Std.	Scale	Std.	Scale
1	Table top flatness (concave)	Per overall length		0.01	0.01	0.02	0.01	0.03	0.02	0.03	0.02
2	Table top runout			0.015	0.01	0.015	0.01	0.02	0.01	0.02	0.01
3	Parallelism of table top to frame bottom	Per overall length	Horizontal	0.02	0.01	0.02	0.01	0.03	0.02	0.03	0.02
4	Center bore runout	Spindle nose		0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005
5	Perpendicularity of table top to frame bottom	Per overall length	Vertical	0.02	0.01	0.02	0.01	0.03	0.02	0.03	0.02
6	Perpendicularity of table top to frame bottom guide blocks	Per overall length	Vertical	0.02	0.01	0.02	0.01	0.03	0.03	0.03	0.03
7	Indexing accuracy (arc sec.)			±7.5	±3	±7.5	±3	±7.5	±3	±7.5	±3
8	Parallelism of center line between rotary table and tailstock to frame bottom guide blocks	Per 300mm	Vertical	0.02	0.01	0.02	0.01	0.02	0.02	0.02	0.02
9	Height difference of both center lines of rotary table and tailstock (Tailstock center line should be higher)		Vertical	0.02	0.01	0.02	0.01	0.02	0.02	0.02	0.02

Notes: 1. For RTV,CA models, No. 3 does not apply.

▶ RNCK-SERIES

Unit: mm

No.	Inspection items		RNCK-501		RNCK-631	
			Standard	With scale	Standard	With scale
1	Table top flatness (concave)	Per overall length	0.03	0.02	0.03	0.02
2	Table top runout		0.02	0.01	0.02	0.01
4	Center bore runout	Spindle nose	0.01	0.005	0.01	0.005
5	Perpendicularity of table top to frame bottom	Per overall length	0.03	0.02	0.03	0.02
6	Perpendicularity of table top to frame bottom guide blocks	Per overall length	0.03	0.03	0.03	0.03
7	Indexing accuracy (arc sec.)		±7.5	±3	±7.5	±3
8	Parallelism of center line between rotary table and tailstock to frame bottom guide blocks	Per 300mm	0.02	0.02	0.02	0.02
9	Height difference of both center lines of rotary table and tailstock (Tailstock center line should be higher)		0.02	0.02	0.02	0.02

Note: Indexing accuracy for tables with scales reflects Heidenhain encoder accuracies.

▶ RCH/RNC-SERIES

Unit: mm

No.	Inspection items		RCH-800		RCH-1000, 1200		RNC-1501,2001	
			Standard	With scale	Standard	With scale	Standard	With scale
1	Table top flatness (concave)	Per overall length	0.03	0.02	0.04	0.02	0.04	0.03
2	Table top runout		0.02	0.01	0.03	0.02	0.03	0.02
3	Parallelism of table top to frame bottom	Per overall length	0.03	0.02	0.04	0.02	0.04	0.03
4	Center bore runout	Spindle nose	0.01	0.005	0.01	0.01	0.01	0.01
7	Indexing accuracy (arc sec.)		±7.5	±3	±7.5	±3	±7.5	±3

Note: Indexing accuracy for tables with scales reflects Heidenhain encoder accuracies.

▶ RZ-SERIES INDEXERS

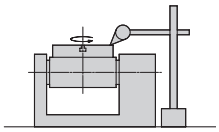
Unit: mm

No.	Inspection items			RZ-161	RZ-201
2	Spindle end runout			0.015	0.015
3	Parallelism of spindle to frame bottom	Per overall length	Horizontal	0.02	0.02
4	Center bore runout	Spindle nose		0.015	0.02
5	Perpendicularity of spindle end to frame bottom	Per overall length	Vertical	0.02	0.02
6	Perpendicularity of spindle end to frame bottom guide	Per overall length	Vertical	0.02	0.02
7	Indexing accuracy (arc sec.)			±22.5	±22.5
9	Height difference of both center lines of headstock and tailstock		Vertical	0.03	0.03

INSPECTION STANDARDS

MULTI-SPINDLE SINGLE AXIS ROTARY TABLES

1



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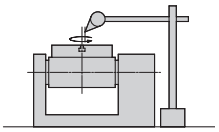
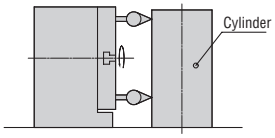


3

Indexing accuracy is measured by an optical measuring device.

