

Spindle Speeder

Instruction Manual

3rd Edition



NIKKEN KOSAKUSHO WORKS, LTD.

Preface

Thank you for your purchase of a NIKKEN Spindle Speeder. We have confidence of our Spindle Speeder which can be used for long life with its durability.

Please read this instruction manual to insure safe operation.

This unit has a built-in mechanism to increase the spindle rotation speed by 4 or 5 times. Actual machining speed can achieve smooth high speed and prevent excessive heat build up. This will increase the life of the machine spindle accuracy.


These Spindle Speeders are not the same as high speed machine spindles. They cannot be run for an excessively long time. (see page 3-5).

The Spindle Speeder contains ground precision gears. Max 20,000 rpm can be achieved on NX5, It's available for small dia, cutting and grinding tools.

If you need a faster model, please use NX6 and PX10.

If you are currently using one of our spindle speeders and want to order the same product, please provide us with the serial number of the product.

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Attention

NIKKEN reserves copy right of part/whole this manual the design and specifications are subject to change for improvement without previous notice.

1. Specifications

1-1 Package contents



Spindle Speeder



OR

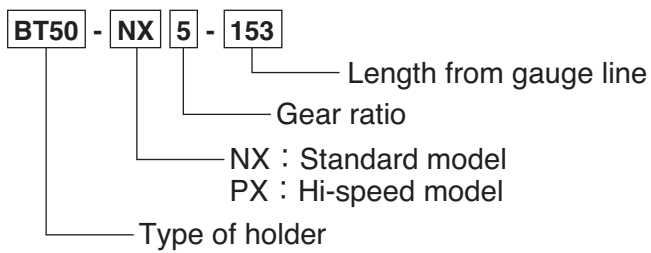


Spanner (2)



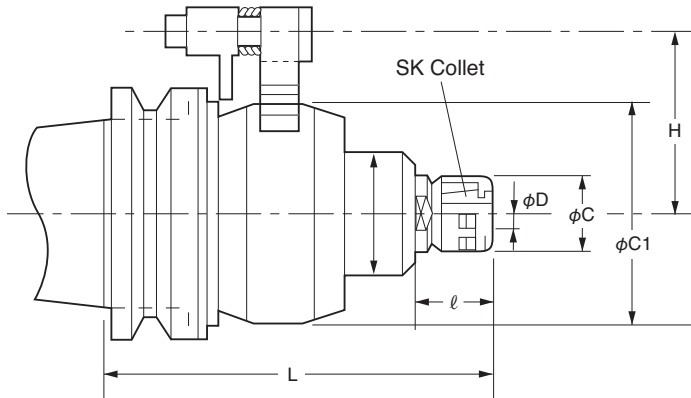
Instruction Manual

1-2 Explanation of Code No.



1-3 Specifications

1-3-1 NX Type



Taper	Code No.	D	L	C	C1	l	H	Ratio	MAX min ⁻¹	Weight (kg)	Collet
No.30	BT30-NX5-153	1.75~10	153	27.5	85	32	55	5	20000	2.9	SK10A
No.40	BT40-NX5-153									5.0	
No.50	BT50-NX4-192	2.75~16	192	40	118	46	82	4	10000	11.0	SK16A
	-NX5-151	1.75~10	151	27.5	85			5	20000	7.0	SK10A

Taper	Code No.	D	L	C	C1	l	H	Ratio	MAX min ⁻¹	Weight (kg)	Collet
No.30	NBT30-NX5-153	1.75~10	153	27.5	85	32	55	5	20000	2.9	SK10A
No.40	NBT40-NX5-153									5.0	
No.50	NBT50-NX4-192	2.75~16	192	40	118	46	82	4	10000	11.0	SK16A
	-NX5-151	1.75~10	151	27.5	85			5	20000	7.0	SK10A

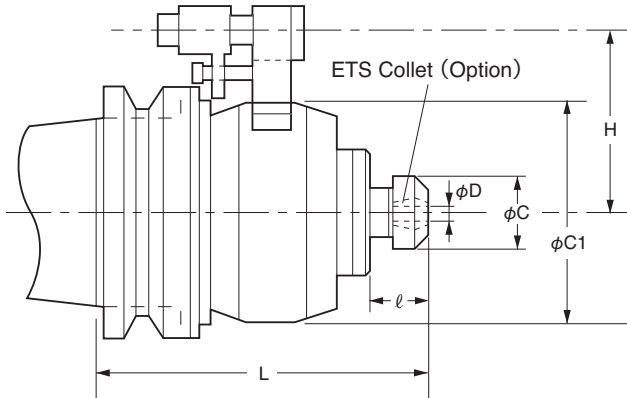
When ordering **SK** collets, please ask for **SK-A** type for End Mill Shank or **SK-P** type for high precision.

In case of Inch size collets, standard accessories are as follows.

NX5 : SK10-3/16A, SK10-1/4A, SK10-5/16A

NX4 : SK16-5/16A, SK16-3/8A, SK16-1/2A, SK16-5/8A

1-3-2 PX Type



Taper	Code No.	D	L	C	C1	l	H	Ratio	MAX min ⁻¹	Weight (kg)	Collet	
No.40	BT40-PX 6-150GX	0.5~8.0	149	22	76	14.5	60	6	30000	4.1	ETS14	
	-PX10-160GX		162.5		98			10	40000	4.5		
No.50	BT50-PX 6-140GX		142		76			82	6	30000		6.8
	-PX10-155GX		155.5		98				10	40000		7.2

Taper	Code No.	D	L	C	C1	l	H	Ratio	MAX min ⁻¹	Weight (kg)	Collet	
No.40	NBT40-PX 6-150GX	0.5~8.0	149	22	76	14.5	60	6	30000	4.1	ETS14	
	-PX10-160GX		162.5		98			10	40000	4.5		
No.50	NBT50-PX 6-140GX		142		76			82	6	30000		6.8
	-PX10-155GX		155.5		98				10	40000		7.2

ETS Collet is not included. Please order separately.

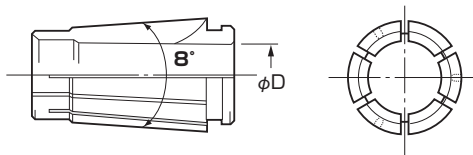
1-4 Collet & Adapter

1-4-1 Collet for NX Type

A type collets are available (Collet bore is h8 on A Type Collets)

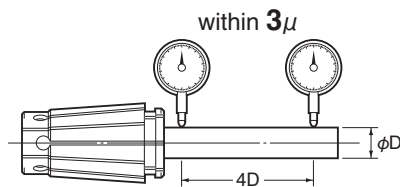
Style	Code No.	Gripping diameter ϕD
SK10 & SK10P	SK10-2	1.75~2.0
	-2.25	2.0~2.25
	-2.5	2.25~2.5
	-2.75	2.5~2.75
	-3	2.75~3.0
	-3.5	3.0~3.5
	-4	3.5~4.0
	-4.5	4.0~4.5
	-5	4.5~5.0
	-5.5	5.0~5.5
	-6	5.5~6.0
	-6.5	6.0~6.5
	-7	6.5~7.0
	-7.5	7.0~7.5
	-8	7.5~8.0
	-8.5	8.0~8.5
	-9	8.5~9.0
-9.5	9.0~9.5	
-10	9.5~10.0	

Style	Code No.	Gripping diameter ϕD
SK16 & SK16P	SK16-3	2.75~3.0
	-3.5	3.0~3.5
	-4	3.5~4.0
	-4.5	4.0~4.5
	-5	4.5~5.0
	-5.5	5.0~5.5
	-6	5.5~6.0
	-6.5	6.0~6.5
	-7	6.5~7.0
	-7.5	7.0~7.5
	-8	7.5~8.0
	-8.5	8.0~8.5
	-9	8.5~9.0
	-9.5	9.0~9.5
	-10	9.5~10.0
	-10.5	10.0~10.5
	-11	10.5~11.0
	-11.5	11.0~11.5
	-12	11.5~12.0
	-12.5	12.0~12.5
-13	12.5~13.0	
-13.5	13.0~13.5	
-14	13.5~14.0	
-14.5	14.0~14.5	
-15	14.5~15.0	
-15.5	15.0~15.5	
-16	15.5~16.0	



■ Explanation of P Class Collet

Run-out accuracy within $3\mu\text{m}$ at $4D$ guaranteed.



1-4-2 Adapter for Drill Chuck (Option)

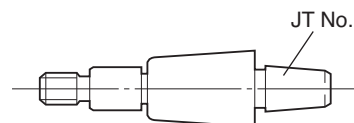
Adapter of Drill Chuck is applicable for **NX5** Type.

Code No.	JT No.
SK10-J1	JT 1

Explanation of Code No.