4



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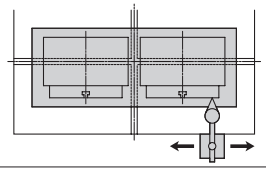

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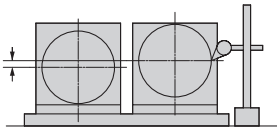

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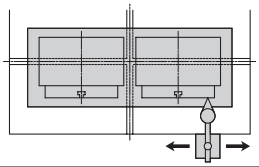

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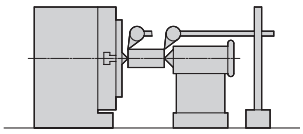

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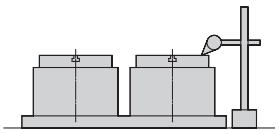

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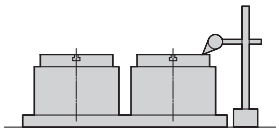

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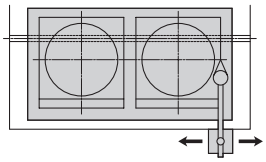


▶ RN MULTI-SPINDLE SERIES

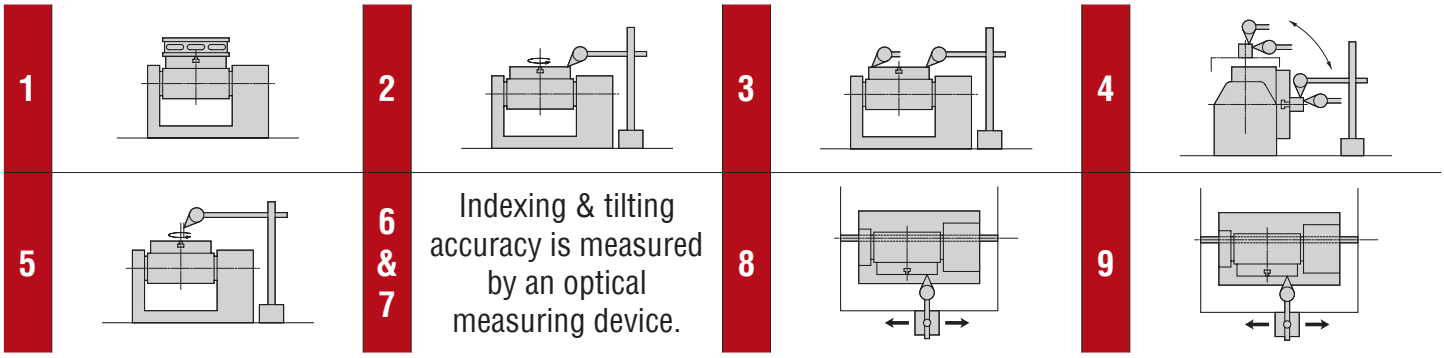
Unit: mm

No.	Inspection items			RN-100,n	RN-150,n	RN-200,n	RN-250,n RN-300,n
1	Table top runout			0.015	0.015	0.015	0.02
2	Center bore runout			0.01	0.015	0.02	0.02
3	Indexing accuracy (arc sec.)			±30	±15	±15	±15
4	Perpendicularity of table top to frame bottom	Per overall length	Vertical	0.02	0.02	0.02	0.02
5	Parallelism & perpendicularity of table top to base bottom guide blocks	Per overall length	Vertical	0.02	0.02	0.02	0.03
6	Difference among all center heights		Vertical	0.02	0.02	0.02	0.02
7	Difference among distances between base bottom guide blocks & tailstock		Vertical	0.02	0.02	0.02	0.02
8	Height difference of both center lines of headstock and tailstock		Vertical	0.03	0.03	0.03	0.03
9	Parallelism of table top to base bottom	Per overall length	Horizontal	0.015	0.02	0.02	0.02
10	Difference among the average heights between base bottom and table top		Horizontal	0.02	0.02	0.02	0.02
11	Difference among the center bore positions based on base bottom guide blocks		Horizontal	0.02	0.02	0.02	0.02

Notes: 1. For RN-150 and RN-200 models, “spindle end” replaces “table top.”
2. If guide blocks are not installed on the base, “base reference face” replaces “base bottom guide blocks” (No. 5, 7, and 11).