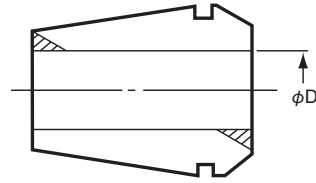
SK 10 - 6 A

- SK : Symbol of Slim Chuck Collet
- 10 : MAX. Chucking Dia.
- 6 : Style No.
- A : Non : Standard
A : A type
P : P class

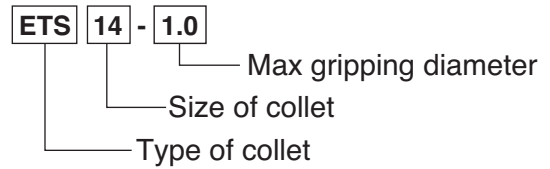


1-4-3 Collet for PX Type

Style	Code No.	Gripping diameter ϕD
PX6 & PX10	ETS14-0.5	0.4~0.5
	-0.6	0.5~0.6
	-0.7	0.6~0.7
	-0.8	0.7~0.8
	-0.9	0.8~0.9
	-1.0	0.9~1.0
	-1.25	1.0~1.25
	-1.5	1.25~1.5
	-1.75	1.5~1.75
	-2.0	1.75~2.0
	-2.25	2.0~2.25
	-2.5	2.25~2.5
	-3.0	2.5~3.0
	-3.5	3.0~3.5
	-4.0	3.5~4.0
	-4.5	4.0~4.5
	-5.0	4.5~5.0
	-5.5	5.0~5.5
	-6.0	5.5~6.0
	-6.5	6.0~6.5
-7.0	6.5~7.0	
-7.5	7.0~7.5	
-8.0	7.5~8.0	



Explanation of Code No.



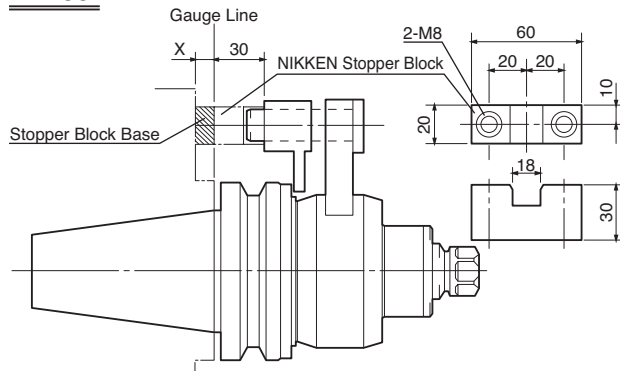
2. Operations

2-1 Setting of NIKKEN Stopper Block

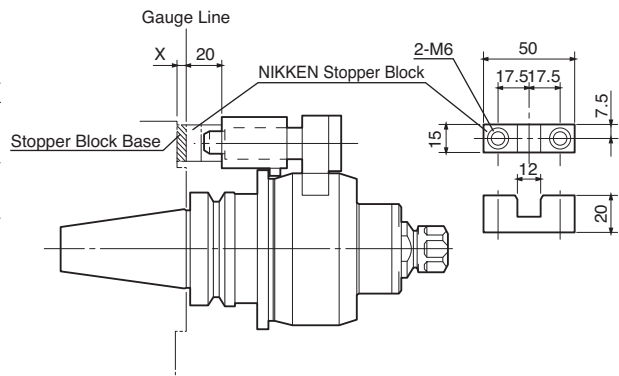
In case of setting of NIKKEN Stopper Block, please supply Stopper Block Base according to the following dimensions. (Stopper Block should be located in Machining Centre Spindle Flange without any interference with A.T.C)

In case of Proper Stopper Block for each specified machine model, Stopper Block Base is not necessary.

BT 50



BT 40



- 1). Please use **NIKKEN Original Stopper Block for Spindle Speeder ①** and make the **Stopper Block Base ②** by yourself.

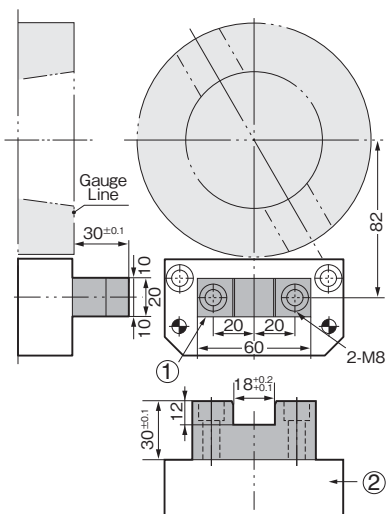
Code No. of Stopper Block

40 : NX40-STB

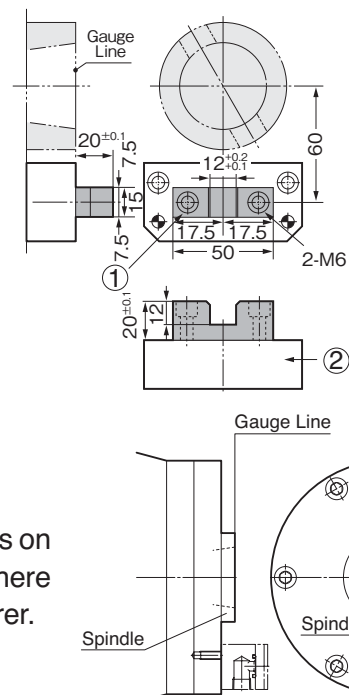
50 : NX50-STB

- 2). How to make the Stopper Block Base
 - Make the suitable shape to align with the tapped holes and the dowel pin holes on your M/C.
 - It's not necessary to be heat-treated.
- 3). The pitch between the spindle centre and the centre of stopper block has to be physically adjusted when the spindle speeder is clamped on the spindle.

BT 50



BT 40

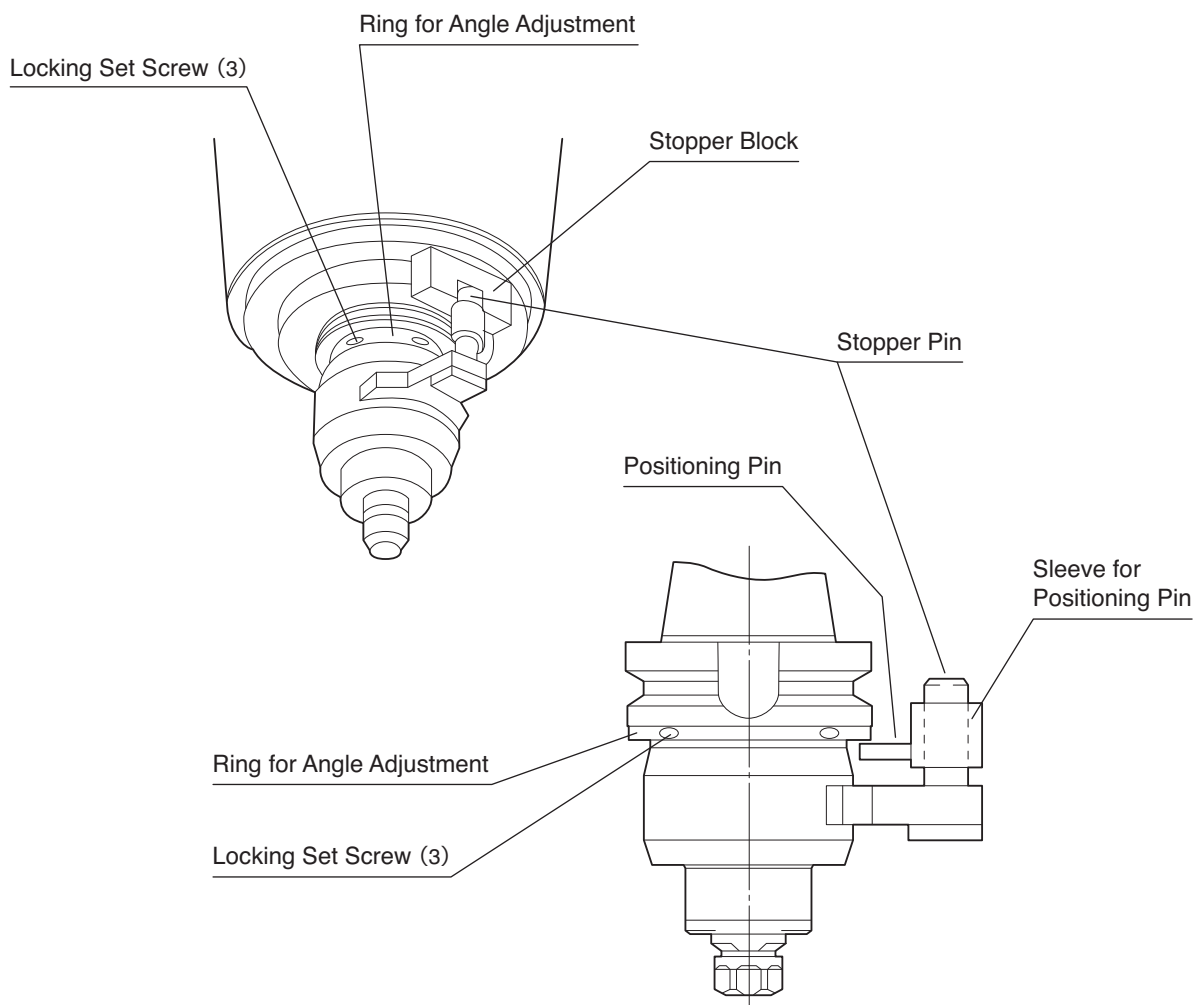


How to mount stopper block. Please use tapped holes on the front cover surface of the machine spindle. If there are no holes, please consult the machine manufacturer.