INSPECTION STANDARDS

TILTING ROTARY TABLES



▶ TN-SERIES

Unit: mm

No.	Inspection items		TN-101	TN-131		TN-161		TN-201		TN-320	
				Standard	w/scale	Standard	w/scale	Standard	w/scale	Standard	w/scale
1	Table top flatness (concave)	Per overall length	—	—	—	—	—	—	—	0.01	0.01
2	Table top runout		0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
3	Parallelism of table top to frame bottom	Per overall length	0.015	0.015	0.015	0.02	0.02	0.02	0.02	0.02	0.02
4	Parallelism of tilt axis center to frame bottom	Per overall length	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
5	Center bore runout	Spindle nose	0.015	0.015	0.015	0.015	0.015	0.02	0.02	0.01	0.01
6	Tilting accuracy (arc sec.)	0° ~ + 90°	±22.5	±22.5	±7.5	±22.5	±7.5	±22.5	±3	±22.5	±3
		- 30° ~ + 90°	—	—	—	±30	±7.5	±30	±3	±30	±3
7	Indexing accuracy (arc sec.)		±20	±20	±7.5	±15	±7.5	±15	±3	±10	±3
8	Parallelism of spindle top to frame bottom guide blocks	Per overall length	0.015	0.015	0.015	0.02	0.02	0.02	0.02	0.02	0.02

Note: Indexing accuracy for tables with scales reflects Heidenhain encoder accuracies.

▶ TND-SERIES

Unit: mm

No.	Inspection items		TND-130	TND-160	TND-200
			Standard	Standard	Standard
1	Table top flatness (concave)	Per overall length	—	—	—
2	Table top runout		0.015	0.015	0.015
3	Parallelism of table top to frame bottom	Per overall length	0.015	0.015	0.015
4	Parallelism of tilt axis center to frame bottom	Per overall length	0.02	0.02	0.02
5	Center bore runout	Spindle nose	0.015	0.015	0.015
6	Tilting accuracy (arc sec.)	0° ~ + 90°	±30	±37.5	±37.5
		- 30° ~ + 90°	—	±45	±45
7	Indexing accuracy (arc sec.)		±20	±15	±15
8	Parallelism of spindle top to frame bottom guide blocks	Per overall length	0.015	0.015	0.015

Note: Indexing accuracy for tables with scales reflects Heidenhain encoder accuracies.

▶ TTNC SERIES

Unit: mm

No.	Inspection items		TTNC-451		TTNC-631		TTNC-1001	
			Standard	With scale	Standard	With scale	Standard	With scale
1	Table top flatness (concave)	Per overall length	0.02	0.02	0.03	0.03	0.04	0.04
2	Table top runout		0.015	0.015	0.02	0.02	0.03	0.03
3	Parallelism of table top to frame bottom	Per overall length	0.02	0.02	0.03	0.03	0.04	0.04
4	Parallelism of tilt axis center to frame bottom	Per overall length	0.02	0.02	0.03	0.03	0.04	0.04
5	Center bore runout	Spindle nose	0.01	0.01	0.01	0.01	0.01	0.01
6	Tilting accuracy (arc sec.)	0° ~ + 90°	±30	±3	±30	±3	±30	±3
7	Indexing accuracy (arc sec.)		±7.5	±3	±7.5	±3	±7.5	±3
8	Parallelism of table top to frame bottom guide blocks	Per overall length	0.02	0.02	0.02	0.02	0.02	0.02

Note: Indexing accuracy for tables with scales reflects Heidenhain encoder accuracies.

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▶ THNC-SERIES

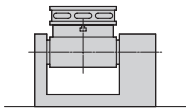
Unit: mm

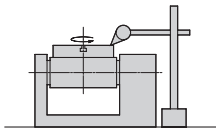
No.	Inspection items		THNC-251, 301	
			Standard	With Scale
1	Table top flatness (concave)	Per overall length	0.01	0.01
2	Table top runout		0.015	0.015
3	Parallelism of table top to frame bottom	Per overall length	0.02	0.02
4	Parallelism of tilt axis center to frame bottom	Per overall length	0.02	0.02
5	Center bore runout	Spindle nose	0.01	0.01
6	Tilting accuracy (arc sec.)	0° ~ + 90°	±30	±30
7	Indexing accuracy (arc sec.)		±7.5	±5
8	Parallelism of table top to frame bottom guide blocks	Per overall length	0.02	0.02
9	Perpendicularity of table to frame bottom guide blocks	Per overall length	0.02	0.02

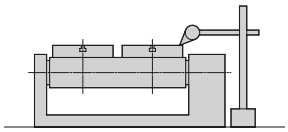
Note: Indexing accuracy for tables with scales reflects Heidenhain encoder accuracies.