2-2 Adjustment of Stopper Pin

Before installation, stopper pin should be set at the required position. If readjustment is required, follow the set procedure described below:

- 1) Loosen 3 Locking Set Screws on the Ring for Angle Adjustment.
- 2) After orientation of Machining Centre Spindle, fit the Spindle Speeder. At the same time, Stopper Pin should be set into Stopper Block.
- 3) Check the correct position between groove of Ring for Angle Adjustment and Stopper Pin, and tighten 3 Locking Set Screws on the Ring for Angle Adjustment.
- 4) Try to auto change on machine tool where applicable, and readjust where necessary.
(Use step 1 to 3)



2-3 Setting of Collet & Adapter

1) Chucking

- ① Always ensure that there is no damage on the internal bore of the chuck, the internal & external of the collet, and the Cutting tool shank.
- ② **Wipe all dust from internal bore of chuck, inside and outside of collet, inside of nut and shank of cutter. Clean minute dust inside slot grooves of collet and inside of nut by air blow. We will recommend to use J type nut to prevent swarf and dust contermination.**
- ③ Set **SK Collet** onto **SK Nut**.
Code No. of Collet Extractor : **SKR-6, SKR-10, SKR-16, SKR-25**
Note : Only for SK13 and SK20 without using Collet Extractor.
- ④ Screw **SK Nut** into Slim Chuck spindle.



– Do not insert the SK Collet alone into Slim Chuck spindle.

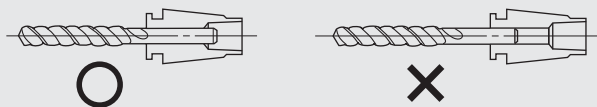
- ⑤ Insert cutting tool shank into **SK Collet**.

– Protection must be used to grip cutter teeth.
– Use a proper **SK Collet** to grip a cutter shank.
Standard SK Collet, except listed in Table 1 gripping range is 0.5mm per diameter.
– Use “**A**” type **SK Collet** to grip a cutter with End Mill shank.
Gripping range of “A” type SK Collet is h8.
– Clamp as much of the shank of cutter as possible. If the clamping length of shank is too short it might cause damage to the cutter or Collet, or damage to the chuck itself.
(The suitable inserting length from the nut surface = cutter dia. x over 4~5 times. Please insert 6mm more for the J type nut.)



– In case of heavy duty milling of the chuck larger or equal to SK16, the followings are recommended.

- Remove the oil from the Collet completely.
- Clean the internal taper of the chuck.
- Put a small amount of the pure oil on the internal taper very thinly. This allows the Collet to detach the taper connection with ease after heavy duty milling.



– Do not clamp without a cutter.



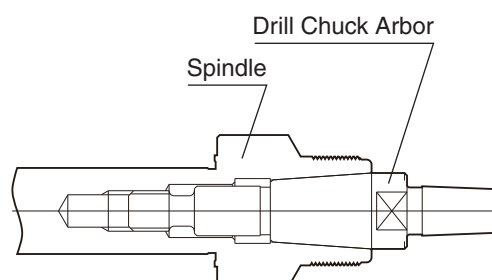
Code No.	Chucking D
SK10-2	1.75~2.0
SK10-2.25	2.0 ~2.25
SK10-2.5	2.25~2.5
SK10-2.75	2.5 ~2.75
SK10-3	2.75~3.0
SK13-3	2.75~3.0
SK16-3	2.75~3.0

Table 1 Gripping Range

- ⑥ After tightening the SK Nut by hand, tighten further using a NIKKEN spanner.
(3-1 Tightening of Nut)

2) Drill Chuck Arbor

Remove Nut and Screw the Arbor into Spindle Head. Tighten using 2 wrenches.





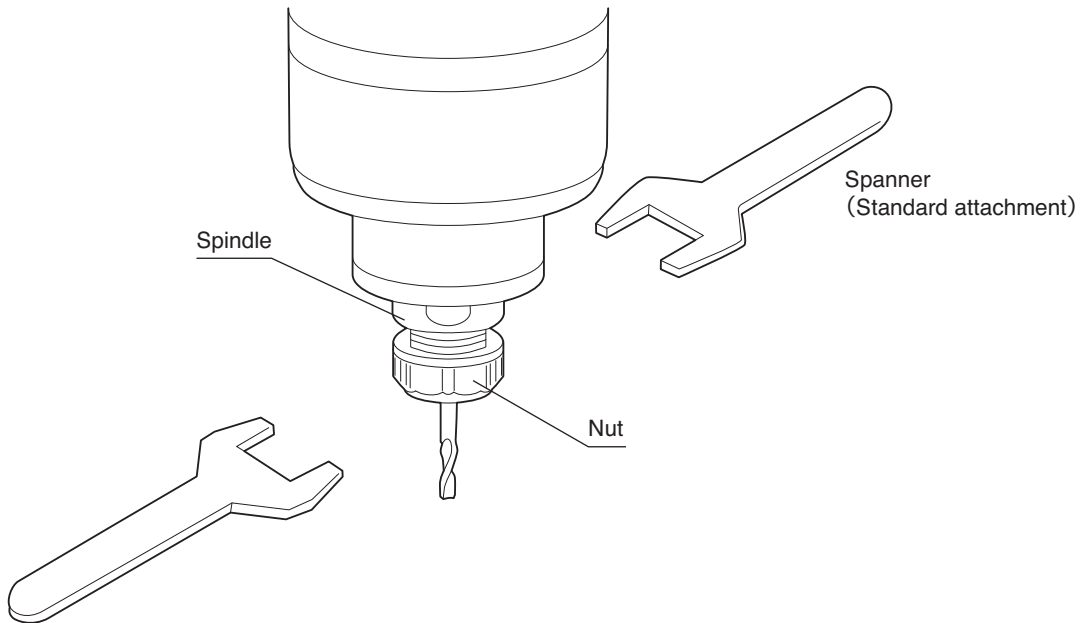
3. Important information

3-1 Tightening of Nut

Please tighten or loosen the Nut by 2 Spanners.

Do not loosen or tighten the nut without using a spindle wrench. It may cause damage to the holder.

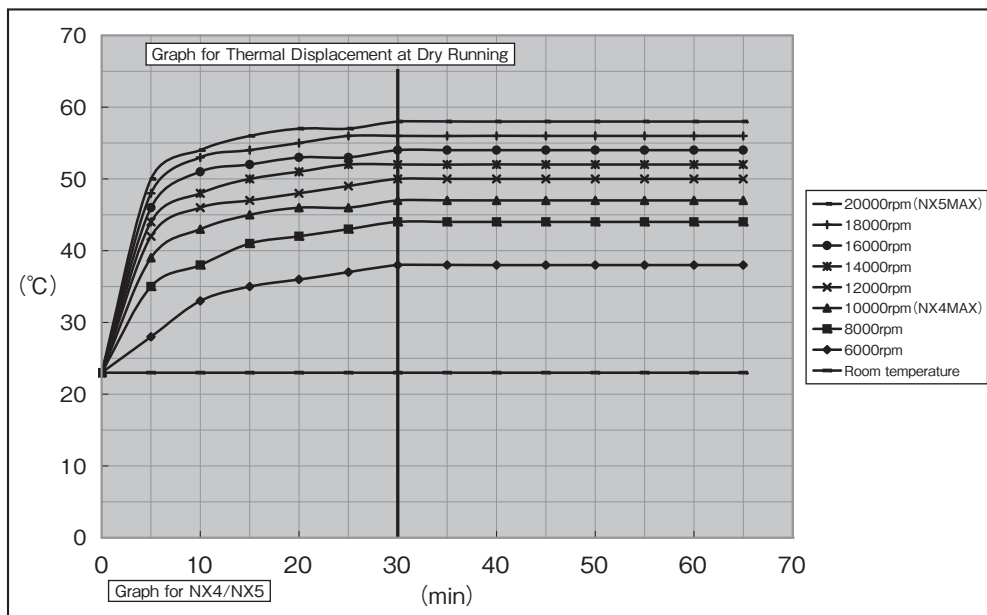
Ensure the tool is not in operation.



3-2 About Thermal Expansion

Expected heat generation should be Max 35°C + Room temperature as guaranteed.

In case of unusual noise or heat generation, please contact your local service agent with the Model No. of the Spindle Speeder, Machining Centre model and cutting details. Do not disassemble by yourself.



Heat displacement on this holder was 0.0035mm/1°C. Example: At 10000RPM, Temperature increased about 25°C, so in this example $25 \times 0.0035 = 0.0875$. The cutting point will extend out 0.0875mm in Z axis.

3-3 Maintenance

The internal mechanism has a sealed grease lubrication system. Please grease after each 300 hours of use. (First 300 hours, as normal use is maintenance-free.) Using without greasing every 300 hours may cause damage or lessen the accuracy of the holder. Lubrication nozzle is extra.

Recommended grease

Makers Name	Grease	Volume(cc)
OMEGA	OMEGA73	1~3

Please use following grease alternatively.

Makers Name	Grease	Volume(cc)
MOBIL	MOBIL FLEX 47	2~7
ESSO	RISTAN 1	
SHELL	ALBANIA GREASE 2	
IDEMITSU	DAPHNEI COLONEX GREASE NO.1	
NISSEKI	MULTI-KNOCK DELAX 1	
DAIKYOU	DYNAMIC GREASE MP-1	

3-4 Please see the following tables for standard cutting conditions.