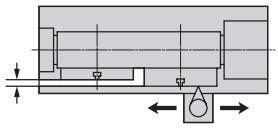
INSPECTION STANDARDS

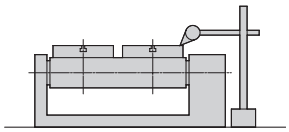
MULTI-SPINDLE TILTING ROTARY TABLES

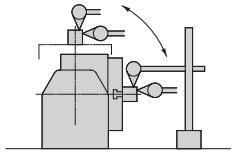
1 

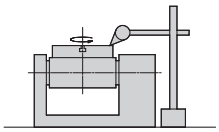
2 

3 

4 

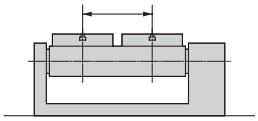
5 

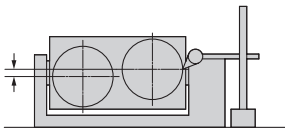
6 

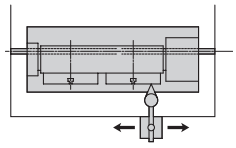
7 

8 Tilting accuracy is measured by an optical measuring device.

9 Indexing accuracy is measured by an optical measuring device.

10 

11 

12 

▶ TTNC MULTI-SPINDLE SERIES

Unit: mm

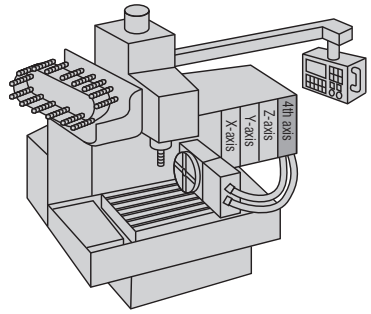
No.	Inspection items		TTNC-102,2	TTNC-101,4	TTNC-151,2	TTNC-201,2
1	Table top flatness (concave)	Per overall length	—	—	0.02	0.01
2	Table top runout		0.015	0.015	0.015	0.015
3	Difference between average heights of both tables	at 0° position	0.02	0.02	0.02	0.02
4	Difference between distances between frame standard face and both table tops	at 90° position	0.02	0.02	0.02	0.02
5	Parallelism of table top to frame bottom	Per overall length	0.015	0.015	0.02	0.02
6	Parallelism of tilt axis center to frame bottom	Per overall length	0.02	0.02	0.02	0.02
7	Center bore runout	Spindle nose	0.015	0.01	0.01	0.01
8	Tilting accuracy (arc sec.)	0 ~ + 90°	±22.5	±30	±30	±30
9	Indexing accuracy (arc sec.)		±20	±30	±15	±7.5
10	Table center distance		± 0.02	± 0.02	± 0.02	± 0.02
11	Difference between both center heights	at 90° position	0.02	0.02	0.02	0.02
12	Parallelism of table top to frame bottom guide blocks	Per overall length at 90° position	0.015	0.015	0.02	0.02

Note: For the TTNC-102,2 and TTNC-101,4 all descriptions of “table top” seen in the inspection items above should be “spindle end surface.”

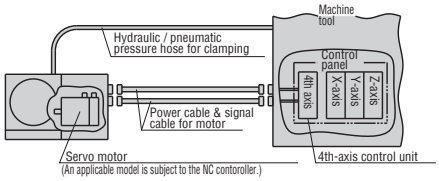
ROTARY TABLE SELECTION

1. Determine the controller system that will drive the rotary table.

Control System #1: A 4th axis (or 5th axis) feature is installed in the machine tool control.