1) Recommended cutting speed for each material (table 1)

Work Piece	Cutting Speed (m/min.)	
	HSS	Carbide
Aluminium	80~100	100~300
Cast Iron	30~50	80~150
Steel	20~25	40~100

Note) Please see the specifications issued by each tool makers for more details.

2) Suitable Spindle rotation (rpm) for tool dia & cutting speed (table 2)

Speed (m/min.)	Tool Dia							
	1 φ	2 φ	3 φ	4 φ	5 φ	6 φ	8 φ	10 φ
20	6400	3200	2100	1600	-	-	-	-
25	8000	4000	2650	2000	1600	-	-	-
30	9600	4800	3100	2500	1900	1600	1200	950
40	12700	6400	4250	3200	2500	2150	1600	1300
50	15900	8000	5300	4000	3200	2650	2000	1600
80	-	12800	8500	6300	5100	4250	3200	2500
100		15900	10500	8000	6400	5300	4000	3200
120		19100	12800	9500	7600	6400	4800	3800
150		15900	11900	9500	7950	6000	4750	
200		-	-	15900	12700	10600	7950	6300
300			-	-	19100	15900	11900	9550

《How to use table 1 & 2》

(EX) Work Materials : Aluminium

Cutting Tool : Carbide End Mill of 5 mm dia

- 1) Cutting speed could be 120 m/min according to table 1.
- 2) Cutting speed of 120 m/min and Tool dia of 5mm gives 7600 rpm as suitable spindle rotation-according to Table 2.

Machine spindle rpm should therefore be either 1900 rpm ($7600 \div 4 = 1900$) with model NX4 or 1520 rpm ($7600 \div 5 = 1520$) with model NX5.

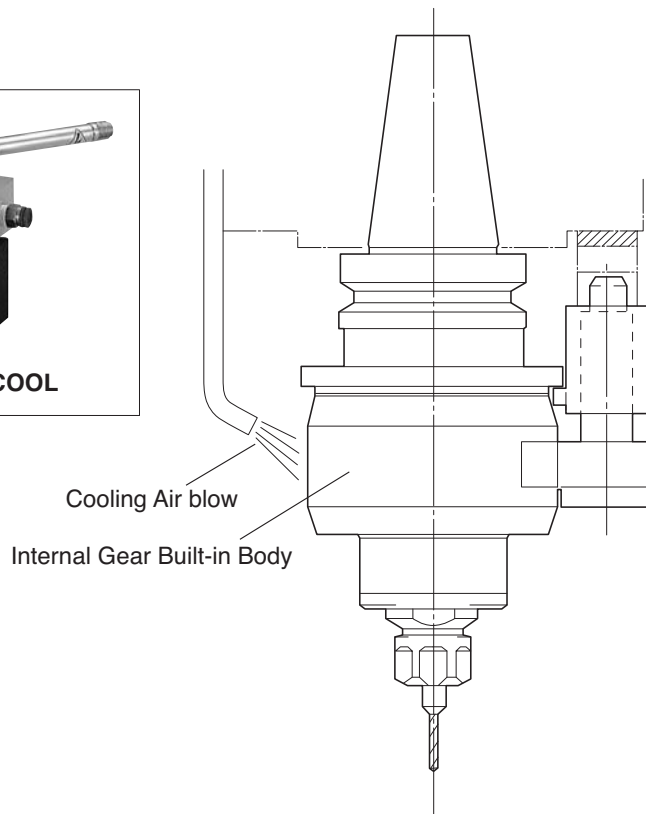
3-5 Continuous running

For continuous running use over 1 hour at 15000 rpm on **NX5** or 6000 rpm on **NX4**.

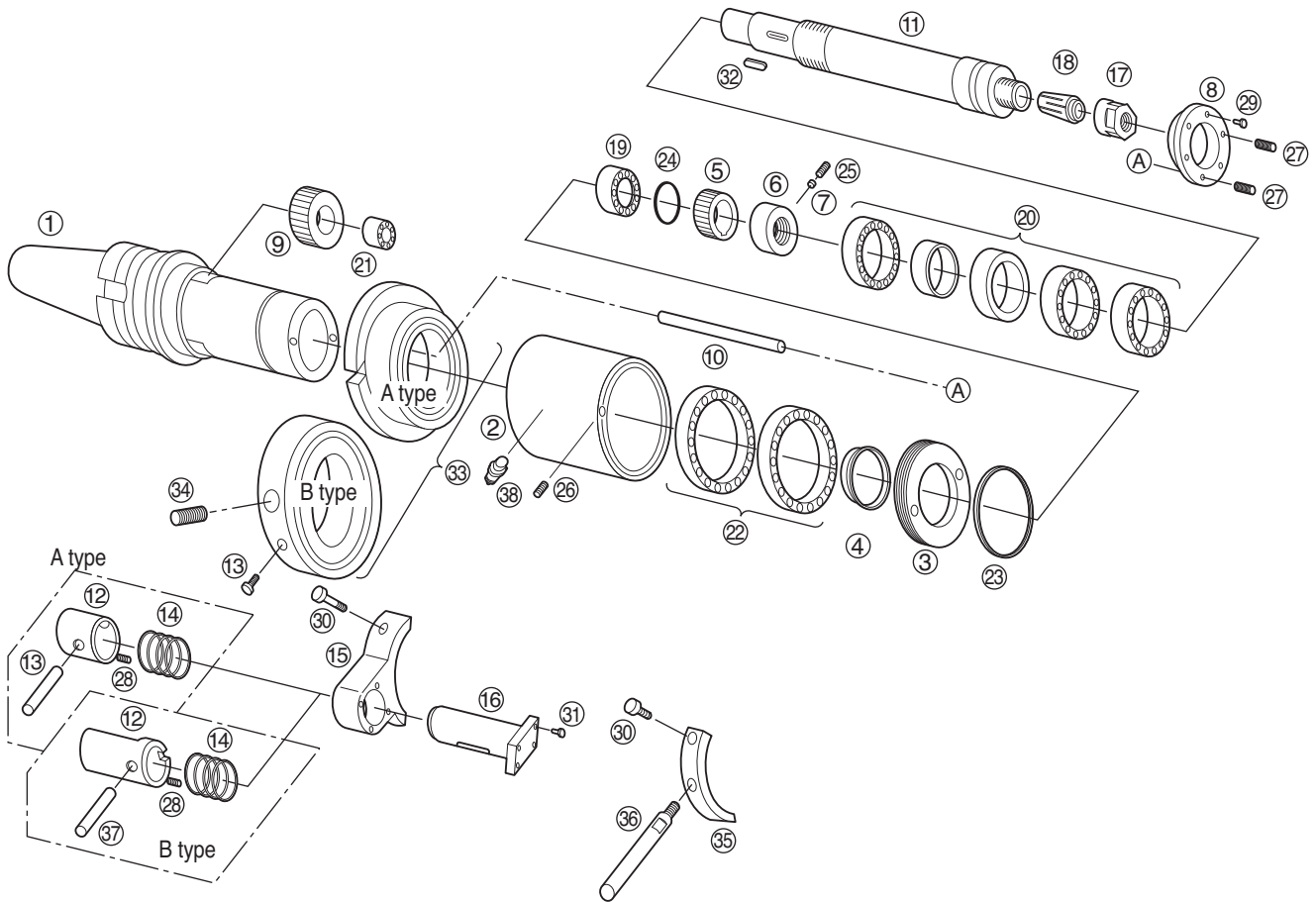
Please give cooling (not coolant) air blow on the body of the gear to reduce heat generation.

Also please see the following table for allowed continuous running time.

Model	r.p.m.(min ⁻¹)	Hour(h)	Note
NX5	~12000	12	-
	12000~15000	5	
	15000~18000	1.0	Cooling Air blow require
	18000~20000	0.5	
NX4	~5000	12	-
	5000~6000	5	
	6000~8000	1.0	Cooling Air blow require
	8000~10000	0.5	



4. Parts List



No	Item	No	Item
①	Main Body	⑳	Angular Contact Bearing
②	Gear Built-in Collar	㉑	Needle Bearing
③	Bearing Holder	㉒	Ball Bearing
④	Collar	㉓	Circlip
⑤	Main Gear	㉔	Snap Ring
⑥	Round Nut	㉕	Set Screw
⑦	Setting Piece	㉖	Set Screw
⑧	Flanger	㉗	Set Screw
⑨	Planetary Gear	㉘	Set Screw
⑩	Gear Pin	㉙	Hexagon Screw
⑪	Spindle	㉚	Hexagon Screw
⑫	Stopper Collar	㉛	Hexagon Screw
⑬	Positioning Pin	㉜	Guide Key
⑭	Spring	㉝	Angle Adjust Collar
⑮	Positioning Arm	㉞	Angle Adjust Bolt
⑯	Stopper Pin	㉟	Positioning Arm for Conventional type
⑰	Chucking Nut	㊱	Stopper for Conventional type
⑱	SK Collet	㊲	Parallel Pin
		㊳	Grease Nipple

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e-mail : export@nikken-kosakusho.co.jp

■Please give your order to the following agent.

D.GF.0.5

●Specifications are subject to change without notice.