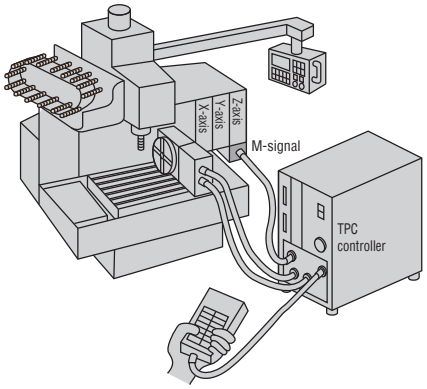
Structure



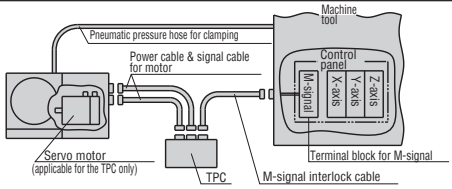
Features

- Simultaneous and continuous contour cutting in the X, Y, and Z-axes is possible subject to the capabilities of the machine tool control.
- Rotary table programming is input at the machine tool control.

Control System #2: (1) or (2) Tsudakoma TPC single axis NC controllers are used (M-signal sent from the machine tool).



Structure

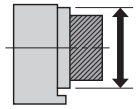


Features

- If the machine tool control does not have 4th axis capabilities, but an M-signal is available, a TPC controller can be used to control the rotary table.
- This control system is only for indexing.
- Rotary table programming should be input directly into the TPC. At the machine tool an M-signal is indexed and input as a start command.

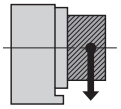
2. Select a rotary table by determining the workpiece parameters and the machining operations to be performed.

- Workpiece diameter



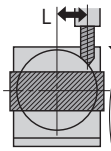
(Should not be larger than the rotary table diameter.)

- Workpiece weight



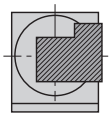
(Should not exceed the maximum specified figure.)

- Workpiece positioning



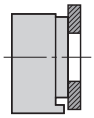
(The value of (F×L) should not be greater than the clamp force.)

- Workpiece with eccentric load



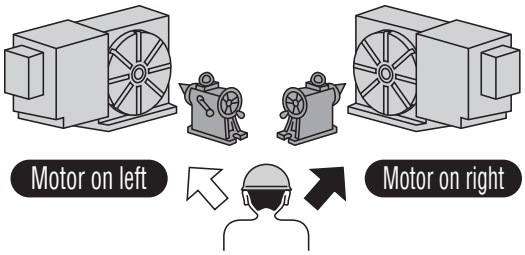
(The workpiece inertia should not exceed the maximum specified figure. The part must not have any machine tool interference.)

- Workpiece of larger diameter, but lighter weight



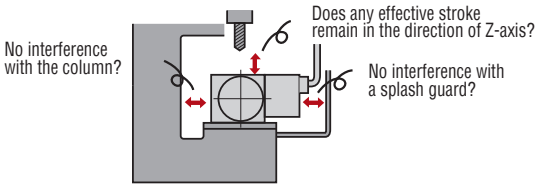
(The workpiece must not have any machine tool interference.)

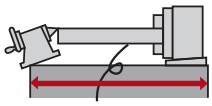
3. Determine the motor location on the rotary table.



Pay careful attention to any interference with the ATC automatic tool changer and also easy operation before determining the setting direction.

4. Ensure there is no rotary table / workpiece / machine tool interference.





Will the combined size of the workpiece and the rotary table fit on the machine tool?

- No interference with the ATC?
- Does the combined weight of the workpiece & rotary table remain with the allowable load for the machine tool?

Technitron Integration Services
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ROTARY TABLE SELECTION

☐ Dealer Company: _____ ☐ End User Company: _____

Contact: _____ Contact: _____

Address: _____ Address: _____

City: _____ State: _____ Zip Code: _____ City: _____ State: _____ Zip Code: _____

E-mail: _____ E-mail: _____

Phone #: _____ Cell #: _____ Phone #: _____ Cell #: _____

1. Machine Tool: Manufacturer: _____ Model _____

☐ New ☐ Existing NC Controller Make: _____ NC Controller Model: _____

2. Workpiece: Description _____ Material _____ Weight _____

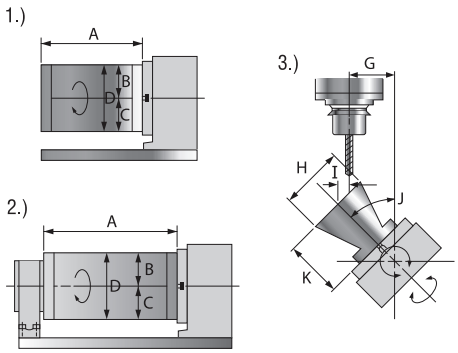
Dimensions:

1.) A: _____ B: _____ C: _____ D: _____

2.) A: _____ B: _____ C: _____ D: _____

3.) G: _____ H: _____ I: _____ J: _____ K: _____

Example:



3. Cutting Conditions

Application: ☐ Mill ☐ Drill

Cutter Size (number of teeth)	Cutting Speed (sfm)	Cutting Feed Rate	Cutting Depth (1 pass)	Cutting Process (indexing or continuous cutting)

Description of Application:

OPERATION MAINTENANCE

Operation Environment & Maintenance Recommended to Keep Performance & Function:

- **Do not use any coolant with chlorine or strong alkaline.**
- Do not use any corrosive gas, water, steam or chemicals that may damage sealing parts.
- Before using your rotary table, recommended lubricant must be supplied as described in the instruction manual. Periodic replacement of lubricant is also required.
- Install adequate covers for protection against cutting chips generated by machining.
- Operate a rotary table within the specified range of temperature.
- Depending on environment conditions, condensation may occur inside the motor cover. To eliminate condensation, air purge the motor cover. Make sure the exhaust port is clear. **See Fig. 1.**
- When attaching a face plate or fixture with the main spindle, use the inner diameter as the reference for fitting. **See Fig. 2.**
- Keep the clearance between the face plate and the main frame of the rotary table or the seals to be 3mm or more. Otherwise, cutting chips caught in the position may impede the rotation of main spindle or the waterproof capability of the seals. **See Fig. 2.**

Fig.1

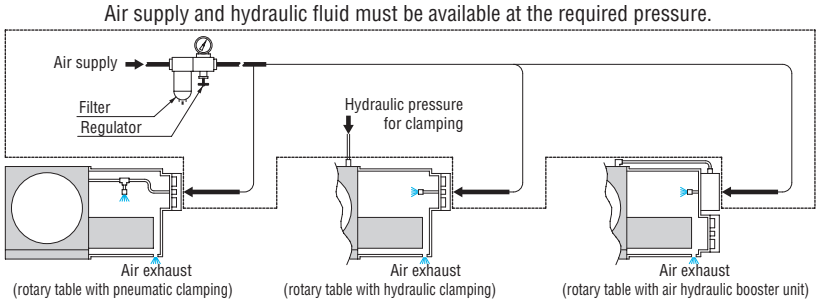
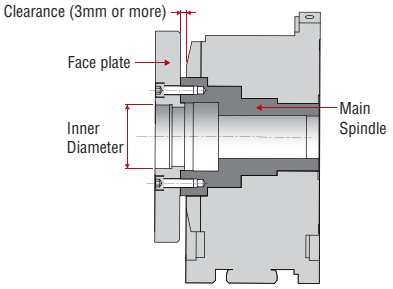


Fig.2



Setting on Machine Tool & Preparation Before Use:

- When moving a rotary table by a hanging method, observe the specific method in the operation manual.
- To fix a rotary table on a machine tool, use the specified fixing parts and follow the specified method.
- Connect each interface cable in accordance with the instructions on the electrical drawing.
- Provide protective measures not to add extraordinary force to any piping or any joint for each interface cable and each connector, to induce any damage, during the operation of a machine tool with a rotary table.
- Each piping is to be connected to the specific input port (connecting port) stated in the outlook drawing.
- Regarding each fluid to be supplied to a rotary table, make sure that **maximum pressure must not exceed the specified pressure** even if there is a pressure variation due to its pressure source or other factors.

Daily Operation, Periodical Check & Others:

- Make sure that the weight and size of the workpiece does not exceed the specified value of the workable force during machining.
- In case any abnormality is realized during operation, stop use immediately.
- When any work is carried out within the operational area of the machine tool, make sure to turn off the power for the machine tool as well as the Tsudakoma controller.
- When restarting operation after a long down time, perform a warm-up operation for the rotary table.
- Do not make any modifications of the rotary table without discussing with the manufacturer.